A COMPARISON OF BEHAVIOR ASSESSMENT SYSTEM FOR CHILDREN – SECOND EDITION PARENT RATING SCALE SCORES FOR CHILDREN AND ADOLESCENTS WITH ADHD, TRAUMATIC BRAIN INJURY, AND HIGH FUNCTIONING AUTISM

A DISSERTATION

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To the Dean of the Graduate School:

I am submitting herewith a dissertation written by Laura R. Sanders entitled "A Comparison of *Behavior Assessment System for Children – Second Edition* Parent Rating Scale Scores for Children and Adolescents with ADHD, Traumatic Brain Injury, and High Functioning Autism." I have examined this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy with a major in School Psychology.

Kathy DeOrnellas, Ph.D., Major Professor

We have read this dissertation and recommend its acceptance:

Department Chair

Accepted:

Dean of the Graduate School

DEDICATION

This dissertation is dedicated to my maternal grandmother, Joanna Forsty. She was one of the most important influences in my life for so many years. I know that she would be incredibly proud of me for accomplishing this goal. She is greatly missed.

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ABSTRACT

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A COMPARISON OF BEHAVIOR ASSESSMENT SYSTEM FOR CHILDREN – SECOND EDITION PARENT RATING SCALE SCORES FOR CHILDREN AND ADOLESCENTS WITH ADHD, TRAUMATIC BRAIN INJURY, AND HIGH FUNCTIONING AUTISM

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This research study was conducted with 192 children (8-21 years old) diagnosed with Attention Deficit Hyperactivity Disorder (ADHD), High Functioning Autism (HFA), Traumatic Brain Injury (TBI), and a control group. Specifically, scale scores on the Behavior Assessment System for Children, Second Edition (BASC-2) Parent Rating Scale (PRS) were analyzed. The data used on the BASC-2 PRS include the following scales: Hyperactivity, Aggression, Conduct Problems, Anxiety, Depression, Somatization, Adaptability, Social Skills, Leadership, Functional Communication, Activities of Daily Living, and Attention Problems. Results indicated an overall multivariate effect of diagnosis on most of the BASC-2 scale scores. High Hyperactivity scores were associated with significantly problematic behavior on all other problem behavior, adaptive behavior, and attention problem scales. Children with HFA presented with the highest incidence of depressive symptoms. All adaptive scales were negatively correlated with Attention Problems. The analyses demonstrated a two-cluster as well as a

three-cluster solution, although they did not demonstrate clustering by diagnostic group (ADHD, HFA, TBI, and control). Individuals from all diagnostic groups were represented in each cluster which reflected a different subtype or behavioral profile. The two-cluster solution featured the Normal Subtype and Overall At-Risk Subtype, while the three-cluster solution included the Normal Subtype, Adaptive Behavior/Attention Problems At-Rick Subtype, and the Clinically Significant Subtype. These subtypes provide an alternative way of viewing the behavioral strengths and weaknesses of a child which can aid in the development of intervention to suit individual behavioral needs.

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CHAPTER I

INTRODUCTION

School psychologists work with students who have a number of disabilities. While there are distinctive criteria for diagnosing disabilities in the federal guidelines and the *Diagnostic and Statistical Manual-Fourth Edition, Text Revision (DSM-IV-TR;* American Psychiatric Association [APA], 2000), differential diagnosis is often difficult because of overlap in the symptomatology between disorders. In addition, high rates of co-morbid disorders in childhood can complicate diagnosis and treatment. Correctly diagnosing and attributing symptoms to the correct disability leads to creating and implementing the best scientifically supported intervention for each student.

Even in the *DSM-IV-TR* (2000), diagnostic criteria often include a statement about symptoms not being better accounted for by another disorder. Sometimes children demonstrate peculiarities in communication, socialization, and emotional regulation, yet do not meet the full criteria for a particular disorder. Children with unusual patterns of behavior and development are sometimes misdiagnosed.

There can be particular difficulties in differentiating between disorders such as Attention Deficit Hyperactivity Disorder (ADHD), High Functioning Autism (HFA), and Traumatic Brain Injury (TBI). According to Jensen, Larrieu, and Mack (1997) there is a "paucity of research to guide the practicing clinician in differentiating primary ADHD from PDDs [Pervasive Developmental Disorders]" (p. 556). Misdiagnosing the disorder

would do a disservice to these children in planning for appropriate treatment. Accurate diagnosis is particularly important when psychotropic medication is being considered.

Many of the childhood-onset neuropsychiatric disorders – which include ADHD, Autism Spectrum Disorders (ASD), tic disorders, and learning disabilities – are defined by operational criteria targeting behaviors and deficits in abilities such as attention, communication, empathy, flexibility, and IQ (Anckarsater et al., 2006). For example, in a sample of young children, 74% of children with ADHD had at least one additional comorbid disorder (Egger & Angold, 2004). In this sample, generalized anxiety disorder was comorbid in 35% and depression in 5.2% (Egger & Angold). Since there can be significant overlap in the symptoms of these disorders, it is essential to utilize tools such as the Behavior Assessment System for Children, Second Edition (BASC-2) to tease apart the symptoms and make an accurate diagnosis.

The BASC was first conceptualized in 1985 by Reynolds and Kamphaus, who noted the need for a tool to assess emotional and behavioral difficulties in children (Reynolds & Kamphaus, 2004). The first edition of the BASC was published in 1992, and it quickly became a staple instrument of psychological assessment in the schools (Shapiro & Heick, 2004). The second edition, the BASC-2, was published in 2004 and included new questions and scale content, updated normative samples, improved psychometric properties, as well as new software and report formats (Reynolds & Kamphaus). In schools, the BASC-2 is frequently used to aid in diagnostic decision-making for special education eligibility (Sattler & Hoge, 2006).

Diagnosis of ADHD, TBI, and HFA in terms of eligibility for special education services in schools requires a collaborative effort between multiple disciplines as well as between school and medical personnel and parents. To be eligible for special education services at school, the disorder must be present at levels that interfere with a child's learning. Best practice is to obtain evaluation information from multiple sources, including the home and school. With the gathering of information from various sources, other medical, psychological, and behavioral problems can be ruled out or better explained (Sattler & Hoge, 2006).

Parent input in the special education process is imperative. Thus, the BASC-2 Parent Rating Scale (PRS) is often given to parents to gain more information on children who have been referred for special education evaluation. Professionals are often attempting to decide between several possible diagnoses for a child and the BASC-2 is helpful in differential diagnosis. Many disorders overlap in symptomatology and appear to be similar in presentation. Attention-Deficit/Hyperactivity Disorder (ADHD), Traumatic Brain Injury (TBI), and High Functioning Autism Spectrum Disorders (HFA) have a host of similar symptoms, including: attentional, emotional, behavioral, and cognitive difficulties. It can be challenging to tease apart symptoms directly related to a disorder and those that are secondary symptoms. Adding to the confusion is the high occurrence of comorbidities in these three disorders (McConaughy & Ritter, 2002; Sattler & Hoge, 2006).

Gioia, Isquith, Kenworthy, and Barton (2002), examined executive functioning in children with ADHD, TBI, Autism, and Reading Disorder as compared to a control group

using the Behavior Rating Inventory of Executive Function (BRIEF). Executive skills are high-level cognitive functions such as planning, organization, time management, working memory, inhibition, and metacognition (Dawson & Guare, 2004). Executive skills help humans regulate behavior to achieve goals. Executive skills are essential components to behavior, or the way people act. Gioia et al. found patterns, or profiles, of executive deficit unique to each disorder. Since children with ADHD, Autism, and TBI have unique executive functioning profiles, it stands to reason that children with these disorders would have unique behavioral profiles as well.

The purpose of the current study was to compare parents' ratings of children diagnosed with ADHD, HFA, TBI, and a control group on the BASC-2 Parent Rating Scale. The BASC-2 PRS yields composite scores for Externalizing behaviors (Hyperactivity, Aggression, Conduct Problems), Internalizing behaviors (Anxiety, Depression, Somatization), and Adaptive behaviors (Adaptability, Activities of Daily Living, Functional Communication, Social Skills, and Leadership), as well as a score for Attention Problems. Relevant literature was reviewed and integrated to develop hypotheses related to the behavioral profiles of ADHD, TBI, and HFA. It was hypothesized that each disorder would have a pattern of relative weaknesses as displayed by the aforementioned scales and that the pattern of weaknesses would be unique to each disorder.

This dissertation adds to the overall knowledge base in school psychology. Federal regulations require that assessment of students for special education be psychometrically sound and that interventions must be evidence based (Sattler & Hoge,

2006). Developing unique behavioral profiles aids school psychologists in differentially diagnosing disorders. In addition, utilizing behavioral profiles gives school psychologists additional information to assist with the development and implementation of evidence-based disorder-specific interventions.

The specific research questions are:

1. What are the profiles of children with TBI, HFA, ADHD, and the control group based on age, gender, and twelve BASC-2 scales?
2. Is there a relationship between disorder (TBI, HFA, ADHD, control group) and the BASC-2 scales?

Definition of Terms

To insure clarity, the following definitions are provided for the purposes of this study:

Activities of Daily Living- "The skills associated with performing basic, everyday tasks in an acceptable and safe manner" (Reynolds & Kamphaus, 2004, p. 60).

Adaptability- "The ability to adapt readily to changes in the environment" (Reynolds & Kamphaus, 2004, p. 60).

Adaptive Behavior- Everyday coping with environmental demands, including an array of important skills (i.e., communication, self-care, social, community use, self-direction, health and safety, functioning academics, home living, leisure, and work) (American Association on Mental Retardation, 1992).

Aggression- "The tendency to act in a hostile manner (either verbal or physical) that is threatening to others" (Reynolds & Kamphaus, 2004, p. 60).

Anxiety- "The tendency to be nervous, fearful, or worried about real or imagined problems" (Reynolds & Kamphaus, 2004, p. 60).

Asperger's Disorder (AS)- A Pervasive Developmental Disorder characterized by "qualitative impairment in social interaction" and "restricted repetitive and stereotyped patterns of behavior, interest, and activities" (DSM-IV-TR, 2000, p. 84). The APA refers to this condition as Asperger disorder; however, the World Health Organization calls the condition Asperger Syndrome in the International Classification of Diseases (ICD-10).

Attention-Deficit/Hyperactivity Disorder- A disorder usually first diagnosed in childhood characterized by the symptoms of inattention, hyperactivity-impulsivity, or both, with "impairment from the symptoms present in two or more settings," as well as "evidence of clinically significant impairment in social, academic, or occupational functioning" (DSM-IV-TR, 2000, p. 66).

Attention Problems- "The tendency to be easily distracted and unable to concentrate more than momentarily" (Reynolds & Kamphaus, 2004, p. 60).

Autism or Autistic Disorder- A Pervasive Developmental Disorder characterized by "qualitative impairment in social interaction," "qualitative impairments in communication," "restricted repetitive and stereotyped patterns of behavior, interests, and activities," and "delays in abnormal functioning in at least one of the following areas, with onset prior to age 3 years: (1) social interaction, (2) language as used in social communication, or (3) symbolic or imaginative play" (DSM-IV-TR, 2000, p. 75).

Autism Spectrum Disorders- Asperger's Disorder, High Functioning Autism, and Pervasive Developmental Disorder - Not Otherwise Specified. For the sake of clarity throughout this paper, the terms Autism, High Functioning Autism, Asperger's Disorder, and Pervasive Developmental Disorder will be referred to as Autism Spectrum Disorders or ASD.

Comorbidity- "Broadly refers to combinations of any types of psychiatric disorders that co-occur in the same individual" (Bennett & Gjonbalaj-Morovic, 2007, p. 34).

Depression- "Feelings of unhappiness, sadness, and stress that may result in an inability to carry out everyday activities or may bring on thoughts of suicide" (Reynolds & Kamphaus, 2004, p. 60).

Externalized Behaviors- Behaviors that are "under-controlled" (Reynolds & Kamphaus, 2004, p. 66), such as aggression, conduct problems, and hyperactivity.

Functional Communication- "The ability to express ideas and communicate in a way others can easily understand" (Reynolds & Kamphaus, 2004, p. 60).

High Functioning Autism (HFA)- "High Functioning Autism Spectrum Disorder (HFA) refers collectively to those children who have Autistic Disorder, without intellectual delay, together with those children who have Asperger's Disorder" (Chalfant, Rapee, & Carroll, 2007). For the purpose of the current study, the participants with Asperger's disorder and Autistic disorder will be collectively referred to as having HFA.

Hyperactivity- "The tendency to be overly active, rush through work or activities, and act without thinking" (Reynolds & Kamphaus, 2004, p. 60).

Internalizing Problems- Behaviors that are "over-controlled" (Reynolds & Kamphaus, 2004, p. 67), such as anxiety, depression, and somatization.

Leadership- "The skills associated with accomplishing academic, social, or community goals, including the ability to work with others" (Reynolds & Kamphaus, 2004, p. 60).

Least Restrictive Environment (LRE)- The concept, introduced in the Education For All Handicapped Children Act of 1975 (Public Law 94-142), that special education services should be delivered to children in an environment that includes non-disabled children to the greatest extent possible (Fagan & Wise, 2000).

Pervasive Developmental Disorder – Not Otherwise Specified (PDD-NOS)- A disorder in which there is a severe and pervasive reciprocal social interaction impairment along with either verbal or nonverbal communication skill impairment or the presence of "stereotyped behavior, interests, and activities" (DSM-IV-TR, 2000, p. 84).

Postconcussive Syndrome (PCS)- A set of symptoms that may develop after a blow to the head, including headaches and dizziness. PCS can occur within the first 7-10 days post-injury and may last for weeks or months (Rao & Lyketsos, 2000).

Social Skills- "The skills necessary for interacting successfully with peers and adults in home, school, and community settings" (Reynolds & Kamphaus, 2004, p. 60).

Somatization- "The tendency to be overly sensitive to and complain about relatively minor physical problems and discomforts" (Reynolds & Kamphaus, 2004, p. 60).

Traumatic Brain Injury- "An acquired injury to the brain caused by an external force" which affect a variety of abilities including cognition, language, memory, attention, reasoning, thinking, problem-solving, motor abilities (US Federal Register, 57 [189], September 29, 2002, p. 4, 802).

CHAPTER II

LITERATURE REVIEW

Reviewing the literature applicable to this study required examination of literature specific to Traumatic Brain Injury (TBI), Attention-Deficit/Hyperactivity Disorder (ADHD), High Functioning Autism (HFA), and the Behavior Assessment System for Children, Second Edition (BASC-2). In addition, the ways externalizing (hyperactivity, aggression, and conduct problems), internalizing (anxiety, depression, and somatization), adaptive behavior (adaptability, social skills, leadership, daily living skills, and communication), and attention problems are manifested in each condition were reviewed.

Traumatic Brain Injury

Each year more than 1.4 million adult and pediatric TBIs occur in the United States. There are an estimated 2,685 deaths, 37,000 hospitalizations, and 435,000 emergency department visits attributed to TBI annually (Langlois, Rutland-Bow, & Thomas, 2004). The precise number of school-aged children with TBIs is unknown due to the various methods of diagnosing, listing, and reporting brain injuries; however, it is known that males have a higher rate of TBI than females. Exact numbers are also hindered because of inaccessibility to children's medical records and because TBIs often go undiagnosed (Cave, 2004). Unintentional injury, including TBI, is the leading cause of death for individuals between the ages of 1 and 44 years; with the greatest cause of TBI is motor vehicle accidents (31%; Langlois et al., 2004). The majority of pediatric TBIs are

mild and results in a brief emergency room visit; however, 10-15% involve severe brain injury (Kirkwood et al., 2000).

There are two types of TBIs: open head and closed head injuries. Open head injuries, also known as penetrating head injuries, involve the skull being penetrated by an object and generally do not result in a loss of consciousness (Jantz & Coulter, 2007). Closed head injuries occur either via a direct contact force, also known as an impact injury, or inertial force, also known as a coup-contracoup injury. Direct contact injuries occur when an object in motion hits a relatively motionless head. Inertial force injuries occur when a head in motion strikes a surface or object. In either type of injury, damage to the brain can occur at two sites: the site of impact (known as coup) and the area opposite the site of impact (known as contracoup). Damage from internal bleeding, bruising, and/or swelling, as well as more generalized damage from twisting and/or rotation of the brain (also known as axonal shearing) may also occur (Jantz & Coulter).

There are numerous ways in which the brain can be injured; however, federal legislation has defined the scope of brain injury to "that which occurs in a traumatic manner" (Jantz & Coulter, 2007, p. 85). Public Law 101-476, the Education of the Handicapped Act Amendments of 1990, added Traumatic Brain Injury as an official category for special education services in schools. In 1992, the official definition and guideline was published in the Federal Registry:

> Traumatic Brain Injury means an acquired injury to the brain caused by an external force, resulting in total or partial functional disability or psychosocial impairment, or both, that adversely affects a child's educational performance. The

> term applies to open or closed head injuries resulting in impairments in one or more areas, such as cognition; language; memory; attention; reasoning; abstract thinking; judgment; problems-solving; sensory, perceptual, and motor abilities; psycho-social behaviors; physical functions; information processing; and speech. The term does not apply to brain injuries that are congenital or degenerative, or to brain injuries induced by birth trauma. (§US Federal Register, 57 [189], September 29, 2002, p. 4, 802)

Research on Children with Traumatic Brain Injury

There has been a great deal of research on adult TBI victims, but fewer studies exist on children. One reason for the dearth of research on pediatric TBIs may be the Kennard Principle, or the idea that "brain damage in children is less impairing than the equivalent damage in adults" (Andrews, Rose, & Johnson, 1998, p. 133). Although the Kennard Principle has been disproven, it remains a popular notion. It is often believed that children are more resilient and their brains are more plastic, resulting in quicker and better recovery after a TBI. This is not necessarily the case. While young children's skulls are better able to absorb the impact of a head trauma, there tends to be more diffuse damage to the brain than would be seen in a mature brain. Oftentimes cognitive damage in young children is present, but not evident due to the limited cognitive skills established at a young age. As children mature, the delays become more evident as the deficits are 'grown into' (p. 19) and developmental milestones are not met as expected (Mayfield & Homack, 2005). In contrast to the Kennard Principle, a comparison of neuropsychological tests with parent rating scales of attention and behavioral regulation

by Dennis, Guger, Roncadin, Barnes, and Schachar (2001) found that the younger the child was when the TBI occurred and the shorter the time since injury, the worse the outcome for attention and inhibition.

It is generally assumed that children will show a similar pattern of deficits as adults after a TBI. Studies conducted on adults with TBI have shown that social functioning in the areas of social interaction and self-esteem is impaired, leading to behavioral changes. Due to the relationship between loneliness and lowered self-esteem and other psychosocial issues such as depression, it is crucial that more is understood about the effects of TBI on children behaviorally and emotionally (Andrews, Rose, & Johnson, 1998).

Effects of Traumatic Brain Injuries

Trauma to the brain may produce a wide variety of outcomes and is associated with physical, cognitive, behavior, and psychosocial changes post-injury. The effects of TBI manifest differently depending on the location, type, and severity of the injury. Other factors such as age at onset, prior medical history, and socioeconomic status or life circumstances may also influence the outcome of the TBI in terms of symptoms (Mayfield & Homack, 2005). Temperament, personality, motivational state, processing abilities, motor output, focused attention, selective attention, concentration, and memory are some of the areas commonly affected post-injury. Mood swings, attention difficulties, and social disinhibition can persist for many years post-injury (Hawley, 2005). Functional deficits in behavioral, attentional, and psychosocial domains, such as loss of peer relationships, worsened school performance, and decreased ability to function

independently on tasks of daily living are seen in TBI patients (Hawley, 2004; Kirkwood et al., 2000). Behavioral disregulation post-TBI is predicted by injury severity and frontal lobe injury moderated by injury severity. Also, the younger a child is at the time of TBI, the greater the social discourse problems (Ewing-Cobbs et al., 1998).

Behavioral deficits can lead to cognitive and emotional deficits. Much of the time, TBI symptoms in one area overlap and intertwine to create functional deficits in other areas. For example, newly acquired cognitive deficits can create behavioral or emotional problems. A child who once performed well academically may have difficulty with simple tasks s/he was once capable of, resulting in frustration and emotional outbursts. These displays of behavior may then socially alienate the child who once had many friends. More simply, deficits in functional abilities are thought to bring about secondary emotional disturbance (Kirkwood et al., 2000). Conversely, problems of memory and attention disrupt learning and school achievement as well as psychosocial functioning (Hawley, 2005).

While TBIs may result in physical and cognitive changes, psychosocial functioning disruptions are often the most pervasive changes after TBI (Mayfield & Homack, 2005; Sattler & Hoge, 2006). Psychosocial functioning refers to the emotional, behavioral, and social facets of existence. Difficulties in the psychosocial domain may result in poor social adjustment, which, according to many studies, is more difficult to deal with than cognitive and physical disabilities for the families of individuals with TBI (Mayfield & Homack). Even when individuals with TBI begin to deal with his or her physical or cognitive limitations, emotional and behavioral sequelae can remain, and may

intensify as frustration and the awareness of physical and cognitive limitations set in (Marsh & Kersel, 2006). Reactions to the significant life changes that accompany a TBI are wide-ranging in children. Some children will act out, while some will withdraw. Depression, anxiety, and anger are common reactions associated with acting-out behaviors (Mayfield & Homack).

Andrews et al.'s (1998) research was one of the first major studies looking at the psychosocial impact of TBI versus the cognitive and behavioral deficits incurred from a TBI. They found that when children with TBIs were compared to controls, the children with TBIs had significantly lower levels of self-esteem and adaptive behavior, as well as significantly higher levels of loneliness, maladaptive behaviors, and aggressive/antisocial behavior. This study found that social and behavioral impairments are the result of even mild TBIs, but are not worsened significantly when the severity of the TBI is increased.

Across the wide array of deficits associated with TBI, it is important that parents and school personnel realize that recovery post-injury will not follow a set course. Recovery can include short-term improvements, little or no change in status, obvious difficulty keeping up with peers, or late emerging deficits (Deidrick & Farmer, 2005). Cognitive performance is often uneven, with basic intellectual and cognitive skills intact in some areas and weakness in other areas. Often cognitive deficits lead to interference in new learning and a long-term decline in achievement scores. Other common TBI sequelae such as fatigue, poor attention, and concentration difficulties limit a child's tolerance for a long school day. Returning to school on a part time basis is sometimes warranted to ease the transition (Deidrick & Farmer). The cognitive disturbances caused

by TBI may result in difficulty completing school work, organizing thoughts and planning, retaining learned information, taking initiative, and connecting old with new information (Sattler & Hoge, 2006). Also, executive functioning deficits make regulating emotional responses challenging. Children with TBI often have difficulty understanding the social pragmatics of situations, resulting in difficulties generating good potential solutions to common conflict situations (Deidrick & Farmer).

