

THE NEUROCOGNITIVE IMPLICATIONS OF DEPRESSIVE  
SYMPTOMS IN YOUTH

A Dissertation

by

KRISTEN MARIE GSANGER

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

August 2005

Major Subject: School Psychology

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## ABSTRACT

The Neurocognitive Implications of Depressive

Symptoms in Youth. (August 2005)

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Research indicates that cognitive and neuropsychological functions are adversely affected by symptoms of depression (Teeter & Semrud-Clikeman, 1997). In addition to deficits in attention and memory, depressive symptomatology may impact one's executive functioning abilities. Over the last several decades, a number of studies have investigated the effects of internalizing symptoms on neurocognitive function in adults (e.g., Beats, Sahakian, & Levy, 1996; Channon & Green, 1999; Fossati, Coyette, Ergis, & Allilaire, 2002). However, little research is available confirming the presence of these adverse patterns in children and adolescents manifesting similar depressive symptoms. Although research suggests that children and adolescents who exhibit symptoms of depression often experience greater school and academic disruption (Mash & Barkley, 1996), it is unclear how symptoms of depression impair executive functioning skills in youth.

DEDICATION

For my family

## ACKNOWLEDGEMENTS

A project such as this can only happen with the support and cooperation of many individuals. I am grateful to have the opportunity to recognize the extraordinary team of people named below.

I would like to express my sincere appreciation to my committee members-- Dr. Cyndi Riccio, Dr. Mike Ash, Dr. Bill Rae, and Dr. Rob Heffer-- for their time, their efforts, and their encouragement.

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## CHAPTER I

### INTRODUCTION

Over the last 20 years, there has been a surge in the production of research on childhood depression; however, the research has been complicated by imprecise language and a lack of clearly defined terms. More specifically, Hammen and Rudolph (1996) explained that confusion in the field of child psychology exists because of the inconsistent application of the term *depression*. While some investigators use the term to identify the presence of a diagnostic disorder in children, others categorize depression as a syndrome or a cluster of symptoms that occur simultaneously and can be recognized as a distinct pattern of behavior (Mash & Barkley, 1996). The second application of the term is considered by professionals to be more empirical in nature, and is not associated with a particular model of cause (Hammen & Rudolph, 1996). Depression in this context is defined as the presence of a discrete pattern of observable behavior. For the purpose of this study, this latter definition was employed.

The estimated prevalence of depression in children is between 6% and 12% of the population (Kashani, Rosenberg, & Reid, 1989); depression may manifest itself in a variety of ways. Children and adolescents experiencing depression may appear withdrawn, lack energy, experience difficulty sleeping, resist social interactions, and

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This dissertation follows the style and format of *Archives of Clinical Neuropsychology*.

display poor concentration (Teeter & Semrud-Clikeman, 1997). Furthermore, youth experiencing symptoms of depression often experience greater school and academic disruption (Mash & Barkley, 1996; Teeter & Semrud-Clikeman, 1997).

In addition to impaired achievement, depression has proven to adversely affect performance on psychological and neuropsychological assessments. Teeter and Semrud-Clikeman (1997) explained that slower response time and a decreased attention to details are only a few of the difficulties encountered on assessments of children experiencing depression. Nevertheless, it is important to differentiate between learning problems and academic complications resulting from the presence of internalizing symptomatology. Weingartner et al. (1981) found significant improvements in learning among children diagnosed with depression when the same information was presented in a different format. Furthermore, academic difficulties often improve following recovery from depression (Caine, 1986). These findings highlight the importance of understanding how psychopathologies impact the unique aspects of cognitive functioning.

### Research Questions and Hypotheses

In contrast to the growing literature on adults, very little research is available confirming the presence of similar adverse patterns in children and adolescents who manifest depressive symptoms. Furthermore, available studies of children and adolescents fail to acknowledge the implications of executive dysfunction in the classroom environment. The goal of further research into childhood depression must advance understanding of the disorder, as well as identify early identification and treatment options for youth identified with depression. The purpose of this study was to

investigate the effects of depressive symptomatology on various aspects of youths' executive functioning abilities.

The present study addresses the following research questions:

*Research Question 1*

What is the level of association between depression as measured by the Behavior Assessment System for Children-Parent Rating Scale (BASC-PRS), Behavior Assessment System for Children-Teacher Rating Scale (BASC-TRS), and Behavior Assessment System for Children-Self-Report of Personality (BASC-SRP) and performance on various neuropsychological measures of interest?

*Research Question 2*

Is the level of depression as measured by Behavior Assessment System for Children-Parent Rating Scale (BASC-PRS), Behavior Assessment System for Children-Teacher Rating Scale (BASC-TRS), and Behavior Assessment System for Children-Self-Report of Personality (BASC-SRP) a significant predictor of problem solving ability as measured by Wisconsin Card Sorting Test (WCST) Categories, Wisconsin Card Sorting Test (WCST) Trials to First Set, and Tower of London-Drexler Edition (TOL<sup>DX</sup>) Total Moves?

*Research Question 3*

Is the level of depression as measured by Behavior Assessment System for Children-Parent Rating Scale (BASC-PRS), Behavior Assessment System for Children-Teacher Rating Scale (BASC-TRS), and Behavior Assessment System for Children-Self-Report of Personality (BASC-SRP) a significant predictor of processing speed as

measured by Wechsler Intelligence Scale for Children-Third Edition (WISC-III) Processing Speed Index, Conners' Continuous Performance Test-II (CPT-II) Reaction Time, Tower of London-Drexel Edition (TOL<sup>DX</sup>) Total Time and the ratio of time between the Trail Making Test-A and the Trail Making Test-B?

*Research Question 4*

Is the level of depression as measured by Behavior Assessment System for Children-Parent Rating Scale (BASC-PRS), Behavior Assessment System for Children-Teacher Rating Scale (BASC-TRS), and Behavior Assessment System for Children-Self-Report of Personality (BASC-SRP) a significant predictor of behavioral regulation as measured by Wisconsin Card Sorting Test (WCST) Failure to Maintain Set, Behavioral Rating Inventory of Executive Functioning (BRIEF) Behavioral Regulation Index, Tower of London-Drexel Edition (TOL<sup>DX</sup>) Rule Violations, and Conners' Continuous Performance Test-II (CPT-II) Commission Errors?

*Research Question 5*

Is the level of depression as measured by Behavior Assessment System for Children-Parent Rating Scale (BASC-PRS), Behavior Assessment System for Children-Teacher Rating Scale (BASC-TRS), and Behavior Assessment System for Children-Self-Report of Personality (BASC-SRP) a significant predictor of metacognitive skills as measured by the Behavioral Rating Inventory of Executive Functioning (BRIEF) Metacognitive Index?

Based on the current literature, it was predicted that individuals manifesting symptoms of depression would likely experience some level of impairment on

neuropsychological measures. Mash and Barkley (1998) explained that the degree of neurocognitive impairment may be influenced directly by the severity of the symptoms. For this reason, incorporating multidimensional measures that evaluate an individual's perceived level of impairment (e.g., BASC) in comprehensive assessment batteries will provide valuable information regarding intervention. Among the numerous difficulties encountered by youth is poor academic functioning (Teeter & Semrud-Clikeman, 1997). Thus, it is essential professionals have a greater understanding of the impact of depression in order to ameliorate the adverse affects. Specifically, increased knowledge regarding the discrete neurocognitive aspects impacted by depressive symptomology will help professionals select more effective instructional techniques.

#### Implications for Practice

In addition to addressing concerns with school performance, practitioners must attend to the specific symptomology (e.g., social withdrawal, somatic symptoms, self-concept) expressed by the individuals. Improved assessments can facilitate the development of appropriate therapeutic treatment plans as well. For example, research suggests that cognitive-behavioral approaches to treating individuals with depression have proven effective (Fine, Forth, Gilbert, & Haley, 1991; Nezu, Nezu, & Perri, 1989; Stark, Humphrey, Laurent, Livingston, & Christopher, 1993). Consequently, professionals must be able to identify impairments in the neurocognitive functioning of clients with depression in order to provide effective treatment options. Furthermore, researchers speculate that the rate of depression in youth may be underestimated, leading to significant under-treatment of this population (Mash & Barkley, 1998). Better

understanding of the correlation between depressive symptoms and performance on neurocognitive measures also may lead to improved diagnostic decision making.

Finally, clinicians must differentiate between neurocognitive deficits related to the manifestation of depressive symptoms and other, more enduring, factors, such as weaknesses associated with a specific learning disability. Unlike children identified with learning disabilities, difficulties related to the presence of depressive symptomology often ameliorate following recovery (Caine, 1986). Therefore, it will be necessary for practitioners to carefully monitor the progression of the depressive symptoms and reassess frequently to provide the most appropriate care.

Thus, in Chapter I, we have discussed the importance of understanding the impact depressive symptoms may have on an individual's overall functioning and what may be gained from greater insight into the dysfunction. In Chapter II a more thorough review of current literature will be provided. In Chapter III, the methods and data analyses of the research questions are presented. Results and discussion are provided in Chapters IV and V.

#### Definitions and Operational Terms

In order to foster a better understanding of the various terms used frequently in this text, the following definitions are provided.

Depression: Confusion exists because this term is used in both a clinical and a colloquial sense. For the purpose of this study, this term refers to a cluster of symptoms that occur simultaneously and can be recognized as a distinct pattern of behavior (Mash & Barkley, 1996). Operationally, depression will be defined in this study in terms of

obtained scores on the parent, teacher, or self-report form of the Behavior Assessment System for Children (BASC).

**Executive Function:** This term has been used to refer to a cluster of skills required for individuals to plan, problem-solve, and interact appropriately with the environment (Teeter & Semrud-Clikeman, 1997).

**Internalizing Symptoms:** This term refers to those disorders that are experienced by the individual and are covert in nature (e.g., anxiety, depression, somatization; Mash & Barkley, 1996).

**Metacognition:** This term has been used to refer to those higher-level skills used to initiate, plan, organize, self-manage, as well as self-evaluate individual performance (Gioia, Isquith, Guy, & Kenworthy, 2000).

**Ecological Validity:** This term is defined as the “functional and predictive relationship between the patient’s performance on a set of neuropsychological tests and behavior in a variety of real-world settings” (Sbordone, 1997, p. 368).

## CHAPTER II

### REVIEW OF THE LITERATURE

In Chapter I the prevalence of depression among youth, as well as the implications of depressive symptomology on neurocognitive functioning were reviewed briefly. Additionally, the need for greater understanding of these adverse effects in children and adolescents were identified in order to provide more effective academic and therapeutic strategies. In this chapter, the available literature regarding depression in children and adolescents is examined more carefully.

#### Depression Among Youth

Depression is a serious mental health concern facing our youth today; however, less than thirty years ago, some investigators (Lefkowitz & Burton, 1978; Rie, 1966) even questioned the existence of childhood depression. Consequently, while investigation pertaining to the etiology, manifestation, and prevalence of depressive symptoms among adults was prolific, research with children notably was absent.

Early researchers dismissed the notion of childhood depression for various reasons. Hammen and Rudolph (1996) explained that some professionals, heavily grounded in psychodynamic theory, erroneously concluded that children's immature superego would prevent the development of depression. Researchers acknowledged children's abilities to experience grief and sadness (Rochlin, 1959), but failed to

recognize that the painful feelings could persist in the absence of a fully-developed superego.

Another faction theorized that the “depressive” behaviors manifested by children were simply a transitory component of normal development (Mash & Barkley, 1996). However, Kovacs (1989) later disproved this myth and confirmed that depression, or the expression of depressive symptoms, during childhood is not common to children’s developmental trajectories. Furthermore, he affirmed that depression does not dissipate with time if untreated, emphasizing the importance of early diagnosis and treatment.

### *Defining Depression*

In recent years, investigators have broadened their examination to include the presence and effects of depression in children and adolescents; however, their research has not been without complication. Compas (1994) explained that examination of childhood depression has been hindered by imprecise language and differing taxonomic systems. Currently, confusion within the field of child psychology exists because of the inconsistent application of the term depression. A review of available literature revealed three discrete definitions all identified under the general heading of “depression.” Investigators applied the label (1) to describe depressed mood, (2) to refer to a syndrome or cluster of symptoms that can be recognized as a distinct pattern of behavior, and (3) to note the presence of a diagnostic disorder in children (e.g., Major Depressive Disorder, Dysthymic Disorder). Compas (1994) rightly stated that this practice has caused miscommunication among professionals.

One possible explanation for the ongoing confusion lies with the myriad of assessment tools employed to measure depression in youth. A number of instruments have been developed to assess the construct of depression among youth. Some measures evaluate a wide range of symptoms and behaviors (e.g., Behavior Assessment System for Children, Achenbach Behavior Checklist), while others seek to identify childhood depression (e.g., Children's Depression Inventory).

In addition to the breadth of assessment, these measures also differ in their sources of information (e.g., self-report, parent report, teacher report; Compas, 1994; Sattler, 1992). Hammen and Rudolph (1996) noted that reports of symptomology among teachers, parents, and youth may be discrepant, adding further confusion pertaining to the interpretation of results. These differing taxonomic systems and incompatible measurement practices have “resulted in a fragmentation of research efforts, and [have] impeded determination of the prevalence of depressive phenomena, understanding of the developmental course of depression, and identification of etiological factors” (Compas, 1994, p. 198).

### *Prevalence*

Current estimates regarding the prevalence of depression in children and adolescents are between 6% and 12% of the population (Kashani et al., 1989). Within this cluster, research suggests that the point prevalence of Major Depressive Disorder (MDD) in youth ranges between 6% and 8% (Hammen & Rudolph, 1996); the prevalence for Dysthymic Disorder is estimated between 0.07% and 4.9% (Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993; Whitaker et al., 1990, respectively). Notably,

prevalence rates appear greater among high-risk groups, such as children whose parents also are depressed and clinic-referred youth.

