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The primary aim of this study was to determine whether students with ADHD endorse higher rates of depressive disorders and depressive symptoms than their non-ADHD college student peers. A second aim was to explore whether protective factors are associated with lower rates of depression in college students with ADHD. Forty-six students with ADHD were enrolled in this study, and compared to a demographically-equivalent group of 46 college students without ADHD on measures assessing depressive disorders, depressive symptoms, and protective factors. The ADHD group more frequently endorsed a depressive episode sometime during college, although they were not necessarily more likely to endorse a current depressive episode. The ADHD group also endorsed more current depressive symptoms than their non-ADHD peers. In terms of protective factors, compared to students with ADHD only, students with ADHD and depression in college endorsed greater utilization of psychological supports and a lesser degree of support from friends during college, as well as greater total protective factors prior to college. ADHD status, a history of depression prior to college, and lesser support from friends were found to predict current depressive symptoms in regression analyses. Overall, findings from these analyses suggest that some of the “protective factors” as measured in this study may better represent outcomes associated with ADHD. Post-hoc analyses revealed that impairment during college and depressive cognitions significantly predicted current depressive symptoms as well. In sum, findings from this study suggest that students with ADHD are at increased risk for experiencing depressive disorders and

depressive symptoms in college compared to students without ADHD. Clinical implications as well as avenues for future research are discussed.

DEPRESSION IN COLLEGE STUDENTS WITH ADHD

by

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Committee Chair

To Andy.

I wouldn't be where I am today without your unwavering love, support, and encouragement. You are my rock.

APPROVAL PAGE

This dissertation written by ALLISON COVILLE BRAY has been approved by the following committee of the Faculty of The Graduate School at The University of North Carolina at Greensboro.

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TABLE OF CONTENTS

	Page
LIST OF TABLES	vii
LIST OF FIGURES	viii
CHAPTER	
I. INTRODUCTION	1
ADHD in Children and Adults	3
ADHD In College Students	9
Understanding the Relation Between ADHD and Depression in College Students	18
Present Study	21
II. METHOD	24
Participants.....	24
Measures	29
Procedure	37
III. RESULTS	41
Preliminary Inspection of the Data	41
Correlations Among Variables	41
Hypothesis 1.....	42
Hypothesis 2.....	45
Post-hoc Analysis 1.....	48
Post-hoc Analysis 2.....	50
Post-hoc Analysis 3.....	52
IV. DISCUSSION.....	53
Potential Explanations for Findings.....	57
Limitations	61
Future Research	64
Clinical Implications.....	67
Conclusion	71
REFERENCES	73

APPENDIX A. TABLES AND FIGURES	95
APPENDIX B. ADULT ADHD RATING SCALE – SELF REPORT.....	106
APPENDIX C. COLLEGE LIFE QUESTIONNAIRE	107
APPENDIX D. IMPAIRMENT RATING SCALE.....	110
APPENDIX E. AUTOMATIC THOUGHTS QUESTIONNAIRE-REVISED	111
APPENDIX F. BACKGROUND INFORMATION FORM	113
APPENDIX G. UNIVERSITY OF NORTH CAROLINA AT GREENSBORO CONSENT TO ACT AS A HUMAN PARTICIPANT.....	115
APPENDIX H. AUTHORIZATION TO DISCLOSE PROTECTED HEALTH INFORMATION.....	118

LIST OF TABLES

	Page
Table 1. Demographic Characteristics of ADHD and Control Groups	95
Table 2. Psychological Characteristics of ADHD and Control Groups.....	96
Table 3. Correlations Among Variables for Final Sample (N = 89).....	97
Table 4. SCID-CV Mood Disorder Module Diagnoses by Group.....	98
Table 5. Hierarchical Logistic Regression Analyses Predicting Depressive Episode in College from Past and Current Protective Factor Variables	99
Table 6. Hierarchical Multiple Regression Analyses Predicting Depression From Past and Current Protective Factor Variables	100
Table 7. Crosstabs: Incidents of Depression in ADHD Group Before and After Entering College (n = 46)	101
Table 8. Crosstabs: Incidents of Depression in Control Group Before and After Entering College (n = 46)	101
Table 9. Hierarchical Multiple Regression Analysis Predicting BDI Score From Impairment During College, Impairment Prior to College, and Depressive Cognitions	102

LIST OF FIGURES

	Page
Figure 1. Safren's (2004) Cognitive-Behavioral Model of Impairment in Adult ADHD	103
Figure 2. Hypothesized Model for the Development of Depressive Symptoms in College Students with ADHD.....	104
Figure 3. Simple Main Effects Analyses Depicting BDI Scores at High (1 <i>SD</i> above the mean), Medium (mean) and Low (1 <i>SD</i> below the mean) Levels of Anxiety (transformed BAI scores)	105

CHAPTER I

INTRODUCTION

Although Attention-Deficit/Hyperactivity Disorder (ADHD) is classified as a childhood condition, it is widely acknowledged to persist into adulthood, with a prevalence rate of approximately 4.4% according to the National Comorbidity Survey Replication (Kessler et al., 2006). Across the lifespan, ADHD impacts academic, occupational, and interpersonal functioning, and is associated with increased risk for co-occurring psychiatric disorders. Up to 60% of children and adolescents with ADHD have at least one additional disorder, and in adults with ADHD the rate of comorbid disorders increases to around 80-85% (Barkley, 2006). Specifically, rates of comorbid depression have been estimated to occur in 25-30% of children and 17-31% of clinic-referred adults with ADHD (Barkley, 2006; Biederman et al., 1993). Some have attributed the development of depression in individuals with ADHD to repeated failures as a result of ADHD symptoms, while others have found that the risk for depression is related to conduct problems earlier in life (Angold, Costello, & Erkanli, 1999; Solanto, 2011).

The college years fall in the developmental period known as emerging adulthood (Arnett, 2000). Relatively little is known about ADHD during this developmental phase, and smaller still is the body of knowledge specifically on ADHD in the context of college. However, students with ADHD are enrolling in postsecondary institutions at increasing rates (Weyandt & DuPaul, 2006). Deficits in executive functioning associated

with ADHD may make ordinary college challenges, like managing long-term assignments, prioritizing academic and social activities, and establishing increased independence, especially difficult for students with ADHD (Culpepper, 2011a, 2011b). Indeed, college students with ADHD tend to have more academic impairment and poorer adjustment than students without ADHD (Barkley, Murphy, & Fischer, 2008; Blasé et al., 2009; DuPaul, Weyandt, O'Dell, & Varejao, 2009; Norwalk, Norvilitis, & MacLean, 2009). Confronted with such challenges, college students with ADHD would seem to be more likely than typically developing students to experience depression, although existing findings on this topic are mixed (e.g., Dooling-Litfin & Rosen, 1997; Gudjonsson, Sigurdsson, Eyjolfsdottir, Smari & Young, 2009; Heiligenstein, Guenther, Levy, Savino, & Fulwiler, 1999; Heiligenstein & Keeling, 1995; Norvilitis, Ingersoll, Zhang, & Jia, 2008; Rabiner, Anastopoulos, Costello, Hoyle, & Swartzwelder, 2008; Richards, Rosen & Ramirez, 1999). Such existing research is limited in that comprehensive assessments of ADHD, comorbidity, and associated impairment were not routinely conducted and control groups were not typically included. Finally, some work has examined protective factors that contribute to better outcomes for college students with ADHD; however, no study to date has examined whether such protective factors mitigate the risk for depression in this population.

The purpose of the current study was to examine depression both categorically and dimensionally in college students with and without ADHD, and to examine the role of protective factors in the relation between ADHD and depression in college students. Achieving a better understanding of the relation between ADHD and depression in

college students is an important clinical and public health concern, as it may help to inform treatment approaches, screenings and assessments, and other services to meet the unique needs of these students on college campuses. Ultimately, this line of research may represent a step towards improving academic, social, occupational, and mental health outcomes for college students with ADHD.

ADHD in Children and Adults

Overview

The college years represent a developmental gap in current knowledge of ADHD, and an understanding of ADHD in children and adults may better inform an understanding of ADHD in the college context. ADHD is a disorder originating in childhood that is characterized by a persistent pattern of developmentally inappropriate inattention and/or hyperactivity-impulsivity symptoms (American Psychiatric Association, 2000). Overall, up to 70-80% of children with ADHD are likely to continue to meet criteria for ADHD or to experience ADHD-related impairment in adolescence (Barkley, Anastopoulos, Guevremont, & Fletcher, 1991; Hinshaw, Owens, Sami, & Fargeon, 2006; Weiss & Hechtman, 1993). Results from four longitudinal studies suggest that the disorder persists into adulthood in about 50% of children diagnosed with ADHD in the United States (Barkley, Fischer, Smallish, & Fletcher, 2006; Biederman et al., 2006; Mannuzza, Klein, Bessler, Malloy, & LaPadula, 1998; Weiss & Hechtman, 1993). However, rates of persistence have varied widely across studies, largely due to methodological factors, including reliance on self-report only (Barkley, 2006; Barkley, Fischer, Smallish, & Fletcher, 2002; Wender, 1995). In order to meet *Diagnostic and*

Statistical Manual of Mental Disorders-Fourth Edition-Text Revision (DSM-IV-TR; APA, 2000) criteria for ADHD, an individual must experience impairment in at least two domains of functioning (e.g., academic, social, occupational), and endorse at least six of nine possible symptoms of inattention and/or six of nine possible symptoms of hyperactivity-impulsivity for a minimum of six months in duration. These symptoms must be present before age seven, must significantly deviate from developmental norms, and must not be better accounted for by other conditions. The diagnostic criteria for ADHD were recently revised in the *DSM-5* (APA, 2013), although at the time of this study, *DSM-IV-TR* criteria were still in place.

Both children and adults with ADHD experience deficits in academic achievement; they tend to do poorly in school and underperform relative to their aptitude, including lower grade point averages, higher rates of course failure, more suspensions and expulsions, and greater use of special education services (Barkley, Fischer, Edelbrock, & Smallish, 1990; Barkley, 2002, 2006; Brown & Borden, 1986; Kent et al., 2010). Despite possessing average or above-average intelligence, adults with ADHD are less likely to enroll in college and even less likely to complete a degree (Barkley, 2002, 2006; Weiss & Hechtman, 1993). Those students who do go on to college, however, tend to possess higher cognitive abilities, have prior academic successes, and have better coping skills than students with ADHD who do not go on to college (Glutting, Youngstrom, & Watkins, 2005). Adults with ADHD are also likely to have lower-level jobs, more frequent job changes, to be fired, and to demonstrate lower quality work than

non-ADHD adults (Barkley, 2002; Biederman, Petty, et al., 2008; de Graaf et al., 2008; Gjervan, Torgersen, Nordahl, & Rasmussen, 2011; Weiss & Hechtman, 1993).

Interpersonal difficulties are also common among individuals with ADHD across the lifespan, including intra-family conflict, negativity, social rejection, poor social and communication skills, fewer close friendships, and marital and parenting difficulties (Bagwell, Molina, Pelham, & Hoza, 2001; Barkley, 2002; Barkley, 2006; Barkley, Anastopoulos, Guevremont, & Fletcher, 1992; Danforth, Barkley, & Stokes, 1991; Hechtman, 2009; Johnston & Mash, 2001; Klimkeit et al., 2006). Adolescents and adults with ADHD are also at risk for driving impairment; abuse of alcohol, nicotine, and drugs; risky sexual behavior; and trouble managing money (Barkley, 2004; Barkley et al., 2008; Barkley, Guevremont, Anastopoulos, DuPaul, & Shelton, 1993; Flory, Molina, Pelham, Gnagy, & Smith, 2006; Kuperman et al., 2001; Molina, Marshal, Pelham, & Wirth, 2005; Richards, Deffenbacher, Rosen, Barkley, & Rodricks, 2006).

Importantly, protective factors that may buffer against impairment in youth and adults with ADHD include positive parenting; sensitive family environments; higher socioeconomic status and intelligence; fewer peer relationship problems; and lesser severity of conduct problems and childhood ADHD (Biederman et al., 1996; Chronis et al., 2007; Fischer, Barkley, Fletcher, & Smallish, 1993; Johnston & Mash, 2001; Latimer et al., 2003; Weiss & Hechtman, 1993).

Comorbid Depression

Overall, comorbidity rates in ADHD across the lifespan are quite high, with rates up to 60% in community youth and approximately 80-85% of clinic-referred adults

(August, Realmuto, MacDonald, Nugent, & Crosby, 1996; Barkley, 2006). Rates of depression in youth with ADHD have been estimated between 25-30%, with a median odds ratio of 5.5 (Angold et al., 1999; Biederman et al., 1996; Pliszka, 2000). Research examining this comorbidity consistently suggests that ADHD precedes the onset of depression (Hechtman, 2009), and that youth with ADHD are at risk for depression as a function of persistent functional impairment (Bagwell et al., 2001; Bagwell, Molina, Kashdan, Pelham, & Hoza, 2006; Tannock, 1994; Waxmonsky, 2003; Weiss & Hechtman, 1993). Some work in this area has found that children with ADHD and comorbid mood disorders report more negative views of themselves and depressive cognitive styles than children with ADHD only (Schmidt, Stark, Carlson, & Anthony, 1998). It has also been suggested that a history of severe externalizing problems in childhood increases the risk for depression in those with ADHD (Angold et al., 1999; Bagwell et al., 2006; Fischer, Barkley, Smallish, & Fletcher, 2002). Others have found that comorbid depression in ADHD samples is instead accounted for by inattention symptoms (Blackman, Ostrander, & Herman, 2005).