It is important to note that while cognitive impairments, emotional disturbance, interpersonal difficulties, and behavioral problems can arise after a TBI, not all individuals with TBI demonstrate evidence of a psychosocial disturbance (Shotton, Simpson, & Smith, 2007). However, when deficits are not immediately present, families may not consider the long-term effects of an injury and stop attributing changes in functioning to the injury (Cave, 2004). It is important for those involved with children who suffer TBI to recognize the likelihood that deficits will emerge as the child matures, as they may grow into the injury.

Externalizing Behavior

Several studies have examined the role of TBI related to changes in externalizing behaviors. Externalized behaviors are those such as aggression, conduct problems, and hyperactivity, which are not controlled appropriately (Reynolds and Kamphaus, 2004). A study by Poggi et al. (2003) found that neuropsychological problems differed across age groups after TBI. The authors found that after a TBI, older children (ages 7-18) exhibited more externalizing behaviors. In addition, males tended to have more behavioral,

psychological, and adjustment problems after a TBI. They also found that after TBI, behavior and personality changes are common, problematic, and long-lasting.

One of the most impaired domains after a closed-head trauma is inhibitory control, or the ability to regulate impulsive behavior (Dennis et al., 2001). Konrad, Gauggel, Manz, and Scholl (2000) found that individuals with TBI and ADHD have deficits in the area of inhibition for different reasons. Thus, after a brain injury, a child's symptoms may mimic ADHD; however, the disorders have different neuropsychological underpinnings. Even when provided with rewards, the children with TBI could not perform tasks that required sustained attention as well as would be expected or as well as children with ADHD. Reward contingencies brought the performance of children with ADHD to the level of normal controls. According to the authors, this supports a "motivational/energetic explanation of the inhibitory deficit in children with ADHD, and of a primary response inhibition deficit due to structural brain damage in children with TBI" (Konrad et al., p. 286). It may be that poor response inhibition in children with TBI is part of a more general impairment in executive functioning due to structural brain damage.

Hyperactivity, aggression, and conduct problems in individuals with TBI. Hyperactivity, aggression, and irritability are common behavioral results of TBI (Fletcher et al., 1990; Max et al., 1998), particularly when the prefrontal cortex (including the orbitofrontal and ventromedial regions) is compromised (Hale & Fiorello, 2004). Such behavioral sequelae are often seen in the acute phase after TBI and resolves as cognitive functioning recovers (Wilson & Dailey, 1999). Aggression has been found to occur in

11% (Brooke et al., 1992) to 33.7% (Tateno et al., 2003) of individuals after TBI. Another study (Baguley et al., 2006) found aggression at a constant rate in 25% of TBI victims post-injury over a five-year period. The authors found that aggression most often occurred comorbidly with depression. While the level of aggression changed individually, the percentage of patients reporting a significant level of aggression did not change over the 5-year time period.

Individuals who have sustained TBI tend to exhibit anger and verbal aggression more often than physical aggression (Dyer et al., 2006) and often the aggression is of an impulsive nature (Barratt et al., 1997). Greve et al. (2001) found that in cases of severe TBI, individuals who displayed aggressive behavior before injury had a higher rate of aggressive impulsive aggression post-injury, particularly in the acute phase post-injury. The aggressive individuals also tended to be younger, more irritable, impulsive, and antisocial. Thus, TBI may release inhibited aggression in individuals prone to aggression.

Hyperactivity, aggression, and other conduct problems may limit social and vocational re-integration into society (Miller, 1991). TBI survivors may also experience problems obtaining needed therapeutic intervention due to aggressive behaviors and the risk of harm to self or others (Miller). Those caring for individuals with TBI report that behavior, such as aggression and conduct problems, are the most difficult changes to which they must adjust (Hall et al., 1994). It is possible that after a TBI, a child's personality may change, such that a docile child may become aggressive.

Internalizing Behavior

Internalizing behaviors are those such as anxiety, depression, and somatization, which are "over-controlled" (Reynolds & Kamphaus, 2004, p. 67). Internalizing symptoms may include apathy, paranoia, depression, and anxiety, as well as a lack of emotional response (Jantz & Coulter, 2007; Kirkwood et al., 2000). Internalizing disorders have been found in varying degrees in children with TBI across the literature, from not increasing the risk for psychiatric disturbances (Brown et al., 1981) to some emotional changes post-injury (Black et al., 1981), to an increased prevalence for mood and anxiety disorders (Max et al., 1997).

Social isolation after TBI can be problematic, leading to the development of depression or anxiety (Prigatano & Gupta, 2006). When children have moderate to severe TBI requiring hospitalization or rehabilitation, they are away from their school and social lives for an extended period. The authors hypothesized that children with more severe TBI would have fewer close friendships in the post acute phase than children with less severe injuries. The study revealed that children with moderate to severe injuries tend to have problematic social lives, particularly after the academic problems inherent to TBI begin to emerge (Prigatano & Gupta).

Anxiety, depression, and somatization in children with TBI. A relationship has been found between TBI and new onset mood and/or anxiety disorders (Hawley, 2003). Even when the injury is mild, TBI still increases the risk for evidencing subsequent internalizing psychiatric symptomatology (Luis & Mittenberg, 2002). Depression is the most often reported mood disorder post-TBI with co-occurrence between 10-77% (Bay &

Donders, 2008; Moldover, Goldberg, & Prout, 2004). While the relationship between TBI and depression is increasingly viewed as "a complex and time-dependent interaction between physiological and psychological variables" (Malec et al., 2007), there are many risk factors that may predict the presence of depressive symptoms after TBI including: alcohol abuse, low levels of education, minority status, previous psychiatric disorder, impaired executive functioning, anxiety, aggression, unemployment, and poorer social functioning (Evans et al., 2005). Depression and poorer functional outcome are correlated in victims of TBI (Evans et al.). Rehabilitation efforts can be encumbered by depression, leading to decreased motivation and fatigue. Other studies have also found that depression is associated with lower social functioning post-injury (Malec et al.).

Barker-Collo (2007) measured behavior of children with mild, moderate, and severe TBI as compared to children with severe orthopedic injury with the Child Behavior Checklist (CBCL). Children in the TBI sample had increased internalizing symptoms correlated to age at the time of injury. Thus, children who were older at the time of TBI had greater anxiety, depression, and somatization levels. Overall, internalizing symptoms were highest in children with moderate TBI, but only approached clinical levels (Barker-Collo). Children with mild TBI actually had lower levels of anxiety than the children in the control group.

Depression, an internalizing behavior, often develops post-TBI. Kirkwood et al. (2000) performed a longitudinal study of depression in children between the ages of 6 and 12 with acquired TBIs. Participants were divided into three groups: severe TBI; moderate TBI; and orthopedic injuries only (OI) which served as a control group.

Participants completed the Child Depression Inventory (CDI), Wechsler Intelligence Scale for Children-Third Edition (WISC-III), and the California Verbal Learning Test (CVLT). Parents of participants completed the CBCL. All measures were administered at the time of injury, when parents were asked to retrospectively rate their children's pre-injury behavior, and again at 6 and 12 month follow-ups. Information regarding ethnicity, education levels, and family income were also collected. The researchers found that the three groups did not differ in self-reported symptoms on the CDI or on premorbid ratings of depressive symptoms as rated by their parents on the CBCL. While most children in the study did not display clinical levels of depression, compared to controls, there was an increased risk for developing depression post-injury. Further, more symptoms of depression were reported over time (at the 6 and 12 month follow-ups) according to parent ratings. The ratings between parent and child were correlated for the TBI groups, but not for those in the OI group. Depressive symptoms were also found to be related to socioeconomic status across the three groups. Children from low-socioeconomic homes were found to have more intensified depressive symptoms, particularly within the TBI groups.

Bay and Donders (2008) found that the strongest risk factor for depressive symptoms after TBI was perceived stress. The second strongest risk factor was determined to be pain. Perceived stress, pain, and involvement in litigation accounted for 70% of the variance in depressive symptoms in the final regression model. It was also found that individuals with mild TBI had more elevated symptoms of depression than individuals with more severe TBI. Based on this finding, the authors posited that

individuals with mild TBI are more vulnerable to additional stressors or that perceived stress mediates depressive symptoms (Bay & Donders).

Self-awareness, conceptualized as a lack of recognition of the severity of deficits and how deficits impact daily functioning, is often impaired after TBI (Evans et al., 2005). In Evans et al.'s study, the incidence of correlation of impaired self-awareness and depression after TBI was examined. Of 96 patients with TBI, more than half reported significant levels of depressive symptoms, with 37% reporting moderate to severe symptoms, as measured by the Satisfaction With Life Scale given at discharge from inpatient rehabilitation.

While symptoms of anxiety are reported less frequently post-TBI than those of depression, obsessive compulsive symptoms are linked with severe brain injury (Grados et al., 2008). Related to anxiety, somatic complaints often occur post-TBI. Headaches, sleep disturbances, fatigue, dizziness, vertigo, visual disturbances, nausea, sensitivity to light and sound, hearing loss, and seizures are some of the most common somatic complaints (Hawley, 2003; Riggio & Wong, 2009). Of these somatic complaints, headache is the most commonly reported (in 25-90% of victims), followed by dizziness and nausea, (24-78%). Fatigue and sleep disturbances (e.g., difficulties initiating and maintaining sleep) were found in up to 73% of TBI victims. Barker-Collo (2007) found that somatization was highest in children with moderate TBI, as compared to mild TBI, severe TBI, and children with severe orthopedic impairment. The author posited that these symptoms (irritability, fatigue, headache, dizziness, nausea, etc.) may actually be

part of Postconcussive Syndrome (PCS; Barker-Collo), which is a set of symptoms that may develop after a blow to the head (Rao & Lyketsos, 2000).

Adaptive Behavior

Studies examining adaptive behavior and TBI have demonstrated that coping with the environmental demands of daily life can be challenging after a head injury. Communication, social skills, academics, self-direction (including executive skills), and other daily tasks may be impaired by physical and cognitive limitations. According to Lash (2004), many children return to school within a month after sustaining a TBI requiring medical attention. Re-entry to school is often a marker for returning to normalcy after an injury for children. Although a child may be physically able to return to school, this does not imply the end of problems associated with the TBI (Deidrick & Farmer, 2005). Children returning to school after a TBI often have significant problems with adaptive behavior. They may be unable to complete self-help tasks of which they were once capable. The recovery process after TBI should be viewed as an improvement process rather than a return to previous functioning. Too often parents and teachers expect a full recovery when that is not likely. Children without obvious physical deficits or damage are easily assumed to have made a complete recovery, and often behavioral, adaptive, and academic assistance is not offered based on outward appearance (Mayfield & Homack, 2005).

Hawley (2004) assessed 67 school-aged children with TBI (divided into mild, moderate, and severe injuries) and 14 matched controls using parent interviews, teacher questionnaires, the King's Outcome Scale for Childhood Head Injury, the Townsend

Deprivation Index, the Vineland Adaptive Behavior Scales (VABS), and the WISC-III. Approximately one-third of the children in the study were identified as having maladaptive behaviors by the teacher questionnaires and parent interviews. As measured by the VABS, nearly two-thirds of the children with TBI exhibited significant maladaptive behaviors. Maladaptive behavior on the Vineland is defined as internalizing and externalizing behaviors that interfere with adaptive behaviors (Sattler & Hoge, 2006). As compared to controls, significantly more of the children with TBI had behavioral problems. No differences between TBI sub groups were found (Hawley).

Giles (2007) examined adaptive behavior ratings of individuals with TBI in the post-acute period using the Adaptive Behaviour and Community Competency Scale (ABCCS). Giles created the ABCCS for use with the TBI population specifically, because measuring adaptive functioning in TBI patients is "notoriously difficult" (p. 521). Giles advocates for the use of adaptive measures as a strategy for measuring outcomes after TBI, rather than using scales such as the Glasgow Coma Scale (GCS) or Levels of Cognitive Functioning Scale (LCFS), which measure the early effects of trauma, but are not helpful when planning for treatment. The author views adaptive behavior as a better measure of functioning than traditional testing. Giles determined that the ABCCS is a "valid indicator of functioning in post-acute TBI individuals and can be completed with high reliability by staff with limited formal training in treatment settings" (p. 527).

Adaptability, activities of daily living, functional communication, social skills, and leadership in individuals with TBI. A variety of deficits in adaptive behavior may occur after TBI. Approximately 2% of Americans have sustained a TBI which causes them to need long-term help with activities of daily living (Thurman et al., 1999). Communication problems, deficits in social skills, difficulty with emotional adjustment, and memory problems impacting daily life are just some of the affected areas. Adolescents who experience significant TBI have been found to have lower health-related quality of life, as well as difficulties with communication skills, adaptive skills, and daily living skills, as reported by parents (Stancin et al., 2002).

Coping with the demands of daily life can be challenging post-TBI. New coping strategies can be taught; however, when existing coping styles are avoidant or impaired, emotional adjustment can be affected (Anson & Ponsford, 2006). Even when adaptive strategies have been taught, often children with TBI forget to use the skills or lack the executive abilities to adapt the skills to particular situations (Anson & Ponsford).

Communication is an area of adaptive functioning that can be particularly challenging for individuals with TBI and can impede reintegration into the community (Galski et al., 1998). According to Dahlberg et al. (2006), those with TBI who do experience social communication deficits also tend to have lower levels of participation in society and satisfaction with life. Focal injuries may manifest as problems such as aphasia and dysarthria, whereas axonal shearing and diffuse injuries tend to create more general conversational problems with attention, memory, informational processing, cognition, and behavior (Adamovich, 1998; Ylvisaker, 1992).

TBI patients may have problems using language, and/or adapting pragmatic language to accommodate the social setting. They tend to violate conversational rules, and have difficulty expressing emotions and selecting appropriate topics of conversation (Coehlo et al., 1991). Turn-taking, acknowledging others, and referring to others in conversation may also suffer. TBI victims may respond slowly, neglect to finish a thought, and pause or hesitate during conversation. Communication may be marked by odd phrases, conversational fillers, and irrelevant comments. Some TBI patients display over-talkativeness, or give too much information, focusing on one subject. The rules of social interactions are not followed due to disinhibition and poor self-monitoring (Levin, 1979; McDonald, 1993; Milton & Wertz, 1986). Compounding the awkwardness of communication is the fact that individuals with TBI do not always recognize that there are problems with their social communication or pragmatic language skills (Hillier & Metzer, 1997; Koskinen, 1998).

Communication is an integral part of other areas of adaptive functioning, such as social skills. After injury, the loss of social contact and difficulties making new friends can be severely debilitating (Long et al., 2008). In the long-term, studies have shown loss of friendship, social support, intimacy, and changes in family dynamics as a result of changes in social cognition and knowledge (Kreutzer et al., 1992; Morton & Wehman, 1995).

Children with TBI have a host of social deficits in comparison to uninjured children (Yeates et al., 2004). Children with TBI report themselves to be less socially competent and lonelier than children without TBI (Andrews, Rose, & Johnson, 1998).

They also tend to be less able to express themselves nonverbally due to impaired facial expressivity as well as less able to understand the facial expressions of others, both of which have been linked to social competence in children (Kupferberg et al., 2001; Philippot & Feldman, 1990; Russell et al., 1993). Additionally, brain injured children have difficulty understanding the mental states of others (i.e., theory of mind), which can lead to separation from peers and decreased opportunities to practice social skills which build competence and self-esteem (Turkstra, Dixon, & Baker, 2004). When children with TBI do engage in social behavior, compared to uninjured children, they have poorer self-regulation skills, and frequently resort to aggression or avoidance (Ganesalingam et al., 2007).

Attention Problems

Cognitive disturbances in attention and concentration may become evident after TBI (Sattler & Hoge, 2006; Yeates, 2004) and are among the most common of neuropsychological sequelae post-TBI (Leclerq, Deloche, & Rousseaux, 2002; Van Zomeren & Brouwer, 1994). Difficulties related to attention may include increases in hyperactivity, distractibility, and impulsivity (Jantz & Coulter, 2007; Mayfield & Homack, 2005). Problems with alertness, focused attention, sustained attention, span of attention vigilance, response execution, and difficulty with interruptions are also related to TBI (Dennis et al., 2001; Sattler & Hoge). After a brain injury, a child's symptoms may mimic ADHD; however, the disorders have different neuropsychological underpinnings (Konrad et al., 2000).

Children who suffer TBI at a young age tend to have worse outcomes for attention (Dennis et al., 2001). Problems of memory and attention disrupt learning and school achievement as well as psychosocial functioning (Hawley, 2005). Ewing-Cobbs et al. (1998) examined attentional disturbances post-TBI in 91 children ages 5 to 8 as part of a longitudinal study of pediatric head injuries. Results indicated that regardless of the severity of injury, younger children have poorer attention scores than older children with TBI. It was also noted in this study that attention problems do persist past the acute stage. As such, attention problems may limit a child's ability to be at school for full days (Deidrik & Farmer, 2005). The cognitive disturbances caused by TBI may result in difficulty shifting attention from one task to another, attending to a task, and maintaining a topic of conversation (Sattler & Hoge, 2006). A child with TBI may be slow to complete timed tasks, ask for frequent repetition of instructions, fail to attend to visual information, and seem to look at pages without taking in content. All of these behaviors are related to attentional problems resulting from TBI (Sattler & Hoge).

While divided attention problems are common post-TBI, studies have shown that the degree of dual-task difficulty is dependent on the task. When a divided-attention task can be performed automatically, little impairment is seen; however, tasks that involve a great deal of working memory and divided attention are more difficult (Leclerq & Azouvi, 2002; Park et al., 1999).

Attention-Deficit/Hyperactivity Disorder

The history of ADHD can be traced to the late 1800s and William James' description of "explosive will" as a variation on normal character. In 1902, George Still, an English physician, described a group of children with a "constellation of symptoms" (Neufeld & Foy, 2006, p. 452) associated with what is now called ADHD. In addition, Still noted that a predisposition to the disorder that seemed to run in families. He also noted the possibility that the disorder could arise from acquired injury to the nervous system. In the years 1917-1918, an epidemic of encephalitis spread through North America. Survivors of this brain disease sometimes developed the symptoms of impulsiveness and overactiveness, which led to the concept of brain-injured child syndrome. When researchers began seeing this same constellation of behaviors in children who had no history of brain injury, the notion of minimal brain damage, leading to the concept of minimal brain dysfunction, arose (Neufeld & Foy).

According to the *Diagnostic and Statistical Manual of Mental Disorders (4th ed., text rev.) of the American Psychiatric Association (DSM-IV-TR,* 2000), ADHD is a neurological disorder distinguished by continual inattention and/or hyperactivity/impulsivity, occurring in 3% to 7% of school age children (*DSM-IV-TR*). Another source lists ADHD diagnoses in 4% to 6% of the school population (Barkley, 1998). To be diagnosable, ADHD symptoms should occur in two or more settings and be present for more than 6 months. There are four subtypes of ADHD including ADHD-predominantly inattentive type, ADHD-predominantly hyperactive impulsive type, ADHD-combined type, and ADHD-not otherwise specified (APA). Subtypes are

dependent on the two major components of ADHD, as stated in the *DSM-IV-TR*: attention problems and behavioral/impulse control deficits. ADHD was first included in the *DSM* in 1980. Since then, North America has seen dramatic increases in the numbers of individuals diagnosed with and treated for ADHD. By 1994, ADHD was the most commonly diagnosed pediatric psychiatric disorder in the United States (Neufeld & Foy, 2006).

Research on Children with ADHD

ADHD was originally thought of as a childhood disorder, based on the diagnostic emphasis of symptoms being present before the age of seven years (*DSM-IV-TR*, 2000). More recent studies demonstrate that of children diagnosed with ADHD, 35% to70% continue to experience ADHD symptoms into their adolescence (Cukrowicz, Taylor, Scatschneider, & Iacono, 2006). The emergence of public acceptability and understanding of ADHD has been hypothesized to play a hand in the increasing prevalence rates. Goldstein and Reynolds (1999) theorized that the increase in ADHD diagnoses is due to increased public awareness of the symptoms of ADHD versus a true increase in rates of inattentiveness and impulsivity. Neufeld and Foy (2006) noted that ADHD is currently understood in the United States as a "real, knowable, and treatable mental disorder" (p. 456), meaning that the symptoms of ADHD are recognized by physicians and educators, as well as by the general public.

The majority of referrals in the schools are for ADHD symptoms of attention problems and behavioral/impulse control. In schools, rating scales filled out by adults in the child's life constitute the most common method for gathering information and

identifying children with behavioral concerns, including those with ADHD (Angello et al., 2003). In young children, ADHD may result in disruptive, impulsive, and aggressive behavior; low frustration tolerance; and temper tantrums. School-age children may experience academic difficulties, poor social interactions, lie, steal, and experience poor self-esteem and attitude problems. If left untreated, disruptive ADHD symptoms may cause difficulties throughout the lifespan (Woodard, 2006). Thus, early diagnosis and intervention has been shown to be important in cases of ADHD. Since ADHD is often a life-long disorder, early intervention of problem behaviors can stymie the development of more severe disruptive behavior (McGoey, DuPaul, Haley, & Shelton, 2007).

As well as being a condition present over a lifetime, ADHD is a global phenomenon with documentation of ADHD affecting individuals from the Middle East, Asia, Australia, South America, Europe, and North America (Neufeld & Foy, 2006). According to Woodard (2006), ADHD occurs at a 3:1 ratio in boys versus girls and is often co-morbid with other conditions such as oppositional defiant disorder, depression, learning disorders, anxiety, and bipolar disorder. In addition to co-morbid disorders, ADHD symptoms can mimic and are often mistaken for conditions such as seizures, sleep disorders, depression, allergies, medication side effects, developmental variations, pervasive developmental disorders, child abuse and neglect, post-traumatic stress disorder, substance abuse, fetal alcohol syndrome, thyroid disorders, and a number of other conditions (Woodard).

Externalizing Behavior

ADHD is comprised of "under-controlled" (Reynolds & Kamphaus, 2004, p. 66) behaviors. Due to the very nature of ADHD, it stands to reason that on the BASC-2, children with ADHD would have high externalizing scores. Hyperactivity and attention problems inherent in ADHD affect all parts of a child's behavior and "predispose children toward greater risk for both externalizing and internalizing problems" (Baxter & Rattan, 2003, p. 820).

High rates of externalizing behavior in individuals with ADHD as measured by the BASC-2 have been found in recent studies. The BASC, which is the precursor to the BASC-2, was used in conjunction with the BRIEF to assess for ADHD in a study by Jarratt et al. (2005). The authors found between-group differences on the BASC Externalizing Problems Composite scale with the ADHD group showing significantly lower levels of appropriate behavior when compared to controls.

Hyperactivity, aggression, and conduct problems in children with ADHD. Approximately 2.4% of children are diagnosed with ADHD hyperactive-impulsive type (Nolan et al., 2001). At least one half of all children with hyperactivity also present with aggressive conduct (Loney & Milich, 1982). Aggression is one of the behaviors associated with conduct problems in the literature (Kolks, 1993). The association between ADHD and substance use (a conduct problem) has been established in the literature (Biederman et al., 1997). Children with ADHD are also at higher risk for criminal involvement over time, as compared to children without behavior problems (Sattlerfield et al., 1982; Weiss et al., 1971).