However, investigators have uncovered significantly higher rates of youth reporting depressive symptoms or experiences (e.g., 10% to 30%) who fall short of diagnostic criteria (e.g., Cooper & Goodyer, 1993; Garrison, Jackson, Marsteller, McKeown, & Addy, 1990; Roberts, Lewinshohn, & Seeley, 1991). Further, subclinical symptoms that remain untreated may persist for years according to the *Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition-Text Revision (DSM-IV-TR)*: American Psychiatric Association [APA], 2000). Moreover, recent evidence suggests the prevalence among children is increasing (Hammen & Rudolph, 1996). Regardless of whether youth meet diagnostic criteria for depression, elevated scores on self-report and other respondent measures may be indicative of impaired functioning, and therefore, cannot be ignored or minimized. According to Mash and Barkley (1998), it is imperative to broaden the scope of therapeutic interventions to include subsyndromal depression since those youth are at increased risk for the development of Major Depressive Disorder.

### *Risk Factors*

A number of risk factors have been associated with the development of depressive disorders among youth. Although both children and adolescents who develop major depression are more likely to have a family history of the disorder, research indicates that the correlation is more robust in children (National Institute of Mental Health [NIMH], 2000). Other potential risk factors identified by the NIMH (2000)

include (1) stress, (2) cigarette smoking, (3) the loss of a parent or loved one, (4) attentional, conduct or learning problems, (5) chronic illness, (6) abuse or neglect, and (7) other trauma, including natural disasters. Gender disparities manifesting during adolescence also appear to place girls at greater risk; this is discussed in more detail below. Although it is imperative to be cognizant of the potential factors placing some children at great risk, Cicchetti and Toth (1998) explained that single risk factors rarely result in depressive outcomes and recommend examination of all the systems (i.e., biological, psychological, environmental, social) potentially affecting the child.

### *Gender Differences*

Research identifying gender differences of adults diagnosed with depression is robust, and recent investigations with adolescents have confirmed the trend. Adolescent studies prove the existence of gender differences, with higher rates of depression observed among young females (Lewinsohn et al., 1993; Whitaker et al., 1990). According to the *DSM-IV-TR* (APA, 2000), adolescent females are twice as likely to develop Major Depressive Disorder as compared to adolescent males.

A number of professionals have attempted to identify the cause for gender discrepancies, and several theories have emerged. As the differences arise during adolescence, with a notable peak in age differences at 14 years, leading theorists have attributed the development of childhood depression to the onset of puberty (Hammen & Rudolph, 1996). However, whether these differences may be linked to hormone production or other psychosocial factors (e.g., body image, societal influences) emerging throughout maturation, remains unclear.

Kaufman and Charney (2003) implicated the neurohormone oxytocin as the potential cause for the gender disparity among youth with depression, but noted that no data have confirmed the hypothesis. Alternatively, Susman et al. (1987) identified correlations between low testosterone levels in nonclinical, adolescent males and increased ratings of sadness; however, their findings have not been confirmed with adolescents with depression. Consequently, while researchers have proven the existence of gender disparity, the origin remains unknown.

Conversely, studies among preadolescent youth have produced mixed findings. Costello et al. (1996) found higher rates of depression among preadolescent boys; however, in a study conducted by Angold and Rutter (1992) no significant differences were observed between prepubescent girls and boys; this is consistent with the *DSM-IV-TR* (APA, 2000). The American Psychiatric Association (2000) reported that prepubescent children are equally affected by Major Depressive Disorder or Dysthymic Disorder regardless of gender, emphasizing that all children may be at risk.

#### *Ethnic and Cultural Differences*

Few studies currently exist investigating the impact of ethnic and cultural diversity in childhood depression (Mash & Barkley, 1996), and of the available research, even fewer examine a wide range of ethnicities (Austin & Chorpita, 2004). Furthermore, Austin and Chorpita (2004) stated that the overall pattern remains mixed.

In a recent large-scale study of middle-school-aged children from nine ethnic groups, increased “crude” rates of depression without impairment were found among African American and Mexican American youth; however, the authors noted that only

those children of Mexican descent experienced significantly elevated rates of depression with impairment (Roberts, Roberts, & Chen, 1997). Nevertheless, other studies have reported no differences among ethnic groups (Austin & Chorpita, 2004; Costello et al., 1996). Further examination of potential race effects are needed to better understand the complex nature of this variable.

### *Comorbidity*

Comorbidity, the co-occurrence of multiple disorders, is another challenge encountered by children and adolescents with depression. Cicchetti and Toth (1998) reported that approximately 40% to 70% of children and adolescents experiencing depression often are diagnosed with a secondary disorder. Disruptive behavior disorders, anxiety disorders, and Attention-Deficit Hyperactivity Disorder are among the most common coexisting with childhood depression (APA, 2000). Obviously the co-occurrence of multiple disorders presents many complications including diagnosis and treatment, as well as a better understanding of the etiology. Nevertheless, awareness of this phenomenon is critical to the well-being of the child.

It has been speculated, however, that the coexistence of depressive and anxious symptoms may be the “true” expression of depression among children. More specifically, in one study conducted by Achenbach (1991), the author found little evidence supporting depressive disorders in children, but rather observed a single factor he identified as anxious/depressed. Clearly, this highlights the need for further investigation regarding the manifestation of depression in youth, as well as examination of current practices for diagnosis.

### *Assessment of Depression in Children and Adolescents*

In assessing depression among children and adolescents, it is imperative to recognize the potential challenges that may interfere with accurate diagnosis. First, although children with depression may exhibit similar symptomology to adults with depression, its form of expression may vary (APA, 2000). Presently, the same diagnostic criteria used to identify depression in adults are applied to children, with few accommodations. For example, the *DSM-IV-TR* (APA, 2000) noted that depressed mood often observed in adults may manifest as irritability among youth. Furthermore, little adjustment is provided to account for the obvious developmental differences among children, adolescent, and adults. While core symptoms typically remain constant between children and adolescents, certain behaviors may be more prominent at different stages of development (Mash & Barkley, 1996). Somatic complaints and social withdrawal are common to younger children, whereas psychomotor retardation and hypersomnia are characteristic of adolescents (APA, 2000). Thus, developmental age, as well as the present level of cognitive ability, must be considered throughout the evaluation.

A second potential challenge to diagnosis relates to the high comorbidity rates. As previously discussed, disorders in youth rarely occur in isolation. Some depressed children may present with various other disorders, including specific behavior disorders (APA, 2000). Mash and Barkley (1998) cautioned that in the presence of externalizing behaviors, the child's internalizing symptomology may be overlooked, and therefore,

remain untreated. Thus, care must be taken to uncover the underlying factors to ensure proper diagnosis and treatment.

Finally, for accurate diagnosis, best practice involves obtaining information from a variety of sources. Although research indicates that parents and children report behaviors of depression similarly, information pertaining to the severity of symptomology often differs. This is particularly true of internalizing symptoms (Kamphaus & Frick, 2002). In addition to providing critical information for differential diagnosis, obtaining information across raters and settings can provide valuable information for treatment (Sattler, 1992).

#### *Implications for Treatment*

Retrospective studies marked the onset of Major Depressive Episodes in children as young as eleven and suggested that the milder versions of depression, such as Dysthymic Disorder, may manifest at an even younger age (Mash & Barkley, 1998). Teeter and Semrud-Clikeman (1997) cited that childhood depression may persist for years, extend into adulthood, and in extreme situations, lead to suicidality. Fortunately, a number of studies have reported high levels of recovery among children and adolescents with treatment (Mash & Barkley, 1998; Teasdale et al., 2002).

One longitudinal study of depressive disorders in school-aged children revealed that 74% of the participants achieved recovery within 1 year of diagnosis (Kovacs et al., 1984). The authors also noted, however, that of those children who successfully recovered, approximately 40% experienced relapse. Additionally, children from their study who were diagnosed with Major Depressive Disorder or Dysthymic Disorder were

equally at risk for the recurrence of depressive illness, with symptom free intervals not exceeding two years in length. Therefore, in spite of the high levels of reported recovery among investigators, professionals must acknowledge the high rates of relapse and identify treatments that are effective in the remediation of initial symptom presentation, as well as in the prevention of relapse.

In a comprehensive review of treatment outcomes conducted by Teasdale et al. (2002), researchers agreed that cognitive therapy techniques proved most effective with both the recovery from depressive disorders and the prevention of recurrence. Mash and Barkley (1998) explained that cognitive approaches to treatment seek to identify and modify maladaptive thought processes. Nevertheless, the process through which cognitive therapies achieve these results remains unknown (Teasdale et al., 2002). In order to maximize the benefits of treatment and enhance outcomes, a better understanding of the physiology involved in the manifestation of depressive symptoms may prove helpful.

#### Neuropsychology of Depression

According to Shenal, Harrison, and Demaree (2003), the right and left hemispheres of the brain have been implicated in the expression of depressive symptoms. However, the right hemisphere is typically credited with negative emotional processing (Kaufman & Charney, 2003; Shenal et al., 2003; Teeter & Semrud-Clikeman, 1997); some researchers hypothesized that depressive symptomology interferes with right-hemisphere processing (Ladavas, Nicoletti, Rizzolatti, & Umilata', 1984). Moreover, recent laboratory tests of both adults and children with depression have

resulted in impaired performance on visuo-spatial tasks, offering further evidence of right-hemispheric involvement in mood-neurocognitive interactions (Liotti & Mayberg, 2001). Heller (1990) has suggested that gaining greater understanding of the neurodevelopmental patterns of depression may provide valuable insight regarding the increase of depressive symptoms during adolescence.

Neurocognitive deficits of depression in adults have been well-documented in the literature (Liotti & Mayberg, 2001; Ottowitz, Dougherty, & Savage, 2002; Shallice, 1988; Shenal et al., 2003; Sweet, 1982; Teeter & Semrud-Clikeman, 1997).

Neurocognitive abilities routinely assessed through standard neuropsychological assessments include attention and concentration (e.g., Trails A and B, simple Reaction Time), executive function (e.g., Stroop tasks, Continuous Performance Test), and memory (e.g., California Verbal Learning Test; Liotti & Mayberg, 2001).

### *Executive Function*

Researchers agree that executive functions refer to those skills thought to be mediated by the frontal lobe, including planning, inhibition, and self-monitoring (Basso, Bornstein, Carona, & Morton, 2001; Guze & Gitlin, 1994; Stern & Prohaska, 1996; Teeter & Semrud-Clikeman, 1997). However, a review of current literature also reveals that the definition of executive functioning abilities may incorporate skills of memory and attention (Channon & Green, 1999; Ottowitz et al., 2002). Continued investigation has provided researchers with evidence linking attention (Ottowitz et al., 2002; Shallice, 1988) and aspects of memory (Channon, & Baker, 1994) with the frontal lobe functions. Regardless of whether authors opt to include memory and attention in their definitions of

executive functions, some connection exists since they are presumed to be subserved by other executive functioning abilities (Rapport, Denney, Kyong-Mee, & Hustace, 2001).

Stern and Prohaska (1996) defined executive functioning abilities as the cluster of skills required for individuals to plan, problem solve, and interact appropriately with the environment. A number of factors, including internalizing symptomology, may interfere with executive functioning abilities (Guze & Gitlin, 1994). As a result, manifestation of depressive symptoms can impact a child's executive functioning skills and impair his ability to function successfully in most settings, including the classroom environment.

#### *Neuropsychological Assessment*

Although the link between executive functions and frontal lobe development was established early, further investigation permitted neurobehavioral scientists to understand the significant role frontal lobes had in the processing of emotional responses (Teeter & Semrud-Clikeman, 1997). Specifically, investigation of neuropsychological deficits of clinical disorders revealed an association between the dysfunction of neural correlates to the development of psychiatric symptoms, including depression (Ottowitz et al., 2002). Heller (1990) theorized that depression resulted from the dysfunctional activation between the two hemispheres, rather than a localized complication within one hemisphere. In recent years, advances in functional imaging have increased our understanding of the relationship between the neural systems and distinct cognitive domains (Ottowitz et al., 2002). However, this technique lacks practicality in most clinical settings. Ottowitz et al. (2002) explained that neuropsychological assessments

may be a more reasonable option for measuring the function of neural systems.

Neuropsychological evaluations are comprehensive assessment batteries that tap into a variety of functional domains (Riccio & Reynolds, 1998).

Neuropsychological evaluations often examine attention, motor, language, memory, mood, perceptual, and executive functioning abilities. Stern and Prohaska (1996) explained that “careful examination of executive functions and the relationship between executive functioning and performance on tests of other neuropsychological domains . . . can provide useful information regarding differential diagnosis . . . and regarding treatment recommendations” (p. 248).

As the field of neuropsychology progressed, greater attention was placed on the objective nature of the assessment results. Sweet (1982) criticized neuropsychologists for investigating executive functioning abilities in isolation without considering the impact of one’s emotional functioning. However, over the last several decades, a number of studies have emerged investigating the effects of depressive symptoms on neurocognitive function in adults (e.g., Channon & Green, 1999; Fisher, Sweet, & Pfaelzer-Smith, 1986; Fossati et al., 2002; Watkins & Brown, 2002). Measures sensitive to depressive impairments on executive functioning abilities and typically employed by neuropsychologists include the Trail Making Test, letter fluency, the Tower of London planning test, and the Wisconsin Card Sorting Test (Channon & Green, 1999).