Many longitudinal studies have reported no difference in rates of mood disorders between ADHD and control groups at late-adolescent or young adult follow-up (e.g., Mannuzza et al., 1991, 1998; Weiss & Hechtman, 1993). However, one longitudinal study found significantly higher lifetime rates of major depression in young adults with ADHD (26%), as compared to controls (12%), and this risk was mediated by the severity of Conduct Disorder in adolescence (Barkley & Fischer, 2005; Fischer et al., 2002). By contrast, results from studies of clinic-referred adults have reported that major depressive

disorder is over-represented in adults with ADHD (Barkley, 2006; Hesslinger, Tebartz van Elst, Mochan, & Ebert, 2003); comorbidity rates (17-31%) appear to be similar to that among children with ADHD, and are significantly higher than that of depression in non-ADHD controls (5%; Biederman et al., 1993). Similarly, rates of dysthymia, a milder form of depression, have been reported in 19-37% of clinic-referred adults with ADHD (Murphy, Barkley, & Bush, 2002; Roy-Byrne et al., 1997). Gender differences have also been reported, as women with ADHD had significantly higher rates of depression and dysthymia, which was not accounted for by comorbid externalizing disorders (Biederman et al., 1993, 1994; Biederman, Ball, et al., 2008). Finally, it has been suggested that ADHD-related impairment across development may contribute to feelings of inadequacy and low self-esteem, which then lead to depression in adulthood (Solanto, 2011).

Summary

ADHD arises in childhood and persists into adulthood in the majority of those affected, causing impairments in academic, home, relationship, and occupational functioning (Barkley, 2006). Predictors of academic success and positive behavioral outcomes in children, adolescents, and adults with ADHD include sensitive family environments; strong parenting skills; higher child intelligence; and better coping skills (Biederman et al., 1996; Fischer et al., 1993; Johnston & Mash, 2001). Rates of comorbidity are high, with up to 60% of children and up to 80-85% of adults with ADHD having at least one additional condition (Barkley, 2006). In particular, some studies have found an increased risk of depression in those with ADHD as development progresses (Biederman et al., 2006); indeed, depression is one of the latest developing disorders and

rarely precedes any comorbid disorder (Costello, Foley, & Angold, 2006; Rohde, Lewinsohn, & Seely, 1991). While some work suggests that young adults with ADHD are not at increased risk for depression (e.g., Mannuzza, Gittelman-Klein, Bessler, Malloy, & LaPadula, 1993; Weiss & Hechtman, 1993), others have found that increased rates of depression in adolescents and young adults with ADHD were accounted for by comorbid conduct problems (e.g., Angold et al., 1999; Bagwell et al., 2006; Fischer et al., 2002), and still others found that depressive symptoms were accounted for by inattention symptoms (Blackman et al., 2005).

There are several limitations to existing research examining depression in ADHD populations. First, the majority of longitudinal studies have included predominantly Caucasian males, those with the hyperactive-impulsive type of the disorder, and those without comorbid conditions (e.g., Mannuzza et al., 1991, 1993, 1998; Rasmussen & Gillberg, 1991; Weiss, Hechtman, Milroy, & Perlman, 1985). Therefore, less is known about the course of the disorder in non-Caucasians, females, those with comorbidities, and those with primarily inattentive symptoms. Additionally, females are more likely overall to develop depression than males in adolescence and adulthood, and are less likely to display externalizing behaviors (e.g., conduct symptoms) that have been found to mediate the relation between ADHD and depression in some studies (Biederman et al., 1994, 2004; Kessler et al., 2003; Nolen-Hoeksema & Hilt, 2009). Next, most longitudinal studies relied on self-report only at the time of adult follow-up; however, inclusion of parent report in assessment of adult ADHD may be more valid than relying on self-report alone (Barkley et al., 2002). Despite limitations in existing research

examining this comorbidity across the lifespan, the literature suggests overall that depression and depressive symptoms commonly develop in individuals with ADHD and the manifestation of depression is not likely to be benign (Spencer, Wilens, Biederman, Wozniak, & Harding-Crawford, 2000).

ADHD in College Students

Despite an extensive body of literature on ADHD in childhood, adolescence, and adulthood, relatively little is known about ADHD during the developmental phase known as “emerging adulthood” (Arnett, 2000), and smaller still is the body of knowledge on ADHD specifically in the college context. Although the majority of individuals with ADHD do not go on to college (Barkley, 2006), students with ADHD are enrolling in postsecondary institutions at increasing rates (Weyandt & DuPaul, 2006). Overall, college students with ADHD tend to have lower GPAs, poorer organization and study skills, time management difficulties, and are less likely to graduate than college students without ADHD (Barkley et al., 2008; DuPaul et al., 2009). These struggles appear to be largely due to deficits in executive functioning and self-regulation (Culpepper, 2011a, 2011b). Indeed, even among typically-developing college students, deficiencies in self-regulation and executive functioning such as initiation of tasks, inhibition, working memory, and organization contribute to procrastination and other academic impairments (Howell & Watson, 2007; Rabin, Fogel, & Nutter-Upham, 2011). For students with ADHD, such challenges, combined with a decrease in structure than they may have been accustomed to previously, may exacerbate ADHD and associated impairment (Culpepper, 2011a). Unfortunately, research on ADHD in college students is complicated

by the fact that these students are difficult to identify and recruit for research, as they are not required to disclose their diagnosis (DuPaul et al., 2009). A further limitation within this literature is that most existing studies have examined students in 4-year colleges; however, students with ADHD may be more likely to attend community colleges, at least initially (Sanford et al., 2011).

Diagnostic Considerations

Diagnosing ADHD in college students is subject to the same concerns as diagnosing ADHD in adults, including child-focused diagnostic criteria, lack of agreement regarding criteria for functional impairment, and difficulty establishing childhood onset, as well as assessing differential diagnoses and comorbid conditions (Reilley, 2005). In college, there is also a drastic shift in the assessment paradigm; prior to college, evaluations place a heavy emphasis on parent, teacher, and other collateral reports, but during college, assessments and screenings for ADHD rely almost exclusively on self-report. Screening for ADHD in college students is also complicated by the fact that non-ADHD students have been found to endorse, on average, 4.5 out of 18 possible ADHD symptoms (Lewandowski, Lovett, Coddington, & Gordon, 2008). The demands and stress affecting all college students may be the reason that students without ADHD are endorsing these symptoms in large numbers (McKee, 2008). Moreover, some students may feign symptoms in order to access benefits that are commonly associated with an ADHD diagnosis, including extra time on exams, tutoring, and stimulant medications (Barkley, 2006; Sollman, Ranssen, & Berry, 2010). Based on suggested best practice for assessing ADHD in adults, evaluations of ADHD in college students should

include clinical interviews with the student and significant others (e.g., parent), self-report questionnaires of ADHD and related symptoms, behavioral questionnaires regarding current and childhood symptoms completed by parents, review of school records, and possibly aptitude and achievement testing (Barkley, 2006). The ultimate goal of this evaluation is to determine the extent to which the student's presentation meets *DSM-IV-TR* criteria for ADHD while considering alternative diagnoses that may better explain symptoms (e.g., learning disability, mood disorder).

Prevalence

Across multiple studies, approximately 12-18% of college students have a diagnosable mental illness (Mowbray et al., 2006), and increasing numbers of college students are entering college with a psychological problem or developing mental health difficulties once on campus (Clay, 2013). Rates of ADHD in the college population have been estimated between 2-8% (DuPaul et al., 2001; Heiligenstein, Conyers, Berns, & Miller, 1998; McKee, 2008; Weyandt, Linterman, & Rice, 1995). These studies relied solely on self-report of current symptoms; rates of ADHD may be much lower (less than 1%) when parent report of childhood symptoms is included (Lee, Oakland, Jackson, & Glutting, 2008). Overall, these rates have been difficult to estimate in part because students with ADHD are not required to disclose a diagnosis to their institution (DuPaul et al., 2009; Weyandt & DuPaul, 2008). Findings regarding gender differences in U.S. college students with ADHD have been mixed, as some have reported higher rates in women than men (e.g., DuPaul et al., 2001), others have found the opposite (e.g., Lee et al., 2008; McKee et al., 2008), and still others have found no gender differences (e.g.,

Heiligenstein et al., 1998). Findings regarding racial and ethnic differences have also been mixed; some have found no differences in rates of symptoms endorsed among Caucasian, Asian, African American, and Hispanic college students (e.g., Heiligenstein et al., 1998), while others have found greater rates of ADHD in African American students than Caucasian students (e.g., Lee et al., 2008). However, both studies included predominantly Caucasians (91% and 89%, respectively).

Impairment

The majority of college students with diagnosed or self-reported ADHD have lower GPAs, more academic concerns, lower overall college adjustment, and are less likely to graduate than college students without ADHD (Barkley et al., 2008; Blasé et al. 2009; DuPaul et al., 2009; Norwalk et al., 2009). Such impairment may be attributed to difficulty with time management and concentration; struggles with academics at a particular university; challenges with timed tests; a perception of having to work harder than their peers; and loss of family structure and support (Heiligenstein et al., 1999; Lewandowski et al., 2008; Weinstein & Palmer, 2002). Symptoms of inattention, in particular, appear to predict poor academic functioning in college students (Frazier, Youngstrom, Glutting, & Watkins, 2007; Rabiner et al., 2008). In this vein, college students with ADHD tend to report more intrusive thoughts and task-irrelevant thoughts compared to non-ADHD students (Hines & Shaw, 1993; Shaw & Giambra, 1993).

Male and female students with ADHD also appear to exhibit social skills deficits and more problems accessing social support compared to non-ADHD students (Kern, Rasmussen, Byrd, & Wittschen, 1999; Shaw-Zirt, Popali-Lehne, Chaplin, & Bergman,

2005). Conversely, greater social skills have been associated with higher levels of self-esteem in college students with ADHD (Dooling-Litfin & Rosen, 1997). Students with ADHD have reported that peer relationships are particularly helpful in coping with the adjustment to college, and some work has found that students with self-reported ADHD do *not* experience less satisfaction with social relationships during their first semester in college relative to non-ADHD students (Meaux, Green, & Broussard, 2009; Rabiner et al., 2008). However, dissatisfaction with peer relationships may increase over time as negative social experiences occur in the college environment (DuPaul et al., 2009). Family relationships may also play an important role, as students with ADHD have reported poorer quality of life compared to their non-ADHD peers, and current quality of life was strongly predicted by family dynamics (Grenwald-Mayes, 2002). In turn, family variables may play a protective role for students with ADHD in terms of improving academic success and quality of life.

Comorbidity

Results from studies comparing rates of comorbidity between ADHD and non-ADHD students have been mixed. Using retrospective chart reviews, one study found that 26% of college students with ADHD also had a depressive disorder (Heiligenstein & Keeling, 1995). By comparison, studies using screening measures have reported rates of depression of 4-11% across the general college population (Eisenberg, Gollust, Golberstein, & Hefner, 2007; Weitzman, 2004). One small study found no differences between students with ADHD and controls in rates of depression or anxiety (Heiligenstein et al., 1999); however, this study excluded students with active

comorbidity, which may account for the findings. A larger, more recent study (N = 210) compared students with ADHD, students with dyslexia, and students with ADHD+dyslexia, and found no differences in rates of depression among these groups (Nelson & Gregg, 2012). However, the authors found that transitioning high school students in all three groups had lower rates of depression than college underclassmen with these conditions. Thus, the authors suggest that the unique experiences and challenges of the college environment may increase the risk for depression in these populations. This study is also strengthened by its use of comprehensive psychological assessments. Overall, however, the aforementioned studies are weakened by their lack of a non-clinical control group.

Other research has found that students who self-report an ADHD diagnosis or clinically significant ADHD symptoms report more depressive symptoms, lower self-esteem, and lower life satisfaction than non-ADHD college students (Dooling-Litfin & Rosen, 1997; Gudjonsson et al., 2009; Heiligenstein & Keeling, 1995; Norvilitis et al., 2008; Rabiner et al., 2008; Richards et al., 1999). In particular, depressive difficulties may be explained by inattention symptoms (Rabiner et al., 2008). Additionally, college students with ADHD and depression have been found to perform significantly worse on neurocognitive measures (e.g., processing speed and recall of verbal information) than those with ADHD only or depression only (Larochette, Harrison, Rosenblum, & Bowie, 2011). The authors suggest that college students with ADHD and depression are likely to experience additive neurocognitive deficits (between the cognitive slowing related to depressive symptoms and the sustained attention deficit related to ADHD), which may

impair processing on reading and writing tasks and performance on time-limited tasks, such as exams.

Other psychological difficulties reported in Heiligenstein and Keeling's (1995) chart review of college students with ADHD include legal problems (12%), anxiety disorders (5%), learning disabilities (2%) and eating disorders (2%). When compared to typical college students, some have found no differences between ADHD and non-ADHD students in terms of psychological functioning (e.g., Heiligenstein et al., 1999). However, others have found that students with ADHD indeed report greater psychological distress, including higher scores on the Symptom Checklist-90-Revised (SCL-90-R) domains of somatization, obsessive-compulsive disorder, interpersonal sensitivity, depression, anxiety, hostility, paranoid ideation, and psychoticism (e.g., Richards et al., 1999; Weyandt, Rice, Linterman, Mitzlaff, & Emert, 1998). College students with ADHD may also be more anger-prone than non-ADHD students (Kern et al., 1999; Ramirez et al., 1997), and may be at increased risk for abuse of alcohol and other substances (DuPaul et al., 2009; Heiligenstein & Keeling, 1995; Weyandt & DuPaul, 2006).

There are numerous limitations in the small body of existing literature on ADHD in the college population, and in studies examining ADHD and comorbidity in particular. First, the majority of studies in this area have relied exclusively on self-report to establish ADHD status (e.g., DuPaul et al., 2001; Heiligenstein et al., 1998; Lewandowski et al., 2008; McKee, 2008); the validity of this approach is highly questionable (Barkley et al., 2002). Moreover, studies have relied primarily on symptom counts or self-report of an

ADHD diagnosis; comprehensive assessments of ADHD are not typically conducted. Rarer still are studies that have comprehensively assessed for comorbid conditions. Future research should aim to include ADHD samples that have been rigorously diagnosed according to the most recent DSM criteria, using a multi-method, multi-informant approach to assessment, and carefully evaluating comorbidities (DuPaul et al., 2009). Moreover, no study to date has examined comorbid conditions such as depression both categorically (e.g., meeting criteria for a depression diagnosis) as well as dimensionally (e.g., number of symptoms). Previous research has also not taken into consideration students' year in college; this may be relevant as students with ADHD may be more prone to struggle, including suffering psychological problems such as depression, at various times throughout their college experience.