Aggression in children with ADHD is more frequent in children who also have comorbid Conduct Disorder (Pliszka, 2005). However, conduct problems do not always necessitate a diagnosis of Conduct Disorder. Across the literature, a high level of comorbidity (ranging from 35% to 70%) between ADHD behaviors and conduct problems has been seen (Biederman et al., 1991; Szatmari et al., 1989; Tannock, 1998). While ADHD seems to predispose individuals to conduct problems, conduct problems and hyperactivity are related, but distinct phenomena (Hinshaw, 2002). Hyperactivity results in children failing to comply or behaving impulsively due to problems with self-control, whereas conduct problems tend to be oppositional in nature (Maniadaki et al., 2006).

Internalizing Behavior

According to several studies, ADHD is often comorbid with internalizing disorders such as anxiety and depression; however, attention problems are sometimes the result of internal behavioral issues such as anxiety or depression rather than attributable to ADHD (Barkley, DuPaul, & McMurray, 1990; Baxter & Rattan, 2003; Fussell, Macias, & Saylor, 2005; Levine, 1987). The comorbidity of ADHD and internalizing disorders is in the range of 13% to 50.8% according to the *DSM-IV-TR* (2000). As inattention is a common reason that children are referred to school mental health practitioners, it is important to be aware of this fact. It is often difficult to distinguish pure inattention problems from a host of other disorders. The function of the behavior must be determined to assess whether inattention is the result of ADHD or another problem, such as a learning disability. While inattention may appear to be the result of ADHD, it may be

attributable to another disorder with different neuropsychological underpinnings. Jensen, Martin, and Cantwell (1997) summarized the literature and demonstrated a high rate of comorbidity between ADHD and internalizing disorders. The authors emphasized that children with ADHD should be diagnosed appropriately since behavioral and medical interventions are dependent on comorbidity. It is also important to remember that emotional problems can be related to cognitive and attention problems. When children are anxious, attention is impaired as they try to divide attention between tasks and anxious thoughts (Baxter & Rattan).

Comorbidity between ADHD and internalizing disorders has been demonstrated on several rating scales. Baxter and Rattan (2003) examined internalizing disorders in males ages 9 to 11 diagnosed with ADHD. Only male participants were used, given that past research on sex differences in hyperactive children found few reliable differences in behavior and cognitive performance regardless of diagnostic source (Barkley et al., 1990). Participants were compared to normative BASC and Revised Children's Manifest Anxiety Scale (RCMAS) samples. Significant levels of anxiety and depression were found on the BASC, as well as significant anxiety on the RCMAS for the children with ADHD as compared to the normative controls. Fussell et al. (2005) found high internalizing scores for children diagnosed with ADHD on the Children's Behavioral Check List (CBCL).

Anxiety, depression, and somatization in children with ADHD. Milberg et al. (1995) found significant comorbidity between ADHD and generalized anxiety disorder in children. Between a quarter and a third of children diagnosed with ADHD also meet the

criteria for an anxiety disorder, as compared to 5% to 15% in the general population (Bird et al., 1993; Cohen et al., 1993). According to Hojman (2008), the comorbidity between anxiety and ADHD in children may be underestimated as children frequently go undiagnosed with an anxiety disorder, because parents and teachers do not notice the subtle symptoms of anxiety. Specific forms of situational anxiety, such as test anxiety, are frequently found in children with ADHD (Taylor & Houghton, 2008). It is important to be aware that children with ADHD may have increases in anxiety around tests and other timed tasks, especially in school settings where high-stakes testing is government mandated.

Estimates of comorbid depression and ADHD range from as low as 3% to as high as 75% (Biederman et al., 1991). Various studies have demonstrated depression co-occurring in children with ADHD in 29% to 38% of cases (LeBlanc & Morin, 2004). Children with ADHD report more depressive symptoms than children without ADHD (LeBlanc & Morin). Even in studies where re-evaluations have been completed to correct for overlapping symptoms of psychiatric diagnoses, 21% to 29% of individuals with ADHD have significant comorbidity with depressive symptoms (Milberg et al., 1995). Research on somatic symptoms associated with ADHD is limited. Egger, Costello, Erkanli, and Angold (1999) found stomachaches in boys to be associated with ADHD.

Adaptive Behavior

Jarratt et al. (2005) noted that adaptive skills for children with ADHD seem to be impaired across current studies. This is unusual, as adaptive skills are not typically a focus of intervention for children with ADHD. Deficits in social skills, which are a focus

of many interventions, are also prevalent in children with ADHD. Social skills are an important component of adaptive skills, as they enable an individual to live and be educated in the Least Restrictive Environment (LRE; Fussell et al., 2005). Fussell et al. found that children diagnosed with only ADHD or a Leaning Disorder (LD) had significantly lower social skills and higher rates of behavioral problems than children with both ADHD and a LD, children with Spina Bifida, or the control group, as measured by the Social Skills Rating Scale (SSRS). Children diagnosed only with ADHD also had significantly worse externalizing behavior problem scores. Thus, children diagnosed only with ADHD had significantly more problems on all four measures of social skills and behavior (Fussell et al.).

Jarrat et al. (2005) investigated how well the BASC and Behavior Rating Inventory of Executive Function (BRIEF) were able to be used together in a diagnostic capacity. Participants included children between the ages of 9 and 15 who were diagnosed with ADHD and a control group without any other learning problems or psychiatric diagnoses. The authors used the BASC as it is an omnibus measure that would help obtain a comprehensive view of the child's behavior, as ADHD is associated with many comorbid disorders. Jarratt et al. found that the BASC and BRIEF both measure similar constructs as they relate to ADHD.

Adaptability, activities of daily living, functional communication, social skills, and leadership in children with ADHD. Children with ADHD have myriad difficulties in the area of adaptive behavior. Social skills deficits, as well as communication problems, tend to be most problematic for these children (Greene et al., 1999; Landau, Milich, &

Diener, 1998). Adaptive communication may be impaired, with poor communication skills, regardless of intelligence levels (Clark, Prior, & Kinsella, 2002; Stein et al., 1995).

Social problems are a major component of the difficulties associated with ADHD although ADHD symptomatology in the DSM-IV-TR does not reflect problems with interpersonal functioning that many affected children experience (Barkley, Fisher, Edelbrook, & Smallish, 1991). It has been suggested that social problems are a hallmark of ADHD and that these children experience serious interpersonal difficulties and peer rejection (Whalen & Henker, 1991).

Although children with ADHD seek social interaction and attempt to gain peer acceptance, they tend to have low levels of social competence (Campbell, 1994). Between 50% and 80% of children with ADHD have problematic peer relationships (Barkley, 1990). While children with ADHD generally know how to initiate friendships, they do not know how to maintain established friendships (Grenell, Glass, & Katz, 1987), and the social deficits tend to be problems of production rather than knowledge (Loney & Milich, 1982.) These children suffer from poor self-regulation, immaturity, and difficulties with planning, which may contribute to social difficulties (Clark, Prior, & Kinsella, 2002). These children can be boisterous, annoying, intrusive, and off-putting to those around them (Landau & Moore, 1991). Children with ADHD-combined type are more likely to evoke peer rejection and have difficulties with skill performance rather than knowledge (Lahey & Wilcutt, 1998). Barkley (1997) found that children with ADHD-combined type are more deviant in peer relationships. They also have more

difficulty in peer relations and demonstrate more aggression than other subtypes (Maedgen & Carlson, 2000).

Attention Problems

ADHD is a chronic and debilitating disorder involving inattention, impulsivity, and hyperactivity (Biederman & Faraone, 2004). Problems with attention are a significant part of the diagnosis of ADHD-inattentive type and ADHD-combined type (APA, 2000). Children diagnosed with ADHD-combined type, have a combination of inattentive and hyperactive-impulsive symptoms and meet criteria for both subtypes. Attention problems in ADHD may result in cognitive processing difficulties and disinhibition which influences school performance (Moonsamy, Jordaan, & Greenop, 2009). Nolan et al. (2001) found a majority of individuals with ADHD are diagnosed with inattentive type (9.9%) as opposed to hyperactive-impulsive (2.4%) or combined type (3.6%).

Inattention, particularly problems with sustained attention, is a common reason that children are referred to school mental health practitioners (Yeats & Taylor, 1998). Attention is something that can be observed easily in children and is subjective (Baxter & Rattan, 2003). It is often difficult to distinguish the pure attentional difficulties of ADHD from attention problems resulting from anxiety, depression, brain injury, or other issues (Baxter & Rattan; Jensen et al., 1997; Levine, 1987). Attention problems are sometimes the result of internal behavioral issues such as anxiety or depression and sometimes attributable to ADHD (Baxter & Rattan).

When children exhibit high levels of inattentive behaviors, social failures are more likely to occur (DeNisco et al., 2005). Verbal outbursts, restlessness, intrusiveness,

or the inability to behave in an appropriate manner for the situation can be attributable to attention deficits and may contribute to poor social outcomes. Children with ADHD often have difficulty in school with completing and handing in assignments, staying seated, and talking only with permission (DeNisco et al.).

High Functioning Autism

The history of autism can be traced back to Leo Kanner's description of children who shared a set of personality characteristics in 1943. Kanner observed that this group of children had a desire for repetition and routine, preferred to be alone, and could not form normal relationships. Hans Asperger published a description of children with quite similar symptoms a year later, calling the condition "autistic psychopathology" (Rinehart, Bradshaw, Brereton, & Tongue, 2002, p. 762). In Asperger's original description (1944), he portrayed a child who was precocious in learning to talk and talked in a pedantic way about a topic of particular, circumscribed interest (as cited in Rinehart et al.). According to both Kanner and Asperger, the individuals they studied appeared to be interested in social relationships, but lacked understanding of the rules of social behavior. While there were many similarities in their sets of patients, Asperger felt his group of patients was different than Kanner's and that he was dealing with a separate disorder (Rinehart et al.). To this day, there continues to be controversy regarding whether Asperger's disorder should be placed among or separate from autism spectrum disorders.

Autism is often referred to as a spectrum disorder, with varying levels of cognitive and adaptive functioning across individuals. The *DSM-IV-TR* (2000) describes five pervasive developmental disorders that fall under the autism spectrum umbrella:

autistic disorder, Rett's disorder, childhood disintegrative disorder, Asperger's disorder, and pervasive developmental disorder-not otherwise specified (PDD-NOS). Generally, as intelligence increases, the number and severity of autistic symptoms decrease (Sattler & Hoge, 2006).

Diagnostic criteria in the *DSM-IV-TR* (2000) describe autism as a "pervasive developmental disorder defined by impairments in social and communication function, and repetitive and stereotyped behavioral patterns" (p. 63). Poor eye contact, difficulty interpreting emotional states, failure to develop typical peer relationships, and social and emotional reciprocity deficits are symptoms of Asperger's disorder, which was first included in the *DSM-IV* as a formal diagnosis in 1994. Communication-related symptoms include a delay or total lack of expressive language and impairment in non-verbal behavior. Additional diagnostic criteria specifies that a child must exhibit abnormal or delayed functioning in one or more of the following areas of social interaction before the age of three: social use of language, symbolic play, or imaginative play. According to Rinehart et al. (2002), individuals with Asperger's disorder exhibit greater levels of psychopathology in comparison to individuals with autism. Asperger's disorder occurs somewhere between in 26-71 in 10,000 people, and the male to female ratio in autism is approximately 2-3:1 and 4:1 for Asperger's disorder (Thede & Coolidge, 2007).

Despite the fact that no such diagnostic distinction is made by the American Psychiatric Association (*DSM-IV-TR*, 2000) or the World Health Organization (*ICD-10*, 2003), there are generally two subtypes of autism found in the literature: low-functioning and high-functioning autism (Rinehart et al., 2002). Relatively intact intellectual

functioning and the absence of identifiable brain damage, neurological findings, or biological markers are associated with High Functioning Autism (HFA). Children diagnosed with HFA have all the characteristics of Asperger's Disorder and a significant language delay. HFA is typically used to describe individuals with Autism who have an IQ above the mentally retarded range (>69) and function higher verbally (Thede & Coolidge, 2007). HFA and Asperger's Disorder share symptoms, biological indicators, and features, thus, there seem to be few qualitative distinctions between the disorders (Mcintosh & Disanyaka, 2004; Ozonoff & McMahon Griffith, 2000). Presumably, individuals with HFA require a different treatment approach and thus need to be distinguished from individuals with Low-Functioning Autism. Approximately 25% of individuals with Autism can be better described as HFA (Thede & Coolidge). Autistic Disorder occurs in 26-36 cases per 10,000 children (Thede & Coolidge).

The Controversy of Autism versus Asperger's Disorder

Current *DSM-IV-TR* (2000) criteria define autism and Asperger's disorder as separate clinical entities; however, individuals diagnosed with Asperger's disorder continue to be conceptualized as having a milder variant of autism. Extending from this notion, the terms Asperger's disorder and High Functioning Autism (HFA) are frequently used interchangeably in the literature. While some epidemiological and genetic evidence supports the uniqueness of these disorder groups (Rinehart et al., 2002), in the absence of extensive developmental history detailing language and social development, the characteristics of HFA and Asperger's disorder present very similarly in children (Rinehart et al.).

A review of the recent literature by Macintosh and Dissanayake (2004) demonstrated that there is evidence of a substantial overlap between Autistic Disorder and Asperger's Disorder in several areas. These areas include cognitive, neuropsychological, language and communication, and motor abilities, as well as medical and developmental histories, course and outcome, and repetitive behaviors and social development. The authors concluded that the literature supports the view that Autistic Disorder and Asperger's Disorder belong on the same spectrum of autism.

The same authors later examined the literature regarding Asperger's Disorder and High Functioning Autism and made the same argument for one continuum of disorders based on the demonstration of significant social skills deficits and problem behaviors in both groups as compared to typical children on the Social Skills Rating Scale (Macintosh & Dissanayake, 2006). Pennington (2002) also makes the argument that social deficits are the primary psychological impairment in all autism spectrum disorders.

Thus, although there is evidence of a neurobiological distinction between HFA and Asperger's disorder, for the purpose of this study, they will be considered one group. Due to federal guidelines which lump all autism spectrum disorders together, it is most helpful to consider the spectrum as a whole for purposes of diagnosis in schools. Because there is no difference in school determination between HFA and Asperger's disorder (i.e., they are considered part of the same spectrum of disorder), these disorders will hence be referred to as High Functioning Autism Spectrum Disorders (HFA).

Effects of HFA

Early in childhood, some of the most common symptoms of HFA are related to communication problems, failure to engage in imitation in play, nonresponsiveness to hearing one's name, and difficulty following another person's gaze or pointing. Other behaviors such as stereotyped or repetitive language, ritualistic behavior, and difficulty with relationships can be observed after the age of two. Other symptoms of HFA may include a lack of appreciation for humor, literal approaches to language, and clumsiness (Sattler & Hoge, 2006).

Children with HFA have marked social impairment, particularly in the use of nonverbal behaviors. They are unable to perceive and process emotional cues from those around them, possibly because of difficulty maintaining attention and selecting salient attributes of the environment to be processed. Self-stimulatory or self-injurious behaviors may emerge. Failure to develop appropriate peer relationships is also common and spontaneous interactions are also difficult. Children with HFA tend to gravitate toward older children and adults and lack skills for reciprocal social interactions. Because they are unable to empathize with others, they do not participate in the give and take of social interaction (Sattler & Hoge, 2006).

Children with HFA also have impairments in communication. While children with Asperger's disorder do not have a delay in speech development, children with autistic disorder do. In either form, the lack of or delay in spoken words is not compensated for by nonverbal behavior. Initiating and maintaining conversation is difficult for these children. Spoken words are taken for their literal meaning, turn taking

in conversation, and understanding others' points of view is difficult. Children with HFA also have stereotyped, repetitive, and idiosyncratic language. Pronominal reversal, or the reversal of pronouns (i.e., referring to oneself as "she") and odd prosody of speech are common (Sattler & Hoge, 2006).

Children with HFA experience difficulty with appropriate behavior. Play skills are impaired and often children with HFA use toys in inflexible, repetitive, perseverative, and mechanical ways (Sattler & Hoge, 2006). Children with HFA may be extraordinarily preoccupied with sameness in the routines and environments, and changes to routine may result in tantrums or emotional shut-down. These children may also display high sensitivity to light, sounds, or touch. This need for extra or limited sensory input may result in odd behaviors such as watching spinning objects, repetitive turning on and off of lights, or closing and opening a drawer. These children are also often preoccupied with a specific topic of interest. This topic, anything from hotel rooms to dinosaurs, is often all-encompassing. These children prefer to talk about, engage in play, and ask questions only related to the topic (Sattler & Hoge).

Externalizing Behavior

Inattention, hyperactivity, and impulsivity are common symptoms in individuals with HFA and are often a cause for referral among higher functioning individuals on the autism spectrum (Grodberg & Kolevzon, 2009). Lecavalier (2006) surveyed 487 children and adolescents with ASD and found that more than 50% had moderate to severe symptoms of hyperactivity and inattention. Another study of 101 children with HFA found that 95% demonstrated attention problems, and 50% exhibited impulse control

problems (Frazier et al., 2001). Being aware of the symptoms of ADHD in children with HFA is important because of the implication for greater impairment in day to day life (Grodberg & Kolevzon).

Smalley et al. (2002) found that HFA and ADHD share a genetic marker on chromosome 16, which may account for why some of the early behavior problems and socially inappropriate behaviors found in HFA can be mistaken for ADHD. Both ADHD and HFA are highly heritable disorders and a common genetic marker points to a common etiology or a genetic association. Gadow, DeVincent, and Pomeroy (2006) found that the severity of ADHD symptoms were similar across the PDD subtypes of autistic disorder, Asperger's disorder, and PDD-NOS.

Hyperactivity, aggression, and conduct problems in children with HFA. Externalizing behaviors are common among children with HFA, particularly hyperactivity. More than 50% of children and adolescents on the autism spectrum exhibit significant symptoms of hyperactivity (Levavalier, 2006). Hyperactivity in children with HFA has a different underlying cause than hyperactivity in children with ADHD (Grodberg & Kolevzon, 2009). Although there are distinct clinical separations between ADHD and HFA, hyperactivity is common in both disorders (Ghaziuddin et al., 1998; Sturm, Fernell, & Gillberg, 2004; Turner, 1999). In HFA, hyperactivity is the manifestation of anxiety, agitation, or a motor stereotypy instead of a symptom of inhibitory deficits as seen in ADHD (Grodberg & Kolevzon).

Children with HFA also display aggressive behaviors. In a meta analysis by Horner et al. (2002), aggression was the second most common problem behavior in

children with HFA (in 59% of the articles). The ICD-10 and DSM-IV-TR do not recognize problems with aggression and self-regulation as prevalent in HFA, and there is a widespread view that children with HFA are often the victim rather than the aggressor (Simpson & Myles, 1998). However, since children with HFA experience the world as an unpredictable place, they tend to be emotionally vulnerable and easily stressed. As such, they are prone to agitation and aggression when feelings overwhelm them. Loss of control, difficulty solving problems, confusing social situations and the like add to the stress of not being able to predict outcomes and may lead to aggression (Simpson & Myles).

Poor understanding of the social world may lead to conduct problems in children and adolescents with HFA. For example, as these children mature, they may encounter difficulty regarding their sexuality. Teens with HFA may not have the necessary tools to understand social cues or have the wherewithal to make complex decisions regarding sexual conduct (Ray et al., 2004). The poor ability to decode social information and a limited repertoire of appropriate behavior combined with an obsessional interest in sexual topics may lead to problem behaviors including aggression, sexual compulsions, and disproportionate self-stimulation (Ray et al.).

On the contrary, HFA symptoms may be protective against other types of conduct problems, such as lying, stealing, and substance use/abuse. Reduced social interaction and high harm avoidance, as well as bifurcated moral values may contribute to low substance use in children and adolescents on the autism spectrum (Soderstrom et al., 2002). It is possible that children with PDD have less access to drugs and alcohol due to

closer supervision in school and at home or that they lack the social skills required to procure drugs and alcohol. Children with PDD also tend to have high moral standards; thus, there is the possibility that these children and adolescents do not engage in substance use at rates typical of peers due to rigid cognitive rules about the wrongness of substance use (Santosh & Mijovic, 2006).

Internalizing Behavior

Lecavalier's 2006 study found that children with pervasive developmental disorders present with a range of clinical symptoms, including anxiety, depression, and attention deficits. These behavior problems likely interfere with the ability to make and sustain healthy peer relationships (Macintosh & Dissanayake, 2006). Anxiety is so frequently found in children with autism spectrum disorders that the *DSM-IV-TR* makes note of anxiety-like responses as common associated features of the disorder (2000). Prevalence of anxiety disorders in ASD is between 47% and 84.1%, the most common one being specific phobias (Muris, Steerneman, Merckelbach, Holdrinet, & Meesters, 1998). Thede and Coolidge (2007) found that children with HFA were significantly higher on generalized anxiety disorder scales than a control group.

Anxiety, depression, and somatization in children with HFA. Anxiety is believed to be quite common in individuals with autism, as it was described in Kanner's (1943) initial accounts of children with autism. Some clinicians think of various types of anxiety as symptoms of autism, rather than comorbid features. While the rates of comorbidity are elevated, high levels of anxiety are not a defining feature of autism and not all individuals with autism experience symptoms of anxiety (Leyfer et al., 2006; Reaven, 2008). In

Leyfer et al.'s research study, the most common additional diagnosis for children with autism was Specific Phobia, of which criteria was met by 44% of the sample. The most common phobias were loud noises (10%), needles/shots (32%), and crowds (32%). Typical fears found in the general population of children, such as fear of heights, occurred at low rates in the children diagnosed with autism. The authors also found separation anxiety disorder symptoms in 12% of the children and social phobia symptoms in 7.4%.

Recent literature has attempted to tease apart HFA and the symptoms of anxiety that often co-occur in children with HFA. There seems to be disagreement in the field as to whether anxiety is part of autism or a separate, diagnosable comorbid disorder (Sukhodolsky et al., 2008). The majority of studies on autism and anxiety has been done with HFA groups (Bellini, 2004; Kim et al., 2000; Russell & Sofronoff, 2005) and seem to support the idea that elevated levels of anxiety are found in most individuals with HFA.

Tantum (2000) concluded that anxiety is almost always comorbid with Asperger's disorder; whereas, other authors have found the prevalence of comorbidity to be lower (between 13.6% and 49%; Bellini, 2004; Green et al., 2000; Kim et al., 2000; Leyfer et al., 2006). Adding to the confusion regarding anxiety and autism, the core feature of stereotyped behaviors may be a reflection of anxiety in children, or it may be that they are used to decrease anxiety, or for pleasures (Sukhodolsky et al., 2008). Even when children with Asperger's disorder do not have clinical levels of anxiety symptoms, they tend to have more symptoms than the general population (Russell & Sofronoff,

2005). The symptoms of anxiety can have a tremendous impact on social functioning, family relationships, and school performance (Reaven, 2009). High levels of anxiety can undermine attempts at using learned social skills, even when the skills have been adequately learned (Sukhodolsky et al.).