Although some investigators (e.g., Fisher et al., 1986) claimed that no discrete pattern of deficits related to depressive symptomatology has been identified, recent findings revealed that adults suffering from depression failed to generate or employ

effective strategies. Specifically, individuals with depression experienced increased difficulty with response inhibition and multiple task scheduling (Channon & Green, 1999). Such findings have led some researchers to consider the existence of a depression-executive dysfunction (DED) syndrome that occurs late in life.

Alexopoulous, Kiosses, Klimstra, Kalayam, and Bruce (2002) explained that clinical findings support the veracity of DED syndrome in elderly patients. The authors further identified the profile of elderly patients suffering from the syndrome that included impaired visual naming, psychomotor retardation, and reduced fluency among its many characteristics. Regardless of the existence of DED syndrome, individuals with depression generally exhibit impaired performance on neurological tests (Fisher et al., 1986), reduced processing speed (Nebes et al., 2000), and difficulty with tasks requiring sustained attention (Quraishi & Frangou, 2002).

At the same time, however, the study conducted by Purcell, Maruff, Kyrios, and Pantelis (1998) that compared the neuropsychological deficits of adults diagnosed with Obsessive-Compulsive Disorder (OCD), unipolar depression, and anxiety with controls, yielded mixed results. In contrast to previous studies (Beats, Sahakian, & Levy, 1996; Elliott et al., 1996), Purcell et al. (1998) found less variability between the depressive and control groups on measures of planning or cognitive speed; significant impairment was observed on tasks requiring set shifting by the participants identified with depression. Nevertheless, the results of their study have not been confirmed. Subsequent studies (Basso et al., 2001; Channon & Green, 1999) have produced results

that implicate the effects of depression on impaired function of executive skills in adults using other tasks.

#### Statement of the Problem

Previous investigations regarding the adverse impact of depressive symptoms on overall functioning has focused primarily on adults. As a result, little research is available confirming the presence of similar adverse patterns in children and adolescents who manifest depressive symptoms. However, early investigation has established that depression, such as Dysthymic Disorders, has an early onset, often is chronic, and can lead to significant impairment (APA, 2000). Additionally, while current research efforts recognize the general impairment youth with depression often encounter (e.g., low self-esteem, poor social skills, attention difficulties), many studies typically fail to acknowledge the implications of executive dysfunction in both the classroom environment as well as with therapeutic intervention.

Although strides have been made in terms of examining childhood depression, most researchers agree that more work is needed (Cicchetti & Toth, 1998; Compas, 1994; Hammen & Rudolph, 1996); despite the recent advances in the field, there remain more questions than answers. Shenal et al. (2003) asserted that further neuropsychological investigation may provide practitioners with a better understanding of the etiology, expression, and ultimately, treatment of unipolar depression.

The goal of further research into childhood depression must advance understanding of the disorder, as well as identify early identification and treatment options for youth identified with depression. The purpose of this study was to investigate the effects of depressive symptomatology on various aspects of youths' executive functioning abilities and address the potential complications that may be encountered in the school environment. The following chapter outlines the method and procedure of the present study, including the sample, instruments, as well as the data analyses. Chapter IV details the findings obtained, and Chapter V provides a discussion regarding the implications for practice and future research.

## CHAPTER III

### METHOD

Chapter I identified the potential adverse impact of depressive symptoms on the various aspects of neurocognitive functioning, including processing speed, planning, and problem-solving, outlined the present study, and identified its purpose. Chapter II followed with a comprehensive review of current literature regarding depression among youth.

In Chapter III, the methodology to be used and descriptive statistics are presented. More specifically, the current chapter identifies the participant characteristics, describes the assessment measures employed, and describes the data analyses to be utilized for each research question. Results and implications are presented in Chapters IV and V.

#### Participants

The participants of this study included 93 children and adolescents (68% male, 32% female) 9 to 15 years of age ( $M = 11.74$ ,  $SD = 2.07$ ) who were consecutive referrals to the Memory, Attention, and Planning study (MAPS) at Texas A&M University. The youth were recruited from the Southwest community through the use of announcements distributed to the local physicians, local support groups for parents of children with Attention Deficit Hyperactivity Disorder, a community-based counseling center, and advertisement in the local newspaper. Participation was voluntary with obtained consent

from parents and assent from the youth. For inclusion in this study, participants had to have obtained an  $IQ \geq 80$ , and had to speak and read English fluently. Additionally, a previous diagnosis of schizophrenia or a history of severe head injury were established as exclusionary criteria prior to the start of the project. Ultimately, six children were excluded from the study based on exclusionary criteria. Tables 1 through 3 provide descriptive information for the sample.

### Procedures

All individuals participated in a comprehensive assessment including assessment of cognition, achievement, language, memory, executive function, attention, and emotional status in a clinical setting. Measures were administered in random order by licensed psychologists or advanced doctoral students supervised by a licensed psychologist. When possible, participants who were currently taking prescribed stimulant medication ( $n = 22$ ) refrained from taking medications during the scheduled evaluations; however, those individuals taking other prescribed medications ( $n = 8$ ) continued their regimens without interruption. For diagnostic purposes, at least two individuals, consisting of at least one doctoral student and one licensed psychologist, independently reviewed the assessment results and provide diagnostic recommendations. Inter-diagnostician agreement was computed using Cohen's kappa for assignment to groups of ADHD, Other Diagnosis, and No Diagnosis and proved adequate (Cohen's kappa = 0.84, proportion of agreement = .90).

Table 1

Total Sample Demographic Information

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	<i>N</i>	<i>Percentage</i>
Gender		
Boys	63	67.70
Girls	30	32.30
Ethnicity		
Caucasian	74	79.60
African American	11	11.80
Hispanic	7	7.50
Asian	1	1.10
Number on Stimulant Medication	22	23.66
Number on Other Medication	8	8.60
Previous Diagnosis	38	30.90
Number in Special Education	6	6.50
	<i>Mean</i>	<i>Standard Deviation</i>
WISC-III Full Scale IQ	102.19	12.45
WJ-III Total Achievement	98.95	14.10
Parent's Level of Education (years)	15.00	2.36
GAF	67.09	10.79

Table 1 (Continued)

	<i>Mean</i>	<i>Standard Deviation</i>
BASC-PRS Depression T-score	54.66	15.47
BASC-TRS Depression T-score	51.45	10.97
BASC-SRP Depression T-score	50.62	9.98

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*Note.* WISC-III = Wechsler Intelligence Scale for Children-Third Edition; WJ-III = Woodcock Johnson Tests of Achievement-Third Edition; GAF = Global Assessment of Functioning; BASC-PRS = Behavior Assessment System for Children-Parent Rating Scales; BASC-TRS = Behavior Assessment for Children-Teacher Rating Scales; BASC-SRP = Behavior Assessment for Children-Self-Report of Personality.

Table 2

Sample Descriptive Statistics for the Behavior Assessment System for Children (BASC)  
Variables by Gender

	N	Mean	SD	Minimum	Maximum
<b>BASC-PRS</b>					
Male	63	53.86	13.84	34.00	93.00
Female	30	56.33	18.59	34.00	110.00
<b>BASC-TRS</b>					
Male	47	51.00	9.33	41.00	77.00
Female	18	52.61	14.68	41.00	96.00
<b>BASC-SRP</b>					
Male	62	51.39	9.71	41.00	80.00
Female	29	48.97	10.50	41.00	78.00

*Note.* BASC-PRS = Behavior Assessment System for Children-Parent Rating Scales; BASC-TRS = Behavior Assessment for Children-Teacher Rating Scales; BASC-SRP = Behavior Assessment for Children-Self-Report of Personality.

Table 3

Sample Descriptive Statistics for the Behavior Assessment System for Children (BASC)  
Variables by Ethnicity

	N	Mean	SD	Min.	Max.
<b>BASC-PRS</b>					
Caucasian	74	56.34	16.08	34.00	110.00
African American	11	50.91	11.70	37.00	77.00
Hispanic	7	42.29	7.52	34.00	53.00
Asian	1	58.00	—	—	—
<b>BASC-TRS</b>					
Caucasian	53	51.21	11.38	41.00	96.00
African American	7	55.28	9.89	42.00	72.00
Hispanic	4	47.50	8.27	41.00	59.00
Asian	1	53.00	—	—	—
<b>BASC-SRP</b>					
Caucasian	73	50.70	9.85	41.00	80.00
African American	11	51.00	12.39	41.00	80.00
Hispanic	6	50.17	8.61	41.00	58.00
Asian	1	43.00	—	—	—

*Note.* BASC-PRS = Behavior Assessment System for Children-Parent Rating Scales; BASC-TRS = Behavior Assessment for Children-Teacher Rating Scales; BASC-SRP = Behavior Assessment for Children-Self-Report of Personality; Min. = Minimum; Max. = Maximum.

## Measures

### *Intellectual Functioning*

For the purpose of this study, a subgroup of measures in the larger study was selected for further investigation. Among the specific instruments was the Wechsler Intelligence Scale for Children- Third Edition (WISC-III: Wechsler, 1991); this is the most frequently used measure of cognitive ability for youth. It is comprised of both verbal and nonverbal tasks and yields an overall score as well as index scores. All subtests required for computation of the factor scores were administered. Incorporation of a measure of cognitive function (e.g., Full Scale IQ) is important in order to ensure that cognition is not a confounding variable.

### *Depressive Symptomatology*

In order to identify the presence of depressive symptoms in the sample, the Behavior Assessment System for Children (BASC: Reynolds & Kamphaus, 1992) was employed. The BASC is an omnibus rating scale that measures a child's adaptive skills and behavior problems in community and home settings. Teeter and Semrud-Clikeman (1997) explained that the BASC is not intended for use as a diagnostic tool but rather to provide objective information regarding the behavior and perceptions of children aged 4-18; the structure of the BASC limits subjectivity by focusing on observable behaviors.

The BASC includes five methods for assessing the behavior of youth, including a structured clinical interview, parent rating scales, teacher rating scales and self-report measures. The Behavior Assessment System for Children-Parent Rating Scale (BASC-PRS), Behavior Assessment System for Children-Teacher Rating Scale (BASC-TRS),

and Behavior Assessment System for Children-Self Report (BASC-SRP) were included in this study. Each version consists of three forms containing similar items that span the preschool (ages 2.5 – 5), child (ages 6 – 11), and adolescent (ages 12 – 18) age ranges. The child and adolescent forms were included in the investigation. Although every attempt was made to obtain completed teacher forms, this was only possible for sixty-five of the children.

The BASC-PRS, BASC-TRS, and BASC-SRP yield a number of composite scores and scores on 10 clinical subscales. For the purpose of this study, however, only information regarding depressive symptomology as measured by the depression subscale was of interest. Although the reliability of the subscales is more variable than that of the composite scores, the depression subscale is among the most reliable subscale ( $r = 0.83$ ; Reynolds & Kamphaus, 1992). Furthermore, significant correlations observed between scores on the BASC and scores on other measures of behavioral and emotional problems in children have established the validity of the BASC (Reynolds & Kamphaus, 1992).

#### *Problem Solving/Set Shifting*

The Wisconsin Card Sorting Test (WCST: Heaton, 1981; Heaton, Chelune, Talley, Kay, & Curtis, 1993) also was administered. The WCST measures the ability to flexibly modify incorrect strategies by inhibiting pre-potent, but incorrect, responses. In this task, the subject must sort cards by color, form, or number with limited corrective feedback (i.e., “correct, “incorrect”). The WCST requires examinees to plan strategically and modulate impulsive responding as well as utilize environmental feedback to shift cognitive sets (Chelune & Bear, 1986). Children with deficits in

executive functioning abilities may exhibit a variety of errors on WCST, including an inability to utilize corrective feedback from the environment (Stern & Prohaska, 1997). As such, this task requires set-shifting, a deficit found with adults with depression (Channon & Green, 1999).

Participants were manually administered the cards until they successfully complete six categories or until all 128 cards are sorted. Successful performance on the WCST requires the examinee to first identify the sorting principle (e.g., color, number, form) based on examiner feedback and then complete the category by maintaining the principle for ten consecutive matches. Once the individual successfully completes a category, the examiner alters the guiding principle, without informing the examinee, and the process is repeated. In addition to yielding an overall score of success (i.e., number of categories completed), the WCST provides information on a number of variables including inefficient initial conceptualization, failure to maintain cognitive set, perseveration, and inefficient learning across stages of the test (Heaton et al., 1993). Overall success rate and the number of trials to complete the first category will be investigated as a measure of problem solving ability for this study. The authors defined overall success as the number of categories obtained; examining the number of trials needed to successfully complete the first category provides insight into the initial conceptualization (Heaton et al., 1993).

The validity of the WCST as a measure of executive functions has been established based on the results of factor analyses and correlations between scores of the WCST and scores on other neuropsychological measures (Shute & Huertas, 1990).

Additionally, the reliability coefficients for the WCST are regarded as good. The generalizability coefficients range from 0.39 to 0.72 and average 0.57. Although this may suggest only fair to moderate reliability, a careful review reveals that the majority of these scores demonstrated moderate to good reliability. Specifically, researchers contend that reliability coefficients of 0.60 or greater are indicative of good scale reliability (Cicchetti & Sparrow, 1981; Mitchell, 1979), and with the exception of two scores (i.e., Percent Perseverative Responses and Percent Perseverative Errors), the remaining scores are considered good under these conditions.