Protective Factors

College students with ADHD may differ from those with ADHD who do not go on to college in a number of important ways. The relative success of college students with ADHD may be attributable to higher cognitive capacity and family socioeconomic status; previous academic success; fewer peer relationship and conduct problems in childhood; lesser conflicts with parents; better coping skills; and lesser severity of ADHD in childhood (Barkley, 2006; Glutting et al., 2005). As previously mentioned, positive family variables, better social skills, possessing talents, and positive peer relationships have been associated with better quality of life, higher self-esteem, and better adjustment to college for students with ADHD (Dooling-Litfin & Rosen, 1997; Grenwald-Mayes, 2002; Meaux et al., 2009). Once in college, students with ADHD who receive proper

treatment and take advantage of on-campus and community disability services increase their likelihood of success (Culpepper, 2011b). Of all students who receive disability services, about 25% do so on the basis of ADHD (Wolf, 2001; Wolf, Simkowitz, & Carlson, 2009). Unfortunately, a study by Chew, Jensen, and Rosen (2009) found that only 40% of students who self-reported ADHD indicated that the university had offered them sufficient accommodations, and of those students who did receive accommodations, only 45% indicated that they took advantage of them. Although empirical studies investigating the efficacy of psychosocial treatments for college students with ADHD are forthcoming (DuPaul et al., 2009; Anastopoulos & King, in press), popular approaches include medication, coaching, and cognitive-behavioral therapy. In the only existing study examining the pharmacological treatment of ADHD in college students, lisdexamfetamine dimesylate (LDX) was found to be superior to placebo in reducing ADHD symptoms, enhancing executive functioning, improving study and organizational skills, and reducing levels of psychopathology (DuPaul et al., 2012). Presently, the most prudent approach is for cognitive-behavioral treatments, perhaps combined with medication (Murphy, 2005).

Summary

College students as a population represent a developmental gap in the ADHD literature, although the body of knowledge on this topic is growing. Rates of ADHD in the college population have been estimated between 2-8% (DuPaul et al., 2009). These students are at risk for a number of negative outcomes compared to students without ADHD, including lower GPAs; poorer study skills; dropping out; impairments in social

interactions; and greater levels of psychological distress, including depressive symptoms (Canu & Carlson, 2003; DuPaul et al., 2009; Shaw-Zirt et al., 2005). However, the results regarding rates of depression in students with ADHD are mixed, and the methodology is flawed (e.g., lack of comprehensive assessment of ADHD and depression, lack of control groups). Better adjustment and academic success in this population may be associated with positive family interactions, better social skills, and positive peer relationships (Dooling-Litfin & Rosen, 1997; Grenwald-Mayes, 2002; Meaux et al., 2009). Although students with ADHD may be relatively higher functioning than those with ADHD who do not attend college, they may find that previous coping mechanisms do not continue to be as effective when faced with the changing demands of college (Nelson & Gregg, 2012; Shaw-Zirt et al., 2005).

Understanding the Relation Between ADHD and Depression in College Students

Although college students with ADHD appear to be at heightened risk for experiencing depressive symptoms (Heiligenstein & Keeling, 1995; Rabiner et al., 2008; Richards et al., 1999; Weyandt et al., 1998), the mechanisms by which such comorbidity occur remain unclear. While college provides a unique set of opportunities and challenges for all students, students with ADHD struggle to a greater degree, with greater academic, interpersonal, and psychological difficulties (Barkley et al., 2008; Canu & Carlson, 2003; DuPaul et al., 2009; Rabiner et al., 2008). Although the small body of research examining depressive symptoms in college students with ADHD is not without limitations, studies generally suggest that these students do indeed experience higher

rates of depressive symptoms than their non-ADHD peers (Blasé et al., 2009; Norvilitis et al., 2008; Rabiner et al., 2008; Richards et al., 1999; Weyandt et al., 1998).

Conceptual Framework

Although the minority of individuals with ADHD who enroll in college may be a particularly resilient group, they are at a high risk of falling victim to a “perfect storm” of circumstances as they transition out of high school and into college. Prior to entering college, students with ADHD are likely to have benefitted from a multitude of supports that helped them to manage their symptoms, including academic accommodations (e.g., individualized education plans) and parental monitoring of school responsibilities and schedules (Barkley, 2006; Parker & Benedict, 2002). Once in college, demands on students’ self-regulation abilities increase exponentially (Hofmann, Friese, & Strack, 2009), including keeping a schedule, managing long-term assignments, and maintaining academic, social, and self-care responsibilities. Combined with a decrease in support systems from which they benefitted previously, students with ADHD, who inherently struggle with self-regulation by nature of their disorder, may encounter continued, or worsened, academic and social impairment as they try to navigate the college environment. Indeed, across time, individuals with ADHD are extremely likely to experience repeated failures and difficulties as a result of deficits in behavioral inhibition and executive functioning (Barkley, 2006; Safren, Sprich, Chulvick, & Otto, 2004; Figure 1).

Drawing from Beck (1976) and Lewinsohn’s (1974) theories of depression, it seems likely that longstanding, repeated experiences with academic, peer, and family

impairment, combined with negative feedback from the environment, may contribute to a negative cognitive style, including negative views of the self, the world, and the future; negative schemas; and faulty information processing. To the extent that this cognitive style is reinforced or exacerbated as students with ADHD encounter further or increased functional impairment during college, they appear to be at high risk for experiencing depressive symptoms (Figure 2). Indeed, Beck (1976) posited that even latent schema (formed from earlier experiences) might not emerge until environmental circumstances emit them. The challenges of the college environment seem highly likely to serve as such an environmental trigger that activates these negative cognitions and schema.

Furthermore, the notion that underlying depressive cognitions (based on a student's prior life experiences) may interact with a student's college experiences to contribute to depressive symptoms is consistent with a diathesis-stress approach in which cognitions based on early life experiences serve as the "diathesis," and the challenging college environment serves as the "stress" which activates depressive symptoms (Goodman & Brand, 2009). Once depressive symptoms are manifest, they, in turn, may further tax the student's ability to manage the multitude of demands on his self-regulation inflicted by the college environment, as well as his ability to use compensatory strategies. Moreover, students who have experienced a single depressive episode, either prior to or during college, are at increased risk for experiencing a subsequent depressive episode (APA, 2013). In this vein, the "scar hypothesis" (Lewinsohn, Steinmetz, Larson, & Franklin, 1981) suggests that individuals who have been depressed in the past acquire unique

depression-related characteristics that persist even after remission of an episode, and increase vulnerability to future depression.

Not all students with ADHD will develop depression, and several protective factors may reduce or mitigate the impact of repeated failures and associated impairment, particularly to the extent that they contribute to a more positive cognitive style and to a higher rate of response-contingent positive reinforcement. Protective factors that have been associated with more positive outcomes for college students with ADHD include accessing support services or treatment; possessing areas of strength; having positive family relationships; and having a positive peer group (Culpepper, 2011b; Dooling-Litfin & Rosen, 1997; Grenwald-Mayes, 2002; Meaux et al., 2009).

Present Study

Students with ADHD are enrolling in college at increasing rates, and yet they are at great risk for experiencing impairment in college as a result of increased demands on self-regulation and a loss of support from which they previously benefitted (Barkley, 2006; Meaux et al., 2009). Based on Safren's (2004) model of impairment in adult ADHD and Beck (1976) and Lewinsohn's (1974) theories of depression, repeated impairment, negative feedback, and activation of a negative cognitive style may deem students with ADHD at increased risk for depression compared to their non-ADHD peers. Indeed, some prior research has found that students with ADHD report higher rates of depression than those without ADHD, although existing studies have yielded mixed results and presented several significant methodological limitations, including reliance on self-report only in establishing ADHD status; lack of a comprehensive assessment

approach to evaluating ADHD and comorbid conditions; and lack of control groups. Moreover, existing research suggests that some protective factors associated with more positive outcomes in ADHD students (e.g., utilization of academic and psychological supports, positive family and peer relationships), which may in turn be associated with lower rates of depression.

The present study improves substantially on limitations of prior studies by examining whether college students with rigorously diagnosed ADHD, based on best-practice recommendations using a multi-method, multi-informant assessment approach (DuPaul et al., 2009; Reilley, 2005), display higher rates of depression than college students without ADHD. This study also aimed to examine depression both categorically (i.e., in terms of endorsement of a *DSM-IV-TR* depressive disorder) and dimensionally (i.e., in terms of symptom counts). This approach will allow for an examination of subclinical levels of depression that may contribute to functional impairment and which warrant intervention. Additionally, no known study to date has examined the impact of protective factors in mitigating the risk for depression in college students with ADHD. This study aimed to examine whether such protective factors are associated with lower endorsement of depression in this population. Although it would be of great theoretical interest to examine a wide range of protective factors encompassed by the proposed conceptual model (e.g., pleasant events), such an undertaking was beyond the scope of the present study. Secondary analyses were, however, planned to specifically explore the possible role of impairment and cognitions, based on Safren's (2004) and Beck's (1976) theories.

Hypotheses

Hypothesis 1. College students with ADHD will report greater levels of depression than students without ADHD, both dimensionally and categorically.

Hypothesis 2. Protective factors (e.g., obtaining treatment, accessing academic and other support services, perception of support from peers and family) will be associated with lower rates of depression in college students with ADHD.

CHAPTER II

METHOD

Participants

A sample of 46 students with ADHD enrolled in this study, and an initial pool of 84 students without ADHD were enrolled in order to subsequently select a subgroup of control participants who were matched to the ADHD group on demographic variables. In total, 130 UNCG undergraduate students (42 male, 88 female) between ages 18 and 30 were enrolled in this study. After matching the two groups (see below), the final sample included 92 participants, who ranged in age from 18 to 25 ($M = 20.34$, $SD = 1.94$). Sixty-seven percent ($n = 62$) of the sample was female. Racial composition was 56.5% ($n = 52$) Caucasian, 16.3% ($n = 15$) African American, 5.4% ($n = 5$) Asian American, 2.2% ($n = 2$) Biracial, and 4.3% ($n = 4$) identified as "Other." Fifteen percent ($n = 14$) of the sample identified as Hispanic in ethnicity. In terms of year in college, 30.4% ($n = 28$) were freshman, 27.2% ($n = 25$) were sophomores, 23.9% ($n = 22$) were juniors, and 18.5% ($n = 17$) were seniors. A summary of demographic characteristics appears in Table 1.

The ADHD group included 44 students who had been previously diagnosed with ADHD through the use of a multi-method, multi-informant psychological evaluation received at the ADHD Clinic at UNCG. Evaluations were conducted by PhD-level clinical psychologists and Master's-level students in the clinical psychology doctoral program at UNCG. This group included primarily students who were referred to the

ADHD Clinic for a psychological evaluation, as well as students who were referred to the Clinic for participation in one of two grant-funded research projects on college students with ADHD¹ and who met eligibility criteria for these projects. An additional two students in the ADHD group were not clinic-referred but participated in this study after hearing about it from friends. These students completed the same ADHD assessment battery that is used in the grant-funded projects in order to establish the ADHD diagnosis before proceeding with study measures. Thus, all students in the ADHD group met *DSM-IV-TR* criteria for ADHD as evidenced by

- endorsement of clinically significant, functionally impairing symptoms on the semi-structured ADHD interview;
- evidence of developmental deviance (i.e., scoring at or above the 93rd percentile on ADHD indices from self-report rating scales);
- corroborating evidence from other informants of clinically significant symptoms between the ages of 5 and 12 as well as during the past 6 months; and
- examination of exclusionary conditions.

Based on current debate surrounding the appropriateness of the age of onset and symptom count criteria for diagnosing ADHD in adults, some students were diagnosed with ADHD, Not Otherwise Specified; this diagnosis was given if the student

¹ One is a project funded by the Oak Foundation that is aimed at adapting psychosocial treatments for adult ADHD to be appropriate and efficacious for college students. The other is an NIMH-funded project (R01MH094435-01A1) examining longitudinal trajectories for college students with ADHD.

demonstrated current symptoms and impairment despite not meeting the precise age-of-onset criteria, or endorsing only 4 or 5 symptoms of inattention and/or hyperactivity-impulsivity (Murphy & Barkley, 1996). In light of the changes in ADHD criteria in the *DSM-5*, including increasing the age of onset to 12 and reducing the symptom count for adults from 6 to 5, all students in this study who were evaluated using *DSM-IV-TR* criteria would also have been eligible with the advent of *DSM-5*.

The control group was taken from a large initial sample of college undergraduate students enrolled in an introductory psychology course who completed a battery of initial screening measures for multiple studies (“mass screening”). From this pool, 615 students between the ages of 18 and 30 who endorsed low levels of current ADHD symptoms (i.e., 3 or fewer current symptoms of inattention and hyperactivity-impulsivity on the ADHD-RS), and who endorsed three or fewer items on a validity measure (the Infrequency Scale) were recruited for this study via email. A total of 84 control participants subsequently enrolled in this study and received required research credits in their introductory psychology course for their participation. Control participants were over-sampled in order to increase the likelihood that the final control group of 46 students would be comparable to the ADHD group in terms of age, race and ethnicity, sex, and year in college. From this pool of 84 potential control participants, five participants indicated that they had been diagnosed with ADHD at some point in their lives. Of these five, four participants endorsed three or fewer symptoms of inattention and hyperactivity-impulsivity both in childhood and currently and had never taken medication for ADHD. Based on this information, these participants remained eligible for the final control group

sample. One initial control participant was excluded from consideration for the final sample based on reported history of an ADHD diagnosis as well as clinically significant inattention symptoms in childhood and current ADHD medications.

Of the demographic variables, it was immediately clear that the non-ADHD pool was skewed in terms of having a large number of freshmen in the sample. Because there were 2 more non-freshman students ($n = 33$) in the ADHD group than in the entire control sample, all eligible non-freshman control participants ($n = 31$) were automatically included in the final control group. These participants were then individually matched to ADHD participants based on (in order of priority): sex, age, race, and ethnicity. Freshman control participants were then individually matched with freshman ADHD participants using the same priority of demographic variables.