Depression is not as common as anxiety in children and adolescents with HFA. However, diagnosing depression and other psychiatric disorders in individuals on the autism spectrum can be difficult, as communication with the individuals is impaired to some degree in autism (Lord & Paul, 1997). Communication and other cognitive problems may also hinder the individual with HFA's ability to describe mental states and experiences. Difficulties communicating with these individuals may make differential diagnosis tricky. It is difficult to assess if symptoms are related to core features of autism or symptoms of another comorbid disorder (Leyfer et al., 2006). Leyfer et al. found that 10% of children with autism in their sample had at least one episode of major depression (as defined in the DSM-IV-TR), and almost 25% met the lifetime diagnostic criteria for impairing depression.

Whiteley (2004) analyzed the frequency of specific somatic variables common to children with autism spectrum disorders. Somatic symptoms that commonly coexist with autism spectrum disorder include: bowel and skin complaints (e.g., impetigo) and a history of viral illnesses (particularly chicken pox). It is unclear though whether particular disorders (i.e., Asperger's disorder) are related to certain somatic complaints. It was found that feeding problems in infancy and impetigo were significantly more prevalent for the children with Asperger's disorder. Headaches and migraines are also

frequently reported in children with HFA; however, recent research has demonstrated that these children report headaches for a different reason than normally developing children: to escape situations, work, or people (Arvans, & LeBlanc, 2009). Children with Asperger's also tend to have disturbed sleep (specifically, difficulty initiating and continuing sleep; Richdale, 1999; Tani et al., 2002).

Adaptive Behavior

Typically developing children's social competence is largely related to their ability to competently interact in social situations. This ability to get along is an adaptive ability, important for functioning in the social world. The process of effectively initiating and responding to social stimuli in the environment is impaired in children with ASD. This impairment can range from a general lack of awareness of others to atypical peer relations (Bauminger, Shulman, & Agam, 2003).

Saulnier and Kiln (2007) found that children diagnosed with HFA have impaired adaptive skills as measured by the Vineland Adaptive Behavior Scales (VABS). There was no correlation, however, between adaptive functioning and the severity of symptoms. Individuals with HFA often lack the ability to translate cognitive potential into real-life adaptive skills. Their deficits tend to take the form of communication and socialization inadaptability. As individuals with HFA age, their socialization skills do not keep pace with development. Socialization skills and other types of informal interpersonal skills are imperative to daily functioning. In the schools, it is vital to intervene early with children on the autism spectrum due to the implications of this developmental stagnation and the importance of social and adaptive skills in daily life (Saulnier & Kiln).

Adaptability, activities of daily living, functional communication, social skills, and leadership in children with HFA. Overall, children with HFA have been found to have moderately low adaptive skills related to daily living (Lee & Park, 2007). Although it is not specified in the ICD 10 or the DSM-IV-TR, adaptive behavior deficits have been identified in many studies of Asperger disorder (Barnhill et al., 2000; Klin, 2000; MacLean et al., 1999; Paul et al., 2005; Szatmari, Archer, et al., 1995; Szatmari, Bryson, Boyle, et al., 2003; Szatmari, Bryson, Streiner, et al., 2000). Because diagnostic criteria do not specify adaptive deficits, there is a controversy in terms of whether communication skills, maladaptive behaviors, and daily living skills deficits should be considered part of adaptive behavior (Lee & Park). Communication is an undisputed area of deficit in individuals with HFA. Even when the individual demonstrates advanced expressive skills, comprehension and receptive skills are often impaired (Lee & Park).

As previously discussed, children with HFA tend to have significant anxiety related symptomatology. Anxiety in children with HFA can lead to difficulties with adaptability (Russell & Sofronoff, 2005). When children are anxious about changes in routine or their expectations are not met, difficulties may arise. The insistence on sameness has been part of the diagnostic criteria of autism spectrum disorders since Kanner's conception of the disorder in 1943. Individuals on the spectrum often have difficulty adapting to or coping with changes to daily routines and function best with structure and routine. This insistence on sameness can include preoccupations with or intense attachments to objects, a resistance to change, limited patterns of play, and stereotyped motor behaviors (Green et al., 2006). The most problematic situations for

children with HFA tend to be cancellation, interruption, or cessation of an activity. Interruption was the most disruptive and included other people's behavior, such as making noise or smoking. This difficulty with interruption may be due to the inability inherent in the disorder to show empathy or take the perspective of others (Green et al.). Interestingly, children with HFA tend to have significantly more difficulty coping with new situations than children with LFA (Bartak & Rutter, 1976).

All-consuming interests in topics also affect children with HFA's abilities in adaptive areas. The pursuit of these interests may lead to lower social and communication abilities, as these interests may disrupt learning in areas important for real-life adaptation and interfere with social interaction (Klin et al., 2007). Most children with Asperger's disorder have an area of circumscribed interest, with two thirds of children displaying circumscribed interested in the preschool years and three quarters by elementary school age. Preschool children tended toward fascination with letters and numbers, which seem to lead to the way in which older children gather information about their preferred topics: written and verbal material. Amassing facts and gathering information is the most frequent form of special interest. Topics that these children enjoy (e.g., dinosaurs, Power Rangers®) tend to be pursued in atypical ways. Typical children integrate information through play, where as children with HFA do not seem to do so (Klin et al.). Hence, topics such as Japanese animation, space and physics, videogames and the Internet, gadgets, heroes, and dinosaurs are more often pursued by reading about the topic, memorizing facts, collecting related artifacts, and through television and video games

(South, Ozonoff, & McMahon, 2005). Thus, circumscribed interests may contribute to isolation from peers and difficulty adapting to social situations (Klin et al.).

Social skills in children with HFA are generally rated as problematic by parents (Barnhill et al., 2000). Children with HFA tend to engage in parallel play rather than coordinated play more often than typical peers (Bauminger et al., 2008). While some children with HFA have friends, the quality and quantity of the friendships differ from typical ones. It seems that children with HFA have to learn cognitive strategies to build and maintain friendships that come more naturally to typically-developing peers (Bauminger et al.). Children with social skills deficits may develop social anxiety, which, in turn, can lead to negative peer reactions, perpetuating the anxiety (LaGreca & Lopez, 1998).

Attention Problems

Children with HFA have difficulty maintaining attention (Sattler & Hoge, 2006). Attention deficits are one of the many clinical symptoms with which children with HFA may present (Lecavalier, 2006). Dysfunctional attention, particularly shifting attention, may be a core deficit in autism (Goldstein, Johnson, & Minshew, 2001). However, there is also research that suggests that there are deficits in focused attention (Kaland et al., 2008) and shifting attention (Courchense et al., 1994; Sargeant, Geurts, & Oosterlaan, 2002).

Due to the important role of attention in information processing, it has been hypothesized that attentional deficits are partially responsible for the atypical manner in which individuals with autism respond to their environment (Courchense et al., 1994;

Sargeant, Geurts, & Oosterlaan, 2002). Attentional deficits may be linked to problems with arousal, orienting, gazing, and filtering of information. Recent neurobehavioral models have postulated that attention deficits occur at the level of executive functioning (Sargeant, Geurts, & Oosterlaan).

The Behavior Assessment System for Children, Second Edition (BASC-2)

Reynolds and Kamphaus (2004) recognized the need for an integrated assessment system for emotional and behavioral difficulties in children, leading them to create the BASC in 1985 and consequently the BASC-2 in 2004. The BASC-2 is an omnibus measure used to get a comprehensive view of a child's behavior (Jarratt et al., 2005). It is a multidimensional, multimethod tool for evaluating children and adolescents aged 2 through 25 years. To be used alone or in combination, the BASC-2 is comprised of Parent Rating Scales (PRS), Teacher Rating Scales (TRS), and Self-Report of Personality (SRP), as well as a Structured Developmental History (SDH), and a Student Observation System (SOS; Reynolds & Kamphaus, 2004). It is multidimensional in design because it measures aspects of behavior that are positive (adaptive) as well as negative (clinical). The BASC-2 was designed to facilitate differential diagnosis and educational classification of a wide range of emotional and behavioral disorders, as well as to assist in treatment planning (Reynolds & Kamphaus).

The individual components of the BASC-2 are reliable and psychometrically sound, and the composites have high internal consistency and test-retest reliability (Reynolds & Kamphaus, 2004). The original BASC was shown to have good criterion-related validity, as well as factorial and concurrent validity with known clinical groups,

such as ADHD (Salvia & Ysseldyke, 2001). When evaluating for childhood disorders such as the ones in the current study (ADHD, TBI, ASD), this approach is particularly important due to the high rate of comorbidity associated with these disorders. Comorbid disorders are those that occur at the same time in the same individual (Bennett & Gjonbalaj-Morovic, 2007). For example, children with ADHD generally show multiple difficulties spanning settings and often have multiple challenges, involving internalizing and externalizing problems.

Since children rarely initiate evaluation or treatment and have difficulty accurately reporting their own behavioral problems, prominent adults in the child's life tend to provide the best information regarding emotions and behavior. Behavioral rating scales are particularly good at gathering this information, as they "measure infrequent, but important behaviors that would likely escape notice in a typical observational session" (Knoster & McCurdy, 2002, p. 1015). Behavior rating scales ask the rater to record frequency of observable behavior instead of inferring the cause of the behavior. These ratings are based on observations formed over time, not a tallying of frequency of a behavior (Reynolds & Kamphaus, 2004). Behavior rating scales from parents provide pertinent, cost-effective, and time-efficient information. Gathering information from both parents and teachers is important. Teachers provide data regarding how the child's behavior affects the child's education. Parents have extensive, long-term knowledge regarding their child's behavior across settings and contexts.

Most school psychologists use a behavior rating scale as a standard, significant source of data for decision-making in diagnosis and service provision, and the BASC and

newer BASC-2 have become standard for practitioners in the schools (Shapiro & Heick, 2004). Some of the advantages of using behavior ratings scales are: they are quick and efficient to complete; they provide an easy means of gathering a great deal of information about a child's behavior in multiple settings and situations; and, they facilitate the integration of information from multiple sources (Knoster & McCurdy, 2002; Wright, Waschbusch, & Frankland, 2007). Ratings scales assess a wide range of behaviors, making their use in school settings as screening instruments for a variety of problem behaviors popular (Ramsay, Reynolds, & Kamphaus, 2002). In addition, they are easy to administer and score and result in easily understood standardized scores (Elliott, Busse, & Gresham, 1993; Ramsay et al., 2002). Behavior rating scales are also less labor-intensive than direct observations during which the targeted behavior may or may not be demonstrated (Sattler & Hoge, 2006).

While behavior rating scales can be quite useful, there are several cautionary factors which limit their usefulness. First, behavior ratings should never be solely used to determine diagnosis or eligibility for services. Second, rating scales only measure behavior in the present and do not provide information about the history of the problems. Further, rating scales are subjective, that is, based on the report of another individual whether parent or caregiver, which introduces bias (Salvia & Ysseldyke, 2001). Behavior rating scales have been regarded with wariness due to their subjective nature, however, reliability and validity data, particularly on the BASC-2, contradict these concerns (Kent, 2006). Hosp, Howell, and Hosp (2003) demonstrated that behavior ratings scales are a useful component in designing and monitoring behavioral interventions, and thus are

important to the complete process of diagnosing and treating that is accomplished in the school setting.

BASC-2 Externalizing Problems Composite

The Externalizing Problems composite score is comprised of the Hyperactivity, Aggression, and Conduct Problems scales. Externalizing behaviors are disruptive or under-controlled ones, and tend to be more stable, with a worse prognosis than internalizing behaviors. According to Reynolds and Kamphaus (2004), externalizing behaviors have a slightly higher level of interrater agreement than internalizing behaviors, which may be explained by their more obvious nature. Children with hyperactivity, aggression, and conduct problems "readily come to the attention of teachers and health care professionals because they disrupt the activities of both peers and adults, they often are unresponsive to adult direction, and they have more problematic relationships with peers" (Reynolds & Kamphaus, p. 66).

Hyperactivity. No single cause has been identified for hyperactivity; however, a neurological component, environmental agents, genetics, and food additives have been identified as probable causes (NIMH, 2006). The BASC-2 Hyperactivity scale includes behaviors such as making noise, leaving one's seat without permission, talking at inappropriate times, and impulsive responding (Montague & Warger, 1997; Vannest, Reynolds, & Kamphaus, 2008). Hyperactive symptoms increase when activities require sustaining effort or lack appeal (APA, 2000).

Aggression. Aggression is destructive or hostile behavior demonstrated for the purpose of dominance or revenge. It can be object-oriented or person-oriented. When oriented towards other people, aggression is used to gain control or access to a situation or person (Vannest, Reynolds, & Kamphaus, 2008). Aggression can be direct (e.g., kicking), indirect (e.g., telling lies about someone), or relational (e.g., restricting friendship) (Reynolds & Fletcher-Janzen, 2007). The BASC-2 examines both verbal and physical aggression, giving more weight to verbal aggression as it is more common (Vannest et al.).

Conduct problems. Conduct problems are related to Conduct Disorder, which occur in 9% of males and 2% of females (Thackery, 2003). Conduct Disorder includes aggressive conduct, nonaggressive conduct, theft and deceitfulness, and rule violations (Vannest, Reynolds, & Kamphaus, 2008). Aggressive conduct may include destruction of property, fighting, assault, bullying, and stealing. Nonaggressive conduct that falls under conduct problems may include substance abuse, disrupting, and seeking revenge. Lying to attain and stealing without confrontation are acts of deceitfulness and theft. Rule violations include a disregard for rules, truancy, or running away (Vannest et al.). Conduct problems need to be treated early in life, as they tend to be stable behaviors that are rewarding to the perpetrator (Frick, 2006; Tarrolla, Wagner, Rabinowitz, & Tubman 2002; Vannest et al.).

BASC-2 Internalizing Problems Composite

The Internalizing Problems composite score on the BASC-2 consists of the Anxiety, Depression, and Somatization scales. Anxiety, Depression, and Somatization are not acting-out behaviors, and thus, are sometimes referred to as overcontrolled behaviors. Thus, children with internalizing problems are not generally disruptive; however, peer relationships may be disturbed by the symptoms of internalizing problems (Reynolds & Kamphaus, 2004). Somatic complaints in children and adolescents are a common cause of absence from school and can affect daily activities, academic achievement, and overall functioning (Siegel, 1990). Stress in school from peer or academic-related problems can exacerbate somatic complains. Other than these types of complaints, children with internalizing problem behaviors are generally compliant and agreeable, and thus, often their difficulties go unnoticed (Reynolds & Kamphaus).

Anxiety. The characteristics of anxiety on the BASC-2 include nervousness, phobias, self-depreciating behavior, and excessive worry (Reynolds & Kamphaus, 2004). Individuals who experience anxiety may have intrusive thoughts, feel overwhelmed, have a sense of dread, or have obsessive thoughts. Anxiety often occurs with somatic complaints and can be a symptom of depression (Vannest, Reynolds, & Kamphaus, 2008).

Depression. Depression is one of the most common psychiatric problems in children and adolescents. Approximately 8% to 10% of school-aged children show symptoms of depression, as well as approximately 1% of preschool children (APA, 2000). Depression is the leading cause of suicide in adolescents. The BASC-2 criteria for

depression include feelings of sadness, unhappiness, or stress that results in an inability to carry out everyday activities as well as thoughts of suicide (Reynolds & Kamphaus, 2004).

Somatization. Somatic complaints are those that are unexplained by physical symptoms (APA, 2000). Between 0.2% and 2% of women, and less than 0.2% of men experience somatization (APA). Somatization is different from other psychiatric disorders in that it does not reflect a conscious effort to invent symptoms (Vannest, Reynolds, & Kamphaus, 2008). Somatic complaints in children tend to communicate emotional or social problems (Taylor & Garralda, 2003) and often co-occur with mood or anxiety disorders (Reynolds & Kamphaus, 2004).

BASC-2 Adaptive Behavior Composite

The BASC-2 Adaptive Skills composite score is comprised of the Adaptability, Activities of Daily Living, Functional Communication, Social Skills, and Leadership scores. Adaptive Skills are those important for functioning in daily life, with others, at school, at home, and in the community. The scales measure ability to express and control emotions, skills important for daily life, communication ability, and other adaptive skills. Low Adaptive Skills may be indicative of a variety of disorders, including mental retardation and autism (Reynolds & Kamphaus, 2004).

Social skills are particularly important for developing children and adolescents. The ability to identify goals, direct behavior to carry out said goals, and adapt to new situations using flexible strategies for attaining goals are important for building social competence (Landry et al., 2004; Robertson & Knight, 2008). Social skills are imperative

for initiating and maintaining friendships with peers. Children are able to practice empathy, caring, and building intimacy through friendships (Asher et al., 1996). Friendship also provides a sense of belonging, social community, and self-worth, as well as impacts a child's quality of life (Bagwell et al. 1998; Fussell et al. 2005).

Adaptability. Deficits in adaptability manifest as a need for consistency and predictability in daily life. Individuals with these deficits appear rigid and inflexible. Changes in routine can result in behaviors from defiance or resistance to temper tantrums or abandoning tasks. Apparent changes in adaptability may be a sign of anxiety.

Functional communication. Functional communication is important because it enables successful social interactions between the person delivering and the person receiving information (Charlop & Trasowech, 1991; Kaiser, 2000).

Social skills. Social skills are learned behaviors appropriate to particular social situations that are demonstrated in social contexts and can be verbal or nonverbal in nature (Spitzberg & Dillard, 2002; Van Hasselt, Hersen, Whitehill, & Bellack, 1979). Deficits in social skills are common to developmental and psychiatric disorders. There are three categories of social skills deficits: skills or acquisition deficits, performance deficits, and self-control deficits (Gresham, 1981, 1998; Gresham, Sugai, & Horner, 2001). Deficits in social skills indicate a lack of knowledge or understanding of appropriate behavior. A performance deficit is indicated when a skill is known, but not performed or performed in an awkward manner. A self-control deficit is when a maladaptive behavior interferes with the performance of a pro-social skill (e.g., impulsive responding to a question by a child with ADHD; Kavale & Forness, 1996).

Attention Problems

Attention has been described as selective concentration (Anderson, 2004) or sustained focus of cognitive resources at the exclusion of other input (Sohlberg & Mateer, 1989). Attention is thought of as "a class of processes, some dealing with the intensity component (such as alertness and vigilance) and some with the selectivity component of attention (such as selective attention and divided attention)" (Pero et al., 2006, p. 1207). The development of attention is most rapid between the ages of 5 and 13 (Helland & Abjørnsen, 2000). By the age of 7, children are able to focus their attention, and from 7 into early adolescents, sustained attention is developed (Helland & Abjørnsen).

Attention is critical for processing incoming information (Sattler & Hoge, 2006). There are four types of attention: selective/focused, divided, sustained, and alternating/shifting (Baron, 2004). While no single cause for attention problems has been identified, there does seem to be a neurobiological basis involving aberrant and/or disorganized transmission of information (DuPaul & White, 2006; Solden, 1995).

Attention problems are common in developmental and psychiatric disorders. Problems may include distractibility by irrelevant stimuli, lack of follow-through, disorganization, and internal distractions (Vannest, Reynolds, & Kamphaus, 2008). Attention problems have a strong relationship to academic problems – even more so than hyperactivity (Hartley, 1998). Difficulties attending may also indicate learning, externalizing, or internalizing disorder (Barkley et al., 1990; Levine, 1987; Sattler & Hoge, 2006).

Conclusion

There are many similarities between the symptomatologies of TBI, ADHD, and HFA. Individuals with all of the disorders have difficulties with externalizing, internalizing, and adaptive behavior, as well as attention. Differential diagnosis of TBI, ADHD, and HFA can be difficult because peculiarities in communication, social skills, and emotional regulation are common to all three disorders. High rates of co-morbidity across these disorders further complicate diagnosis and subsequently, intervention.

Children with HFA may have been previously diagnosed with ADHD. In addition, children with TBI may be misdiagnosed with HFA or ADHD. Therefore, it is extremely important for the examiner to ask if the child has ever had a head injury when making a diagnostic assessment because of similar symptoms across the disorders, especially in the area of adaptive behavior. Some of the similar symptoms across all three disorders include difficulty making friends and low social contact. However, there are differences in the neurological underpinnings of the disorders. Children with TBI and HFA have social difficulties related to knowledge: understanding facial expressions and theory of mind (e.g. empathy). A key differentiator is that children with ADHD have social deficits not related to knowledge (i.e. they understand proper emotional behavior) but with production (i.e. they do not produce the proper behavior because of impulsivity; Loney & Milich, 1982).

All three disorders are related to negative academic and social functioning which affects school performance. In addition, the IDEA mandates that students be educated in

the LRE. Therefore, it is important to make accurate diagnoses to allow for proper intervention, including the determination of educational setting.

Hypotheses

This study investigated the following hypotheses:

1. There will be distinct profiles for children with TBI, ADHD, HFA, and in the control group based on age, gender, and the BASC-2 PRS scales.
2. There will be significant relationships between disorder (TBI, ADHD, HFA, control group) and the BASC-2 PRS scales, such that:
    a. Children diagnosed with ADHD and HFA will have statistically greater Hyperactivity BASC-2 scores than children with TBI, and the controls group will have statistically lower Hyperactivity BACS-2 scores than children in the three disorder groups.
    b. Children diagnosed with TBI, HFA, and ADHD will have statistically higher Aggression BASC-2 scores than the control group.
    c. Children diagnosed with ADHD will have statistically greater Conduct Problem BASC-2 scores than children with HFA and TBI, and the control group will have statistically lower Conduct Problems scores than the children in the three disorder groups.
    d. Children diagnosed with HFA will have statistically greater Anxiety BASC-2 scores than children with ADHD and TBI, and the control group will have statistically lower Anxiety scores than children in the three disorder groups.

e. Children diagnosed with TBI will have statistically greater Depression BASC-2 subscale scores than children with ADHD and HFA, and the control group will have statistically lower Depression BASC-2 subscale scores than children in the three disorder groups.

f. Children diagnosed with TBI and HFA will have statistically greater Somatization BASC-2 scale scores than children with ADHD, and the control group will have statistically lower Somatization BASC-2 subscale scores than children in the three disorder groups.

g. Children diagnosed with TBI and HFA will have statistically lower Adaptability BASC-2 scale scores than children with ADHD, and the control group will have statistically higher Adaptability BASC-2 scale scores than children in the three disorder groups.

h. Children diagnosed with TBI will have statistically lower Activities of Daily Living BASC-2 scores than children with HFA and ADHD, and the control group will have statistically higher Activities of Daily Living scores than children in the three disorder groups.

i. Children diagnosed with TBI, HFA, and ADHD will have statistically lower Social Skills BASC-2 scores than the control group.

j. Children diagnosed with HFA and TBI will have statistically lower Functional Communication BASC-2 scores than children with ADHD, and the control group will have statistically higher Functional Communication scores than children in the three disorder groups.

k. Children diagnosed with TBI, HFA, and ADHD will have statistically lower Leadership BASC-2 scores than children in the control group.

l. Children diagnosed with TBI, HFA, and ADHD will have statistically lower Attention Problem BASC-2 scores than children in the control group.