The Tower of London-Drexel Edition (TOL<sup>DX</sup>; Culbertson & Zillmer, 2000) was given as an additional measure of executive functioning. The TOL<sup>DX</sup> is a neuropsychological instrument designed to measure higher-order problem solving abilities and strategy use in children and adults. The TOL<sup>DX</sup> is useful in identifying age-related trajectory of frontal-executive functions in children. Also, it contributes to the understanding of frontal lobe function in developmental and acquired childhood disorders; it is used to investigate the neuropsychological performance of children with attention, impulsivity, or activity control problems. The measure consists of ten problems of ascending difficulty. The examinee is required to move colored beads mounted on three vertical pegs to match a presented configuration in accordance with two strictly enforced problem-solving rules. Seven scoring variables are used to represent different, though related, aspects of executive planning and problem-solving abilities. These seven indexes relate to move performance, rule adherence, and temporal efficiency. Individuals suspected of executive functioning deficits may perform poorly

on this test. Specifically, examinees may lack the skills necessary to develop an effective approach or strategy to complete the task (Stern & Prohaska, 1997). In regards to problem solving ability, only the number of problems solved in the correct number of moves was included; additional variables for consideration are discussed later.

Reliability coefficients for the Total Move Score are high ( $r = 0.80$ ;  $p \leq .001$ ), and validity for the measure ranges from 0.58 to 0.80.

### *Processing Speed*

Based on the findings from the adult literature, measures of speed of processing were also of interest. As such, the Processing Speed Index score from the WISC-III was of particular interest and will be included in the analyses. The Processing Speed Index score is comprised of two subtests: Coding and Symbol Search. The Coding subtest requires examinees to copy abstract symbols that are paired with the numerals 1 to 9. This task measures several constructs of executive function such as attention, cognitive flexibility, and speed of processing (Kaufman & Lichtenberger, 1999; Sattler, 1992). The Symbol Search subtest requires individuals to determine if either the provided target symbols is present among an array of abstract symbols. Similarly, this subtest measures processing speed, short-term memory abilities, and cognitive flexibility (Kaufman & Lichtenberger, 1999; Sattler, 1992). Although the individual subtests might lack high reliability, greater confidence may be placed in the reliability of the index score (range 0.80 – 0.91; Wechsler, 1991). Furthermore, inter-correlational studies have established strong evidence for internal consistency for the Coding and Symbol Search subtests (alpha = 0.87 and alpha = 0.88 respectively; Wechsler, 1991).

The Conners' Continuous Performance Test-II (CPT-II: Conners, 2000) was another instrument included in this study. For administration of the CPT-II, the examinee is instructed to view a computer screen on which letters are presented at random and deploy the space bar on the computer key board each time a letter appears; however, the examinee is directed to ignore the letter "X" and withhold his or her response each time this letter is presented. Riccio, Reynolds, and Lowe (2001) explained that the initial intent of the CPT was to measure one's select attention by calculating the number or percentage of correct hits. Since its introduction, however, researchers have identified a number of variables for investigation including the amount of time between the stimulus onset and the individual's response (hit reaction time). This provides a very precise measure of response speed. Although the manual does not provide data pertaining to the reliability of this measure, information confirming the validity of the CPT-II is made available (Conners, 2000).

A third measure of processing speed included the TOL<sup>DX</sup> Time. As discussed previously, data obtained from the TOL<sup>DX</sup> contributes to greater understanding of frontal lobe functioning (Culbertson & Zillmer, 1999). TOL<sup>DX</sup> Time score is determined by combining the examinee's initiation time and execution time. The authors did not provide information regarding reliability or validity of this score. Nevertheless, it will be included for investigation to determine its predictive quality.

A final measure of processing speed included in this investigation was the child version of The Trail Making Test (TMT: Reitan & Wolfson, 1985). In addition to assessing attention, mental flexibility, and visual search (Miner & Ferraro, 1998; Spreen

& Strauss, 1998; Wecker, Kramer, Wisniewski, Delis, & Kaplan, 2000), Tapert and Brown (1999) explained that the TMT also measures speed of processing given the tool's emphasis on time. The TMT is comprised of two parts, TMT-A and TMT-B. On the TMT-A, the examinee simply is required to connect the numerals 1 to 15 in order. For the TMT-B, the child must connect the numerals 1 to 15 and the letters A to O in order, alternating from a numeral to a letter (i.e., A-1, B-2, etc.).

A number of methods for interpreting the results of the TMT exist. One option is to compare the examinee's individual completion times of TMT-A and TMT-B to normative data; however, researchers argue that impairment rates vary significantly depending on the normative data used (Kalechstein, VanGorp, & Rapport, 1998; Lange, Iverson, & Franzen, 2001). An alternative method of interpretation involves analyzing the ratio score (TMT-B time/TMT-A-time). Golden, Espe-Pfeifer, and Wachsler-Felder (2000) explained that in this process the TMT-A time serves as a baseline for the interpretation of the TMT-B and controls for other potential confounds. For the purpose of this study, the latter process was employed. Based on available research, the TMT reliability is variable, with most reliability coefficients ranging between 0.64 and 0.94 (Goldstein & Watson, 1989; Snow, Tierney, Zorsitto, Fisher, & Reid, 1988).

#### *Behavioral Regulation and Metacognition*

The parent and teacher versions of the Behavior Rating Inventory of Executive Function (BRIEF: Gioia et al., 2000) were administered to evaluate the participants' present level of executive functioning. The BRIEF consists of a parent questionnaire and a teacher questionnaire, and is designed to assess executive functioning in the home

and school environments. The BRIEF is useful in evaluating children with a wide spectrum of developmental and acquired neurological conditions including learning disabilities and Attention-Deficit/ Hyperactivity Disorder (ADHD). Each BRIEF questionnaire contains 86 items in 8 clinical scales. These theoretically and statistically derived scales form two broader Indexes: Behavioral Regulation (3 scales) and Metacognition (5 scales). Although the combined indexes' scores yield a Global Executive Composite score, only the Behavioral Regulation and Metacognition Indexes will be investigated in this study. The Behavioral Regulation Index (BRI) estimates a child's ability to shift cognitive set and demonstrate inhibitory control (Gioia et al., 2000). It consists of the Inhibit, Shift, and Emotional Control Scales. According to the authors, the Metacognitive Index (MI) reflects the child's ability to actively problem solve as well as cognitively self-monitor his or her performance. The MI is comprised of the Initiate, Plan/Organize, Organization of Materials, Monitor, and Working Memory scales. Factor analytic studies and structural equation modeling provided support for the two-factor model of executive functioning as encompassed by the two Indexes (Gioia et al., 2000). Validity scales measure negativity and inconsistency of responses. For this study, due to the inability to obtain BRIEF teacher forms on all children, only the parent BRIEF was included.

The CPT-II also was used to evaluate behavioral regulation. In addition to reaction time, the CPT-II provides valuable information regarding an individual's response inhibition (Conners, 1995; Conners, 2000). Response inhibition is measured by the total number of commission errors (i.e., the number of times the examinee

incorrectly deploys the space bar when the designated letter is presented). Although commission errors often are investigated to measure impulsivity, Halperin, Sharma, Greenblatt, and Schwartz (1991) argued that commission errors may be regarded as a measure of dyscontrol when a single-stimulus CPT version is applied. Research based on adults diagnosed with depression indicates that adults with depression may exhibit increased commission errors (Koetsier et al., 2002). Therefore, depressive symptoms appear to interfere with one's ability to control reactions and inhibit responses.

The final variables to be considered in the prediction of difficulties in behavior regulation are the WCST Failure to Maintain Set score and TOL<sup>DX</sup> Rule Violation score. As with other measures that claim to evaluate behavior regulation, these variables require sustained attention and inhibition. Failing to maintain a set on the WCST occurs when the examinee incorrectly matches a card to the appropriate stimulus card following five or more previous correct matches (Heaton et al., 1993). Failing to maintain the set, despite positive feedback, might be indicative of problems with attention and impulsivity. Likewise, violating the rules of the TOL<sup>DX</sup> (TOL<sup>DX</sup> Rule Violation score) may suggest similar difficulties. Therefore, these variables are of interest.

In the following chapter, the results are presented. The results are provided in tabular and graphic format. Chapter V provides interpretation and discussion of the specific findings from the analyses, as well as the implications for practitioners and future research.

## CHAPTER IV

### RESULTS

Chapter I identified the potential negative effects of depressive symptoms on the various aspects of neurocognitive functioning, provided an overview of the present study, and identified its purpose. In Chapter II, a comprehensive review of current literature regarding depression in youth was presented. Chapter III outlined the specific method and procedures of the current study, as well as described the data analyses to be used for each research question.

In this chapter, the results are presented by research question; the outcomes of the investigation are briefly discussed. Chapter V provides a more thorough interpretation and discussion of the findings, including the implications for practice and future research.

### Statistical Analyses and Procedures

The analytic plan involved a correlational matrix and conducting several multiple regression analyses. Among the various assumptions for correlations and multiple regressions is the belief that data are independent and normally distributed (Glass & Hopkins, 1996). If the data are skewed, this may influence the overall outcome of the analyses. For this reason, it is essential to examine the data prior to conducting the analyses. Specifically, Glass and Hopkins (1996) explained that researchers must investigate the data set to determine if the data are asymmetrical (skewness) or if there are more or fewer extreme scores (kurtosis) than would be present in a normal distribution. Furthermore, the authors advised that non-linear transformations may be required in order to achieve normal distribution prior to investigation. Therefore, all the variables were reviewed for normalcy prior to analysis (See Table 4).

According to Kline (1998), a variable may be considered asymmetrical when the skewness exceeds 3.00 and the kurtosis surpasses 8.00. As shown in Table 2, the skewness and kurtosis of the *Wisconsin Card Sorting Test* Trials to First Set variable. Therefore, the data for this variable was transformed to achieve more normal distribution prior to examination.

Table 4

## Skewness and Kurtosis of Measures Employed

	<u>Skewness</u>	<u>SE</u>	<u>Kurtosis</u>	<u>SE</u>
WCST Categories	-1.92	.25	3.69	.50
WCST Trials to First Set	-3.95	.25	18.37	.50
WCST Failure to Maintain Set	-.96	.25	.65	.50
TOL <sup>DX</sup> Total Time	-.96	.25	.43	.50
TOL <sup>DX</sup> Total Moves	-.38	.25	-.52	.50
TOL <sup>DX</sup> Rule Violations	-.19	.25	-1.76	.50
WISC-III PS Index	.21	.25	.30	.50
CPT-II Reaction Time	.36	.25	-.61	.50
CPT-II Commission Errors	-.26	.25	-.43	.50
Trail Making Test-A/Test-B	.67	.25	1.02	.50
BRIEF Bx Regulation Index	.30	.25	.93	.50
BRIEF Metacognition Index	-.28	.25	-.46	.50

Table 4 (Continued)

	<u>Skewness</u>	<u>SE</u>	<u>Kurtosis</u>	<u>SE</u>
BASC-PRS Depression Subscale	1.18	.25	1.55	.50
BASC-TRS Depression Subscale	1.71	.30	3.60	.59
BASC-SRP Depression Subscale	1.28	.25	1.07	.50

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*Note.* WCST = Wisconsin Card Sorting Test; TOL<sup>DX</sup> = Tower of London-Drexel Edition; WISC-III = Wechsler Intelligence Scale for Children-Third Edition; CPT-II = Conners' Continuous Performance Test-II; BRIEF = Behavior Rating Inventory of Executive Functioning; Bx = Behavior; BASC-PRS = Behavior Assessment System for Children-Parent Rating Scales; BASC-TRS = Behavior Assessment System for Children-Teacher Rating Scales; BASC-SRP = Behavior Assessment System for Children-Self-Report of Personality.

*Research Question 1*

What is the level of association between depression as measured by the Behavior Assessment System for Children (BASC) and performance on various neuropsychological measures of interest?

To explore the level of association between variables representing depressive symptomology and measures of neuropsychological function of interest, a correlational matrix was generated. It was hypothesized that depression as measured by the three unique versions of the Behavior Assessment System for Children (e.g., parent, teacher, and self-report) would be associated with the child's performance on the identified neuropsychological measures. As can be seen in Table 5, significant correlations were found between both the parent and teacher ratings of depression and the BRIEF Behavioral Regulation Index and BRIEF Metacognitive Index. An additional significant correlation was observed between the teacher ratings of depression and the WCST Categories. However, there were no significant correlations obtained between the neuropsychological measures and the self-report edition of the BASC.

Table 5

## Correlational Matrix of Variables of Interest

	<u>BASC-PRS<sup>a</sup></u>	<u>BASC-TRS<sup>b</sup></u>	<u>BASC-SRP<sup>c</sup></u>
Problem Solving			
WCST Categories	.04	-.26*	-.01
WCST Trials to First Set	-.09	-.20	.04
TOL <sup>DX</sup> Total Moves	.16	.08	.12
Processing Speed			
WISC-III PS Index	-.15	-.11	-.18
CPT-II Reaction Time	.15	.17	.09
TOL <sup>DX</sup> Total Time	.09	-.04	.13
Trail Making Test-A/Test-B	-.11	-.20	-.03
Behavioral Regulation			
WCST Failure to Maintain Set	-.10	-.09	-.20
BRIEF Bx Regulation Index	.69**	.42**	.11
TOL <sup>DX</sup> Rule Violations	-.10	-.24	-.07
CPT-II Commission Errors	-.02	-.08	.19

Table 5 (Continued)

	<u>BASC-PRS<sup>a</sup></u>	<u>BASC-TRS<sup>b</sup></u>	<u>BASC-SRP<sup>c</sup></u>
Metacognition			
BRIEF Metacognitive Index	.54**	.30*	.10

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*Note.* WCST = Wisconsin Card Sorting Test; TOL<sup>DX</sup> = Tower of London-Drexel Edition; WISC-III = Wechsler Intelligence Scale for Children-Third Edition; CPT-II = Conners' Continuous Performance Test-II; BRIEF = Behavior Rating Inventory of Executive Functioning; Bx = Behavior; BASC-PRS = Behavior Assessment System for Children-Parent Rating Scales; BASC-TRS = Behavior Assessment System for Children-Teacher Rating Scales; BASC-SRP = Behavior Assessment System for Children-Self-Report of Personality.