Participants in the final ADHD sample ($N = 46$) ranged in age from 18 to 25 ($M = 20.46$, $SD = 2.03$), while participants in the final control sample ($N = 46$) ranged in age from 18 to 24 ($M = 20.22$, $SD = 1.86$). Sixty-seven percent ($n = 31$) of both the ADHD and control samples was female. In the ADHD group, racial composition was 56.5% ($n = 26$) Caucasian, 17.4% ($n = 8$) African American, 2.2% ($n = 1$) Asian, 2.2% ($n = 1$) Biracial, and 4.3% ($n = 2$) identified as "Other." Seventeen percent ($n = 8$) identified their ethnicity as Hispanic. In the control group, racial composition was 56.5% ($n = 26$) Caucasian, 15.2% ($n = 7$) African American, ($n = 4$) Asian, 2.2% ($n = 1$) Biracial, and 4.3% ($n = 2$) identified as "Other." Thirteen percent ($n = 6$) identified their ethnicity as Hispanic, 8.7%. In terms of year in college, the ADHD group included 28.3% ($n = 13$) freshmen, 23.9% ($n = 11$) sophomores, 28.3% ($n = 13$) juniors, and 19.6% ($n = 9$)

seniors, while the control group included 32.6% ($n = 15$) freshmen, 30.4% ($n = 14$) sophomores, 19.6% ($n = 9$) juniors, and 17.4% ($n = 8$) seniors.

This produced a final control sample equivalent to the ADHD group by sex (15 males and 31 females in both groups) and age $t(90) = -.59, p = .557$. In terms of statistical comparison between groups in racial composition, Asian, Biracial, and Other were collapsed because of low frequencies. Thus, race was re-categorized as African American, Caucasian, and Other, as well as an ethnically Hispanic group (within which race was not assessed). This yielded ADHD and control samples that were equivalent with respect to race and ethnicity, $\chi^2(3, N = 92) = 1.17, p = .760$. The final samples were also found to be equivalent with respect to year in college $\chi^2(3, N = 92) = 1.29, p = .732$.

Ninety-eight percent ($n = 45$) of the ADHD group reported having been formally diagnosed with ADHD, and of these, 69.6% ($n = 32$) had been diagnosed with ADHD while in college. On the ADHD Semi-Structured Interview, the ADHD group reported an average of 7.57 current inattention symptoms ($SD = 1.39$) and an average of 4.74 current hyperactive-impulsive symptoms ($SD = 2.39$). On the CAARS, the ADHD group had an average T score of 85.34 ($SD = 10.48$) on the DSM-IV Inattentive Symptoms subscale and an average T score of 65.09 ($SD = 13.85$) on the DSM-IV Hyperactive-Impulsive Symptoms subscale. The ADHD group reported an average of 6.96 current inattention symptoms ($SD = 1.95$) and an average of 4.73 current symptoms of hyperactivity-impulsivity ($SD = 2.36$) on the ADHD-RS. Forty-four percent ($n = 20$) of the ADHD group reported that they were being treated with medication for ADHD. Overall, these results are consistent with their diagnostic status. On the ADHD-RS, the control group

reported an average of .98 current inattention symptoms ($SD = 1.16$) and an average of 1.07 current symptoms of hyperactivity-impulsivity ($SD = 1.02$); these results are consistent with their non-ADHD status. Twenty-eight percent ($n = 13$) of the ADHD group reported currently having a mood disorder, and 32.6% ($n = 15$) reported currently having an anxiety disorder. Of the control group, 11% ($n = 5$) reported currently having a mood disorder, and 6.5% ($n = 3$) reported a current anxiety disorder. A summary of psychological characteristics appears in Table 2.

Measures

ADHD Diagnostic Status

ADHD Semi-Structured Interview. A modified version of the ADHD module from the *Computerized Diagnostic Interview Schedule for Children, Version IV* (C-DISC-IV; Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000) was administered to students in the ADHD group as part of their prior ADHD evaluation. The C-DISC-IV has well-established reliability for diagnosing ADHD in children (Shaffer et al., 2000). The module was modified for use with adults by clinicians at the ADHD Clinic at UNCG and gathers information about current ADHD symptom count, age of symptom onset, and impairment in a variety of domains. The reliability and validity of this interview was assessed for this study, using data from a clinical sample of 190 college students who completed this interview as part of their evaluation at the ADHD Clinic at UNCG. Internal consistency was found to be acceptable for the inattentive symptom total ($\alpha = .71$) and the hyperactive-impulsive symptom total ($\alpha = .75$). Concurrent validity was assessed based on analogous CAARS DSM-IV and ADHD-RS scales from the same

sample. Total inattentive symptoms from the ADHD Semi-Structured Interview correlated significantly with the CAARS DSM-IV Inattentive Symptoms subscale, $r(177) = .47, p < .001$, and with the inattentive symptom count from the ADHD-RS, $r(177) = .51, p < .001$. Similarly, total hyperactive-impulsive symptoms from the interview correlated significantly with the CAARS DSM-IV Hyperactive-Impulsive Symptoms subscale $r(182) = .68, p < .001$, as well as with the hyperactive-impulsive symptom count from the ADHD-RS, $r(182) = .64, p < .001$.

Adult ADHD-Rating Scale. The Adult ADHD-RS is a version of the ADHD-RS-IV (DuPaul, Power, Anastopoulos, & Reid, 1998) that has been modified for use with adults and is used to assess symptoms of ADHD (Appendix A). The ADHD-RS contains 18 items corresponding to the nine *DSM-IV* inattention and nine *DSM-IV* hyperactive-impulsive symptoms, presented in alternating order. Items are rated on a 4-point Likert scale (0 = *Never or rarely*; 1 = *Sometimes*; 2 = *Often*; 3 = *Very often*) for occurrence between the ages of 5 and 12 and within the past 6 months. The ADHD-RS yields symptom counts and severity scores for inattention and hyperactivity-impulsivity, as well as a total ADHD severity score. Internal consistencies for the subscales range from 0.86 to 0.92, and test-retest reliability over four weeks is good, ranging from 0.78 to 0.86 (DuPaul et al., 1998). Reliability of this measure for college students was examined for this study utilizing ADHD-RS data from a separate clinical sample of 190 college students who completed the measure as part of an ADHD evaluation at the ADHD Clinic at UNCG. Internal consistency was found to be good for the current inattentive symptom total ($\alpha = .81$) and the current hyperactive-impulsive symptom total ($\alpha = .82$), as well as

for childhood inattentive symptom total ($\alpha = .90$) and the hyperactive-impulsive symptom total ($\alpha = .89$). The ADHD-RS was administered to the ADHD group as part of their evaluation at the ADHD Clinic at UNCG, and was administered to the control group as the primary screening measure of current ADHD symptoms.

Conners Adult ADHD Rating Scale. The self-report long version of the CAARS (Conners et al., 2004) was collected as part of the prior ADHD evaluation process for students in the ADHD group. This measure is used to establish developmental deviance of current ADHD symptoms. The CAARS contains 63 items rated on a 4-point Likert scale from 0 (*Not at all, never*) to 3 (*Very much, very frequently*). Separate norms are available by sex and age. The CAARS yields *T*-scores for eight factor-derived subscales, including three *DSM-IV-TR* ADHD subscales (DSM-IV Inattentive Symptoms, DSM-IV Hyperactive-Impulsive Symptoms, DSM-IV Total ADHD Symptoms). These factors have been confirmed with normative and clinical samples (Conners et al., 1999). The CAARS has good test-retest reliability, good criterion validity (diagnostic efficiency rate = 85%), and internal consistencies for the subscales are also good, ranging from 0.86 to 0.92 (Erhardt, Epstein, Conners, Parker, & Sitarenios, 1999). In this study, the *DSM-IV-TR* ADHD subscales were used to assess developmental deviance of ADHD symptoms.

Outcome Measures

Structured Clinical Interview for DSM Disorders, Clinician Version. The clinician-administered SCID (First, Spitzer, Gibbon, & Williams, 1996) is a semi-structured diagnostic interview that assesses Axis I disorders using *DSM-IV* criteria. The SCID was administered to students in the ADHD group as part of their prior ADHD

evaluation in order to examine exclusionary and comorbid psychological conditions, including past and current depressive disorders. The mood module of the SCID was administered to all participants in the current study in order to evaluate the presence or absence of depressive disorders both in the past (including during college and prior to college) and currently (i.e., within the past month).

Beck Depression Inventory. The BDI (Beck, Steer, & Brown, 1996) was used to examine symptoms of depression dimensionally, in addition to categorical depressive disorder diagnoses established by the SCID-I. The BDI is a 21-item, multiple-choice, self-report measure of depressive symptoms in which respondents rate the degree to which they have experienced each symptom during the past month. Higher ratings indicate more severe depressive symptoms. The BDI has well-established validity and has demonstrated excellent reliability ($\alpha = .91-.93$) in outpatient samples (Beck et al., 1996; Dozois, Dobson, & Ahnberg, 1998). The BDI was administered to both groups in the current study in order to evaluate current symptoms. Internal consistency for the BDI was found to be excellent ($\alpha = .92$) with the current sample.

Predictor Variables

College Life Questionnaire. A questionnaire was created for purposes of this study that assesses the extent to which students have experienced various protective factors, both in college as well as prior to college (see Appendix B). This questionnaire inquires about protective factors that have been proposed in the literature on college students with ADHD, including utilization of academic and psychological support services and perceptions of support from family members and friends (Culpepper, 2011b;

Dooling-Litfin & Rosen, 1997; Grenwald-Mayes, 2002; Meaux et al., 2009). For example, an item for this questionnaire states “Since becoming a college student (at UNCG or elsewhere), how often have you received emotional support from a family member when you wanted to?” The student then indicated the frequency of emotional support on a 4-point Likert scale (0 = *Never/rarely*, 1 = *Sometimes*, 2 = *Often*, 3 = *Very often*). Consistent with the scoring paradigm of the ADHD-RS, a protective factor was considered to “count” when the respondent rated the item “Often” or “Very Often.” For questions that included multiple responses, the number of responses rated “Often” or “Very Often” was then summed to create a total score. Internal consistency for this measure was found to be adequate ($\alpha = .71$). This questionnaire was administered to both groups in this study.

Impairment Rating Scales. Two rating scales were created by Barkley and Murphy (2006) in order to assess past and current impairment in various domains of functioning in adults with ADHD. One scale is a 10-item measure that asks about the extent to which individuals have experienced problems in adulthood as a result of their symptoms in 10 domains: work, social, community, education, dating/marriage, money, driving, leisure, and daily responsibilities. For purposes of this study, instructions were modified to ask participants to “Please rate how frequently you have had difficulties in each of these areas of life activities *since being in college*” (see Appendix C). The other scale is an 8-item measure that asks about the extent to which individuals experienced problems related to their symptoms between the ages of 5 and 12 in 8 domains: family, social, community, school, sports, self-care, play, and chores. Instructions asked

participants to “Please rate how frequently you have had difficulties in each of these areas of life activities *between the ages of 5 and 12.*” All ratings are completed on a 4-point Likert scale (0 = *Never/rarely*, 1 = *Sometimes*, 2 = *Often*, 3 = *Very often*). Each scale yields 3 different types of scores: A score for each individual item, a total rated impairment score reflecting a simple sum of the answers given across all items, and a pervasiveness score reflecting the number of different domains rated as “often” or “very often” impaired. Due to the paucity of guidance given in the *DSM-IV-TR* as to how to evaluate impairment, as well as the general lack of measures assessing impairment related to ADHD, these scales were created by researchers who conducted the longitudinal Milwaukee study of ADHD (e.g., Barkley et al., 2006) as well as the UMASS study of ADHD in adults (e.g., Barkley et al., 2008). In this sample, internal consistency was found to be good to excellent for both childhood impairment items ($\alpha = .90$) and college impairment items ($\alpha = .87$). The scales were administered to both groups in this study in order to assess past and current functional impairment in post-hoc analyses.

Automatic Thoughts Questionnaire-Revised. The original ATQ (Hollon & Kendall, 1980) is a 30-item measure that assesses the occurrence of automatic negative thoughts associated with depression (e.g., “I’m no good,” “I’m worthless”). Respondents rate how frequently each thought occurred within the past week on a 5-point Likert scale (1 = *Not at all*, 2 = *Sometimes*, 3 = *Moderately often*, 4 = *Often*, 5 = *All the time*). Higher scores indicate more frequent and severe depressive cognitions. The ATQ has demonstrated excellent reliability ($\alpha = .96$) and it has been found to distinguish between

depressed and non-depressed groups (Hollon & Kendall, 1980). A recent variation of this measure is the ATQ-Revised (Anastopoulos, Mitchell, Knouse, Kimbrell & Benson, unpublished measure), which intersperses with the original ATQ items 33 additional items thought to correspond specifically to cognitions common in people with ADHD, such as “I didn’t think that through,” “I do better waiting until the last minute,” and “Being overactive is part of my personality,” which are rated on the same 5-point scale as the original ATQ items. The ADHD cognitions subscale is in the process of undergoing validation for use with a clinical ADHD population. In the current sample, internal consistency was found to be excellent for both ADHD items ($\alpha = .90$) and depression items ($\alpha = .96$). The ATQ-R was administered to both groups during participation in this study in order to assess cognitions related to depression and ADHD within the past week (see Appendix D).

Other Measures

Background Information Form. This form collects information regarding participants’ age, sex, race/ethnicity, year in college, overall GPA, current living situation, participation in Greek life and athletics, history of ADHD, anxiety, and mood disorders, and parental occupation. This measure also gathered clinically relevant information, included history of past or current ADHD diagnosis, current mood or anxiety disorder diagnosis, and current use of medication for ADHD (see Appendix E).

Alcohol Use Disorders Identification Test. The AUDIT (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001) is a 10-item measure developed by the World Health Organization (WHO) used to screen for alcohol-related problems. Questions assess the

amount and frequency of alcohol intake, alcohol dependence, and problems related to alcohol consumption. Scores range from 0 to 40, and the generally accepted cut-off for identifying potentially dangerous alcohol intake is 8; some have suggested that a cut-off score of 5 or 6 is more appropriate for women (de Meneses-Gaya, Zuardi, Loureiro, & Crippa, 2009). Across several studies, internal reliability has been found to be good ($\alpha = .80$). Total score test-retest reliability over a one-month period is 0.84 (de Meneses-Gaya et al., 2009). The AUDIT was administered to both groups in this study for purposes of examining alcohol use as a potential covariate.