CHAPTER III

METHODOLOGY

The purpose of this study was to compare children diagnosed with Attention-Deficit/Hyperactivity Disorder (ADHD), High Functioning Autism (HFA), and Traumatic Brain Injury (TBI) based on several scales on the Behavior Assessment System for Children, Second Edition (BASC-2) Parent Rating Scale as reported by parents and compared to control participants. The following chapter will serve to introduce the participants in the study. The assessment tool utilized will also be discussed.

Participants

Traumatic Brain Injury

The TBI sample for the study consisted of 66 children between the ages of 6 and 21 selected from a database maintained at a pediatric specialty hospital in Dallas, Texas. The database included demographic information and neuropsychological test battery scores for children admitted to this hospital. Demographic information available included assessment number (e.g., initial assessment, second assessment), gender, ethnicity, age, handedness, diagnosis, time since injury, type of head injury (i.e., open or closed head injury), cause of injury (e.g., motor vehicle accident, fall, bicycle accident), whether or not the child was restrained in a motor vehicle accident, and Glascow Coma Scale (GCS) score. Unfortunately, the severity of injury as measured by the GCS was not available for each participant. A Glascow Coma Scale score was available for 32 of the participants. Within this subgroup, GCS scores

ranged from 3 (severe) to 14 (mild; $M = 6.75$, $SD = 3.24$), with a mean in the severe range. The BACS-2 PRS was administered as part of a neuropsychological assessment completed 3 to 84 months post injury ($M = 18.73$, $SD = 18.86$). Participants were treated in accordance with the ethical standards set by the Institutional Review Board of Baylor Hospital system.

Attention-Deficit/Hyperactivity Disorder

The ADHD sample, which consisted of 33 children between the ages of 6 and 21, was derived from archival data gathered in the private practice of a licensed psychologist in northern Texas. The sample was selected based on age and diagnosis of ADHD-Combined Type. Participants sought evaluation after referral by a physician with a suspicion of ADHD. Evaluation of these children consisted of intellectual and achievement testing, a continuous performance test, behavioral ratings from parents and teachers, developmental history and background information from parents, and school observations.

High Functioning Autism

Part of the HFA sample was derived from a previous research study conducted at Texas Woman's University. The goal of the original study was to examine best practices in the assessment of children and adolescents previously diagnosed with high-functioning autism spectrum disorders, which included High Functioning Autism (HFA), Asperger's Disorder, and Pervasive Developmental Disorder - Not Otherwise Specified (PDD NOS). Participants, ages 6 to 21, were gathered in northern Texas via newspaper ads and fliers distributed to local autism societies and at professional conferences. The study utilized instruments to examine cognitive functioning, visual-motor ability, social preferences,

and personality types of the participants. Parents of the participants completed behavior rating scales, parenting stress inventories, developmental history questionnaires, and an assessment of personality type.

The current HFA group consisted of children between the ages of 6 and 21 gathered from both the Texas Woman's University research team data from the study detailed above and in part from the files of the private practice of a licensed psychologist in northern Texas.

Control Group

Control participants between the ages of 6 and 21 were gathered from the data of a previous research team conducted at Texas Woman's University in the School Psychology program. The research team gathered the data as part of a study that compared clinical interview responses of children diagnosed with ASD and a control sample. The BASC-2 was used as a screening device to ensure that the control participants did not meet diagnostic criteria for any emotional or behavioral disorder.

Instruments

Behavior Assessment System for Children, Second Edition (BASC-2)

The BASC-2 "is a multimethod, multidimensional system used to evaluate the behavior and self-perceptions of children and young adults aged 2 through 25 years" (Reynolds & Kamphaus, 2004, p. 1). The intent behind the BASC-2 was to "facilitate the differential diagnosis and educational classification of a variety of emotional and behavioral disorders in children to aid in the design of treatment plans" (Reynolds & Kamphaus, p. 1). The BASC-2 is comprised of five components that can be used

individually or in combination. Three of the components are individually completed rating scales: a Parent Rating Scale (PRS), a Teacher Rating Scale (TRS), and a self-report for students (SRP). The BASC-2 system also includes a Structured Developmental History (SDH) and a behavior observation system (SOS) for recording classroom behavior as it is observed (Reynolds & Kamphaus).

The BASC-2 is designed to be multidimensional, in that it measures aspects of behavior and personality that are both positive (adaptive) and negative (clinical), and thus can aid in diagnosis as well as be used to guide the intervention process (Reynolds & Kamphaus, 2004). The PRS, TRS, and SRP forms of the BASC-2 provide similar, but not identical results, which allow for comparisons between raters and enhance reliability and accuracy of diagnoses. Scales are consistent to provide continuity between raters and over time. The BASC-2 is normed on "large, representative samples and are differentiated according to the age, sex, and clinical statue of the child" (Reynolds & Kamphaus, p. 2). The design of the BASC-2 includes "various types of validity checks to help the clinician detect carelessness or untruthful responding, misunderstanding, or other threats to validity" (Reynolds & Kamphaus, p. 3). The BASC-2 is useful for the full age range of students in preschool through technical school, college, and university. Finally, the BASC-2 provides clear differential diagnoses through "broad content coverage of both clinical and adaptive behavior concerns as well as narrow-band scales" (Reynolds & Kamphaus, p. 3).

The BASC-2 Parent Rating Scale (PRS) was used for the current study as it is "a comprehensive measure of a child's adaptive and problem behaviors in community and

home settings" (Reynolds & Kamphaus, 2004, p. 4). PRS forms are available for three age groups: preschool (ages 2-5), child (ages 6-11), and adolescent (ages 12-21). Respondents rated behaviors on a 4-point sale of frequency (never, sometimes, often, or almost always). For this research project, twelve scales were investigated: Hyperactivity, Aggression, Conduct Problems, Anxiety, Depression, Somatization, Adaptability, Activities of Daily Living, Functional Communication, Social Skills, Leadership, and Attention Problems (Reynolds & Kamphaus).

The BASC-2 PRS norm sample included a total of 4,800 participants with children ages 2 to 18. The sample was drawn from a large sample representative of children across the United States, designed to match the 2001 U.S. population census. Educational professionals who served as site coordinators recruited teachers to participate in the norming project. Teachers distributed information sheets to gather parent education levels, the child's race/ethnicity, and emotional, physical, or behavioral problems extant, as well as consent for their child's participation. PRS forms were collected from one parent of each participant (Reynolds & Kamphaus, 2004).

The BASC-2 scales were reported using linear *T* scores which are not interpretable in the same way as *T* scores in terms of the normal distribution. The psychometric properties of the BASC-2 reported in the manual include information on reliability, long-term stability, and validity. Reynolds and Kamphaus (2004) report on several measures of reliability, including internal consistency, test-retest reliability, and interrater reliability. Internal consistency, which reports the degree to which the items of a scale measure the same ability, is in the low to mid-.90s for the Adaptive Skills

composite and in the middle .80s to middle .90s for the Externalizing and Internalizing Problems composites. Internal consistency reliabilities of the BASC- 2 PRS composites are high and consistent across age groups, between males and females, and at different age levels (Reynolds & Kamphaus).

Test-retest reliability for the BASC-2 was established with the Parent Rating Scale by gathering PRS forms at an interval of 9 to70 days between ratings. The test-retest reliability ratings were found to be in the low .80s to the low .90s for all composite scales except Internalizing Problems on the TRS-C (.78) Median interrater reliabilities were .74, .69, and .77 for the three levels (preschool, child, and adolescent respectively; Reynolds & Kamphaus, 2004).

Interrater reliability describes the level of agreement among raters providing approximately concurrent ratings. For this purpose, each child in this sample was rated by two parents or caregivers. The inter-parent correlations were .74, .69, and .77 for the three levels (preschool, child, and adolescent) while interrater reliability on the composite scores were similar across levels (Reynolds & Kamphaus, 2004).

Reported measures of validity included three types in the BASC-2 manual: factor analysis for grouping the scales into composite scores, pattern of correlations of the PRS scales and composites with other behavior measures, and score profiles of groups of children with specific diagnoses (Reynolds & Kamphaus, 2004). Factor analysis of the BASC-2 utilized the factor structure of the original BASC. The Externalizing Problems (original scales: Hyperactivity, Aggression, and Conduct Problems with the addition of Attention Problems), Internalizing Problems (original scales: Anxiety, Depression,

Somatization, Atypicality, and Withdrawal, with the addition of Adaptability) and Adaptive Scales (original scales: Adaptability, Social Skills, Leadership, Activities of Daily Living, and Functional Communication, with the addition of Anxiety and Attention Problems) were used in final factor loading (Waggoner, 2005).

The BASC-2 manual reports correlations with three other instruments including the Achenbach System of Empirically Based Assessment Child Behavior Checklist (CBCL), the Conners' Parent Rating Scales–Revised (CPRS-R), and the *Behavior Rating Inventory of Executive Functioning* (BRIEF), as well as the original BASC PRS. Correlations with the CBCL overall score were moderate to high for similarly named scales, ranging from .73 to .84. Externalizing Problems correlations ranged from .74 to .83, and Internalizing Problems composites ranged from .65 to .75. Overall scale correlations for the CPRS-R were moderate to high, as were correlations with the BRIEF. Correlations between the BASC and BASC-2 scales are extremely high (Reynolds & Kamphaus, 2004).

Reynolds and Kamphaus (2004) report group profiles of children and adolescents identified with one or more behavioral, emotional, physical, or learning problems. Profiles were generated for the following groups based on the norm sample: Attention-Deficit/Hyperactivity Disorder, Bipolar Disorder, Depression Disorders, Emotional/Behavioral Disturbance, Hearing Impairment, Learning Disability, Mental Retardation or Developmental Delay, Motor Impairment, Pervasive Developmental Disorders, and Speech or Language Disorder.

The BASC-2 PRS provides two types of normative scores, *T* scores and percentiles. *T* scores were the means for comparison on the current study. Reynolds and Kampahus (2004) describe *T* scores as indicating a distance from the mean of the norm-group with a mean of 50 and a standard deviation of 10. Scores ranging from 41 to 59 are in the average range. Scores one to two standard deviations from the mean are in the At-Risk range (60 to 69), and scores greater than two standard deviations from the mean are Clinically Significant (70 and above). Thus, for the composites and individuals scale scores that comprise the problem scales, the higher the score above the average range, the greater the problem. For the Adaptive Scales, scores below the average range (41-59) are problematic (e.g., 31 to 40 is At-Risk and below 30 is Clinically Significant; Reynolds & Kamphaus).

Analysis

After data were collected, data analysis was performed. The following hypotheses were analyzed via the described data analyses procedures.

1. There will be distinct profiles for children with HFA, ADHD, TBI, and in the control group based on age, gender, and the BASC-2 PRS scales.

Cluster analysis was used to determine whether children with HFA, ADHD, TBI, and in the control group cluster into groups based on their BASC-2 PRS scale scores. Cluster analysis is an exploratory technique designed to find natural groupings within a data set with no predefined determination of group membership (SPSS, 1997). In cluster analysis, distances between data points are utilized to determine whether observations should group together in one cluster group or another. While cluster analysis does not

provide perfect groupings within the data, it does allow a high degree of insight into the structure of the data. The SPSS statistical software program was used to perform all statistical analyses.

2. There will be significant relationships between disorder (TBI, ADHD, HFA, control group) and the BASC-2 PRS scales.

A Multivariate Analysis of Variance (MANOVA) was conducted to test differences by diagnostic category on the BASC-2 scales. Univariate effects of groups on each scale were examined if the multivariate effect was significant. For scales with significant univariate effects, post hoc analyses determined specific group differences.

Research Design and Analysis Plan

This research design was a cross-sectional comparison of archival data. The scores on the scales of the BASC-2 PRS served as continuous, dependent variables. Measures of central tendency including means and standard deviations, as well as frequencies and percentages were calculated to describe the diagnostic categories. Relationships between diagnostic category and the demographic variables, age and gender, were examined using crosstabulation χ^2 tests, and Analysis of Variance (ANOVA). Cluster analysis was used to determine whether children with TBI, ADHD, HFA, and in the control group cluster into groups based on their BASC-2 PRS scales. A Multivariate Analysis of Variance (MANOVA) was conducted to test differences by diagnostic category on the BASC-2 PRS scales.

CHAPTER IV

RESULTS

The purpose of the current study is compare children diagnosed with Attention Deficit Hyperactivity Disorder (ADHD), High Functioning Autism (HFA), Traumatic Brain Injury (TBI), and a control group based on the scales on the Behavior Assessment System for Children, Second Edition (BASC-2) as reported by parents. It was hypothesized that each disorder would have a pattern of relative weaknesses as displayed by the aforementioned scales and that the pattern of weaknesses would be unique to each disorder. Cluster analysis was conducted to determine if cohesive clusters could be determined based on the BASC-2 scales. Analyses were conducted through multivariate analysis of variance, cluster analyses, and crosstabulation to determine how diagnoses are related with the BASC-2 scales, as well as how the clusters found compared to the diagnoses of the children.

A total of 192 individuals participated in the current study. The frequencies and percentages for the demographic variables are displayed in Table 1. The majority of respondents were male (72.4%) while females comprised 27.6% of the sample. A greater majority of the respondents were Caucasian (83.3%). The remaining proportions of the sample were African American (5.2%) and Hispanic (11.5%). In terms of diagnosis, 17.2% were diagnosed with ADHD, 26.0% with HFA, 34.4% with TBI and, 22.4% were

the normal control group. Age of participants ranged from 71 months to 252 months, M = 143.58, SD = 40.90 (see Table 2).

Table 1

Frequencies and Percentages of Categorical Demographic Variables

	N	%
Gender		
Male	139	72.4
Female	53	27.6
Ethnicity		
Caucasian	160	83.3
African American	10	5.2
Hispanic	22	11.5
Diagnosis		
ADHD	33	17.2
HFA	50	26.0
TBI	66	34.4
Control	43	22.4

Note: Frequencies not adding to 192 and percentages not summing to 100 reflect missing data.

Table 2

Means and Standard Deviations for Continuous Variables

	N	Mean	*SD*	Min	Max
Age in Months	192	143.58	40.90	71	252

Scores for scale items of the BASC-2 are shown in Table 3. Hyperactivity scores ranged from 34 to 96 with an average score of 58 ($M = 58.13$, $SD = 13.12$). Aggression scores ranged from 36 to 108, with an average score of 56 ($M = 55.97$, $SD = 12.18$) and Conduct Problems scores ranged from a minimum of 34 to a maximum of 99 with an average score of 55 ($M = 54.59$, $SD = 13.35$). Anxiety scores ranged from 30 to 96, with an average score of 54 ($M = 53.55$, $SD = 12.54$) and Depression scores ranged from 35 to 112 with an average of 59 ($M = 59.14$, $SD = 14.82$). The average Somatization score was 51 ($M = 51.13$, $SD = 13.41$) and ranged from 33 minimum to 100.

The average score for Adaptability was 43 ($M = 43.36$, $SD = 11.98$) and ranged from 16 to 69. Social Skills scores ranged 21 to 70 with an average score of 45 ($M = 44.79$, $SD = 11.50$) and Leadership scores ranged from 22 to 75 with an average score of 46 ($M = 45.55$, $SD = 10.87$). The average score for Activities of Daily Living was 42 ($M = 42.42$, $SD = 12.25$) and ranged from 10 to 70. Functional Communication had scores ranging from 14 to 71 with an average score of 42 ($M = 41.92$, $SD = 12.12$). Finally,

scores for Attention Problems ranged from 33 to 93 with an average of 58 ($M = 57.74$, $SD = 11.87$).

Table 3

Means and Standard Deviations for the BASC-2 Scales

	N	Mean	*SD*	Min	Max
Hyperactivity	192	58.13	13.12	34	96
Aggression	192	55.97	12.18	36	108
Conduct Problems	192	54.59	13.35	34	99
Anxiety	192	53.55	12.54	30	96
Depression	192	59.14	14.82	35	112
Somatization	192	51.13	13.41	33	100
Adaptability	192	43.36	11.98	16	69
Social Skills	192	44.79	11.50	21	70
Leadership	192	45.55	10.87	22	75
Activities of Daily Living	192	42.42	12.25	10	70
Functional Communication	192	41.92	12.12	14	71
Attention Problems	192	57.74	11.87	33	93

Crosstab analysis using Pearson's Chi–square and Cramer's *V* tests were conducted to examine the relationships between independent categorical variables. As shown in Table 4, there was a significant relationship between gender and type of diagnosis, $\chi^2(3) = 9.05$, $p < .05$, Cramer's $V = .22$. Specifically, a greater percentage of those diagnosed with HFA were male (30.9% of all male participants) than female (13.2% of all female participants). Furthermore, a greater percentage of the control group were female (34.0%) compared to male respondents (18.0%). There were no significant relationships between the variables of age, ethnicity, and gender, all *ns.*

Table 4

Frequencies and Percentages for Age, Ethnicity, and Diagnosis by Gender

	Male		Female			
	n	%	n	%	χ^2	*p*
Age					.20	.652
6 to 11 Years	68	48.9	24	45.3		
12 to 21 Years	71	51.1	29	54.7		
Ethnicity					.13	.718
Caucasian	115	82.7	45	84.9		
Non-Caucasian	24	17.3	8	15.1		
Diagnosis					9.05	.029
ADHD	24	17.3	9	17.0		
HFA	43	30.9	7	13.2		
TBI	47	33.8	19	35.8		
Control	25	18.0	18	34.0		

The relationship between ethnicity and diagnosis is shown in Table 5. Results failed to reveal a significant relationship between ethnicity and diagnosis, χ^2 (3) = 7.13, *ns*, Cramer's V = .068.

Table 5

Frequencies and Percentages for Diagnosis by Ethnicity

	Caucasian		Non-Caucasian			
	n	%	n	%	χ^2	*p*
Diagnosis					7.13	.068
ADHD	29	18.1	4	12.5		
HFA	46	28.8	4	12.5		
TBI	49	30.6	17	53.1		
Control	36	22.5	7	21.9		

The relationships between diagnosis and gender, age, and ethnicity are shown in Table 6. As previously mentioned, there was a significant relationship between diagnosis and age, χ^2 (3) = 21.76, $p < .001$, Cramer's V = .337. A smaller percentage of those who were between the ages of 6 and 11 years were diagnosed with TBI (25.8%) than those who had been diagnosed with ADHD (51.5%) and HFA (58.0%). Furthermore, a greater percentage of those who are between the ages of 12 and 21 were diagnosed with TBI (74.2%) than who were diagnosed with ADHD (48.5%) and HFA (32.6%). There was also a significant relationship between gender and diagnosis, $\chi^2(3) = 9.05$, $p < .05$,

Cramer's $V = .22$. Of the male participants, a greater proportion were diagnosed with TBI (86.0%) compared to those diagnosed with ADHD (72.7%) and HFA (71.2%). Additionally, of the female participants, a smaller percentage were diagnosed with HFA (14.0%) compared to those in diagnosed with ADHD (27.3%) and HFA (28.8%). There was, however, no significant relationship between diagnosis and ethnicity, $\chi^2(3) = 7.13$, *ns*, Cramer's $V = .193$.

Table 6

Frequencies and Percentages for Gender, Age, and Ethnicity by Diagnosis

	ADHD		HFA		TBI		Control			
	n	%	n	%	n	%	n	%	χ^2	*p*
Gender									9.05	.029
Male	24	72.7	43	86.0	47	71.2	25	58.1		
Female	9	27.3	7	14.0	19	28.8	18	41.9		
Age									21.76	<.001
6 to 11 Years	17	51.5	29	58.0	17	25.8	29	67.4		
12 to 21 Years	16	48.5	21	42.0	49	74.2	14	32.6		
Ethnicity									7.13	.068
Caucasian	29	87.9	46	92.0	49	74.2	36	83.7		
Non-Caucasian	4	12.1	4	8.0	17	25.8	7	16.3		

Relationships between Continuous Variables

Pearson's Product Moment Correlations were conducted to examine the relationships between age and the BASC-2 PRS scale scores. As shown in Table 7, age was significantly positively correlated with the Somatization scores ($r = .153, p < .05$) and Social Skills scores ($r = .146, p < .05$), indicating that older children tended to have higher Somatization and Social Skills scores. Age was not significantly correlated with any of the other BASC-2 scale scores, all *ns*.

Pearson's Product Moment Correlations were also conducted to examine the relationships between the individual BASC-2 scales. As shown in Table 8, children's Hyperactivity, Aggression, Conduct Problems, Depression, Somatization, and Attention Problems were all positively correlated with one another ($rs = .156$ to $.693, p < .05$), indicating that having increased scores on one of these subscales was related to increased scores on the other subscales. The Anxiety scale was positively correlated with hyperactivity, depression, somatization, and attention problems ($rs = .179$ to $.579, p < .05$), indicating that having increased scores on the Anxiety scale was related to increased scores on Hyperactivity, Depression, Somatization, and Attention Problems. Results also showed significant positive correlations between Adaptability, Social Skills, Leadership, Activities of Daily Living, and Functional Communication ($rs = .600$ to $.770, p < .01$), indicating that having increased scores on one of these scales was related to increased scores on the other scales.

Table 7

Pearson Product Moments Correlations of Age and BASC-2 Scale Scores

	Age in Months r
Hyperactivity	.042
Aggression	.038
Conduct Problems	.037
Anxiety	.026
Depression	.132
Somatization	.153 *
Adaptability	.062
Social Skills	.146 *
Leadership	-.015
Activities of Daily Living	.059
Functional Communication	.082
Attention Problems	-.026

Note. $*p < .05$

Table 8

Pearson Product Moment Correlations of BASC-2 Scale Scores

	1	2	3	4	5	6	7	8	9	10	11
2	.682 **										
3	.662 **	.693 **									
4	.179 *	.072	.025								
5	.601 **	.537 **	.477 **	.579 **							
6	.321 **	.251 **	.156 *	.413 **	.471 **						
7	-.667 **	-.595 **	-.477 **	-.260 **	-.656 **	-.294 **					
8	-.529 **	-.486 **	-.402 **	.011	-.450 **	-.158 *	.683 **				
9	-.559 **	-.386 **	-.361 **	-.192 **	-.564 **	-.247 **	.680 **	.756 **			
10	-.597 **	-.460 **	-.492 **	-.158 *	-.516 **	-.178 *	.683 **	.600 **	.731 **		
11	-.607 **	-.431 **	-.419 **	-.208 **	-.526 **	-.212 *	.656 **	.627 **	.770 **	.727 **	
12	.572 **	.464 **	.470 **	.200 **	.508 **	.330 **	-.606 **	-.494 **	-.596 **	-.585 **	-.589 **

Note. *$p < .05$; **$p < .01$; Hyperactivity = 1; Aggression = 2; Conduct Problems = 3; Anxiety = 4; Depression = 5; Somatization = 6; Adaptability = 7; Social Skills = 8; Leadership = 9; Activities of Daily Living = 10; Functional Communication = 11; Attention Problems = 12.