<sup>a</sup>n = 93.

<sup>b</sup>n = 65.

<sup>c</sup>n = 91.

\**P* < .05.

\*\**P* < .01.

*Research Question 2*

Is the level of depression as measured by Behavior Assessment System for Children-Parent Rating Scale (BASC-PRS), Behavior Assessment System for Children-Teacher Rating Scale (BASC-TRS), and Behavior Assessment System for Children-Self-Report of Personality (BASC-SRP) a significant predictor of problem solving ability as measured by Wisconsin Card Sorting Test (WCST) Categories, Wisconsin Card Sorting Test (WCST) Trials to First Set, and Tower of London-Drexler Edition (TOL<sup>DX</sup>) Total Moves?

To determine the extent to which scores on the depression subscale of the different BASC forms can predict deficits in problem solving abilities, a multiple regression was conducted. It was hypothesized that symptoms of depression would have an adverse affect on tasks measuring problem-solving ability. Multiple regression analyses were conducted to determine the direct effect of problem-solving abilities on depression. Investigations utilizing the Enter method revealed no significant predictors among the problem-solving measures (See Table 6). Furthermore, only 4.70% to 10.5% of variation in problem-solving performance was accounted for by depression, with the parents' ratings of depression accounting for the greatest variation (See Table 7). Tables 8, 9, and 10 demonstrate the discrete impact of depressive symptoms as measured by the parent, teacher, and individual on each measure of problem-solving ability.

Table 6

## The Direct Effect of Depressive Symptoms on Problem-Solving Ability

	<u>B</u>	<u>SE B</u>	<u><math>\beta</math></u>
WCST Categories			
BASC-PRS <sup>a</sup>	0.15	0.16	0.14
BASC-TRS <sup>b</sup>	-0.59	0.23	-0.37
BASC-SRP <sup>c</sup>	-0.02	0.22	-0.01
WCST Trials to First Set			
BASC-PRS <sup>a</sup>	0.04	0.08	0.08
BASC-TRS <sup>b</sup>	-0.26	0.18	-0.32
BASC-SRP <sup>c</sup>	-0.02	0.11	-0.02
TOL <sup>DX</sup> Total Moves			
BASC-PRS <sup>a</sup>	0.11	0.14	0.13
BASC-TRS <sup>b</sup>	<0.01	0.19	<0.01
BASC-SRP <sup>c</sup>	0.17	0.19	0.13

*Note.* WCST = Wisconsin Card Sorting Test; TOL<sup>DX</sup> = Tower of London-Drexel Edition; BASC-PRS = Behavior Assessment System for Children-Parent Rating Scales; BASC-TRS = Behavior Assessment System for Children-Teacher Rating Scales; BASC-SRP = Behavior Assessment System for Children-Self-Report of Personality.

<sup>a</sup>n = 93.

<sup>b</sup>n = 65.

<sup>c</sup>n = 91.

Table 7

Multiple Regression Analysis Predicting the Effects of Depressive Symptoms on Problem-Solving Ability

	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Standard Error of the Estimate
WCST Categories	.33	.11	.06	16.10
WCST Trials to First	.30	.09	.04	8.28
TOL <sup>DX</sup>	.22	.05	<-.01	13.45

*Note.* WCST = Wisconsin Card Sorting Test; TOL<sup>DX</sup> = Tower of London-Drexel Edition.

Table 8

Multiple Regression Analysis Predicting the Individual Effects of Depressive Symptoms on the Wisconsin Card Sorting Test (WCST) Categories Obtained

	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Standard Error of the Estimate
BASC-PRS <sup>a</sup>	.57	<.01	-.01	16.72
BASC-TRS <sup>b</sup>	.33	.11	.08	15.97
BASC-SRP <sup>c</sup>	.33	.11	.06	16.10

*Note.* BASC-PRS = Behavior Assessment System for Children-Parent Rating Scales; BASC-TRS = Behavior Assessment System for Children-Teacher Rating Scales; BASC-SRP = Behavior Assessment System for Children-Self-Report of Personality.

<sup>a</sup>n = 93.

<sup>b</sup>n = 65.

<sup>c</sup>n = 91.

Table 9

Multiple Regression Analysis Predicting the Individual Effects of Depressive Symptoms on the Tower of London-Drexel Edition (TOL<sup>DX</sup>) Total Moves

	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Standard Error of the Estimate
BASC-PRS <sup>a</sup>	.18	.03	.02	13.33
BASC-TRS <sup>b</sup>	.18	.03	<.01	13.44
BASC-SRP <sup>c</sup>	.22	.05	<-.01	13.45

*Note.* BASC-PRS = Behavior Assessment System for Children-Parent Rating Scales; BASC-TRS = Behavior Assessment System for Children-Teacher Rating Scales; BASC-SRP = Behavior Assessment System for Children-Self-Report of Personality.

<sup>a</sup>n = 93.

<sup>b</sup>n = 65.

<sup>c</sup>n = 91.

Table 10

Multiple Regression Analysis Predicting the Individual Effects of Depressive Symptoms on the Wisconsin Card Sorting Test (WCST) Trials to First

	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Standard Error of the Estimate
BASC-PRS <sup>a</sup>	.09	.01	-.01	8.49
BASC-TRS <sup>b</sup>	.29	.09	.06	8.22
BASC-SRP <sup>c</sup>	.30	.09	.04	8.28

*Note.* BASC-PRS = Behavior Assessment System for Children-Parent Rating Scales; BASC-TRS = Behavior Assessment System for Children-Teacher Rating Scales; BASC-SRP = Behavior Assessment System for Children-Self-Report of Personality.

<sup>a</sup>n = 93.

<sup>b</sup>n = 65.

<sup>c</sup>n = 91.

*Research Question 3*

Is the level of depression as measured by Behavior Assessment System for Children-Parent Rating Scale (BASC-PRS), Behavior Assessment System for Children-Teacher Rating Scale (BASC-TRS), and Behavior Assessment System for Children-Self-Report of Personality (BASC-SRP) a significant predictor of processing speed as measured by Wechsler Intelligence Scale for Children-Third Edition (WISC-III) Processing Speed Index, Conners' Continuous Performance Test-II (CPT-II) Reaction Time, Tower of London-Drexel Edition (TOL<sup>DX</sup>) Total Time and the ratio of time between the Trail Making Test-A and the Trail Making Test-B?

Multiple regressions also were employed to determine the extent to which scores on the depression subscale of the BASC can predict one's processing speed abilities. It also was hypothesized that symptoms of depression would have an adverse affect on processing speed performance. Results revealed similar finding to the previous analysis. There were no significant predictors among the processing speed variables (See Table 11). Additionally, only 3.3% to 9.9% of the total variation of processing speed performance was accounted for by depression (See Table 12). Please refer to Tables 13 through 16 for a summary of the results regarding the individual impact of depressive symptoms on each measure of processing speed.

Table 11

The Direct Effect of Depressive Symptoms on Processing Speed

---

	<u>B</u>	<u>SE B</u>	<u><math>\beta</math></u>
WISC-III PS Index			
BASC-PRS <sup>a</sup>	-0.17	0.12	-0.21
BASC-TRS <sup>b</sup>	-0.01	0.17	-0.01
BASC-SRP <sup>c</sup>	-0.19	0.17	-0.16
CPT-II Reaction Time			
BASC-PRS <sup>a</sup>	0.09	0.10	0.13
BASC-TRS <sup>b</sup>	0.18	0.14	0.19
BASC-SRP <sup>c</sup>	-0.05	0.14	-0.05
TOL <sup>DX</sup> Total Time			
BASC-PRS <sup>a</sup>	0.29	0.15	0.28
BASC-TRS <sup>b</sup>	-0.36	0.22	-0.24
BASC-SRP <sup>c</sup>	0.15	0.21	0.10

Table 11 (Continued)

	<u>B</u>	<u>SE B</u>	<u>β</u>
Trail Making Test-A/ Trail Making Test-B			
BASC-PRS <sup>a</sup>	<0.01	<0.01	-0.03
BASC-TRS <sup>b</sup>	<-0.01	<0.01	-0.15
BASC-SRP <sup>c</sup>	<-0.01	<0.01	-0.04

*Note.* WISC-III = Wechsler Intelligence Scale for Children-Third Edition; PS= Processing Speed; CPT-II = Conners' Continuous Performance Test-II; TOL<sup>DX</sup> = Tower of London-Drexel Edition; BASC-PRS = Behavior Assessment System for Children-Parent Rating Scales; BASC-TRS = Behavior Assessment System for Children-Teacher Rating Scales; BASC-SRP = Behavior Assessment System for Children-Self-Report of Personality.

<sup>a</sup>n = 93.

<sup>b</sup>n = 65.

<sup>c</sup>n = 91.

Table 12

Multiple Regression Analysis Predicting the Effects of Depressive Symptoms on Processing Speed

	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Standard Error of the Estimate
WISC-III PS Index	.32	.10	.05	12.19
CPT-II Reaction Time	.26	.07	.02	10.21
TOL <sup>DX</sup> Total Time	.29	.08	.04	15.31
Trail Making Test-A/ Trail Making Test-B	.18	.03	-.02	0.20

*Note.* WISC-III = Wechsler Intelligence Scale for Children-Third Edition; PS = Processing Speed; CPT-II = Conners' Continuous Performance Test-II; TOL<sup>DX</sup> = Tower of London-Drexel Edition.

Table 13

Multiple Regression Analysis Predicting the Individual Effects of Depressive Symptoms on the Wechsler Intelligence Scale for Children-Third Edition (WISC-III) Processing Speed Index

	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Standard Error of the Estimate
BASC-PRS <sup>a</sup>	.28	.08	.06	12.12
BASC-TRS <sup>b</sup>	.28	.08	.05	12.22
BASC-SRP <sup>c</sup>	.32	.10	.05	12.19

*Note.* BASC-PRS = Behavior Assessment System for Children-Parent Rating Scales; BASC-TRS = Behavior Assessment System for Children-Teacher Rating Scales; BASC-SRP = Behavior Assessment System for Children-Self-Report of Personality.

<sup>a</sup>n = 93.

<sup>b</sup>n = 65.

<sup>c</sup>n = 91.

Table 14

Multiple Regression Analysis Predicting the Individual Effects of Depressive Symptoms on the Conners' Continuous Performance Test-II (CPT-II) Reaction Time

	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Standard Error of the Estimate
BASC-PRS <sup>a</sup>	.18	.03	.02	12.38
BASC-TRS <sup>b</sup>	.29	.08	.05	12.15
BASC-SRP <sup>c</sup>	.31	.10	.05	12.17

*Note.* BASC-PRS = Behavior Assessment System for Children-Parent Rating Scales; BASC-TRS = Behavior Assessment System for Children-Teacher Rating Scales; BASC-SRP = Behavior Assessment System for Children-Self-Report of Personality.

<sup>a</sup>n = 93.

<sup>b</sup>n = 65.

<sup>c</sup>n = 91.

Table 15

Multiple Regression Analysis Predicting the Individual Effects of Depressive Symptoms on the Tower of London-Drexel Edition (TOL<sup>DX</sup>) Total Time

	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Standard Error of the Estimate
BASC-PRS <sup>a</sup>	.20	.04	.02	15.43
BASC-TRS <sup>b</sup>	.28	.08	.05	15.25
BASC-SRP <sup>c</sup>	.29	.08	.04	15.31

*Note.* BASC-PRS = Behavior Assessment System for Children-Parent Rating Scales; BASC-TRS = Behavior Assessment System for Children-Teacher Rating Scales; BASC-SRP = Behavior Assessment System for Children-Self-Report of Personality.

<sup>a</sup>n = 93.

<sup>b</sup>n = 65.

<sup>c</sup>n = 91.

Table 16

Multiple Regression Analysis Predicting the Individual Effects of Depressive Symptoms on the Trails Making Test A-Trails Making Test B Ratio

	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Standard Error of the Estimate
BASC-PRS <sup>a</sup>	.12	.01	<-.01	.20
BASC-TRS <sup>b</sup>	.18	.03	<-.01	.20
BASC-SRP <sup>c</sup>	.18	.03	-.02	.20

*Note.* BASC-PRS = Behavior Assessment System for Children-Parent Rating Scales; BASC-TRS = Behavior Assessment System for Children-Teacher Rating Scales; BASC-SRP = Behavior Assessment System for Children-Self-Report of Personality.

<sup>a</sup>n = 93.

<sup>b</sup>n = 65.

<sup>c</sup>n = 91.

#### *Research Question 4*

Is the level of depression as measured by Behavior Assessment System for Children-Parent Rating Scale (BASC-PRS), Behavior Assessment System for Children-Teacher Rating Scale (BASC-TRS), and Behavior Assessment System for Children-Self-Report of Personality (BASC-SRP) a significant predictor of behavioral regulation as measured by Wisconsin Card Sorting Test (WCST) Failure to Maintain Set, Behavioral Rating Inventory of Executive Functioning (BRIEF) Behavioral Regulation Index, Tower of London-Drexel Edition (TOL<sup>DX</sup>) Rule Violations, and Conners' Continuous Performance Test-II (CPT-II) Commission Errors?