Beck Anxiety Inventory. The BAI (Beck, Epstein, Brown, & Steer, 1988) is a 21-item, self-report measure of anxiety symptoms in which respondents rate how often they have been bothered by a particular symptom within the past week on a 4-point Likert scale (0 = *Not at all*, 1 = *Mildly*, 2 = *Moderately*, 3 = *Severely*). The BAI has high internal reliability ($\alpha = .92$) and one-week test-retest reliability of 0.75 (Beck et al., 1988). The BAI was administered to both groups in order to examine anxiety as a potential covariate.

Childhood Symptoms Scale. A rating scale was created by Barkley and Murphy (2006) in order to assess childhood externalizing symptoms, including conduct problems, in adults with ADHD. The conduct component of this scale is a 15-item measure corresponding to the 15 behaviors listed under criterion A for a diagnosis of Conduct Disorder in the DSM-IV. Respondents rate the presence of each behavior between the ages of 5 and 18 in a yes/no format. A total symptom score is calculated by summing all of the items endorsed by the respondent. In this study, this measure was administered to both ADHD and control groups in order to examine a history of conduct problems as a

covariate in post-hoc analyses. Internal consistency in this study was found to be poor ($\alpha = .57$), and the overall endorsement of symptoms was low ($M = 1.29$, $SD = 1.5$).

Infrequency Scale. The Infrequency Scale (Chapman & Chapman, 1986) is a 13-item measure designed to detect careless and random responding. Items are self-descriptive and are rated in a dichotomous true/false format. Items are designed to have a very low probability of being endorsed in a certain direction. For example, endorsement of the item “I believe that most light bulbs are powered by electricity” as false suggests random or careless responding. Students who endorsed three or more of these items during mass screening were not recruited for participation in this study. No student in the ADHD group endorsed more than 2 of these items; thus, all ADHD group participants’ data were retained for analyses.

Procedure

This study was approved by the UNCG Institutional Review Board (IRB# 12-0214). The ADHD group was recruited through one of the following four mechanisms. First, after undergoing a comprehensive evaluation for ADHD using the standard multi-method, multi-informant assessment battery at the ADHD Clinic and receiving feedback from their respective clinician, students who had previously indicated an interest in research studies were informed that they were eligible for this project. If interested, they were contacted by the researcher and given the opportunity to participate. Second, other students with ADHD who had undergone an evaluation at the ADHD Clinic within the past year were contacted by the researcher and informed about their eligibility for this project. In order to obtain permission to contact past and current clients of the ADHD

Clinic, a Waiver of Authorization for Release of Protected Health Information (PHI) was obtained. Third, students with ADHD who had recently completed one of the two aforementioned grant-funded studies at the ADHD Clinic were alerted by study staff about this project and offered the opportunity to participate. Students from these grant-funded studies shared a summary of their clinical scores, which were used to confirm eligibility for the current project. Finally, two students with ADHD contacted the researcher directly about this study after hearing about it from a friend. Eligibility was first assessed using the same ADHD assessment battery that is used in the grant-funded projects. Both students met eligibility criteria and subsequently completed all study measures.

After undergoing informed consent, all ADHD participants completed the SCID-CV mood disorders module, followed by a packet of questionnaires containing the Background Information Form, ATQ-R, AUDIT, BDI, BAI, Childhood Symptoms Scale, College Life Questionnaire, Impairment Rating Scale, and Infrequency Scale. Some students in the ADHD group had previously completed a concurrently-running dissertation project at the ADHD Clinic; in the consent form, participants gave permission for the researchers of each project to share data that overlapped between the two studies (e.g., Background Information Form, AUDIT, BDI, BAI, College Life Questionnaire, and Infrequency Scale). Students who had already participated in the other dissertation project first completed the SCID-IV mood disorders module, followed by a packet of questionnaires containing only those measures unique to this study (i.e., the ATQ-R, Childhood Symptoms Scale, and Impairment Rating Scale). Participants who

had previously received an evaluation at the ADHD Clinic were also asked to sign an Authorization to Release PHI form (see Appendix G), which outlined how information already completed by the participant would be accessed and used as part of the current study. After completing study measures, the researcher checked the BDI for endorsement of suicidality. Any participant who had endorsed suicidality (i.e., a score of 2 or higher on item 9) underwent the standard suicidality assessment that is used in the ADHD and Psychology Clinics at UNCG and were provided with resources. No participant was determined to be at imminent risk of suicide. Participants in the ADHD group were given a \$10 gift card to Target® as compensation for their time. Control group participants were recruited through “mass screening,” in which undergraduate students receive required research credits in their introductory psychology course for participation in research studies. Through mass screening, control participants completed the ADHD-RS, BDI, and Infrequency Scale. Eligible participants were then contacted by the researcher via email, and interested students scheduled their participation in this study using Experimetrix®, an online research participation scheduling system. Participants underwent informed consent, and subsequently completed the SCID-CV. After completing this interview, participants completed a packet of questionnaires including the Background Information Form, AUDIT, BAI, Childhood Symptoms Scale, College Life Questionnaire, and Impairment Rating Scale. In the event that a student had previously completed the other ongoing dissertation project at the ADHD Clinic, the SCID-CV was conducted, followed by only those measures that were unique to this study (as mentioned

above). All control participants were awarded research credits for participation through Experimentrix®.

With the exception of control participants who completed initial measures online via mass screening, all study procedures took place in a private therapy room at the ADHD Clinic at UNCG and were administered either by the researcher or another Master's-level doctoral student in the clinical psychology program at UNCG. Packets of measures included the Background Information Form on top and the College Life Questionnaire appeared last, with all other measures presented in random order. To ensure randomness of these measures, a random list generator was used (www.random.org/lists). Students who endorsed past or current depression during the SCID-CV were informed about various resources on- and off-campus. All measures were de-identified and labeled with a unique code number only. All data was entered into an Excel database by the researcher, and accuracy was evaluated by double-entering approximately 20% of data.

CHAPTER III

RESULTS

Preliminary Inspection of the Data

All analyses were conducted using SPSS Version 20.0 (IBM, 2011). A univariate examination of data including skew, kurtosis, and Q-Q plots indicated that the dependent variable assessing current depressive symptoms (BDI score) was not normally distributed. A closer examination of this variable utilizing boxplots revealed three outliers (two in the control group and one in the ADHD group; Pallant, 2007). Once these outliers were removed, final skew and kurtosis statistics for this variable fell within acceptable limits (skewness = 1.10; kurtosis = .88). These outliers were subsequently removed from all analyses utilizing the BDI as the outcome variable. Preliminary inspection of data also revealed that two additional variables (AUDIT and BAI Total scores) violated assumptions of normality based on skew and kurtosis statistics. These variables were log transformed (after adding a constant to all data points, as several cases included values of zero), resulting in normally distributed variables. Final skew statistics for all variables ranged from -.32 to 1.45, and final kurtosis statistics for all variables ranged from -1.62 to 1.61.

Correlations Among Variables

Table 3 depicts results of correlational analyses conducted among ADHD and depression variables, as well as variables that represented potential covariates (e.g.,

AUDIT and BAI) and variables that have been found in prior research to be associated with ADHD in young adults (e.g., impairment rating scales and assessment of cognitions). These analyses yielded numerous significant correlations. In particular, higher ADHD Inattention and ADHD Hyperactive-Impulsive symptom counts were associated with higher BDI Total scores ($r = .30, p = .005$ and $r = .24, p = .028$, respectively), greater ADHD-related cognitions ($r = .52, p = .000$ and $r = .51, p = .000$) greater conduct problems in childhood ($r = .25, p = .021$ and $r = .37, p = .000$), greater functional impairment in college on the IRS ($r = .52, p = .000$ and $r = .55, p = .000$), and greater functional impairment in childhood on the IRS ($r = .62, p = .000$ and $r = .58, p = .000$). Higher ADHD Inattention symptom count was also associated with greater endorsement of depressive cognitions on the ATQ-R ($r = .48, p = .000$), and higher ADHD Hyperactive-Impulsive symptom count was associated with higher BAI total scores ($r = .22, p = .038$). Higher BDI score was associated with greater endorsement of depressive cognitions on the ATQ-R ($r = .75, p = .000$); greater endorsement of ADHD-related cognitions ($r = .47, p = .000$); higher BAI total scores ($r = .60, p = .000$); greater functional impairment in college on the IRS ($r = .44, p = .000$); and greater functional impairment in childhood on the IRS ($r = .34, p = .001$).

Hypothesis 1

Depressive Disorders

In order to evaluate whether the proportion of students meeting SCID-CV criteria for a depressive disorder was significantly greater in the ADHD group than in the control group, Pearson chi-square analyses were conducted. The proportions of students who

endorsed a current depressive episode (i.e., within the past month); past depressive episode(s) during college; depressive episode(s) prior to entering college; current dysthymic disorder; and past dysthymic disorder prior to college were each examined (Table 4). These results revealed that the proportion of students in the ADHD group who endorsed having previously experienced a depressive episode during college (34.8%) was significantly higher than that of the control group (14.3%), $\chi^2(1, N = 88) = 4.92, p = .027$. The phi statistic indicated that this effect size was small-medium ($\phi = .24$). To follow up on this finding, relative risk analyses revealed that students with ADHD are 2.43 times more likely to experience a depressive episode in college than students without ADHD (34.8%/14.3%; 95% CI: 1.05 to 5.64). Students in the ADHD and control groups did not differ in rates of current depressive episode endorsed, $\chi^2(1, N = 92) = 0.00, p = 1.00$, nor did they differ in rates of depressive episodes endorsed prior to entering college, $\chi^2(1, N = 92) = 2.47, p = .116$. The two groups also did not significantly differ in terms of current or past dysthymic episode, $\chi^2(1, N = 92) = 0.12, p = .726$, and $\chi^2(1, N = 92) = 0.10, p = .748$, respectively.

Depressive Symptoms

In order to evaluate whether the ADHD group endorsed significantly more current (i.e., within the past month) symptoms of depression than the control group, an independent samples *t*-test was conducted. In this analysis, Levene's Test for Equality of Variances was significant ($F = 9.93, p = .002$); therefore, the *t*-test assuming inequality of variances was used. Results of this test revealed that the ADHD group, on average,

endorsed significantly more symptoms of depression ($M = 9.58, SD = 8.25$) than the control group ($M = 5.59, SD = 4.98; t(87) = 2.75, p = .007$).

As mentioned, ANCOVAs were planned in order to examine anxiety and substance use as covariates. Given differential rates of depression between males and females generally (APA, 2000), sex was examined as a covariate as well. According to correlational analyses, AUDIT and BDI Total scores were not significantly correlated; this finding eliminated substance use as a possible covariate. In examining BAI Total score (transformed) as a potential covariate, it was determined that there was a significant interaction between group (ADHD v. control) and BAI (transformed) score ($F(1, 89) = 7.92, p = .006$). Therefore, the homogeneity of slopes assumption required for ANCOVA was not met. Simple main effects analyses were instead conducted, examining differences between ADHD and control groups on BDI score at low (1 *SD* below the mean), medium (within 1 *SD* of the mean), and high (1 *SD* above the mean) levels of the covariate (Green & Salkind, 2008). A *p* value of .017 (.05/3) was required for significance for each of these tests. These results suggested that the ADHD and control groups did not significantly differ in depression at low levels of anxiety ($F(1, 89) = .07, p = .80$). However, the ADHD group had significantly higher mean levels of depression than the control group at moderate ($F(1,89) = 6.18, p = .015$) and high ($F(1,89) = 13.81, p = .000$) levels of anxiety (see Figure 3). Overall, these results suggest that the ADHD group reported significantly higher levels of current depression than the control group at medium and high levels of anxiety, but the two groups did not differ on depression at low levels of anxiety. Finally, across all participants, mean BDI scores were not significantly

different between males ($M = 6.30$, $SD = 5.53$) and females ($M = 8.27$, $SD = 7.71$), $t(87) = -1.25$, $p = .22$.

Hypothesis 2

Protective factors in students with and without depression in the ADHD group

First, an independent samples t -test was conducted in order to compare number of protective factors endorsed between students with ADHD and depression in college (either currently or sometime earlier in college; “ADHD+depression”) and those with ADHD only. These results indicated that total number of protective factors in college did not differ between the ADHD+depression and ADHD only groups, $t(44) = 1.06$, $p = .29$. Given these null findings, specific protective factor domains were examined separately. The ADHD+depression group reported a lesser degree of support from friends than ADHD students without depression, $t(44) = -2.21$, $p = .032$. This group also endorsed significantly greater utilization of psychological supports such as counseling, group therapy, or medication than students with ADHD only, $t(44) = 2.65$, $p = .011$. There was no difference in frequency of academic supports or levels of support from family endorsed by ADHD students with and without depression, $t(44) = 1.32$, $p = .192$ and $t(44) = 0.73$, $p = .472$, respectively. Finally, in terms of protective factors prior to college, students with ADHD+depression endorsed that they had experienced significantly *greater* numbers of protective factors prior to college (e.g., parents often helping with homework, utilizing academic accommodations, receiving services for ADHD) than students with ADHD only, $t(44) = 2.66$, $p = .011$.