Significant negative correlations were found between the Adaptability, Social Skills, Leadership, Activities of Daily Living, and Functional Communication scales with the Hyperactivity, Aggression, Conduct Problems, Depression, Somatization, and Attention Problems scales (rs = -.178 to -.656, $p < .01$), indicating that increased scores on Adaptability, Social Skills, Leadership, Activities of Daily Living, or Functional Communication were related to decreased scores on Hyperactivity, Aggression, Conduct Problems, Depression, Somatization, and Attention Problems. The Anxiety scale was negatively correlated with Adaptability, Leadership, Activities of Daily Living, and Functional Communication (rs = -.158 to -.260, $p < .05$), indicating that having increased scores on the Anxiety subscale was related to decreased scores on Adaptability, Leadership, Activities of Daily Living, and Functional Communication scales.

BASC- 2 Comparisons

Age

A Multivariate Analysis of Variance (MANOVA) was conducted to examine differences between age groups (6–11 years vs. 12–21 years) on the BASC-2 scale scores. A significant multivariate effect was found, $F(12, 179) = 2.24$, $p < .05$, indicating that the two age groups differed on at least one of the 12 scales. Examination of the univariate effects showed that younger and older participants differed on their Social Skills, $F(1, 190) = 5.25$, $p < .05$, $\eta = .027$ and Activities of Daily Living scores, $F(1, 190) = 4.27$, $p < .05$, $\eta = .022$. As shown in Table 9, adolescents who were between the ages of 12 to 21 years had significantly greater Social Skills scores ($M = 46.59$, $SD = 11.71$) than children who were between the ages of 6 and 11 years ($M = 42.83$, $SD = 10.90$).

Participants who were between the ages of 12 to 21 years also had significantly higher Activities of Daily Living scores ($M = 44.16$, $SD = 11.14$) than children who were under the age of 12 years ($M = 40.53$, $SD = 11.93$).

Table 9

Means and Standard Deviations of BASC-2 Scales by Age

	n	Mean	*SD*	*F*	*p*
Hyperactivity				.02	.878
6 to 11 years	92	57.98	13.60		
12 to 21 years	100	58.27	12.73		
Aggression				.08	.776
6 to 11 years	92	55.71	13.45		
12 to 21 years	100	56.21	10.94		
Conduct Problems				.08	.776
6 to 11 years	92	54.88	13.39		
12 to 21 years	100	54.33	13.38		
Anxiety				.06	.803
6 to 11 years	92	53.32	12.81		
12 to 21 years	100	53.77	12.35		
Depression				1.28	.259
6 to 11 years	92	57.88	14.41		
12 to 21 years	100	60.30	15.16		
Somatization				2.78	.097
6 to 11 years	92	49.46	12.29		
12 to 21 years	100	52.67	14.25		

Note. $F(12, 179) = 2.24$, $p < .01$.

Table 9, continued

Means and Standard Deviations of BASC-2 Scales by Age

Adaptability				2.40	.123
6 to 11 years	92	41.97	12.36		
12 to 21 years	100	44.64	11.53		
Social Skills				5.25	.023
6 to 11 years	92	42.83	10.99		
12 to 21 years	100	46.59	11.71		
Leadership				.82	.365
6 to 11 years	92	44.80	11.93		
12 to 21 years	100	46.23	9.81		
Activities of Daily Living				4.27	.040
6 to 11 years	92	40.53	13.17		
12 to 21 years	100	44.16	11.14		
Functional Communication				1.78	.183
6 to 11 years	92	40.71	12.99		
12 to 21 years	100	43.04	11.21		
Attention Problems				1.50	.222
6 to 11 years	92	58.84	11.73		
12 to 21 years	100	56.74	11.96		

Note. $F(12, 179) = 2.24$, $p < .01$.

Gender

A separate MANOVA was conducted to examine the effect of gender on the BASC-2 scale scores. A significant multivariate effect was found, $F(12, 179) = 1.97$, $p < .05$, indicating that the two gender groups differed on at least one of the 12 scales.

Examination of the univariate effect showed that male and female participants differed on Social Skills, $F(1, 190) = 8.91, p < .01, \eta = .045$, Activities of Daily Living scores, $F(1, 190) = 4.62, p < .05, \eta = .024$, and Functional Communication $F(1, 190) = 5.44, p < .05, \eta = .028$. As shown in Table 10, females had significantly higher Social Skills scores ($M = 48.72$, $SD = 12.19$) than males ($M = 43.29$, $SD = 10.90$). Additionally, females had significantly higher Activities of Daily Living scores ($M = 45.47$, $SD = 13.45$) than males ($M = 41.26$, $SD = 11.61$). Finally, females had significantly higher Functional Communication scores ($M = 45.19$, $SD = 13.16$) than males ($M = 40.68$, $SD = 11.51$).

Table 10

Means and Standard Deviations of BASC-2 Scales by Gender

	n	Mean	*SD*	*F*	*p*
Hyperactivity				1.90	.169
Male	139	58.94	13.18		
Female	53	56.02	12.85		
Aggression				1.78	.184
Male	139	56.69	12.70		
Female	53	54.08	10.57		
Conduct Problems				1.04	.308
Male	139	55.20	13.42		
Female	53	53.00	13.16		
Anxiety				1.76	.187
Male	139	52.81	12.53		
Female	53	55.49	12.47		

Note. $F(12, 179) = 1.97, p < .05$.

Table 10, continued.

Means and Standard Deviations of BASC-2 Scales by Gender

Depression				1.08	.299
Male	139	58.45	14.10		
Female	53	60.94	16.56		
Somatization				1.37	.243
Male	139	50.43	12.80		
Female	53	52.96	14.87		
Adaptability				1.75	.188
Male	139	42.65	11.74		
Female	53	45.21	12.52		
Social Skills				8.91	.003
Male	139	43.29	10.90		
Female	53	48.72	12.19		
Leadership				2.40	.123
Male	139	44.80	10.04		
Female	53	47.51	12.68		
Activities of Daily Living				4.62	.033
Male	139	41.26	11.61		
Female	53	45.47	13.45		
Functional Communication				5.44	.021
Male	139	40.68	11.51		
Female	53	45.19	13.16		
Attention Problems				2.15	.144
Male	139	58.52	11.52		
Female	53	55.72	12.63		

Note. $F(12, 179) = 1.97, p < .05$.

Ethnicity

A separate MANOVA was conducted to examine the effect of ethnicity on the 12 BASC-2 scales. The results revealed that ethnicity did not have a significant effect on the 12 BASC-2 scale scores, $F(12, 179) = 1.25$, *ns*, $\eta = .077$. A deeper examination of the univariate analyses revealed, however, that ethnicity had a significant effect on Hyperactivity, $F(1, 190) = 4.42$, $p < .05$, $\eta = .023$ and Attention Problems scores, $F(1, 190) = 4.01$, $p < .01$, $\eta = .021$. As shown in Table 11, Caucasians had significantly higher Hyperactivity scores ($M = 59.01$, $SD = 12.67$) than non-Caucasians ($M = 53.71$, $SD = 14.62$). Additionally, Caucasians had significant higher Attention Problems scores ($M = 58.51$, $SD = 11.79$) than non-Caucasians ($M = 53.94$, $SD = 11.68$).

Table 11

Means and Standard Deviations of BASC-2 Scales by Ethnicity

	n	Mean	*SD*	*F*	*p*
Hyperactivity				4.42	.037
Caucasian	160	59.01	12.67		
Non-Caucasian	32	53.72	*14.62*		
Aggression				2.30	.131
Caucasian	160	56.56	12.14		
Non-Caucasian	32	53.00	12.12		
Conduct Problems				.09	.762
Caucasian	160	54.73	13.52		
Non-Caucasian	32	53.94	12.66		

Note. $F(12, 179) = 1.25$, *ns*.

Table 11, continued.

Means and Standard Deviations of BASC-2 Scales by Ethnicity

Anxiety				.11	.739
Caucasian	160	53.69	12.42		
Non-Caucasian	32	52.88	13.28		
Depression				1.31	.254
Caucasian	160	59.69	14.87		
Non-Caucasian	32	56.41	14.48		
Somatization				.08	.775
Caucasian	160	51.01	13.64		
Non-Caucasian	32	51.75	12.37		
Adaptability				2.83	.094
Caucasian	160	42.71	11.97		
Non-Caucasian	32	46.59	11.71		
Social Skills				.08	.778
Caucasian	160	44.68	11.83		
Non-Caucasian	32	45.31	9.80		
Leadership				2.34	.128
Caucasian	160	45.01	10.65		
Non-Caucasian	32	48.22	11.72		
Activities of Daily Living				1.71	.193
Caucasian	160	41.91	11.59		
Non-Caucasian	32	45.00	15.10		
Functional Communication				3.21	.075
Caucasian	160	41.23	11.77		
Non-Caucasian	32	45.41	13.38		
Attention Problems				4.01	.047
Caucasian	160	58.51	11.79		
Non-Caucasian	32	53.94	11.68		

Note. F (12, 179) = 1.25, *ns*.

Diagnostic Code

Finally, a MANOVA was conducted to examine the effect of the diagnostic codes on BACS-2 scale scores. A significant multivariate was found, $F(36, 537) = 5.50$, $p < .01$, $\eta = .269$, indicating that diagnosis had a significant effect on at least one of the 12 scales (see Table 12).

Hyperactivity scores. Diagnosis had a significant effect on Hyperactivity scores, $F(3, 188) = 9.88$, $p < .01$, $\eta = .136$. Children who had been diagnosed with ADHD, combined type, had significantly higher Hyperactivity scores ($M = 59.06$, SD 14.02) than children in the control group ($M = 51.14$, $SD = 9.00$). Furthermore, children who had been diagnosed with HFA had significantly higher Hyperactivity scores ($M = 64.88$, $SD = 12.31$) than children who were diagnosed with TBI ($M = 57.11$, $SD = 13.18$) or children in the control group ($M = 51.14$, $SD = 9.00$).

Aggression scores. Diagnosis had a significant effect on Aggression scores, $F(3, 188) = 5.86$, $p < .01$, $\eta = .086$. Children who were in the control group had significantly lower Aggression scores ($M = 50.16$, $SD = 7.53$) than children diagnosed with ADHD ($M = 60.57$, $SD = 12.05$) and HFA ($M = 58.28$, $SD = 13.58$).

Conduct problems scores. Diagnosis also had a significant effect on Conduct Problems scores, $F(3, 188) = 4.44$, $p < .01$, $\eta = .066$. Children who were diagnosed with ADHD had significantly higher Conduct Problems scores ($M = 61.64$, $SD = 14.81$) than children who had been diagnosed with HFA ($M = 53.66$, $SD = 13.31$), with TBI ($M = 54.12$, $SD = 13.98$), or the control group ($M = 51.00$, $SD = 9.00$).

Table 12

Means and Standard Deviations of BASC-2 Scales by Diagnosis

	n	Mean	*SD*	*F*	*p*
Hyperactivity				9.88	<.001
ADHD	33	59.06 [ab]	14.02		
HFA	50	64.88 [b]	12.31		
TBI	66	57.11 [ac]	13.18		
Control	43	51.14 [c]	9.00		
Aggression				5.86	<.001
ADHD	33	60.58 [e]	12.05		
HFA	50	58.28 [e]	13.58		
TBI	66	55.70 [ef]	12.30		
Control	43	50.16 [f]	7.53		
Conduct Problems				4.44	.005
ADHD	33	61.64 [g]	14.81		
HFA	50	53.66 [h]	13.31		
TBI	66	54.12 [h]	13.98		
Control	43	51.00 [h]	9.00		
Anxiety				2.26	.083
ADHD	33	54.85	12.33		
HFA	50	56.82	13.41		
TBI	66	52.29	13.55		
Control	43	50.70	8.97		

Note. F (36, 537) = 5.50, $p < .01$. Means with different superscripts indicate significant differences, $p < .05$.

Table 12, continued.

Means and Standard Deviations of BASC-2 Scales by Diagnosis

Depression				10.92	<.001
ADHD	33	63.42	i	16.61	
HFA	50	65.34	i	13.15	
TBI	66	58.30	i	15.47	
Control	43	49.93	j	8.26	
Somatization				1.78	.152
ADHD	33	51.52		14.07	
HFA	50	54.02		16.31	
TBI	66	51.03		12.93	
Control	43	47.63		8.69	
Adaptability				29.91	<.001
ADHD	33	42.06	k	11.49	
HFA	50	32.74	l	8.18	
TBI	66	47.70	m	11.24	
Control	43	50.05	m	8.24	
Social Skills				24.76	<.001
ADHD	33	44.82	n	11.88	
HFA	50	35.30	o	8.08	
TBI	66	47.24	np	10.20	
Control	43	52.02	p	9.28	
Leadership				27.89	<.001
ADHD	33	44.82	q	11.14	
HFA	50	37.26	r	4.92	
TBI	66	46.35	q	10.62	
Control	43	54.51	s	8.63	

Note. F (36, 537) = 5.50, $p < .01$. Means with different superscripts indicate significant differences, $p < .05$.

Table 12, continued

Means and Standard Deviations of BASC-2 Scales by Diagnosis

Activities of Daily Living					14.38	<.001
ADHD	33	40.18	tu	13.46		
HFA	50	35.38	t	9.53		
TBI	66	43.83	u	12.56		
Control	43	50.16	v	8.20		
Functional Communication					22.96	<.001
ADHD	33	38.85	w	12.35		
HFA	50	34.18	wx	7.22		
TBI	66	42.92	x	11.91		
Control	43	51.74	y	9.61		
Attention Problems					15.30	<.001
ADHD	33	63.58	z	9.16		
HFA	50	63.44	z	7.37		
TBI	66	55.00	aa	13.69		
Control	43	50.86	aa	9.88		

Note. F (36, 537) = 5.50, $p < .01$. Means with different superscripts indicate significant differences, $p < .05$.

Anxiety scores. There was no significant effect of diagnosis on Anxiety scores, F (3, 188) = 2.26, *ns*, $\eta = .035$.

Depression scores. Diagnosis had a significant effect on Depression scores, F (3, 188) = 9.88, $p < .01$, $\eta = .136$. Children who were in the control group had significantly lower Depression scores ($M = 49.94$, $SD = 8.26$) than children with ADHD ($M = 63.42$, $SD = 16.61$), TBI ($M = 58.30$, $SD = 15.47$), and HFA ($M = 65.34$, $SD = 13.15$). Furthermore, children with HFA had significantly higher Depression scores ($M = 65.34$, $SD = 13.16$) than those diagnosed with TBI ($M = 58.30$, $SD = 15.47$).

Somatization scores. There was no significant effect of diagnosis on Somatization scores for any of the groups, F (3, 188) = 1.78, *ns*, $\eta = .028$.

Adaptability scores. As shown in Table 13, diagnosis had a significant effect on Adaptability scores, F (3, 188) = 29.12, $p < .01$, $\eta = .323$. Children diagnosed with HFA had significantly lower Adaptability scores ($M = 32.74$, $SD = 13.15$) than children who were diagnosed with ADHD ($M = 42.06$, $SD = 11.49$), or TBI ($M = 51.03$, $SD = 12.93$), as well as children in the control group ($M = 47.63$, $SD = 8.69$). Children with TBI also had significantly higher Adaptability scores ($M = 51.03$, $SD = 11.24$) than children with ADHD ($M = 42.06$, $SD = 11.49$). Finally, children with ADHD had significantly lower Adaptability scores ($M = 42.06$, $SD = 11.49$) than the control group ($M = 50.04$, $SD = 8.24$).

Activities of daily living scores. Diagnosis had a significant effect on Activities of Daily Living scores, $F(3, 188) = 14.38$, $p = .01$, $\eta = .187$. Children who were in the control group had significantly higher Activities of Daily Living scores ($M = 54.51$, $SD = 8.20$) than the clinical group with ADHD ($M = 40.18$, $SD = 13.46$), HFA ($M = 35.38$, $SD = 4.92$), and TBI ($M = 43.83$, $SD = 12.56$). Additionally, children who had been diagnosed with HFA had significantly lower Activities of Daily Living scores ($M = 35.38$, $SD = 9.53$) than the TBI group ($M = 43.83$, $SD = 12.56$).

Social skills scores. Diagnosis also had a significant effect on Social Skills scores, $F(3, 188) = 24.76$, $p < .01$, $\eta = .283$. Children who were diagnosed with HFA had significantly lower Social Skills scores ($M = 35.30$, $SD = 8.08$) than those with ADHD ($M = 44.82$, $SD = 11.88$), TBI ($M = 47.24$, $SD = 10.20$), and children in the control group ($M = 52.02$, $SD = 9.28$). The control group also had significantly higher Social Skills scores ($M = 52.02$, $SD = 9.28$) than children with ADHD ($M = 44.82$, $SD = 11.88$).

Functional communication scores. Additionally, diagnosis had a significant effect on Functional Communication scores, $F(3, 188) = 22.96$, $p < .01$, $\eta = .268$). Children who were diagnosed with TBI had significantly higher Functional Communication scores ($M = 42.92$, $SD = 11.91$) than children diagnosed with HFA ($M = 34.18$, $SD = 7.22$). Furthermore, the control group ($M = 51.74$, $SD = 9.61$) had significantly higher Functional Communication scores than children diagnosed with ADHD ($M = 38.85$, $SD = 12.35$), HFA ($M = 34.18$, $SD = 7.22$) and TBI ($M = 42.92$, $SD = 11.91$).

Leadership scores. Diagnosis had a significant effect on Leadership scores, F (3, 188) = 27.89, $p < .01$, $\eta = .268$. Children who were diagnosed with HFA had significantly lower Leadership skills ($M = 37.26$, $SD = 4.92$) than in the ADHD group ($M = 44.82$, $SD = 11.14$), TBI group ($M = 46.35$), or the children in the control group ($M = 54.51$, $SD = 8.63$). Children who were in the control group ($M = 54.51$, $SD = 8.63$) also had significantly higher Leadership scores than the ADHD ($M = 44.82$, SD 11.14) and TBI groups ($M = 46.35$, $SD = 10.62$).

Attention problems scores. Finally, diagnosis had a significant effect on Attention Problems scores, F (3, 188) = 15.30, $p < .01$, $\eta = .196$. Children who were diagnosed with ADHD had significantly higher Attention Problems scores ($M = 63.58$, $SD = 9.16$) than children who were diagnosed with TBI ($M = 55.00$, $SD = 13.69$) or the control group ($M = 50.86$, $SD = 9.88$). Furthermore, children diagnosed with HFA had significantly higher Attention Problems scores ($M = 63.44$, $SD = 7.37$) than those with TBI ($M = 55.00$, $SD = 13.69$) or children in the control group ($M = 50.86$, $SD = 9.88$).

Cluster Analysis

Cluster analyses were completed in an attempt to identify homogenous subgroups in this sample of children with ADHD, TBI, HFA, and control group. Analyses were conducted using K Means Cluster analysis, centroid analysis, between-group linkage, and within group linkage initially; however, good agreement between the solutions derived using these methods were not found. Therefore, a variety of agglomerative hierarchical techniques were explored in order to arrive at a parsimonious solution. Examination of the cluster analysis results revealed that using the Ward's method and the Schwarz-

Bayesian method using the squared Euclidean distance as the distance criterion for grouping cases yielded similar results. Ward's method is designed to minimize the variance within clusters at each stage of grouping. This method merges individual participants or groups of participants that result in the least increase in the within-groups sum of squares (Borgen & Barnett, 1987). The Schwarz-Bayesian method is used with large data sets and can rapidly form clusters on the basis of either categorical or continuous data.

Examination of the cluster solutions using these methods suggested the presence of two possible solutions (e.g., a two-cluster solution and a three-cluster solution). Rand's statistic examines the degree of agreement between two clustering methods, and a value of 0.0 indicates a purely chance agreement, while 1.0 indicates a complete agreement between methods. For this analysis, Rand's statistic for the two-cluster solution was .91 and .90 for the three-cluster solution, indicating excellent agreement for both clustering methods. Additionally, Ward's method maximizes between-group differences and minimizes within-group distances. The researcher, therefore, selected Ward's method for the purpose of reporting the results for the cluster analysis of the BASC-2 subscales scores. Each of the cluster solutions is discussed.

Two-Cluster Solution

Descriptive labels were assigned by this researcher to each subtype based on the major features of the profile: Normal Subtype and Overall At-Risk Subtype. The profile for the Normal Subtype did not contain any clinically significant or at-risk level score elevations. In other words, no score fell within the range of scores equal to or greater than 60*T* for the problem behaviors or less than or equal to 40*T* for adaptive skills. Parents of children in this subtype did not express undue concern about their child's psychosocial functioning. This subtype accounted for 45% of the sample. The Overall At-Risk Subtype profile was characterized by at-risk elevations on all scales except for Conduct Problems, Anxiety, and Somatization. Scores on these two subscales fell just outside the at-risk range. Children falling within this subtype appear to have significant difficulties with externalizing behavioral control as well as symptoms related to depression and attention problems. This subtype accounted for 55% of the sample.

For each of the two subtypes in the two-cluster solution, mean BASC-2 scores on all 12 scales were calculated to obtain the profiles presented in Figure 1. Review of the means (below) across subtypes aided in defining the differentiating factors between subtypes.

Crosstab analyses with Cramer's *V* of the two-cluster solution by the demographic variables were conducted to examine if there was a relationship between the two subtypes and demographics. As shown in Table 13, there were no significant relationships between gender, age, and ethnicity and the two subtypes, all *ns*. There was a significant relationship between diagnosis category and the two subtypes, $\chi^2(3) = 63.48$, $p < .01$,

Cramer's $V = .575$. As shown in Table 13, a greater percentage of children diagnosed with ADHD were in the Overall At-Risk Subtype than in the Normal Subtype. Additionally, a greater number of children who had been diagnosed with HFA were clustered in the Overall At-Risk Subtype than were in the Normal Subtype. Furthermore, a greater percentage of children diagnosed with TBI were in Normal Subtype than were in Overall At-Risk Subtype. Finally, a greater percentage of children who were in the control group were in the Normal Subtype than were in the Overall At-Risk Subtype.