To address this question, multiple regression analyses were utilized. It was hypothesized that the level of depression would be a significant predictor of behavioral regulation dysfunction. Multiple regressions analyses were conducted to determine the direct effect of behavioral regulation on symptoms of depression as measured by the parent, teacher, and youth self-report. Results indicated that behavioral regulation, as measured by the BRIEF Behavioral Regulation Index, was significantly affected by the BASC-PRS depression rating (See Table 17). However, no significant relationships were observed between behavioral regulation measures and either the teacher or self-report of depressive ratings. The total variation of behavioral regulation accounted for by depression varied significantly. Table 18 reveals that depression accounted for 50.3% of behavioral regulation dysfunction on the BRIEF Behavioral Regulation Index. However, depression only accounted for 1.9%, 9.1%, and 5.2% of the variation on the subsequent measures. Please refer to Tables 19 through 22 for a summary of the results regarding the individual impact of depressive symptoms on each measure of behavioral regulation.

Table 17

The Direct Effect of Depressive Symptoms on Behavior Regulation

---

	<i>B</i>	<i>SE B</i>	<i>β</i>
BRIEF Bx Regulation Index			
BASC-PRS <sup>a</sup>	0.66	0.11	0.69*
BASC-TRS <sup>b</sup>	0.03	0.15	0.02
BASC-SRP <sup>c</sup>	0.02	0.14	0.02
CPT-II Commission Errors			
BASC-PRS <sup>a</sup>	0.02	0.12	0.02
BASC-TRS <sup>b</sup>	-0.13	0.16	-0.12
BASC-SRP <sup>c</sup>	0.13	0.16	0.12
TOL <sup>DX</sup> Rule Violations			
BASC-PRS <sup>a</sup>	-0.08	0.20	-0.06
BASC-TRS <sup>b</sup>	-0.53	0.28	-0.28
BASC-SRP <sup>c</sup>	0.04	0.27	0.02

Table 17 (Continued)

	<u>B</u>	<u>SE B</u>	<u>β</u>
WCST Failure to Maintain			
BASC-PRS <sup>a</sup>	-0.06	0.14	-0.06
BASC-TRS <sup>b</sup>	-0.02	0.20	-0.02
BASC-SRP <sup>c</sup>	-0.27	0.20	-0.19

*Note.* BRIEF = Behavior Rating Inventory of Executive Functioning; Bx = Behavior; CPT-II = Conners' Continuous Performance Test-II; TOL<sup>DX</sup> = Tower of London-Drexel Edition; WCST = Wisconsin Card Sorting Test; BASC-PRS = Behavior Assessment System for Children-Parent Rating Scales; BASC-TRS = Behavior Assessment System for Children-Teacher Rating Scales; BASC-SRP = Behavior Assessment System for Children-Self-Report of Personality.

<sup>a</sup>n = 93.

<sup>b</sup>n = 65.

<sup>c</sup>n = 91.

\**P* < .001.

Table 18

Multiple Regression Analysis Predicting the Effects of Depressive Symptoms on Behavior Regulation

	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Standard Error of the Estimate
BRIEF Bx Regulation	.71	.50	.48	10.45
CPT-II Commission Errors	.14	.02	-.03	11.56
TOL <sup>DX</sup> Rule Violations	.30	.09	.05	19.64
WCST Failure to Maintain	.23	.05	<.01	14.19

*Note.* BRIEF = Behavior Rating Inventory of Executive Functioning; Bx = Behavior; CPT-II = Conners' Continuous Performance Test-II; TOL<sup>DX</sup> = Tower of London-Drexel Edition; WCST = Wisconsin Card Sorting Test.

Table 19

Multiple Regression Analysis Predicting the Individual Effects of Depressive Symptoms on the Behavior Rating Inventory of Executive Function (BRIEF) Behavioral Regulation Index

	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Standard Error of the Estimate
BASC-PRS <sup>a</sup>	.71	.50	.49	10.28
BASC-TRS <sup>b</sup>	.71	.50	.49	10.36
BASC-SRP <sup>c</sup>	.71	.50	.48	10.45

*Note.* BASC-PRS = Behavior Assessment System for Children-Parent Rating Scales; BASC-TRS = Behavior Assessment System for Children-Teacher Rating Scales; BASC-SRP = Behavior Assessment System for Children-Self-Report of Personality.

<sup>a</sup>n = 93.

<sup>b</sup>n = 65.

<sup>c</sup>n = 91.

Table 20

Multiple Regression Analysis Predicting the Individual Effects of Depressive Symptoms on the Conners' Continuous Performance Test-II (CPT-II) Commission Errors

	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Standard Error of the Estimate
BASC-PRS <sup>a</sup>	.01	<.01	-.02	11.48
BASC-TRS <sup>b</sup>	.09	.01	-.03	11.53
BASC-SRP <sup>c</sup>	.14	.02	-.03	11.56

*Note.* BASC-PRS = Behavior Assessment System for Children-Parent Rating Scales; BASC-TRS = Behavior Assessment System for Children-Teacher Rating Scales; BASC-SRP = Behavior Assessment System for Children-Self-Report of Personality.

<sup>a</sup>n = 93.

<sup>b</sup>n = 65.

<sup>c</sup>n = 91.

Table 21

Multiple Regression Analysis Predicting the Individual Effects of Depressive Symptoms on the Tower of London-Drexel Edition (TOL<sup>DX</sup>) Rule Violation

	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Standard Error of the Estimate
BASC-PRS <sup>a</sup>	.19	.04	.02	19.90
BASC-TRS <sup>b</sup>	.30	.09	.06	19.48
BASC-SRP <sup>c</sup>	.30	.09	.05	19.64

*Note.* BASC-PRS = Behavior Assessment System for Children-Parent Rating Scales; BASC-TRS = Behavior Assessment System for Children-Teacher Rating Scales; BASC-SRP = Behavior Assessment System for Children-Self-Report of Personality.

<sup>a</sup>n = 93.

<sup>b</sup>n = 65.

<sup>c</sup>n = 91.

Table 22

Multiple Regression Analysis Predicting the Individual Effects of Depressive Symptoms on the Wisconsin Card Sorting Test (WCST) Failure to Maintain Set

	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Standard Error of the Estimate
BASC-PRS <sup>a</sup>	.14	.02	<.01	14.19
BASC-TRS <sup>b</sup>	.15	.02	-.01	14.30
BASC-SRP <sup>c</sup>	.23	.05	<.01	14.19

*Note.* BASC-PRS = Behavior Assessment System for Children-Parent Rating Scales; BASC-TRS = Behavior Assessment System for Children-Teacher Rating Scales; BASC-SRP = Behavior Assessment System for Children-Self-Report of Personality.

<sup>a</sup>n = 93.

<sup>b</sup>n = 65.

<sup>c</sup>n = 91.

*Research Question 5*

Is the level of depression as measured by Behavior Assessment System for Children-Parent Rating Scale (BASC-PRS), Behavior Assessment System for Children-Teacher Rating Scale (BASC-TRS), and Behavior Assessment System for Children-Self-Report of Personality (BASC-SRP) a significant predictor of metacognitive skills as measured by the Behavioral Rating Inventory of Executive Functioning (BRIEF) Metacognitive Index?

A final analysis utilizing multiple regression was included to determine the extent to which scores on the depression subscale of the BASC can predict metacognitive abilities. It was hypothesized that the level of depression would predict metacognitive skills. To determine the relationship between symptoms of depression and metacognitive abilities, regression analyses were conducted. Results indicated that metacognitive skills, as measured by the BRIEF Metacognitive Index, were significantly affected by the BASC-PRS depression rating (See Table 23). Additionally, 29.4% of the variation in the BRIEF Metacognitive Index was accounted for by depression (See Table 24). Please refer to Table 25 for a summary of the results regarding the individual impact of depressive symptoms on the BRIEF Metacognitive Index.

Table 23

The Direct Effect of Depressive Symptoms on the Behavior Rating Inventory of Executive Function (BRIEF) Metacognitive Index

	<u>B</u>	<u>SE B</u>	<u>β</u>
BASC-PRS <sup>a</sup>	0.47	0.11	0.57*
BASC-TRS <sup>b</sup>	-0.03	0.15	-0.02
BASC-SRP <sup>c</sup>	-0.06	0.15	-0.05

*Note.* BASC-PRS = Behavior Assessment System for Children-Parent Rating Scales.  
 BASC-TRS = Behavior Assessment System for Children-Teacher Rating Scales.  
 BASC-SRP = Behavior Assessment System for Children-Self-Report of Personality.

<sup>a</sup>n = 93.

<sup>b</sup>n = 65.

<sup>c</sup>n = 91.

\**P* < .001.

Table 24

Multiple Regression Analysis Predicting the Effects of Depressive Symptoms on Metacognitive Abilities as Measured by the Behavior Rating Inventory of Executive Function (BRIEF) Metacognitive Index

	<u>R</u>	<u>R<sup>2</sup></u>	<u>Adjusted R<sup>2</sup></u>	<u>Standard Error of the Estimate</u>
BRIEF Metacognitive Scale	.54	.29	.26	10.88

*Note.* BRIEF = Behavior Rating Inventory of Executive Functioning.

Table 25

Multiple Regression Analysis Predicting the Individual Effects of Depressive Symptoms on the Behavior Rating Inventory of Executive Function (BRIEF) Metacognitive Index

	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Standard Error of the Estimate
BASC-PRS <sup>a</sup>	.54	.29	.28	10.73
BASC-TRS <sup>b</sup>	.54	.29	.27	10.81
BASC-SRP <sup>c</sup>	.54	.29	.26	10.89

*Note.* BASC-PRS = Behavior Assessment System for Children-Parent Rating Scales; BASC-TRS = Behavior Assessment System for Children-Teacher Rating Scales; BASC-SRP = Behavior Assessment System for Children-Self-Report of Personality.

<sup>a</sup>n = 93.

<sup>b</sup>n = 65.

<sup>c</sup>n = 91.

Chapter IV related the results of the data analyses. In the following chapter, a more extensive interpretation of the findings will be presented. Finally, in Chapter V the limitations, as well as the direction of future research are discussed.

## CHAPTER V

### SUMMARY AND CONCLUSIONS

Chapter I identified the potential negative effects of depressive symptoms on the various aspects of neurocognitive function, provided an overview of the current study and identified its purpose. Chapter II followed with a comprehensive review of current literature regarding depression in youth. In Chapter III, the specific method and procedures of the current study, as well as described the data analyses to be used for each research question were outlined. Chapter IV revealed the results of the individual data analyses by research question.

Chapter V is organized into three major sections. The first section is an overview of the problem and a brief summary of the study that includes the research hypotheses. The second section will provide a more thorough interpretation and discussion of the findings. The implications for practice also are addressed here. Finally, in the third section, the limitations of the current study as well as the direction of future research are discussed.

#### Overview of the Problem

Depression is a complex issue facing young children and adolescents, but investigation of this crisis has been ignored for many decades. In recent years, efforts have been made to examine the potential harmful affects of depression in children;

however, researchers agree that more comprehensive examination is warranted (Cicchetti & Toth, 1998; Compas, 1994; Mash & Barkley, 1996).

Evidence suggests the prevalence rate of depressive symptoms among children is increasing steadily, and the association between the presence of depressive symptoms and impairment has been well-documented in the available literature (APA, 2000; Hammen & Rudolph, 1996; Teeter & Semrud-Clikeman, 1997). More specifically, Compas (1994) explained that youth manifesting symptoms of depression are at increased risk for disruption in academic achievement, poor peer relations, and an impaired sense of self. Furthermore, researchers have speculated that symptoms of depression may persist for years and extend into adulthood (Teeter & Semrud-Clikeman, 1997). Although early evidence suggested high levels of recovery among children and adolescents with treatment, researchers cautioned that relapse is common (APA, 2000; Kovas et al., 1984; Mash & Barkley, 1998; Teasdale et al, 2002). Obviously, these findings highlight the need for accurate identification and early intervention.

The ever-growing body of research represents a positive trend and demonstrates an understanding regarding the magnitude of this phenomenon. Professionals have accepted that childhood depression is not a problem that can be ignored or simply be resolved if untreated. Despite the advances in the field of child psychology, however, many questions remain unanswered and many areas for investigation continue to be unexplored. The goal of this study was to investigate the effects of depressive symptomatology on various aspects of youths' executive functioning abilities and to address the potential complications that may be encountered in the school environment.

Based on the current literature, it was hypothesized that children and adolescents manifesting symptoms of depression would experience some level of impairment on neuropsychological instruments measuring processing speed, problem-solving ability, behavioral regulation, and metacognitive abilities.

### Conclusions

Contrary to the enormous body of literature documenting significant neurocognitive impairment in adults and growing evidence confirming similar trends in youth, results of this study failed to substantiate the presence of a neuropsychological pattern associated with depressive symptoms in youth. Across raters, the presence (or absence) of depressive symptoms did not predict individual performance on direct measures of problem-solving, processing speed, and behavioral regulation. This finding, however, is consistent with the findings of others who have examined the association between laboratory measures of neuropsychological status and “real-life” behavior. In recent years, a number of researchers have investigated the ecological validity of neuropsychological measures to predict functioning outside the assessment setting (e.g., at home, work, classroom environment; Price, Joschko, & Kerns, 2003). Although Price et al. (2003) cited a number of studies from the adult literature that document a link between performance on neuropsychological measures and everyday functioning, Sbordone (1997) cautioned that the predictive ability of these measures remains limited, accounting for no more than 40% of the variance.