Hierarchical logistic regression analyses

To further explore the impact of protective factors on the relation between ADHD and depression, hierarchical logistic regression analyses were conducted including both ADHD and control groups. The criterion variable was endorsement of a SCID-CV depressive disorder in college (i.e., current depressive episode, past depressive episode in college, or current dysthymic disorder) versus no depressive disorder in college. The criterion variable was regressed on ADHD status (ADHD v. control group) and endorsement of a depressive episode prior to college in the first step, and total past protective factors and total current protective factors in the second step. Standardized residuals were also examined in order to detect outliers in this sample; seven participants had standardized values either greater than 2 or less than -2, and were subsequently excluded from these analyses (Sarkar, Midi, & Rana, 2011). Analyses revealed that the model was significant after step one ($\chi^2 = 54.78$, $df = 2$, $p < .001$), and step two yielded additional predictive value ($\chi^2 = 10.52$, $df = 2$, $p < .01$). Coefficients for this analysis can be found in Table 5. In particular, a history of depression prior to college ($p < .001$) and greater past protective factors ($p < .05$) significantly predicted SCID-CV depressive disorder in college. Given that a minimum of 50 cases per predictor is recommended in logistic regression (Burns & Burns, 2008), the current sample size may have been too small to adequately power these analyses. This also precluded examination of individual protective factors as predictors of a SCID-CV depressive disorder diagnosis.

Hierarchical multiple regression analyses

To assess the impact of protective factors on depression as measured dimensionally, hierarchical multiple regression analyses were conducted utilizing BDI score as the criterion variable (as such, the three participants whose BDI scores were determined to be outliers were excluded from these analyses). Total BDI score was regressed on ADHD status (ADHD v. control group) and depression prior to college (endorsement of a depressive episode prior to college on the SCID) in the first step, and total past protective factors and total current protective factors in the second step (Table 6). Results suggested that ADHD status and depression prior to college accounted for a significant amount of variability in BDI score ($R^2 = .16$, $F(2,86) = 8.28$, $p = .001$); however, total past and current protective factors scores did not significantly predict BDI score over and above ADHD status and past depression (R^2 change = .04, F change (2,84) = 2.12, $p = .127$). Given the potential utility of examining protective factors separately as demonstrated by the series of t -tests described above, BDI score was subsequently regressed on ADHD status and depression prior to college in step one, followed by individual past protective factors (academic supports, help from parents on schoolwork, mental health services for ADHD, and mental health services for a problem other than ADHD) in the second step, and current protective factors in college (academic supports, psychological supports, emotional support from friends, emotional support from family, and current use of ADHD medication) in the third step (Table 6). In this analysis, ADHD status and depression prior to college again accounted for a significant amount of variability in BDI score ($R^2 = .16$, $F(2,86) = 8.28$, $p = .001$). The four past protective

factors did not significantly predict BDI score over and above ADHD status and past depression (R^2 change = .03, F change (4,82) = .78, p = .545). However, the five current protective factors accounted for a significant proportion of variance in BDI score in the third step (R^2 change = 0.16, F change (5,77) = 3.74, p = .004). Of the five current protective factors, only a lesser degree of support from friends was associated with greater depressive symptoms (β = -.27, p = .008).

Multicollinearity diagnostics were examined in order to evaluate any possible influence of correlations among the predictors in these analyses. All variance inflation factor (VIF) values fell well within acceptable limits (ranging from 1.03 to 2.25). However, with only 44 students in the ADHD group, 45 students in the control group, and a large number of predictors, these analyses may have been underpowered, as 50 participants per group are recommended to detect a large effect size for multiple regression with 8 predictors at power = .80 and alpha = .05 (Cohen, 1992).

Post-hoc Analysis 1

Are students more likely to endorse a depressive episode during college compared to prior to college?

A priori findings suggested that students with ADHD were more likely than control students to endorse a depressive disorder at some point in college (though not necessarily prior to college or within the past month); this may suggest that the college experience in particular increases the risk for depression in individuals with ADHD. To explore this possibility, a 2x2 McNemar's test (chi-square analysis for matched pairs) was conducted with the ADHD and control groups separately in order to examine

whether students in each group endorsed higher rates of depressive disorders in college compared to prior to college (Tables 7 and 8). Of students with ADHD, 39.1% ($n = 18$) endorsed experiencing a depressive episode prior to college, and 37.0% ($n = 17$) endorsed experiencing a depressive episode at any time during college (currently and/or earlier during college); these rates were not significantly different from each other based on the results of the McNemar test of dependent proportions, $p = 1.00$. In the ADHD group, 5 students (10.9%) reported experiencing a depressive episode for the first time in college, 6 students (13.0%) endorsed experiencing a depressive episode prior to college but not during college, and 12 students (26.1%) endorsed a depressive episode both prior to and during college. Incidents of depressive disorders in college and prior to college were also compared within the control group: 23.9% ($n = 11$) endorsed a depressive episode prior to college and this same number endorsed a depressive episode during college. In this group, 1 (2.2%) student reported experiencing a depressive episode for the first time in college, 1 (2.2%) student had experienced a depressive episode prior to college only, and 10 students (21.7%) experienced a depressive episode both prior to and during college. Thus, students in both groups were not more likely to endorse a depressive episode during college than prior to college, and the majority of students who experienced a depressive episode prior to college also reported experiencing a depressive episode during college. These results suggest that students who had experienced depression prior to college were likely to experience another episode during college.

To follow up on these findings, rates of endorsement of a SCID-CV depressive disorder in college were compared between freshmen and upperclassmen in each group,

as it seems possible that rates of depression may increase as students with ADHD encounter continued or exacerbated impairment over time in the college environment (Culpepper, 2011a; Safren et al., 2004). In the ADHD group, 38.5% ($n = 5$) of freshman and 39.4% ($n = 13$) of upperclassmen endorsed a depressive disorder in college; these rates were not statistically different, $\chi^2(1, N = 46) = 0.03, p = .953$. In the control group, rates of depressive disorder were not significantly different between freshman (40.0%, $n = 6$) and upperclassmen (19.4%, $n = 6$), $\chi^2(1, N = 46) = 2.24, p = .135$.

Post-hoc Analysis 2

Does impairment predict depression in students with and without ADHD?

In the analysis for hypothesis 2, findings indicated that students with ADHD and comorbid depression endorsed *greater* utilization of resources that had been hypothesized to be protective against depression. Thus, these factors may provide more of a measure of *outcomes* related to having ADHD and comorbid depression, rather than buffers that protect against the development of depression in students with ADHD. Additionally, much research has suggested that individuals with ADHD are at risk for depression as a function of persistent impairment in academic, home, and social functioning (Bagwell et al., 2001; Bagwell et al., 2006; Tannock, 1994; Waxmonsky, 2003; Weiss & Hechtman, 1993), and greater levels of impairment were associated with higher ADHD and BDI scores in preliminary analyses. Thus, post-hoc analyses were conducted examining the role of impairment in predicting depression both between the ADHD and control groups, and between students with and without depression in the ADHD group. Overall, students with ADHD consistently endorsed greater levels of impairment both during college and

prior to college (based on IRS total severity scores), than students without ADHD, $t(90) = -4.19, p = .000$ and $t(90) = -6.60, p = .000$, respectively. Within the ADHD group, there was not a significant difference in level of impairment (either during college or prior to college) between students who experienced a depressive episode in college and those who did not, $t(44) = -1.59, p = .119$, and $t(44) = -1.46, p = .151$, respectively. These results suggest that students with ADHD are more impaired than students without ADHD, but that depression does not appear to be associated with greater levels of impairment within the ADHD group.

Hierarchical multiple regression analyses were again conducted in order to assess whether impairment during college and prior to college predicted depressive symptoms in students with and without ADHD (Table 9). ADHD status and depression prior to college were entered in step one, and impairment during college and impairment prior to college (IRS total scores) were entered in step two. In this analysis, ADHD status and depression prior to college again accounted for a significant amount of variability in BDI score, $R^2 = .16, F(2,86) = 8.28, p = .001$. Impairment during and prior to college also accounted for a significant proportion of variance in BDI score above and beyond ADHD status and a history of depression prior to college, R^2 change = 0.12, F change (2,84) = 6.72, $p = .002$. Of the impairment variables, only impairment during college significantly predicted BDI score ($\beta = .40, p = .001$), such that a greater degree of impairment in college was predictive of greater current depressive symptoms. Finally, the depressive cognitions and ADHD cognitions variables (ATQ-R depressive cognitions and ADHD cognitions total scores) were added to this model in step 3. These results indicated that depressive and

ADHD cognitions uniquely accounted for a significant amount of variability in BDI score (R^2 change = 0.30, F change (1,83) = 29.09, p = .000), and depressive cognitions significantly predicted BDI score (β = .65, p = .000). Multicollinearity diagnostics fell within acceptable limits (VIF scores ranging from 1.03 to 2.15), suggesting that these results were not an artifact of high correlations among predictors.

Post-hoc Analysis 3

Are conduct problems in childhood associated with ADHD and depression in college students?

Given that some prior longitudinal research has suggested that symptoms of conduct disorder in childhood account for the relation between ADHD and depression at young adult follow-up (Angold et al., 1999; Bagwell et al., 2006; Fischer et al., 2002), post-hoc analyses were conducted to assess whether conduct problems (as assessed by the Childhood Symptoms Scale) were associated with ADHD and depression in this sample. Correlational analyses indicated that CSS score was not correlated with either BDI score or depressive cognitions on the ATQ-R. Within the ADHD group, a one-way ANOVA revealed that there was not a significant difference in CSS scores between students who endorsed a depressive episode in college (either current or in the past during college) on the SCID and those who did not ($t(44) = .76, p = .449$), suggesting that the association between ADHD and depression in this college sample is not accounted for by conduct problems in childhood.

CHAPTER IV

DISCUSSION

Students with ADHD are enrolling in postsecondary institutions at increasing rates, and research on ADHD in the college student population is growing (Weyandt & DuPaul, 2006). In large part due to the demands on self-regulation required during the college years, students with ADHD demonstrate more academic impairment and poorer college adjustment than students without ADHD. In the face of these challenges, and drawing from Safren's (2004) model of impairment in adult ADHD, it seems likely that college students with ADHD are at increased risk for developing depression compared to their non-ADHD counterparts; however, existing findings in this domain have been inconsistent (e.g., Dooling-Litfin & Rosen, 1997; Gudjonsson et al., 2009; Heiligenstein et al., 1999; Heiligenstein & Keeling, 1995; Norvilitis et al., 2008; Rabiner et al., 2008; Richards et al., 1999). To expand on existing research, the current study compared rates of depressive disorders and depressive symptoms between college students with rigorously-diagnosed ADHD and students with a clear absence of ADHD.

It was first hypothesized that students with ADHD would report more frequent incidents of depressive disorders (as measured by endorsement of depressive disorders on the SCID-CV mood disorders module) and greater levels of current depressive symptoms (as measured by scores on the BDI) compared to their non-ADHD college peers. Consistent with this prediction, students with ADHD were found to endorse higher rates

of depressive episodes sometime earlier in college (i.e., after entering college but not within the past month) than students without ADHD. Overall, students with ADHD were 2-3 times more likely to have experienced a depressive episode in college than students without ADHD. This effect size was small-medium. Students with ADHD were not more likely to endorse a current depressive episode than non-ADHD students, nor were they more likely to endorse a depressive episode prior to entering college. When examining depression dimensionally, students with ADHD endorsed greater current depressive symptoms (i.e., within the past month) than students without ADHD. Anxiety symptoms were highly correlated with depressive symptoms in this sample, and differences in depressive symptoms between ADHD and control groups were found to exist at moderate and high levels of anxiety (i.e., individuals in both groups who were low on depressive symptoms tended to be low on anxiety symptoms as well).

In post-hoc analyses, within-groups chi-square analyses were run in order to determine whether students in both groups were more likely to endorse a depressive episode in college compared to prior to college. Results suggested that students in both groups were not significantly more likely to endorse a depressive episode during college than prior to college, and the majority of students who endorsed a depressive episode prior to college also reported experiencing a depressive episode during college. A follow-up analysis was also conducted to examine whether endorsement of a depressive disorder differed between freshmen and upperclassmen in each of the groups, given the possibility that students with ADHD develop depression over time after repeated struggles and impairment in college (Culpepper, 2011a; Safren et al., 2004). Rates of depressive

disorders between freshmen and upperclassmen in each of the groups were not significantly different.

Next, it was hypothesized that, compared to students with ADHD and depression, students with ADHD only would report higher levels of factors that have been proposed in prior research to be associated with better college adjustment, quality of life, and self-esteem (e.g., academic and psychological supports, support from family members and friends; Dooling-Litfin & Rosen, 1997; Grenwald-Mayes, 2002; Meaux et al., 2009). Contrary to expectations, there was no difference in total number of protective factors in college endorsed between students with ADHD+depression and those with ADHD only; however, when these factors were examined individually, students with ADHD only endorsed significantly greater support from friends, which may suggest that such support plays a protective role in terms of development of depression for these students. Compared to students with ADHD only, those with ADHD+depression endorsed significantly greater use of psychological supports. In terms of protective factors prior to college, students with ADHD+depression endorsed significantly *greater* protective factors (e.g., parents often helping with homework, utilizing academic accommodations, receiving services for ADHD) than students with ADHD only. Overall, these results may suggest that at least some of the “protective factors” as measured in this study (e.g., receipt of psychological services) may be better conceptualized as *outcomes* related to having ADHD and comorbid depression, rather than as buffers that prevent the onset of depression in students with ADHD.

Regression analyses were then conducted in order to evaluate the contribution of protective factor variables in predicting depression and depressive symptoms. First, hierarchical logistic regression analyses revealed that history of a depressive disorder prior to college, as well as *greater* protective factors prior to college, were significant predictors of a SCID-CV depressive disorder in college. This finding again suggests that “protective factors” may actually be a measurement of outcomes associated with ADHD. Next, hierarchical multiple regression analyses indicated that having ADHD and a history of depression prior to college were predictive of current depressive symptoms; however, total past protective factors and total current protective factors were not predictive of depressive symptoms above and beyond the first two variables. When these analyses were re-run entering past and current protective factor variables individually, results suggested that, in addition to having ADHD and a history of depression prior to college, lesser support from friends in college was predictive of depression.

In light of these findings, post-hoc analyses were conducted to determine if impairment was associated with depression in students with ADHD. Indeed, the proposed protective factors in this study are thought to be associated with a lesser degree of impairment, and impairment is widely believed to contribute to the development of internalizing problems, including depression, in adults with ADHD (Safren et al., 2004). In post hoc analyses, consistent with prior research, students with ADHD reported greater functional impairment than students without ADHD, but students with ADHD+depression did not report greater impairment than students with ADHD only. However, hierarchical multiple regression analyses revealed that, above and beyond

ADHD status and a history of depression, impairment during college and depressive cognitions were significant predictors of depressive symptoms.