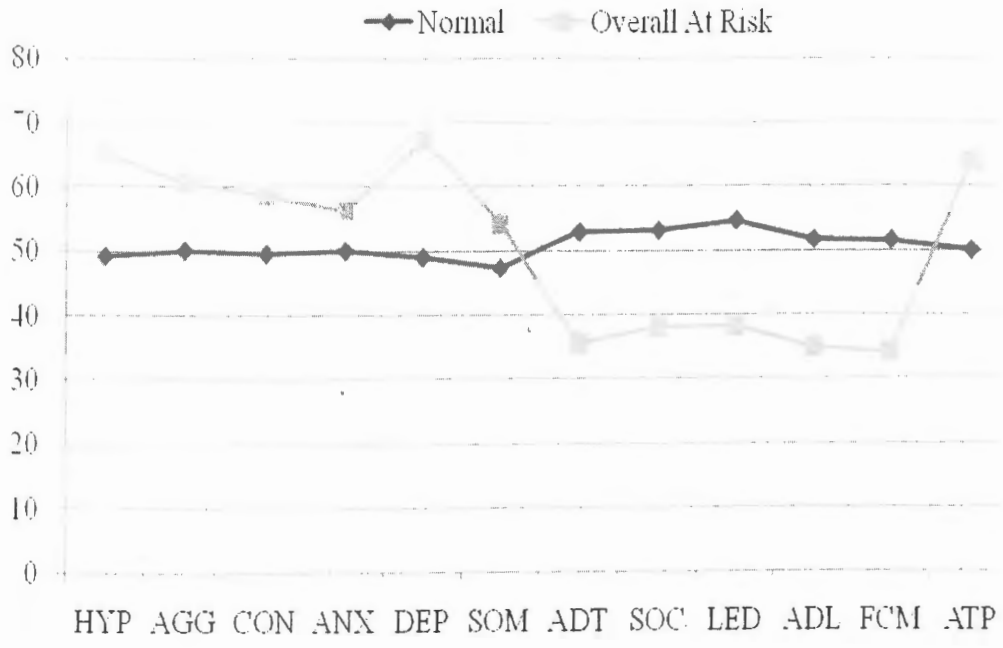

Figure 1. Mean BASC-2 profiles for the two-cluster solution. HYP – Hyperactivity; AGG = Aggression; CON = Conduct; ANX = Anxiety; DEP = Depression; SOM = Somatization; ADT = Adaptability; SOC = Social Skills; LED = Leadership; ADL = Activities of Daily Living; FCM = Functional Communication; ATP = Attention Problems.

Table 13

Percentages of Gender, Age, Ethnicity, and Diagnosis by Two-Cluster Solution

	Cluster			
	Normal Subtype (n = 86)	Overall At-Risk Subtype (n = 106)	χ^2	*p*
Gender			1.91	.167
Male	41.7	58.3		
Female	52.8	47.2		
Age			1.39	.238
6 to 11 Years	43.5	52.0		
12 to 21 Years	56.5	48.0		
Ethnicity			3.30	.069
Caucasian	41.9	58.1		
Non-Caucasian	59.4	40.6		
Diagnosis			63.48	<.001
ADHD	36.4	63.6		
HFA	4.0	96.0		
TBI	54.5	45.5		
Control	83.7	16.3		

A multivariate analysis of variance (MANOVA) was computed with the 12 BASC-2 scales as repeated dependent measures (within-subjects factors) and the two psychosocial subtypes derived from the Ward's method cluster analysis as the between-subject factors. As shown in Table 14, the tests of within-subjects effects demonstrated an overall effect of Ward's two-cluster solution on the BASC-2 subscales, F (12, 179) =

37.70, $p < .01$, $\eta = .717$. Examination of the univariate effects revealed differences between the two subtypes for all 12 of the scales, all *Fs*, $p < .001$. As shown in Table 14, the Normal Subtype had significantly lower scores on the Hyperactivity, Aggression, Conduct Problems, Anxiety, Depression, Somatization, and Attention Problems scales than the Overall At-Risk Subtype. The Normal Subtype also had significantly greater scores on the Adaptability, Social Skills, Leadership, Activities of Daily Living, and Functional Communication than the Overall At-Risk Subtype.

Table 14

Means and Standard Deviations of BASC-2 Scales by Two-Cluster Solution

	Normal (n = 86)		Overall At-Risk (n = 106)			
	Mean	*SD*	Mean	*SD*	*F*	*p*
Hyperactivity	49.27	7.67	65.32	12.21	112.56	<.001
Aggression	50.10	7.73	60.73	13.05	44.32	<.001
Conduct Problems	49.59	8.42	58.65	15.16	24.55	<.001
Anxiety	50.07	9.75	56.38	13.82	12.75	<.001
Depression	49.06	6.96	67.32	14.47	115.3	<.001

Table 14, contiued

Means and Standard Deviations of BASC-2 Scales by Two-Cluster Solution

	Normal (n = 86)		Overall At-Risk (n = 106)			
	Mean	*SD*	Mean	*SD*	*F*	*p*
Somatization	47.33	8.09	54.22	15.90	13.35	<.001
Adaptability	52.97	7.92	35.57	8.57	209.35	<.001
Social Skills	53.16	8.15	37.99	9.09	145.03	<.001
Leadership	54.73	7.44	38.09	6.70	265.11	<.001
Activities of Daily Living	51.72	8.22	34.88	9.50	168.24	<.001
Functional Communication	51.64	8.55	34.04	8.25	209.36	<.001
Attention Problems	50.06	9.44	63.98	9.82	98.78	<.001

Ward's Three-Cluster Solution

For each of the three subtypes in the three-cluster solution, mean BASC-2 scores on all 12 scales were calculated to obtain the profiles presented in Figure 2. Review of the means across subtypes aided in defining the differentiating factors between subtypes. Descriptive labels were assigned by this researcher to each subtype based on the major features of the profile: Normal Subtype, Adaptive Behavior/Attention Problems At-Risk Subtype, and At-Risk/Clinically Significant Problems Subtype.

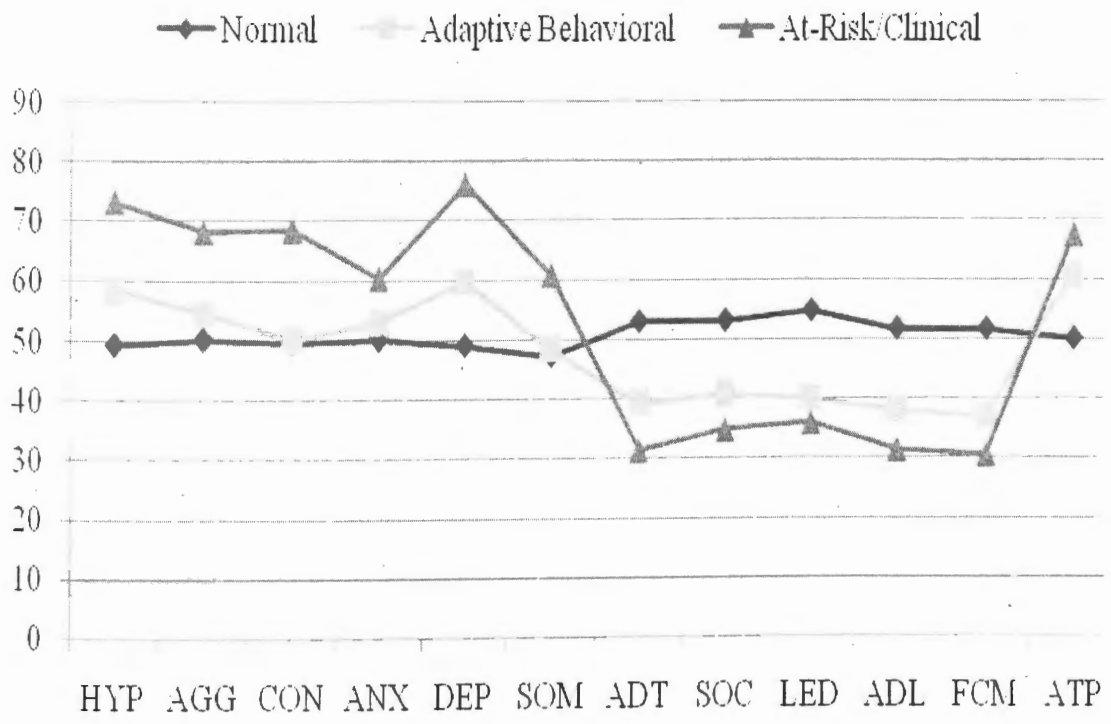

Figure 2. Mean BASC-2 profiles for the three-cluster solution. HYP – Hyperactivity; AGG = Aggression; CON = Conduct; ANX = Anxiety; DEP = Depression; SOM = Somatization; ADT = Adaptability; SOC = Social Skills; LED = Leadership; ADL = Activities of Daily Living; FCM = Functional Communication; ATP = Attention Problems.

The profile for the Normal Subtype did not contain any clinically significant or at-risk level score elevations. In other words, no score fell within the range of scores equal to or greater than 60*T* for the problem behaviors or less than or equal to 40*T* for adaptive problems. Parents of children in this subtype did not express undue concern about their child's psychosocial functioning. This subtype accounted for 45% of the sample and was identical to the Normal Subtype found in the two-cluster solution presented above. The second subtype had a mean BASC-2 profile with at-risk level scores on the Atypicality, Leadership, Activities of Daily Living, Functional Communication, and Attention Problems scales. The Social Skills scale ($M = 40.75$) was nearly at-risk as well. Children in this subtype are likely to suffer from mild problems with attention along with difficulties coping with everyday environment demands. Within the three-cluster solution, this subtype accounted for 30% of the sample. Finally, the At-Risk/Clinically Significant Problems Subtype had a mean BASC-2 profile with clinically significant concerns on the Hyperactivity, Depression, and Functional Communications scales. The means of all other areas measured (Aggression, Conduct Problems, Anxiety, Somatization, Adaptability, Social Skills, Leadership, Activities of Daily Living, and Attention Problems) fell in the at-risk range. The behavioral characteristics of this group include elevated motor activity, depression, and problems expressing ideas and communicating in an adaptive way. This subtype comprised 25% of the sample within the three-cluster subtype.

Crosstab analyses with Cramer's *V* of the three-cluster solution by the demographic variables were conducted to examine if there was a relationship between the

three subtypes and demographics. As shown in Table 15, there were no significant relationships between gender, age, ethnicity and three subtypes, all *ns.*

Table 15

Percentages of Gender, Age, Ethnicity, and Diagnosis by Three-Cluster Solution

	Normal (n = 86)	Cluster Adaptive Behavioral (n = 57)	At Risk/ Clinical (n = 49)	χ^2	*p*
Gender				2.31	.315
Male	41.7	32.4	25.9		
Female	52.8	22.6	24.5		
Age Category				1.56	.460
6 to 11 Years	43.5	50.0	54.0		
12 to 21 Years	56.5	50.0	46.0		
Ethnicity				3.57	.168
Caucasian	41.9	31.9	26.3		
Non-Caucasian	59.4	18.8	21.9		
Diagnosis				65.50	<.001
ADHD	36.4	27.3	36.4		
HFA	4.0	52.0	44.0		
TBI	54.5	24.2	21.2		
Control	83.7	14.0	2.3		

There was, however, a significant relationship between diagnosis and the three subtypes, χ^2 (6) = 65.50, $p < .01$, Cramer's $V = .584$. As shown in Table 15, a greater percentage of children diagnosed with TBI were in the Normal Subtype (54.5%) than were in Adaptive Behavior/Attention Problems At-Risk Subtype (24.2%) or who were in At-Risk/Clinically Significant Problems Subtype (21.2%). A smaller percentage of those diagnosed with HFA were in the Normal Subtype (4.0%) than were in Adaptive Behavior/Attention Problems At-Risk Subtype (52.0%) or in the At-Risk/Clinically Significant Problems Subtype (44.0%). The ADHD group was divided among the subtypes the most evenly, with an equal number of participants in the Normal and At-Risk/Clinical groups (36.4%) and a slightly smaller number (27.3%) in the Adaptive Behavioral Subtype. Finally, a greater percentage of children who were in the control group were in the Normal Subtype (83.7%) than those who were in Adaptive Behavior/Attention Problems At-Risk Subtype (14.0%) or in At-Risk/Clinically Significant Problems Subtype (2.3%).

A multivariate analysis of variance (MANOVA) was computed with the 12 BASC-2 scales as repeated dependent measures (within-subjects factors) as the three psychosocial subtypes derived from the Ward's method cluster analysis was the between-subject factors. The tests of within-subjects effects demonstrated an overall effect of Ward's three-cluster solution on the BASC-2 subscales, F (24, 358) = 18.61, $p < .01$, η = .555. Examination of the univariate effects revealed differences between the three subtypes for all 12 of the scales, all Fs, $p < .001$. As shown in Table 16, At-Risk/Clinically Significant Problems Subtype had significantly greater scores on the

Hyperactivity, Aggression, Conduct Problems, Anxiety, Depression, Somatization, and Attention Problems scales than on Normal Subtype or Adaptive Behavior/Attention Problems At-Risk Subtype.

Table 16

Means and Standard Deviations of BASC-2 Scales by Three-Cluster Solution

	n	Mean		*SD*	*F*	*p*
Hyperactivity					114.89	<.001
Normal	86	49.27	a	7.67		
Adaptive Behavioral	57	58.46	b	9.27		
At Risk/ Clinical	49	73.31	c	10.23		
Aggression					54.81	<.001
Normal	86	50.10	d	7.73		
Adaptive Behavioral	57	54.33	e	9.30		
At Risk/ Clinical	49	68.16	f	12.91		
Conduct Problems					56.85	<.001
Normal	86	49.59	g	8.42		
Adaptive Behavioral	57	50.16	g	7.80		
At Risk/ Clinical	49	68.53	h	15.69		
Anxiety					12.06	<.001
Normal	86	50.07	i	9.75		
Adaptive Behavioral	57	52.88	i	10.95		
At Risk/ Clinical	49	60.45	j	15.70		
Depression					115.11	<.001
Normal	86	49.06	k	6.96		
Adaptive Behavioral	57	59.68	l	9.94		
At Risk/ Clinical	49	76.20	m	13.88		

Note. Subscale means with different superscripts, differed significantly, $p < .05$

Table 16, continued

Means and Standard Deviations of BASC-2 Scales by Three-Cluster Solution

	n	Mean		*SD*	*F*	*p*
Somatization					21.21	<.001
Normal	86	47.33	n	8.09		
Adaptive Behavioral	57	48.49	n	10.45		
At Risk/ Clinical	49	60.88	o	18.47		
Adaptability					132.96	<.001
Normal	86	52.97	p	7.92		
Adaptive Behavioral	57	39.23	q	7.56		
At Risk/ Clinical	49	31.31	r	7.71		
Social Skills					83.87	<.001
Normal	86	53.16	s	8.15		
Adaptive Behavioral	57	40.75	t	8.36		
At Risk/ Clinical	49	34.78	u	8.92		
Leadership					142.30	<.001
Normal	86	54.73	v	7.44		
Adaptive Behavioral	57	39.93	w	5.79		
At Risk/ Clinical	49	35.96	x	7.11		
Activities of Daily Living					97.87	<.001
Normal	86	51.72	y	8.22		
Adaptive Behavioral	57	37.89	z	8.06		
At Risk/ Clinical	49	31.37	aa	9.90		
Functional Communication					122.80	<.001
Normal	86	51.64	bb	8.55		
Adaptive Behavioral	57	37.09	cc	6.27		
At Risk/ Clinical	49	30.49	dd	8.89		
Attention Problems					59.84	<.001
Normal	86	50.06	ee	9.44		
Adaptive Behavioral	57	60.82	ff	9.09		
At Risk/ Clinical	49	67.65	gg	9.44		

Note. Subscale means with different superscripts, differed significantly, $p < .05$

Additionally, as shown in Table 16, Adaptive Behavior/Attention Problems At-Risk Subtype had greater scores on the Hyperactivity, Depression, and Attention Problems scales than the Normal Subtype. Furthermore, the Normal Subtype had greater scores on the Adaptability, Social Skills, Leadership, and Functional Communication scales than the Adaptive Behavior/Attention Problems At-Risk and At-Risk/Clinically Significant Problems Subtypes. The Adaptive Behavior/Attention Problems At-Risk Subtype also had greater scores on the Adaptability, Social Skills, and Functional Communication scales than the At-Risk/Clinically Significant Problems Subtype. Finally, the Adaptive Behavior/Attention Problems At-Risk Subtype had greater scores on Activities of Daily Living than the Normal or At-Risk/Clinically Significant Problems Subtypes.

Further Subtype Analysis

The four-cluster and five-cluster solutions were also examined. Rand's statistic for the four-cluster solution was determined to be .54 and had a distance ranging between 36 and 74. Rand's statistic for the five-cluster solution was .86, but had a distance ranging between 36 and 104. Therefore, the four-cluster and five-cluster solutions were not compared for further analyses (see Figures 3 and 4).

Summary

The results indicated there was an overall multivariate effect of diagnosis on most of the BASC-2 scale scores. Children with ADHD, TBI, and HFA tended to have greater Depression, Aggression, Conduct Problems, Hyperactivity, and Attention Problems scale scores than children in the control group, and they also tended to have lower Leadership,

Functional Communication, Social Skills, Activities of Daily Living, and Adaptability scale scores than children in the control group. The analyses also demonstrated a two-cluster solution as well as a three-cluster solution for children diagnosed with ADHD, HFA, TBI, and in the control group, although the cluster analysis also revealed that there were no consistent four- and five- cluster solutions. The two-cluster and three-cluster solutions, although consistent, did not demonstrate a clear and concise solution in that children with ADHD, TBI, and HFA were interspersed and did not cluster into individual clusters, as expected.

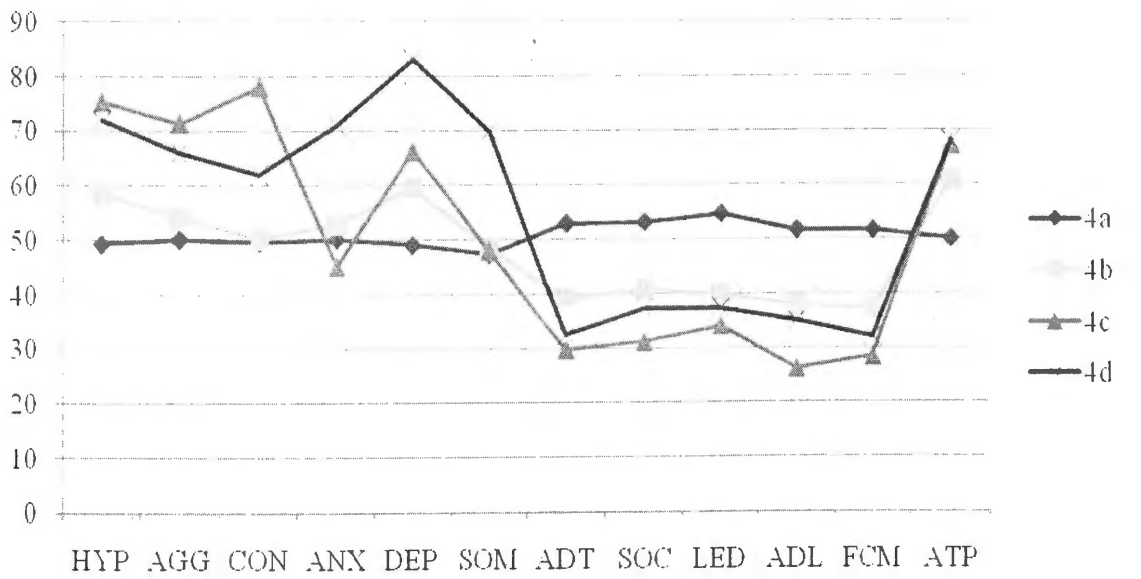

Figure 3. Mean BASC-2 profiles for the four-cluster solution. HYP – Hyperactivity; AGG = Aggression; CON = Conduct; ANX = Anxiety; DEP = Depression; SOM = Somatization; ADT = Adaptability; SOC = Social Skills; LED = Leadership; ADL = Activities of Daily Living; FCM = Functional Communication; ATP = Attention Problems.

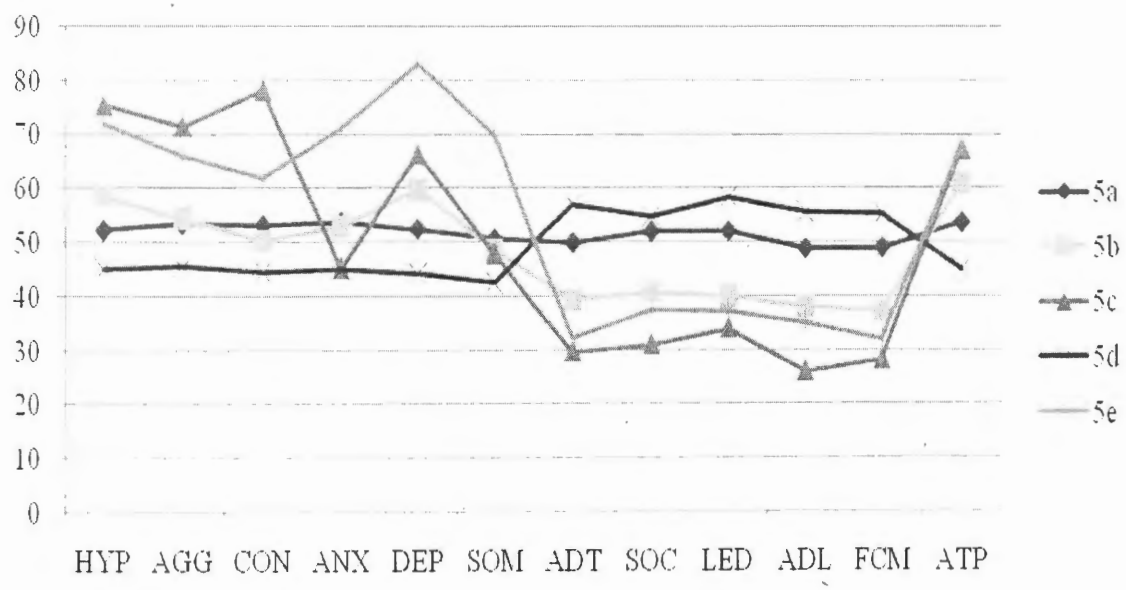

Figure 4. Mean BASC-2 profiles for the five cluster solution. HYP – Hyperactivity; AGG = Aggression; CON = Conduct; ANX = Anxiety; DEP = Depression; SOM = Somatization; ADT = Adaptability; SOC = Social Skills; LED = Leadership; ADL = Activities of Daily Living; FCM = Functional Communication; ATP = Attention Problems.

CHAPTER V

DISCUSSION

The previous chapters discussed research on Attention Deficit Hyperactivity Disorder (ADHD), High Functioning Autism (HFA), and Traumatic Brain Injury (TBI) with regard to the Behavior Assessment System for Children, Second Edition (BASC-2) scales investigated and described the current study. The final chapter of this study is divided into five sections. The first section of this chapter restates the purpose of this study. The second section integrates study findings with relevant literature. Explanations are posited to better understand study outcomes, and thoughts and opinions are explored as related to current data. The third section reports implications of the findings relevant to practice as a school psychologist. Several significant results were reported with regard to the current research and they will be further examined in the balance of this chapter. In addition, limitations of the current study, implications for use in practice, and suggestions for future research will be discussed. The fourth section addresses future research options. The chapter will conclude with an overall summary.