Despite the lack of evidence identifying a link between depressive symptoms and executive dysfunction in direct measures, a significant correlation was found between

the teacher rating of depression and the WCST Categories. The WCST is thought to measure mental flexibility with the support of corrective feedback. Research has confirmed deficits with set-shifting in adults with depression (Channon & Green, 1999; Chelune & Bear, 1986; Stern & Prohaska, 1997). Therefore, this finding may suggest that children and adolescents with depression also may experience some impairment with set-shifting, a skill required in general classrooms. Some researchers have argued that the severity of depressive symptoms highly correlate with performance on neurocognitive tasks (Austin, Mitchell, & Goodwin, 2001); however, others proposed that individuals with depression simply demonstrate less spontaneous use of appropriate strategies on neurocognitive tasks (Channon & Green, 1999). In their study, Channon and Green (1999) found adults with depression experienced difficulty utilizing appropriate performance strategies, even with corrective feedback. The authors further noted that the increased strategies did not significantly affect overall performance. Channon and Green (1999) contended their findings supported the cognitive model that implicates reduced or diverted attentional processing resources in the manifestation of depression.

Significant correlations also were observed between the parent and teacher ratings of depression with the BRIEF Behavioral Regulation Index and BRIEF Metacognitive Index. Thus, the correlations observed in this current study between parent and teacher ratings of depression and discrete aspects of executive function, as measured by the BRIEF parent questionnaire, may indicate that while the children's

overall performance may not have been significantly impaired the processes they employed may have been less efficient.

The overall results indicated the BASC-PRS Depression Scale score accurately predicted impaired performance on both the BRIEF Behavioral Regulation Index and the BRIEF Metacognitive Index, accounting for 50.3% and 29.4% of the variance respectively. Although depression as measured by the BASC-TRS did not predict deficits in either behavioral regulation or metacognitive skills, it is important to acknowledge that the limited availability of teacher input may have unfairly impacted the findings. However, another rationale for these results may be that parents are better able to rate children's behavior. Several researchers have reported that agreement between parent and teacher ratings is often low (Hart & Lahey, 1999; Kamphaus & Frick, 2002). Although Hart and Lahey (1999) claimed teachers are among the most accurate reporters of child behaviors, one unpublished study cited by Kamphaus and Frick (2002) argued that parents were more successful describing children's behaviors differentially across measures than teachers. Based on his individual findings, Daniel (as cited in Kamphaus & Frick, 2002) maintained that parents have more time to observe individual child behavior than most teachers and therefore, may be able to identify certain variations of behavior more accurately. Alternatively, these results may reflect parent consistency in responding across the two scales (i.e., BASC-PRS and BRIEF).

Regardless of one's perspective relating to this argument, it emphasizes the need for practitioners to include multiple raters from various settings. In spite of the reported low agreement ratings between parent and teachers, each rater provides unique

information pertaining to the individual child's behaviors according to setting (Hart & Lahey, 1999). Understanding problem behaviors and including behaviors that may be specific to environment can be vital to the development of an appropriate treatment plan.

No significant correlations were observed between self-report ratings and the neuropsychological measures of interest. One possible explanation for these limited findings between children's self-report and other measures may be related directly to their developmental level. According to Piagetian theory, children begin to think abstractly and utilize deductive reasoning abilities around age 11 (Sattler, 1992); the mean age of children investigated for this study was 11.74 years. Until children and young adolescents reach this formal operations stage, they may lack the higher order thinking skills required for self-evaluation and self-monitoring, the primary characteristics of metacognitive ability. Although research states that children may be better able to report internalizing symptoms (Kamphaus & Frick, 2002), the age at which this occurs has not been identified.

#### Implications for Practice

Unfortunately, little is known about childhood depression and its proper treatment. Impairment of cognitive functioning has been accepted among professionals (Elliott et. al., 1997). Researchers have speculated that depression in youth does not impair overall intellectual ability, but rather, the symptoms often associated with depression (e.g., poor concentration, impaired motivation) affect academic performance and scholastic achievement (Mash & Barkley, 1996). Evidence also indicates that youth suffering from depressive symptoms may encounter difficulty with new learning and the

completion of assignments (Teeter & Semrud-Clikeman, 1997). These preliminary findings, along with the belief that depression in children may be more widespread than previously recognized, emphasize the need for improved identification strategies, as well as greater prevention and intervention techniques.

Overall, the results of this investigation suggest that children and adolescents with depression may experience deficits in behavioral regulation and metacognitive abilities. More specifically, parents reported significant difficulty in children regarding the abilities to monitor their own behavior, maintain attention and concentration, and complete assignments. These problems are not inconsistent with the existing literature (e.g., Teeter & Semrud-Clikeman, 1997). In addition to addressing the realistic problems associated with these overt behaviors, practitioners must attend to the underlying causes. When treating for depression, one also must determine if there is a need to address these associated deficits.

Most studies appear to focus on clinical populations; however, a larger portion of children appear to be experiencing subclinical levels of depression. Research estimates that depression may be underidentified in youth (Mash & Barkley, 1996). Further investigation is needed to better understand the implications of subsyndromal symptoms on classroom performance. Moreover, efforts must be made for early identification.

Clearly, it is essential for professionals working with children and adolescents to be aware of childhood depression. In addition to recognizing risk factors common to the disorder, practitioners must be aware of the general patterns of age and sex differences that increase vulnerability among certain populations. Regardless of whether they are

teachers, therapists, or parents, anyone who comes in contact with a child has the ability to play a significant role in the life of a child with depression. When a child presents with these difficulties it may be prudent to rule out depression as the underlying cause. Therefore, increased efforts to educate through professional development are warranted. Professional development should aim to broaden knowledge base of childhood depression and disseminate information regarding early detection strategies.

#### Limitations of the Study

Although the results suggested that depressive symptoms have little predictive effect on the performance of laboratory measures of neurocognitive functioning, practitioners must consider the limitations of this investigation. Overall, the participants in the study were rather homogeneous in nature, with a much smaller percentage being female and from diverse ethnic backgrounds. Additionally, all of the youth were recruited from a small, Southwest community. The limited sample size prohibited exploration and restricted investigation of the data. Each of these factors must be considered carefully in the interpretation of the study's findings. Furthermore, analysis of the 93 participants included for investigation revealed relatively low levels of depressive symptomology as reported by parent, teacher, and child/adolescent informants.

Another limitation of the study is the reliance on self- and other informant ratings. In spite of the fact that parent, teacher, and child raters have demonstrated adequate validity in the identification of problem behaviors, Kamphaus and Frick (2002) have noted that reports from teachers, parents, and individual self-reports may be

discrepant, potentially complicating interpretation of results. Additionally, although research has suggested that children's self-reports of internalizing problems (e.g., anxiety, depression) are more accurate as compared to teacher and parent reports (Kamphaus & Frick, 2002; Mash & Barkley, 1996), Hart and Lahey (1999) cautioned that self-report ratings may be influenced by social desirability effects. Results from rating scales also may be affected by other factors including the scale's content and wording, characteristics of the informant, characteristics of the child, setting, and purpose of the evaluation (Hart & Lahey, 1999). A final complication of rating scales relates to their limited scope. Although behavior rating scales identify depressive symptoms, Compas (1994) noted that ratings do not provide sufficient data regarding the severity and duration of the symptomology. Thus, it is important to recognize the potential problems that may arise when relying on rating scales. These results are complicated further by the inability to include teacher data for all participants.

A final limitation to the study is the restricted definition of executive function. Although multiple measures thought to tap into executive function were included for investigation, significant findings were only indicated on the Behavior Rating Inventory of Executive Function (BRIEF) Behavioral Regulation Index. Unlike the other measures (i.e., CPT-II, WCST, TOL<sup>DX</sup>), the BRIEF results were based on parent report rather than individual child and adolescent performance. Therefore, behavioral dysregulation was limited to the definition provided by the measure's authors, as well as parent report on their measure. This limitation also applies to the study's findings regarding depressive symptomology's impact on metacognitive abilities.

### Future Research

Based upon the findings of this study and the paucity of existing related literature, further research is warranted. The suggestions presented in this section incorporate issues of methodology and design, as well as research focus and application.

It is recommended that the current research be replicated with the addition of a clinical sample. As previously discussed, the children and adolescents included in this study were of a non-clinical population. Incorporating a clinical group for investigation would enable researchers to draw comparisons between clinical and non-clinical populations. Any differences observed between groups may increase understanding of childhood depression, as well as identify potential risk factors that place certain youth at greater risk for depression.

It also would be valuable to incorporate participants from differing geographic areas, as well as those from divergent racial and ethnic backgrounds. Currently, too few studies investigating the complex relationship between ethnicity and depression are available. Furthermore, many researchers (e.g., Austin & Chorpita, 2004) have complained that existing literature often fails to examine a wide range of ethnic populations.

In addition, larger sample sizes are suggested. Expanding the size of the sample would permit greater investigation, including further examination of gender differences. Researchers have identified gender differences in the development of depression; however, the cause for this difference remains unknown. These recommendations would strengthen the research design and could increase the generalizability of the results.

Further investigation with the BRIEF also is recommended verifying its ability to identify deficits in executive functioning, including metacognitive skills. Research indicates that internalizing symptomology may interfere with executive functioning abilities (Guze & Gitlin, 1994). If that is the case, depressive symptoms can impair a child's ability to function successfully in most settings, including the classroom environment. Although researchers continue to rely on neuroimaging to advance our understanding of executive functioning abilities, the BRIEF may provide practitioners with a more practical alternative for assessment.

Also, Teasdale et al. (2002) found that increased metacognitive awareness, in conjunction with cognitive therapy, reduced relapse in depression in adults. Although this finding has yet to be confirmed in youth, such discoveries are encouraging. Presently, the BRIEF is one of the few measures thought to assess metacognitive abilities in youth. Examination regarding the ameliorating affects of metacognitive skills in children is needed.

Finally, investigators should explore other measures of depression employed in the assessment of children (e.g., Achenbach Behavior Checklist, Children's Depression Inventory) in order to examine their potential predictive ability on tests of neuropsychological status. In spite of the fact that neuropsychological measures were not initially developed for this purpose (Sbordone, 1997), researchers must continue to investigate the ecological validity of these tests to advance our understanding of the data obtained and how it relates to overall functioning. Price et al. (2003) explained that much of the research in this area focuses on adult samples; however, gaining a better understanding of how best to use neuropsychological measures as predictors of functional behavior in children may help professionals develop improved treatment plans and select more appropriate educational interventions for youth experiencing the adverse affects of depression.

#### Summary

Overall, there is still much to learn about the potential harmful affects of depression on youth's neurocognitive functioning. With the current group of children and adolescents, few significant findings were observed between symptoms of depression and performance on neuropsychological measures. Nevertheless, this finding does not indicate that depressive symptoms have no impact. This study highlighted the predictive quality of depressive symptoms and the development of executive function deficits as measured by parent report (e.g., BRIEF); this may be a first step toward the identification of a profile associated with depression in youth. More importantly, however, advancing our understanding of the link between executive dysfunction and

the manifestation of depression may prove to be an effective and practical way of detecting children and adolescents who previously have been overlooked. Better understanding also can inform prevention programming for children and adolescents.

Best practice for the assessment of depression in youth remains multidimensional and should include careful examination of all the systems potentially influencing the child, as well as data from multiple informants. Differential diagnosis is complicated by several factors, and recovery from symptoms relies on accurate diagnosis of the true underlying problem. Therefore, clinicians must be aware of potential overlap of symptoms and the effective strategies to employ in order to identify depression.

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APPENDICES

APPENDIX A

Table 26

Diagnostic Criteria for 296.2x Major Depressive Episode Provided by the *DSM-IV-TR*

- A. Five (or more) of the following symptoms have been present during the same 2-week period and represent a change from previous functioning; at least one of the symptoms is either (1) depressed mood or (2) loss of interest in pleasure.

**Note:** Do not include symptoms that are clearly due to a general medical condition, or mood-incongruent delusions or hallucinations.

- (1) depressed mood most of the day, nearly every day, as indicated by either subjective report (e.g., feels sad or empty) or observation made by others (e.g., appears tearful). **Note:** In children and adolescents, can be irritable mood.
- (2) markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day (as indicated by either subjective account or observation made by others)
- (3) significant weight loss when not dieting or weight gain (e.g., change of more than 5% of body weight in a month), or decrease or increase in appetite nearly every day. **Note:** In children, consider failure to make expected weight gains.
- (4) insomnia or hypersomnia nearly every day
- (5) psychomotor agitation or retardation nearly every day (observable by others, not merely subjective feelings of restlessness or being slowed down)
- (6) fatigue or loss of energy nearly every day
- (7) feelings of worthlessness or excessive or inappropriate guilt (which may be delusional) nearly every day (not merely self-reproach or guilt about being sick)
- (8) diminished ability to think or concentrate, or indecisiveness, nearly every day (either by subjective account or as observed by others)
- (9) recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation with a specific plan, or a suicide attempt or a specific plan for committing suicide

- B. The symptoms do not meet criteria for a Mixed Episode.

- C. The symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning.

Table 26 (Continued)

- D. The symptoms are not due to the direct physiological effects of a substance abuse (e.g., a drug of abuse, a medication) or a general medical condition (e.g., hypothyroidism).
- E. The symptoms are not better accounted for by Bereavement, i.e., after the loss of a loved one, the symptoms persist for longer than 2 months or are characterized by marked functional impairment, morbid preoccupation with worthlessness, suicidal ideation, psychotic symptoms, or psychomotor retardation.