Finally, given that some prior longitudinal work has demonstrated that depression at adult follow-up was attributable to conduct problems in childhood, post-hoc analyses were conducted to examine this possibility. Childhood conduct symptoms were not correlated with either depressive symptoms or depressive cognitions, and conduct symptoms did not differ between the ADHD only and ADHD+depression groups. Therefore, associations between ADHD and depression in college students do not appear to be due a history of conduct problems in childhood.

Potential Explanations for Findings

Overall, findings from the current study indicate that college students with ADHD are more likely to endorse a depressive episode sometime in college, and report more current depressive symptoms, than college students without ADHD. These results are consistent with many (but not all) of the existing prior studies of comorbid conditions in college students and other young adults with ADHD. Methodological strengths of this study, which significantly improve upon prior research in this area, include a comprehensive assessment battery used to establish ADHD status and evaluate comorbid mood disorders, an examination of depression both categorically and dimensionally, and a control group matched on relevant demographic characteristics.

When examining depression categorically, students with ADHD were 2-3 times more likely to endorse a depressive episode earlier in college; this finding is consistent with some prior work suggesting that students and young adults with ADHD are at

increased risk for a depressive disorder compared to their non-ADHD counterparts (e.g., Barkley, 2006; Heiligenstein & Keeling, 1995; Hesslinger et al., 2003; Rabiner et al., 2008). However, findings from the current study indicated that students with ADHD were not necessarily more likely to endorse a *current* depressive disorder, although they endorsed higher rates of current depressive symptoms than students without ADHD. These seemingly discrepant findings may be attributable to the fact that students in the ADHD and control groups scored an average of 9.58 and 5.59, respectively, on the BDI; thus, both groups' mean scores for current depressive symptoms fell below the clinical cutoff for moderate or severe depression. It is also important to note that the majority of students in the ADHD group were predominantly clinic-referred upperclassmen. In addition to the fact that up to 75% of students with ADHD drop out of college (Barkley et al., 2008), the ADHD group in this study is comprised of students who were at least organized enough to follow through with a comprehensive evaluation at the ADHD Clinic, including a packet of questionnaires that must be completed and returned prior to an evaluation even being scheduled. Thus, the ADHD group in this study may represent a relatively higher-functioning, organized, resilient subset of students who have remained in college and obtained an evaluation. Overall, results in the current study may be an underrepresentation of the relative risk of depressive disorders in students with ADHD compared to students without the condition.

Additionally, follow-up within-subjects comparisons suggested that students in both groups were no more likely to experience a depressive disorder in college compared to prior to college. These results may suggest that the college experience itself does not

exacerbate the risk for depression; however, a longitudinal design would be needed in order to more accurately address this question. Results of the current study may also again point to the possibility that it is a particularly resilient group of students who enroll in college in the first place, and such students may have established effective coping strategies for managing their symptoms.

In regards to the second hypothesis, students with ADHD+depression and students with ADHD only endorsed a comparable degree of total protective factors in college. When protective factors were examined individually, students with ADHD+depression reported a lesser degree of support from friends, and greater utilization of psychological supports, than students with ADHD only. The ADHD+depression group also endorsed significantly greater total protective factors prior to college than the ADHD-only group. This finding may suggest that students with more significant difficulties (i.e., a combination of ADHD and depression) required more academic, psychological, and parental support. As discussed, these supports are typically stripped away when a student transitions to the college environment, and a “perfect storm” of demands on self-regulation ensues. Students with comorbid ADHD and depression may be especially vulnerable to the consequences of removing such supports. In other words, it may be the *loss* of such previously-beneficial protective factors once the student transitions from high school to college that contributes to depression in students with ADHD.

Overall, these results appear to suggest that protective factors as measured in this study may be better conceptualized as *outcomes*, rather than protective factors *per se*,

associated with having ADHD and comorbid depression. In other words, “protective factors,” as assessed in this study, may have reflected resources and supports that students with ADHD were using as a result of their ADHD status. That being said, the ADHD+depression group endorsed lesser support from friends in college, and this same variable, in addition to ADHD status and history of a depressive episode prior to college, was the only “protective factor” predictor significantly associated with lower rates of depression. These results may point to support from friends as a buffer against depression in students with ADHD. However, it is impossible in this cross-sectional design to make causal conclusions that lesser support from friends contributes to the development of depression; it may be the case that students with ADHD and depression withdraw from friends, and are less inclined to seek support from friends, as a consequence of their depression.

The increased rate of depressive symptoms in students with ADHD is thought to be related to increased impairment that students with ADHD experience across a variety of domains (DuPaul et al., 2009). However, in follow-up analyses, students with ADHD+depression in this study did not endorse significantly higher rates of impairment than students with ADHD only. This is a curious finding, and may be due to a highly subjective self-report measure of functional impairment that has not been psychometrically validated (Barkley & Murphy, 2006). By contrast, in subsequent regression analyses, impairment during college and depressive cognitions (in addition to ADHD status and a history of depression before college) were significant predictors of current depressive symptoms. These results are highly consistent with Safren’s (2004)

model of impairment in adult ADHD, in which ADHD-related deficits contribute to impairment that reinforces dysfunctional cognitions, which in turn creates mood disturbances. The notion that depression is caused by depressive cognitions, established across time as a result of various struggles or impairment experiences, is also highly consistent with Beck's (1976) theory of depression. Thus, failure and impairment experienced by college students as a result of ADHD-related deficits seems highly likely to contribute to depression in this population.

Limitations

Although shedding new light on the mood status of college students with ADHD, interpretation of the obtained findings must be tempered by a consideration of study limitations. First, this study relied largely on self-report only, including retrospective reports and highly subjective reports of functioning. Specifically, results involving past depressive episodes and level of functioning during and prior to college must be interpreted cautiously with this in mind. Next, all existing studies on ADHD in the college population, including the present study, have been cross-sectional in design. Longitudinal work, in particular, is needed in order to evaluate risk and protective factors related to the development of depression in students with ADHD, as well as for academic, social, and psychological success across the college years.

Sample size may also have been a limitation in this study. Power analyses conducted prior to study initiation suggested a sample size of 26 per group to detect large effects, or 64 per group to detect medium effects using mean comparisons, with .80 power and alpha of .05. For chi-square analyses with one degree of freedom, 26

participants per group are suggested to detect large effects and 87 per group are suggested to detect medium effects. Thus, the present study's enrollment of 46 participants per group falls below the suggested sample size for detecting medium-small effect sizes to address mean comparisons and chi-square analyses in the first hypothesis. In terms of the chi-square analyses, it is therefore possible that true differences in endorsement of depressive disorders between ADHD and non-ADHD groups were not captured in this study. The study also appears to have been underpowered to address hypothesis two, given the number of predictors that were entered into both the logistic regression analyses (in which 50 cases per predictor is recommended; Burns & Burns, 2008) and the hierarchical multiple regression model (in which 50 participants per group are suggested to detect large effects with at least 8 predictors; Cohen, 1992). Post-hoc analyses examining the predictive utility of impairment variables included 5 predictors; in this case, the current sample size exceeds the suggested 42 participants per group needed to detect large effects. In general, this sample was approximately two-thirds female, which is consistent with the gender ratio of UNCG (Harris, 2011); however, the ratio of males to females with ADHD in adulthood is approximately 1:1 (Barkley, 2006). Therefore, this sample may have reflected a gender bias, and replication is warranted in a sample that is more balanced by gender.

In terms of other design limitations, this study recruited only students from one four-year large public university in the southeastern United States. In particular, an estimated 13-30% of UNCG undergraduates are first-generation college students, and about 34% are from traditionally underrepresented backgrounds (Harris, 2011). Thus,

these findings may not generalize to samples from other postsecondary educational settings. Additionally, students in the ADHD group were predominantly upperclassmen; therefore, students who experienced more struggle and impairment within the first year or so of college (and consequently may have been more likely to be depressed) may have dropped out of the potential recruitment sample. As discussed, it may therefore be the case that relatively higher-functioning students with ADHD participated in this study. Furthermore, the ADHD sample consisted almost entirely of clinic-referred students; this makes it impossible to determine whether this is a representative sample of students with ADHD, as many students with ADHD will not self-refer for services or research.

Additionally, a few of the measures in this study, including those used to assess impairment, protective factors, and conduct problems in childhood, have not been psychometrically validated. In particular, the assessment of “protective factors” represents a limitation of this study. As no measure of protective factors currently exists for the purpose of assessing college students with ADHD, a questionnaire was created for this study, with items based on factors that have been suggested in prior work to be associated with more positive outcomes for these students. Although internal consistency appeared to be sound, as previously suggested, protective factors as assessed in the current study may actually be better conceptualized as outcomes associated with ADHD. For example, students with ADHD (and perhaps particularly those who have self-referred for an evaluation at the ADHD Clinic) may have taken advantage of various supports and resources that help them to manage their symptoms, succeed academically, and so forth. Moreover, students were only asked in this measure to report the frequency with which

they accessed various supports (e.g., academic services), but were not asked to report the extent to which they found such supports helpful. Indeed, students' perceived benefit of these supports may be a better measure than utilization alone. Ultimately, only a longitudinal design has the potential to examine "buffers" against the development of depression over time in individuals with ADHD at any age.

Future Research

Bearing limitations in mind, the current findings suggest that college students with ADHD experience depressive disorders and depressive symptoms (even subclinical) at higher rates than students without ADHD. This study yields several avenues for future research. In terms of research design, future examination of depression in college students with ADHD may strive to recruit those who are not clinic-referred, as a sample of clinic-referred students may not be representative of the population of college students with ADHD as a whole. This may be accomplished in future studies by recruiting in classrooms, posting flyers in common areas, using social networking platforms, and through new student orientation sessions. Generally, replication of this study with a larger sample is warranted in order to examine if findings related to depressive symptoms and endorsement of depressive disorders are reproducible, and to potentially re-run the regression analyses with greater statistical power.

Future research may also be enhanced by including information collected from collateral informants who could also report on students' functioning, such as parents, roommates, or close friends. Similarly, rather than relying on self-report only, objective indices of specific functioning areas may also be warranted, such as collecting academic

performance information from university registrar's offices. Additionally, as indicated, future studies would ideally employ a longitudinal design in order to prospectively examine those factors that make students with ADHD more or less likely to exhibit depression in college. Protective factors that have been noted in prior research but were not assessed in this study may also be examined, including IQ, socioeconomic status, and possessing an area of talent.

Also, it may be that students with ADHD, by nature of their academic struggles, are more likely to enroll at two-year colleges than four-year colleges, at least initially (Sanford et al., 2011). They are even more likely not to enroll in college at all, or to enroll but drop out (Barkley et al., 2008). Thus, as mentioned, students with ADHD who enroll in 4-year colleges may be higher functioning and have more compensatory strategies than young adults with ADHD who start at two-year colleges or who do not go on to college. Such students may therefore not exhibit the same level of impairment or comorbidity than their non-college student peers. Therefore, an important avenue for future research may include an examination of ADHD and contributing factors to comorbid depression in students at two-year colleges and in individuals who do not pursue postsecondary education. In addition, future research may collect data on age at which students were diagnosed with ADHD. For example, it may be the case that students diagnosed for the first time in college represent a less severe, more resilient subgroup of individuals with ADHD. Alternatively, students diagnosed at an early age may have previously benefitted from treatment and other support services, and may possess skills that help them to transition more easily into the college environment.

As discussed, impairment in college was found to be predictive of depression in this study. This study included a measure of “global” impairment; future studies may assess the unique contributions of specific domains of impairment (e.g., academic, social, occupational, financial) in order to further elucidate the association between impairment and depressive symptoms in this population. Moreover, impairment in college students with ADHD is thought to be due to the “perfect storm” that results from difficulties managing multiple, increased demands on self-regulation, combined with a decrease in support systems from which they once benefitted. Thus, more specific assessment of the degree to which students with ADHD are struggling with particular self-regulation demands may be warranted. In future studies, this may include intermittently asking students (perhaps through event sampling methodology) about struggles maintaining a schedule, managing long-term assignments, and keeping up with academic, social, and self-care responsibilities. Such an approach may also include asking students to rate their mood over the same period of time. In this way, students would provide data “in real time,” rather than relying on retrospective report of symptoms and impairment. Future investigation may also examine whether impairment, and associated mood difficulties, are more frequent when there is a “mismatch” between an ADHD student’s needs and strengths, and the academic program, activities, and services that are available to him or that he takes advantage of through his institution. For example, ADHD students who attend a university with services tailored to meet the needs of those with ADHD may have better outcomes than students who attend universities without such resources.

In this study, depressive cognitions (as measured by the ATQ-R) were associated with, and predictive of, depressive symptoms. Although multicollinearity diagnostics suggested that results of this analysis were not attributable to a high degree of correlation among the variables, the depressive cognitions variable was very highly correlated with the ADHD cognitions variable. Thus, it may be prudent in future research to examine the independent contribution of such cognitions in the presentation of depression in students with ADHD. It may also be beneficial in future research to further examine the origins and impact of these cognitions on students with ADHD. In particular, it would be interesting to examine whether such cognitions are more strongly related to particular precipitating events (e.g., academic struggles, perceived peer rejection, etc.), which may highlight a point of intervention (or prevention) for these students. Moreover, self-reported motivation has been shown to predict overall impairment in college students with ADHD (Langberg, Dvorsky, Choi, & Elnasseh, 2013); future research may expand upon this work by examining the relations among motivation, impairment, and comorbid conditions such as depression and anxiety, as well as mechanisms for enhancing motivation in these students.

Clinical Implications

Findings from this study support the notion that students with ADHD are at increased risk for experiencing depressive episodes and depressive symptoms in college compared to typical college students. In light of the fact that students with ADHD are attending postsecondary institutions at increasing rates (Weyandt & DuPaul, 2006), this finding yields multiple clinical implications and represents an important public health

concern on college campuses. The results of this study highlight the necessity for comprehensive assessment of ADHD and comorbid conditions in college students, particularly given that many students with ADHD are diagnosed for the first time once they experience impairment in the college environment (Parker & Benedict, 2002). This may be especially true for the relatively successful, resilient subgroup of individuals with ADHD who arrive on college campuses in the first place.