Purpose of the Study

The purpose of the current study was to compare parents' ratings of children diagnosed with ADHD, HFA, TBI, and a control group on the BASC-2 Parent Rating Scale (PRS). The BASC-2 is an integrated assessment system for emotional and behavioral difficulties in children and adolescents (Reynolds & Kamphaus, 2004). It is an

omnibus measure used to obtain a comprehensive view of a child's behavior (Jarratt et al., 2005). The BASC-2 PRS yields composite scores for Externalizing behaviors (Hyperactivity, Aggression, and Conduct Problems), Internalizing behaviors (Anxiety, Depression, and Somatization), and Adaptive behaviors (Adaptability, Activities of Daily Living, Functional Communication, Social Skills, and Leadership), as well as a score for Attention Problems. The current study was conducted in order to add to the overall knowledge base in the field of school psychology and aid practitioners in differentially diagnosing disorders based on unique profiles on the BASC-2 PRS. The intent is that this information be used to help school psychologists develop specific evidence-based interventions dependent on accurate diagnosis.

Study participants were gathered from several archival data sets. Participants (n = 50) in the TBI group were selected from an archival sample of children and adolescents who sustained closed-head TBI from the records of Our Children's House at Baylor. The ADHD group data (n = 33) and part of the HFA group data were derived from a private practice of a licensed psychologist in northern Texas. Additional HFA data were obtained from a previous research study at Texas Woman's University, as were the control group data. Participants were between the ages of 6 and 21 years with a slightly varied racial group composition. The majority of the participants were Caucasian and male. Correlations between age, ethnicity, and gender were also examined to further explore the sample.

Findings

Examination of Research Question # 1

There will be distinct profiles for children with TBI, ADHD, HFA, and in the control group based on age, gender, and the BASC-2 PRS scales.

The cluster analysis found a two- and a three-cluster solution. Diagnosis did not necessarily overlap with the clusters. The clusters show that there are groupings on other factors, pulling children from each of the four groups. Thus, behavioral symptoms do not seem to be as diagnosis-specific as diagnostic categories would imply that they are. Inspection of the prevalence rates for the clusters in the two-and three-cluster solutions reveals that parents of 84% of the children in the Control Group have no or limited concerns regarding their children's behavior. The HFA children grouped together the best, with 96% of the children diagnosed with HFA falling in the Overall At-Risk Subtype in the two-cluster solution. Overall, 64% of participants fell in the Overall At-Risk subtype (ADHD = 64%; TBI = 46%; Control = 16%). The rest of the sample fell into the Normal Subtype, indicating that over half the parents of the children with TBI did not report problematic behaviors. In the three-cluster solution, the Normal Subtype contained the same children as in the two-cluster solution (Control = 84%; TBI = 55%; ADHD = 36%; HFA = 4%) while the Overall At-Risk Subtype in the two-cluster solution was broken down further into the Adaptive Behavior / Attention Problems At-Risk Subtype (HFA = 52%; ADHD = 27%; TBI = 24%; Control = 14%) and the At-Risk / Clinically Significant Subtype (HFA = 44%; ADHD = 36%; TBI = 21%; Control = 2%) in the three-cluster solution.

The Adaptive Behavior/Attention Problems At-Risk Subtype in the three-cluster solution includes no areas of clinically significant parent concern; however, it demonstrates mildly problematic behavior in adaptive areas (all but Social Skills) and with attention. Children in this subtype will have difficulty coping with everyday environmental demands, which may be further impacted by problems attending.

Children with HFA comprise the greatest percentage of the most severe (At-Risk / Clinically Significant Problems Subtype) cluster in the three-cluster solution, as well as the two-cluster solution. Children in the At-Risk/Clinically Significant Subtype presented with clinically significant parent concerns in the areas of Hyperactivity, Depression, and Functional Communication. Estimates in the literature of comorbid depression and ADHD range from 3% to 75% (Biederman et al., 1991), and various studies have demonstrated that children with ADHD report more depressive symptoms than those without ADHD. Thus, it is likely that children in this subtype will be diagnosed with ADHD, have symptoms of depression, and poor skills with which to communicate their emotional state. Internalizing problems in children who also have acting out behaviors may be overlooked, as the internalizing behavior may not cause problems for others. Within a school/clinical setting, the exploration of possible depression is signaled by this subtype.

Clusters were examined for significant results in demographic variables including age, gender, and ethnicity. There were no significant relationships between gender, age, ethnicity and the three subtypes.

Examination of Research Question # 2

The current study included several hypotheses which examined the differences between group (ADHD, HFA, TBI, and the control group) and BASC-2 PRS scores on the 12 scales included in this study. It was posited that there would be significant relationships between disorder (TBI, ADHD, HFA, control group) and the BASC-2 PRS scales. The research question was supported; however, results were not identical to hypotheses.

Externalizing behaviors: hyperactivity, aggression, and conduct problems. The current study included several hypotheses that examined differences between diagnosis groups and externalizing behaviors. Several correlations were found. Children who had been diagnosed with ADHD had significantly higher Hyperactivity scores than children in the control group, which would be expected as hyperactivity is one of the criteria for diagnosis of two subtypes of ADHD. Children who had been diagnosed with HFA had significantly higher Hyperactivity scores than children who were diagnosed with TBI or children in the control group. This is not surprising as more than 50% of children and adolescents on the autism spectrum exhibit symptoms of hyperactivity (Lecavalier, 2006).

An especially interesting finding of this study was that children rated high on Hyperactivity were more likely to have significantly higher Aggression, Conduct Problems, Anxiety, Somatization, and Attention Problem scores than children with lower Hyperactivity scores. In addition, Hyperactivity had a significant negative correlation with Adaptability, Social Skills, Leadership, Activities of Daily Living, and Functional

Communication scales. These findings indicate that children with significantly elevated Hyperactivity scores will likely have problems in all other BASC-2 areas measured in this study.

Regarding Aggression, children who were in the control group had significantly lower Aggression scores than children who were diagnosed with ADHD or with HFA. High Aggression scores were associated with significantly more problems with conduct, depression, somatization, attention, social skills, leadership, activities of daily living, and functional communication. Children with TBI had higher scores than those in the control group; however, scores did not reach significance. This finding does not support the literature which says children with moderate to severe TBI tend to have more problems with aggression (Greve et al., 2001). There may be two reasons for the disparity: children with TBI tend to exhibit verbal aggression more often than physical aggression, which may account for parent ratings (Dyer et al., 2006) and children in the current study may have had milder TBI than those studied in Dyer et al.'s study.

As was expected, children who were diagnosed with ADHD had significantly higher Conduct Problem scores than children who had been diagnosed with HFA, TBI, or were in the control group. Children with ADHD are at risk for substance use (Biederman et al., 1997), criminal involvement (Sattlerfield et al., 1982; Weiss et al., 1971), and oppositional behavior (Maniadaki et al., 2006). Children in the current study with high Conduct Problems scores were more likely to have problems with depression, somatization, attention, adaptability, social skills, leadership, activities of daily living, and functional communication.

Internalizing behaviors: anxiety, depression, and somatization. The current study also included several hypotheses that examined differences between diagnosis group and internalizing behavior. Correlations were also found for these variables. No diagnosis group was more likely to have elevated Anxiety scores. However, children with high Anxiety scores were significantly more likely to have problems with depression, somatization, attention problem, adaptability, leadership, activities of daily living, and functional communication. This was a surprising finding, as other studies have found anxiety to be highly prevalent in children with HFA (Muris, Steerneman, Merckelbach, Holdrinet, & Meesters, 1998; Thede & Cooldiage, 2007). One possible explanation for this finding may be that the most common type of anxiety in children with HFA, specific phobias, may not be captured in the BASC-2 PRS.

Regarding Depression, children in the control group had significantly lower Depression scores than children in the three diagnosis groups. Furthermore, children with TBI had significantly lower Depression scores than children who had been diagnosed with HFA and ADHD. Children with elevated Depression scores were likely to have problems with somatization, attention, adaptability, social skills, leadership, activities of daily living, and functional communication. The literature regarding HFA and depression indicates that depression is often difficult to diagnose in this population due to communication problems (Lord & Paul, 1997). This result may indicate that the BASC-2 PRS is able to hone in on signs of depression in this population, which should be explored further. Another possible explanation for the results could be that parents of children with HFA perceive their children as depressed.

No diagnosis group was significantly more likely to have elevated Somatization scores. However, older children were more likely to have significantly more problems with somatization than were younger children. Children with higher Somatization scores tended to have more problems with attention, adaptability, social skills, leadership, activities of daily living, and functional communication.

Adaptive behaviors: adaptability, social skills, leadership, activities of daily living, and functional communication. The current study also included several hypotheses which examined differences between diagnosis group and adaptive behavior. Correlations were also found for these variables. For all groups, problems in the areas of Adaptability, Social Skills, Leadership, Activities of Daily Living, and Functional Communication were negatively correlated with Attention Problems. Thus, children with adaptive behavior difficulties will likely have attention problems.

Children who were diagnosed with HFA had significantly lower Adaptability scores than children who were diagnosed with ADHD, TBI, or in the control group. Children with TBI also had significantly higher Adaptability scores than children with ADHD. Finally, children with ADHD had significantly lower Adaptability scores than children who were in the normal control group. Thus, children with HFA were found to have the lowest Adaptability levels of the four groups compared. This is consistent with previous research regarding this population's difficulty adapting to changes in the environment (Bartak & Rutter, 1976; Russell & Sofronoff, 2005). However, previous literature has posited that anxiety plays a major role in problems with adaptability (Green et al., 2006) and anxiety was not found to be a significant problem for this population in

this study. Adaptability problems were correlated with attention, social skills, leadership, activities of daily living, and functional communication problems.

Children in the control group had significantly higher Activities of Daily Living scores than children in the three diagnosis groups. Additionally, children with HFA had significantly lower Activities of Daily Living scores than children who had been diagnosed with TBI. Children with higher Activities of Daily Living scores were more likely to have significantly higher Functional Communication scores and significantly lower Attention Problems scores.

Social Skills deficits are generally found in children with ADHD, HFA, and TBI. In the current study, children with ADHD, TBI, and in the control group had significantly better Social Skills than children with HFA. This finding was similar to those found by Barnhill et al. (2000) who studied social skills ratings of children with HFA by their parents. However, according to the literature, children with TBI tend to have poor self-regulation skills and tend to be aggressive in social interactions (Ganesalingam et al., 2007). They also tend to be less socially competent overall (Andrews, Rose, & Johnson, 1998). In the current study, children with ADHD had significantly lower Social Skills scores than those in the control group. This finding is supported in the literature: children with ADHD have been shown to have impaired social skills and this is frequently an area of intervention for these children (Fussell et al., 2005). It was also found that age correlated with social skills in that children who were older tended to have better Social Skills scores than younger children. It has been demonstrated that theory of mind is associated with social behavior in children (Astington & Jenkins, 1995).While children

with developmental disorders may be taught theory of mind, social skills may never be easy or come naturally. Older children may also have better social skills because children with developmental disorders are taught social skills as they age. When Social Skills were low, leadership, activities of daily living, functional communication, and attention also tended to be problematic. Thus, social skills have quite an impact on other areas of adaptive behavior.

In the area of functional communication, children with HFA had significantly lower Functional Communication scores than children who had been diagnosed with TBI. Furthermore, children in the control group had significantly higher Functional Communication scores than children within the three diagnosis groups. This was a surprising finding, as there is very little literature regarding functional communication problems in children with ADHD. According to the literature, children with TBI and HFA have particular difficulties in the area of functional communication (Coehla et al., 1991; Klin et al., 2007; McDonald, 1993), but children with ADHD are not presented as having problems in this area. The present study found that children with good functional communication were found to have fewer attention problems.

Leadership is an area with little scientific research in the TBI, HFA, and ADHD populations. In the current study, children with HFA were found to have significantly lower Leadership skills than children with ADHD, TBI, and in the control group, with children in the control group having significantly higher Leadership scores than children with ADHD and TBI. Thus, all three groups were found to have low ratings on

Leadership skills, which impacted their scores on Activities of Daily Living, Functional Communication, and Attention Problems.

Attention Problems. The current study found that children with ADHD and HFA had significantly more Attention Problems than children with TBI or in the control group. This finding contradicts the findings that attention and concentration are significantly impaired in children post-TBI (Sattler & Hoge, 2006; Yeates, 2004) and are among the most common problems for this population (Leclerq, Deloche, & Rousseaux, 2002; Van Zomeren & Brouwer, 1994). This may be accounted for by the fact that in the current study, there was a greater percentage of older children (between the ages of 12 and 21) in the TBI group, and children who suffered TBI at a young age tend to have worse outcomes for attention (Dennis et al., 2000). Ewing-Cobbs et al. (1998) also examined attention in younger children (ages 5 to 8 years) after TBI and found that, regardless of the severity of the injury, younger children had worse attention scores than older children with TBI. Another possible explanation for children with TBI not demonstrating problems with attention, as would be expected based on the literature, is that the deficits have yet to manifest. Depending on how soon after the injury the BASC-2 PRS was administered, parents of these children may have not seen the full effects of the injury.

The finding of the current study regarding attention difficulties in children with ADHD and HFA are consistent with the literature. Attention deficits are part of the constellations of clinical symptoms common to children with HFA (Lecavalier, 2006). Deficits have been found in focused attention (Kaland et al., 2008) and shifting attention (Courchense et al., 1994; Sargeant, Geurts, & Oosterlaan, 2002). A majority of Children

with ADHD are diagnosed with inattentive type, as opposed to hyperactive-impulsive or combined type (Nolan et al., 2001). As discussed previously, attention problems are often attributed to ADHD when another diagnosis would be more appropriate (Baxter & Rattan; Jensen et al., 1997; Levine, 1987).

Limitations

As with most research, there are several limitations to the current study that need to be addressed. First, due to sampling limitations, the participants were mainly Caucasian (83.3%) and male (72.4%), which is not consistent with national ratios. Future studies may wish to include females and children from more diverse ethnicities. Limitations exist in the ability to utilize study outcomes with diverse racial groups due to the extensive amount of study participation by parents of Caucasian children.

Another limitation of the current study is an issue of diagnosis. In the HFA group, there were children previously diagnosed with Asperger's disorder, High Functioning Autism, and Pervasive Developmental Disorder – Not Otherwise Specified by a variety of practitioners. These diagnoses were lumped into one group (i.e., HFA), which is consistent with current research; however, the issue of autism spectrum disorder diagnosis is controversial (Macintosh & Dissanayake, 2004, 2006; Thede & Coolidge, 2007).

Another limitation is sample size as it was rather small in comparison to other studies looking at similar variables. The small sample size may be partially accounted for by the prevalence among the general population of the studied disorders. Regardless, small sample size negatively affects power and may cause misleading results (i.e., a

significant difference is missed; Howell, 2007). Another limitation to be considered is that the design of the current study was quasi-experimental; thus, conclusions about the independent variables affecting the dependent variables cannot be definitively made.

Recommendations for Future Research

The current study's findings indicate the need for further research in several areas. Research on hyperactivity and how parent perception of hyperactivity affects perception of all other aspects of the child's behavior should be conducted. The current research found that all other scales studied on the BASC-2 were correlated with high scores on the hyperactivity scale. More research is needed to confirm the findings produced in this study. Additional research could focus on whether the BASC-2 PRS hyperactivity scale affects all other BASC-2 PRS scales and could also investigate teacher perceptions as well. Future efforts could be focused on understanding why hyperactivity seems to affect so many other areas of behavioral ratings by parents.

As was evident in the review of the literature, children with a variety of developmental and psychiatric diagnoses have overlapping symptoms and co-morbidities, which can lead to difficulties in diagnosis (McConaughy & Ritter, 2002; Sattler & Hoge, 2006). According to Kamphaus et al. (1997), when research is limited to only diagnostic groups, opportunities for prevention and early intervention are lost. The current research offers means of further distinguishing subtypes of child behavior to allow for the development of more targeted interventions. Future research should investigate the clinical validity, or perceived meaningfulness and relevance, of behavioral subtypes to practitioners of school psychology. Longitudinal investigations should also be conducted

in the future to evaluate the stability of the clusters over time, developmental trajectories, and differential response to treatment.

Additional research could focus on leadership in children with ADHD, HFA, and ADHD, as well are other developmental and psychiatric disorders. Leadership skills are those that are involved in accomplishing goals and working with others. Leadership skills are important for adaptive functioning and cooperating with others in group situations. The findings of the current study indicate that children with TBI, ADHD, and HFA have significantly more problems in this area than children in the control group, leading to a need for research regarding leadership and these populations. Children with HFA were found to have particularly low leadership scores as well as social skills scores. Further research could focus on children with HFA, the connection between social skills and leadership skills, and building evidence-based interventions to assist this population in acquiring these skills.

Future research should also be conducted examining the use of the BASC-2 with the HFA population for examining anxiety-related behaviors. Contrary to other research studies, the current study did not find children with HFA to have elevated anxiety scores on the BASC-2. While anxiety is not a defining feature of autism, the rates of comorbidity are very high, with the most common type of anxiety being specific phobias (Muris, Steerneman, Merckelbach, Holdrinet, & Meesters, 1998). Other work found that the HFA population score significantly higher on measures of generalized anxiety disorder than the general population (Thede & Coolidge, 2007). Furthermore, even when children with HFA do not have clinical levels of anxiety, they tend to have more

symptoms than the general population (Russell & Sofronoff, 2005). Thus, future research should attempt to discern why the BASC-2 did not demonstrate significant anxiety-related behaviors in the current study.

Another possible avenue for future research concerns functional communication and ADHD. There is little literature regarding communication deficits in children with ADHD. The current study found that children with ADHD had significantly lower Functional Communication scores than children in the control group. The present study also found that children with good functional communication were found to have fewer attention problems. Thus, this may be an area of interest for future investigation.

Additional future research could be conducted on the same or a similar sample by splitting the TBI group based on severity of injury as indicated by the GCS and/or time since injury. There may be differences in parent ratings based on the severity of injury as well as how much time has elapsed since the injury. Longitudinal research on the same children will also help to understand parent ratings based on their child's recovery.

Lastly, future research with the same diagnostic groups could be conducted using the content scales of the BASC-2. The content scales available on the BASC-2 are: Anger Control; Bullying; Developmental Social Disorders; Ego Strength; Emotional Self-Control; Executive Functioning; Mania; Negative Emotionality; Resiliency; and Test Anxiety.

Summary

Federal regulations require that schools provide psychometrically sound assessment and specially designed evidence-based interventions for children with identified disabilities, including autism, traumatic brain injury, other health impairment, such as attention deficit hyperactivity disorder (Sattler & Hoge, 2006). Specially designed interventions meet the unique needs of a child with a disability and adapt the content, methodology, or delivery of the intervention to those particular needs. Due to the overlap of behavioral symptoms and comorbidities in ADHD, HFA, and TBI, it can be difficult, especially in the absence of a detailed developmental history, to accurately diagnose children.

The current study found several correlations between diagnostic groups and BASC-2 PRS scales. High Hyperactivity scores were associated with significantly problematic behaviors on all other problem behavior, adaptive behavior, and attention problems scales. Children diagnosed with ADHD had significant behavior as rated by parents in all externalizing behavior scales. Regarding internalizing behaviors, children in the three diagnostic groups were more likely to display depressive symptoms than children in the control group, with children with HFA presenting with the most symptoms. All adaptive behaviors (i.e., Adaptability, Social Skills, Leadership, Activities of Daily Living, and Functional Communication) were negatively correlated with Attention Problems, indicating that children with adaptive behavior difficulties will also be likely to have attention problems. Children with ADHD and HFA were found to have significantly more Attention Problems than children with TBI or in the control group.

The results of this study provide valuable information in addition to the traditional *DSM-IV-TR* (2000) and school-based diagnoses. The application of the cluster analytic methods revealed a typology of the full range of child behavior from a normal subtype to one with at-risk and clinically significant features. Despite differing diagnostic group membership (i.e., ADHD, HFA, TBI, control), children from all three diagnostic categories, as well as the control group, were represented in each of the clusters. Thus, diagnostic categories do not always capture the set of problems with which children with these disorders exhibit. The subtypes presented in the current research present another way of looking at children based on their behavioral strengths and weaknesses and can aid in the development of interventions by identifying the behavioral needs of each child.

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APPENDIX A

Predicted versus Found Results

Problem Behavior Scales

	PREDICTED	FOUND	SIGNIFICANCE
Hyperactivity	ADHD/HFA > TBI/C All > C	ADHD > C HFA > TBI/C	Children with high Hyperactivity had problems on all other scales. Contradicts the literature – TBI and Control did not differ
Aggression	ADHD/HFA/TBI > C All > C	ADHD/HFA > C	TBI - Tend to exhibit more verbal v. physical aggression which might account for the rating – Contradicts the literature
Conduct Problems	ADHD > HFA/TBI All > C	ADHD > HFA/TBI/C	As expected, children with ADHD had high incidence of CP (i.e., substance use, running away, lying, stealing, etc.)
Anxiety	HFA > ADHD/TBI All > C	No Effect	Lots of research on HFA and Anxiety. Specific phobias are most common in HFA – BASC-2 questions may not be sensitive to this
Depression	TBI > ADHD/HFA All > C	HFA > TBI All > C	Hypothesized due to difficulties diagnosing dep. in HFA – perhaps BASC-2 is sensitive to this OR parents of HFA perceive children as depressed
Somatization	TBI/HFA > ADHD All > C	No Effect	Contradicts the literature, particularly for TBI and HFA

Adaptive Behavior Scales

	PREDICTED	FOUND	SIGNIFICANCE
Adaptability	ADHD >TBI/HFA C > All	TBI > ADHD C/ADHD/TBI > HFA C > ADHD	HFA had lowest levels as consistent with research – link between Anxiety and Adaptability in literature didn't show in this study
Activities of Daily Living	HFA/ADHD > TBI C > All	TBI > HFA C > All	All were found to have lower ADL scores than Controls. TBI had best – could be a function of kids in the TBI group?
Social Skills	C > All	C > ADHD/TBI > HFA	As expected, all three had worse than control. HFA had worst – there is no literature comparing these groups, but all three had poor skills in the literature
Functional Communication	ADHD > HFA/TBI C > All	TBI > HFA C > All	There is no literature ADHD having problems with functional communication.
Leadership	C > All	C > TBI/ADHD > HFA	As expected, all three had poor skills. Little lit.
Attention Problems	All > C	ADHD/HFA > TBI/C	Contradicts findings about TBI commonly impairing attention – could be b/c my sample had more older children and younger children tend to have worse attn. outcomes OR deficits have yet to manifest
CLUSTERS	Clustering by diagnosis	2- and 3-cluster solutions did not cluster by diagnosis – Control group was more cohesive, but not entirely	Further research needs to be done to determine how these clusters relate to diagnoses. Behavioral symptoms do not seem to be as diagnosis-specific as diagnostic categories would imply they are.