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Table 27

Diagnostic Criteria for 300.4 Dysthymic Disorder Provided by the *DSM-IV-TR*

- A. Depressed mood for most of the day, for more days than not, as indicated either by subjective account or by observation by others, for at least 2 years. **Note:** In children and adolescents, mood can be irritable and duration must be at least 1 year.
- B. Presence, while depressed, of two (or more) of the following:
  - (1) poor appetite or overeating
  - (2) insomnia or hypersomnia
  - (3) low energy or fatigue
  - (4) low self-esteem
  - (5) poor concentration or difficulty making decisions
  - (6) feelings of hopelessness
- C. During the 2-year (1 year for children or adolescents) of the disturbance, the person has never been without the symptoms in Criteria A and B for more than 2 months at a time.
- D. No Major Depressive Episode has been present during the first 2 years of the disturbance (1 year for children or adolescents); i.e., the disturbance is not better accounted for by the chronic Major Depressive Disorder, or Major Depressive Disorder, In Partial Remission.
 

**Note:** There may have been a previous Major Depressive Episode provided there was a full remission (no significant signs or symptoms for 2 months) before development of the Dysthymic Disorder. In addition, after the initial 2 years (1 year in children or adolescents) of Dysthymic Disorder, there may be superimposed episodes of Major Depressive Disorder, in which both diagnoses may be given when the criteria are met for a Major Depressive Disorder.
- E. There has never been a Manic Episode, a Mixed Episode, or a Hypomanic Episode, and criteria have never been met for Cyclothymic Disorder.
- F. The disturbance does not occur exclusively during the course of a chronic Psychotic Disorder, such as Schizophrenia or Delusional Disorder.
- G. The symptoms are not due to the direct physiological effects of a substance abuse (e.g., a drug of abuse, a medication) or a general medical condition (e.g., hypothyroidism).

Table 27 (Continued)

- H. The symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning.

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APPENDIX B

## Attention and Planning Study Consent Form for Child Participation

I give permission for my child, \_\_\_\_\_, and me to participate in this study. I understand that the purpose of this study is to look at different aspects of attention problems and planning in children and adults ages 9 to 35 years. I understand that before the study is completed, 200 individuals will be included in this study. I understand that my participation and that of my child is voluntary and that I can withdraw my consent at any time with any records of my participation destroyed at my request.

I understand that in participating, my child will be administered a number of tests including measures of ability, school achievement, language, memory, attention, and emotional state. In conjunction with the evaluation, my child will be asked to read and respond to statements describing a variety of behaviors, thoughts, or emotions; my child will be asked to complete a number of tasks that require planning, the ability to pay attention, the ability to recall information, and the ability to verbally express myself; I will be asked to provide information regarding my child's development and medical, educational, and social/behavioral history. Completion of behavioral ratings will take 15-30 minutes of my time. I understand, however, that my child and I can choose not to answer any questions that make me feel uncomfortable at any time. With my permission, my child's teacher will be asked to complete some rating scales related to my child's behavior at school. This will take about 15-30 minutes of the teacher's time.

I understand that the actual evaluation of my child will take approximately 3 – 5 hours over two sessions. I understand that this evaluation will be conducted at no charge to me or my insurance carrier. The evaluation will be conducted by doctoral students under the supervision of a licensed psychologist. I will receive a narrative report of the results of the evaluation. The results will be confidential and will not be shared with anyone without my express written permission. I understand that there is low risk involved in participation in this study.

I understand that a subsample of the 200 participants will be invited to return at one year and two years after the initial assessment. I understand that indicating an interest here does not mean that I or my child have to participate in the future; I also realize that my child may not be selected for the follow-up portion of this study. If selected, I will be asked to complete another consent form at that time.

\_\_\_\_\_ I prefer not to be contacted about my child's participation in the future.

\_\_\_\_\_ You may contact me about future participation.

Initials \_\_\_\_\_

Date \_\_\_\_\_

Attention and Planning Study  
 Consent Form for Child Participation  
 (page 2)

If you would like to talk to a therapist or counselor about any concerns or issues, in addition to the Counseling and Assessment Clinic (CAC: 979 845-8021), some local resources include:

MHMR Crisis Hotline                      (979) 361-9815

TAMU Psychology Clinic                      (979) 845-8017

I have read and understand the explanation provided to me (or it was read to me). I have had all my questions answered to my satisfaction, and I voluntarily agree for my child and me to participate in this study. I have been given a copy of this consent form. If I have any questions about this study at any time, I can contact:

Cynthia A. Riccio, Ph.D.  
 Department of Educational Psychology  
 Texas A & M University – MS 4225  
 College Station, TX 77843-4225  
 (979) 862-4906

\_\_\_\_\_  
 Signature

\_\_\_\_\_  
 Date

\_\_\_\_\_  
 Cynthia A. Riccio, Ph.D., Principal Investigator

\_\_\_\_\_  
 Date

This research study has been reviewed and approved by the Institutional Review Board – Human Subjects in Research, Texas A & M University. For research-related problems or questions regarding subjects' rights, the Institutional Review Board may be contacted through Dr. Richard E. Miller, IRB Coordinator, Office of the Vice President for Research and Associate Provost for Graduate Studies at (979) 845-1811.

**Attention/Planning Study  
Assent Form for Child/Adolescent**

It has been explained to me that this is a study to learn more about attention and planning in children and adults, ages 9 to 35. I understand that 200 people will be participating in this study. I understand that I don't have to participate, and that I can change my mind about participating at any time without getting into trouble.

I understand that the tasks I am asked to do will involve talking and answering questions, writing, drawing, reading, making puzzles, solving problems, and so on. I understand that sometimes the tasks may be very hard and I may not be able to do them; I am supposed to do my best. I will be asked to respond to statements about thoughts, feelings, and behaviors that I may have. I understand that I can choose not to answer any questions that make me feel uncomfortable. I understand that the tasks will take 3 – 5 hours over two sessions.

I understand that my parents will receive a report that discusses the results but that the information will not be shared with anyone else without their permission.

I understand what has been explained to me and all of my questions have been answered. I agree to participate in this study.

\_\_\_\_\_  
Student Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Cynthia A. Riccio, Ph.D., Principal Investigator

\_\_\_\_\_  
Date

If I have any questions about this study at any time, I can contact:

Cynthia A. Riccio, Ph.D.  
Department of Educational Psychology  
Texas A & M University – MS 4225  
College Station, TX 77843-4225  
(979) 862-4906

APPENDIX C

Table 28

Behavior Assessment System for Children-Self-Report of Personality (BASC-SRP):  
Depression Subscale Items

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	<u>Form</u>	
	<u>Child</u>	<u>Adolescent</u>
1. Adults have a better life than I do.	X	X
2. I always have bad luck.	X	X
3. I am always in trouble at home.	X	—
4. I am always in trouble with someone.	X	—
5. I am good at only one or two things.	X	X
6. I don't seem to do anything right.	—	X
7. I have too many problems.	X	—
8. I just don't care anymore.	X	X
9. I never have anything to do that is really fun.	—	X
10. I prefer not to be noticed.	X	—
11. I prefer to be alone most of the time.	X	—
12. I think I am dumb next to my friends.	X	X
13. I used to be happier.	X	—
14. Life is getting worse and worse.	X	X
15. No one understands me.	X	X
16. Nobody ever listens to me.	X	X
17. Nothing about me is right.	X	X
18. Nothing ever goes right for me.	X	X
19. Nothing goes my way.	X	X

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Table 29

Behavior Assessment System for Children-Teacher Rating Scale (BASC-TRS):  
Depression Subscale Items

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	<u>Form</u>	
	<u>Child</u>	<u>Adolescent</u>
1. Changes mood quickly	X	—
2. Complains about being teased	X	—
3. Cries easily	X	X
4. Is easily upset	X	X
5. Is sad	X	X
6. Says, "I don't have any friends"	X	X
7. Says, "I hate myself"	—	X
8. Says, "I want to die" or "I wish I were dead"	X	X
9. Says, "I want to kill myself"	—	X
10. Says, "Nobody likes me"	X	X
11. Says, "Nobody understands me"	X	X
12. Stays disappointed a long time if a favorite activity is canceled	X	—

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Table 30

Behavior Assessment System for Children-Parent Rating Scale (BASC-PRS):  
 Depression Subscale Items

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	<u>Form</u>	
	<u>Child</u>	<u>Adolescent</u>
1. Changes mood quickly	X	X
2. Complains about being teased	—	X
3. Complains about not having friends	X	—
5. Cries easily	X	X
7. Is easily frustrated	X	—
8. Is easily upset	X	X
9. Is sad	X	X
10. Pouts	—	X
11. Says, “I don’t have any friends”	X	—
12. Says, “I hate myself”	—	X
14. Says, “I want to die” or “I wish I were dead”	X	X
15. Says, “I want to kill myself”	X	X
16. Says, “I’m so ugly”	X	—
17. Says, “Nobody likes me”	X	X
18. Says, “Nobody understands me”	X	X

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APPENDIX D

Table 31

The Behavior Rating Inventory of Executive Function (BRIEF) Parent Form Scale Items  
for the Behavioral Regulation Index

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Inhibit Scale

1. Acts wilder or sillier than others in groups (birthday parties, recess)
2. Interrupts others
3. Gets out of seat at the wrong times
4. Gets out of control more than friends
5. Blurts things out
6. Acts too wild or “out of control”
7. Has trouble putting the breaks on his/her actions
8. Gets in trouble if not supervised by an adult
9. Becomes too silly
10. Talks at the wrong time

Shift Scale

1. Resists or has trouble accepting a different way to solve a problem with schoolwork, friends, chores, etc.
2. Becomes upset with new situations
3. Tries the same approach to a problem over and over even when it does not work
4. Acts upset by a change in plans
5. Is disturbed by change of teacher or class
6. Resists change of routine, foods, places, etc.
7. Has trouble getting used to new situations (classes, groups, friends)
8. Thinks too much about the same topic

Emotional Control Scale

1. Overreacts to small problems
  2. Has explosive, angry outbursts
  3. Becomes tearful easily
  4. Has outbursts for no reason
  5. Mood changes frequently
  6. Reacts more strongly to situations than other children
  7. Mood is easily influenced by the situation
  8. Angry or tearful outbursts are intense but end suddenly
  9. Small events trigger big reactions
  10. Becomes upset too easily
-

Table 32

The Behavior Rating Inventory of Executive Function (BRIEF) Parent Form Scale Items  
for the Metacognitive Index

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Initiate Scale

1. Is not a self-starter
2. Needs to be told to begin a task even when willing
3. Has trouble coming up with ideas for what to do in play or free time
4. Has trouble getting started on homework or chores
5. Has trouble organizing activities with friends
6. Does not take initiative
7. Complains there is nothing to do
8. Lies around the house a lot (“couch potato”)

Working Memory Scale

1. When given three things to do, remembers only the first or last
2. Has a short attention span
3. Has trouble concentrating on chores, schoolwork, etc.
4. Is easily distracted by noises, activity, sights, etc.
5. Has trouble with chores or tasks that have more than one step
6. Needs help from an adult to stay on task
7. Forgets what he/she was doing
8. When sent to get something, forgets what he/she is supposed to get
9. Has trouble finishing tasks (chores, homework)
10. Has trouble remembering things, even for a few minutes

Plan/Organize Scale

1. Does not bring home homework, assignment sheets, materials, etc.
2. Has good ideas but cannot get them on paper
3. Does not connect doing tonight’s homework with grades
4. Forgets to hand in homework, even when completed
5. Gets caught up in details and misses the big picture
6. Has good ideas but does not get job done (lacks follow-through)
7. Becomes overwhelmed by large assignments
8. Underestimates time needed to finish tasks
9. Starts assignments or chores at the last minute
10. Does not plan ahead for school assignments
11. Written work is poorly organized
12. Has trouble carrying out the actions needed to reach goals (saving money for special item, studying to get a good grade)

Table 32 (Continued)

## Organization of Materials Scale

1. Leaves playroom a mess
2. Keeps room messy
3. Cannot find things in room or school desk
4. Leaves a trail of belongings wherever he/she goes
5. Leaves messes that others have to clean up
6. Has a messy closet

## Monitor Scale

1. Does not check work for mistakes
  2. Makes careless errors
  3. Has poor handwriting
  4. Is unaware of how his/her behavior affects or bothers others
  5. Does not notice when his/her behavior causes negative reactions
  6. Has poor understanding of own strengths and weaknesses
  7. Work is sloppy
  8. Does not realize that certain actions bother others
-

## VITA

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Education

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Texas A&M University, College Station, Texas  
Ph.D.; School Psychology  
August 2005

The University of Texas at Austin, Austin, Texas  
M.Ed.; Special Education  
August 1998

The University of Texas at Austin, Austin, Texas  
B.S.; Applied Learning and Development  
December 1993

Professional Experiences

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Children's Hospital, Columbus, Ohio  
Pediatric Psychology Intern August 2004 – August 2005

Honors and Awards

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Texas A&M University's Department of School Psychology 2004 Next Step Award  
Texas A&M University's Executive Committee of the Faculty of Neuroscience 2003-  
2004 Travel Award  
Texas A&M University's Executive Committee of the Faculty of Neuroscience 2002-  
2003 Travel Award  
The University of Texas at Austin Award of Master's Scholarship

Presentations

---

Gsanger, K. M., Homack, S. &, Riccio, C. A. (2005). Spatial Span Components as Predictors of Attention Problems and Executive Functioning in Adults. Poster presented at the International Neuropsychological Society Conference, St. Louis, Missouri February 2 – February 5, 2005.

Gsanger, K. M., Homack, S. R., Macey, K. D., & Riccio, C. A. (2004). The Effects of Internalizing Symptoms on Memory: Implications for the Classroom. Poster presented at the National Association of School Psychologists' Annual Conference. Dallas, Texas March 30 – April 3, 2004.