In this study, 39% of students with ADHD experienced a depressive disorder at some point during college, compared to 26% of students without ADHD. While students with ADHD may be at greater risk, the rate of depressive disorders in students without ADHD is also quite high, and higher than the 4-11% prevalence rate that has been estimated in previous studies based on screening instruments for depression in college students (Eisenberg et al., 2007; Weitzman, 2004). Again, replication of these findings is warranted, but overall, these results seem to highlight the need for quality assessment and counseling services for all students on college campuses, certainly not limited to those with ADHD. Given that only 40% of students at 4-year colleges graduate within 6 years (Settersten & Ray, 2010), with rates even lower for ADHD students (Barkley et al., 2008; DuPaul et al., 2009), meeting the mental health needs of college students in general and students with ADHD in particular appears to be a crucial factor in promoting student success, and ultimately graduation rates.

Given the higher rates of depressive disorders and current, subclinical depressive symptoms endorsed by students with ADHD in this study, there are several implications for assessment and treatment of this population. Overall, cognitive-behavioral therapy has

been found to effectively treat depression (Beck, 2011), as well as adult ADHD (Safren et al., 2004), which provides strong rationale for efforts to disseminate CBT approaches within college counseling centers and other psychological support services on campuses. Moreover, CBT approaches that are tailored to meet the unique needs of college students with ADHD and comorbid conditions such as depression are much needed. This notion is supported by preliminary findings from an open trial of a cognitive-behavioral therapy and mentoring program developed for this population, which yielded significant improvements in knowledge of ADHD, application of organizational and other strategies to manage ADHD symptoms, and adaptive thinking skills (Anastopoulos & King, in press). Moreover, the current study found that depressive cognitions were a significant predictor of depressive symptoms in college students, which appears to again highlight the utility of treatment approaches for college students with ADHD that target depressive cognitions. Interventions targeting this cognitive style may also be a useful preventative measure for students with ADHD who are not currently depressed.

Additionally, consistent with Safren's (2004) model of impairment in adult ADHD, impairment during college was found to be a significant predictor of depressive symptoms in this study (as were having ADHD and a history of depression prior to college). Students with ADHD who are experiencing academic, social, or other daily life impairment are therefore important targets of intervention or prevention efforts on college campuses. Ideally, these students would seek support prior to the onset of impairment, but data suggests that relatively low rates (45%) of college students with ADHD take advantage of support services even when they are registered to receive them

(Chew et al., 2009). Thus, it appears to be the case that many students with ADHD may seek services only after experiencing significant struggle. This notion may also be supported in this study by the fact that students with ADHD and depression reported greater use of psychological support services such as counseling, group therapy, or medication, than students with ADHD only.

Results from this study may also provide rationale for early interventions (e.g., in middle or high school) that target strategies for managing ADHD symptoms as well as addressing cognitive styles and beliefs in youth with ADHD, which may help to promote success in the college years. Moreover, early interventions seem particularly relevant in light of findings from the current study suggesting that the majority of ADHD students with comorbid depression in college also endorsed a depressive disorder prior to college. However, it remains unclear how well-identified or well-managed comorbid depression is in this population, either prior to college or during college. In particular, preventative efforts targeting cognitions may bolster students' resiliency to frustrations and setbacks that they encounter due to ADHD-related impairments in both secondary and postsecondary education. For example, high school students with ADHD who are taught adaptive coping thoughts in response to academic struggles may use these skills to thwart the effects of academic struggles in college. Additionally, screenings for first year college students with a history of ADHD or other mental health conditions, as well as follow-up assessments during the first few semesters of college, may help to provide early interventions as well as coordinate various services (e.g., academic support, counseling, career services) to promote success. Overall, psychosocial treatments for college students

with ADHD are much needed and are a very important avenue for future research, particularly because psychotropic medication, considered the first line of defense in treating ADHD (Barkley, 2006), carries the risk of misuse by college students (Rabiner et al., 2009), and does not provide basic skills, such as organization and planning, which help to reduce impairment in functioning (Safren et al., 2004).

Conclusion

This study is the one of the first investigations to compare rates of depression between students with rigorously-diagnosed ADHD and students with a clear absence of ADHD, and is the first known study to examine depression both categorically and dimensionally. This study found that students with ADHD endorsed higher rates of a past depressive episode in college than students without ADHD, and students with ADHD were 2.43 times more likely to endorse a depressive episode at some point in college than students without ADHD. In addition, consistent with some prior research (e.g., Blasé et al., 2009; Norvilitis et al., 2008; Rabiner et al., 2008; Richards et al., 1999; Weyandt et al., 1998), the ADHD group endorsed more current depressive symptoms than the control group. Post-hoc analyses revealed that students in both groups were no more likely to endorse a depressive episode during college compared to prior to college. This may suggest that the college experience in particular does not necessarily increase the risk for depression in students with or without ADHD, although a longitudinal study is needed to further address this question.

This study also examined possible protective factors that were expected to be associated with lower rates of depression in college students with ADHD; contrary to

expectations, students with ADHD and depression and students with ADHD only endorsed similar rates of protective factors overall. The ADHD+depression group endorsed greater utilization of psychological supports and a lesser degree of support from friends. These results generally indicated that some of the “protective factors” as assessed in this study may be better conceptualized as outcomes associated with having ADHD and comorbid conditions. In regression analyses, having ADHD and a history of depression prior to college were predictive of depressive symptoms. Lesser support from friends was also a significant predictor, and in post-hoc analyses, impairment in college and depressive cognitions were significant predictors as well. Additional work is warranted to clarify the relation between ADHD and depression in college students, to identify the mechanisms underlying this comorbidity, and to elucidate factors that promote success in this population.

REFERENCES

- American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders (4th ed., text revision)*. Washington, DC: American Psychiatric Association.
- American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders (5th ed.)*. Washington, DC: American Psychiatric Association.
- Anastopoulos, A.D., & King, K.A. (in press). A Cognitive-Behavior Therapy and Mentoring Program for College Students With ADHD. *Cognitive and Behavioral Practice*. doi: 10.1016/j.cbpra.2014.01.002
- Angold, A., Costello, E.J., & Erkanli, A. (1999). Comorbidity. *Journal of Child Psychology and Psychiatry*, 40, 57-87. doi:10.1111/1469-7610.00424.
- Arnett, J.J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist*, 55, 469-480. doi:10.1037//0003-066X.55.5.469.
- August, G.J., Realmuto, G.M., MacDonald, A.W., Nugent, S.M., & Crosby, R. (1996). Prevalence of ADHD and comorbid disorders among elementary school children screened for disruptive behavior. *Journal of Abnormal Child Psychology*, 24, 571-595. doi:10.1007/BF01670101.

- Babor, T.F., Higgins-Biddle, J.C., Saunders, J.B., & Monteiro, M.G. (2001). *AUDIT: The Alcohol Use Disorders Identification Test (2nd ed.)*. World Health Organization: Department of Mental Health and Substance Dependence.
- Bagwell, C.L., Molina, B.S.G., Kashdan, T.B., Pelham, W.E., & Hoza, B. (2006). Anxiety and mood disorders in adolescents with childhood attention-deficit/hyperactivity disorder. *Journal of Emotional and Behavioral Disorders*, *14*, 178-187.
- Bagwell, C.L., Molina, B., Pelham, W.E., & Hoza, B. (2001). Attention-deficit hyperactivity disorder and problems in peer relations: Predictions from childhood to adolescence. *Journal of the American Academy of Child and Adolescent Psychiatry*, *40*, 1285-1292. doi: 0890-8567/01/4011-1285
- Barkley, R.A. (2002). Major life activity and health outcomes associated with attention deficit/hyperactivity disorder. *Journal of Clinical Psychiatry*, *63*, 10-15.
- Barkley, R.A. (2004). Driving impairments in teens and adults with attention-deficit/hyperactivity disorder. *Psychiatric Clinics of North America*, *27*, 233-260. doi:10.1016/S0193-953X(03)00091-1.
- Barkley, R.A. (2006). *Attention-deficit hyperactivity disorder, 3rd ed.: A handbook for diagnosis and treatment*. New York, NY, US: The Guilford Press.
- Barkley, R.A., Anastopoulos, A.D., Guevremont, D.G., & Fletcher, K.F. (1991). Adolescents with ADHD: Patterns of behavioral adjustment, academic functioning, and treatment utilization. *Journal of the American Academy of Child and Adolescent Psychiatry*, *30*, 752-761. doi:0890-8567/91/3005-0752.

- Barkley, R.A., Anastopoulos, A.D., Guevremont, D.C., & Fletcher, K.E. (1992). Adolescents with Attention Deficit Hyperactivity Disorder: Mother-adolescent interactions, family beliefs and conflicts, and maternal psychopathology. *Journal of Abnormal Child Psychology*, *20*, 263-288. doi:0091-0627/92/0600-026.
- Barkley, R.A., & Fischer, M. (2005). Suicidality in children with ADHD, grown up. *The ADHD Report*, *13* (6), 1-6. doi:10.1521/adhd.2005.13.6.1.
- Barkley, R.A., Fischer, M., Edelbrock, C.S., & Smallish, L. (1990). The adolescent outcome of hyperactive children diagnosed by research criteria: I. An 8-year prospective follow-up study. *Journal of the American Academy of child and Adolescent Psychiatry*, *29*, 546-557. doi:10.1097/00004583-199007000-00007.
- Barkley, R.A., Fischer, M., Smallish, L., & Fletcher, K. (2002). The persistence of attention-deficit/hyperactivity disorder into young adulthood as a function of reporting source and definition of disorder. *Journal of Abnormal Psychology*, *111*, 279-289. doi:10.1037//0021-843X.111.2.279.
- Barkley, R.A., Fischer, M., Smallish, L., & Fletcher, K. (2006). Young adult outcome of hyperactive children: Adaptive functioning in major life activities. *Journal of the American Academy of Child & Adolescent Psychiatry*, *45*(2), 192-202. doi:10.1097/01.chi.0000189134.97436.e2.
- Barkley, R.A., Guevremont, D.G., Anastopoulos, A.D., DuPaul, G.J., & Shelton, T.L. (1993). Driving-related risks and outcomes of attention deficit hyperactivity disorder in adolescents and young adults: A 3-5 year follow-up survey. *Pediatrics*, *92*, 212-218.

- Barkley, R.A. & Murphy, K.R. (2006). *Attention-Deficit Hyperactivity Disorder: A Clinical Workbook*. New York, NY: The Guilford Press.
- Barkley, R.A., Murphy, K. R., & Fischer, M. (2008). *ADHD in adults: What the science says*. New York, NY: The Guilford Press.
- Beck, A.T. (1976) *Cognitive Therapy and Emotional Disorders*. New York, NY: International Universities Press.
- Beck, A.T., Epstein, N., Brown, G., & Steer, R.A. (1988). An inventory for measuring clinical anxiety: Psychometric properties. *Journal of Consulting and Clinical Psychology*, 56, 893-897. doi:10.1037//0022-006X.56.6.893.
- Beck, A.T., Steer, R.A., & Brown, G.K. (1996). *Beck Depression Inventory* (2nd ed.). San Antonio, TX: Psychological Corporation.
- Beck, J.S. (2011). *Cognitive Behavior Therapy: Basics and Beyond* (2nd Ed.). New York, NY: The Guilford Press.
- Biederman, J., Ball, S.W., Monuteaux, M.C., Mick, E., Spencer, T., McCreary, M... Faraone, S.V. (2008). New insights into the comorbidity between ADHD and major depression in adolescent and young adult females. *Journal of the American Academy of Child and Adolescent Psychiatry*, 47, 426-434. doi:10.1097/CHI.0b013e31816429d3.
- Biederman, J., Faraone, S.V., Milberger, S., Guite, J., Mick, E., Chen, L., Perrin, J. (1996). A prospective 4-year follow-up study of attention-deficit hyperactivity and related disorders. *Archives of General Psychiatry*, 53, 437-446. doi:10.1001/archpsyc.1996.01830050073012.

- Biederman, J., Faraone, S.V., Spencer, T., Wilens, T., Mick, E., & Lapey, K.A. (1994). Gender differences in a sample of adults with attention deficit hyperactivity disorder. *Psychiatry Research*, *53*, 13-29. doi:10.1016/0165-1781(94)90092-2.
- Biederman, J., Faraone, S.V., Spencer, T., Wilens, T., Norman, D., Lapey, K.A., ... Doyle, A. (1993). Patterns of psychiatric comorbidity, cognition, and psychosocial functioning in adults with attention deficit hyperactivity disorder. *The American Journal of Psychiatry*, *150*, 1792-1798.
- Biederman, J., Monuteaux, M.C., Mick, E., Spencer, T., Wilens, T.E., Silva, J.M., ... Faraone, S.V. (2006). Young adult outcome of attention deficit hyperactivity disorder: A controlled 10-year follow-up study. *Psychological Medicine*, *36*, 167-179. doi:10.1017/S0033291705006410.
- Biederman, J., Petty, C.R., Fried, R., Kaiser, R., Dolan, C.R., Schoenfeld, S., ... Faraone, S.V. (2008). Educational and occupational underattainment in adults with attention-deficit/hyperactivity disorder: A controlled study. *Journal of Clinical Psychiatry*, *69*, 1217-1222. doi:10.4088/JCP.v69n0803.
- Blackman, G.L., Ostrander, R., & Herman, K.C. (2005). Children with ADHD and depression: A multisource, multimethod assessment of clinical, social, and academic functioning. *Journal of Attention Disorders*, *8*, 195-207. doi:10.1177/1087054705278777.
- Blasé, S.L., Gilbert, A.N., Anastopoulos, A.D., Costello, E.J., Hoyle, R.H., Swartzwelder, H.S., & Rabiner, D.L. (2009). Self-reported ADHD and adjustment

- in college: Cross-sectional and longitudinal findings. *Journal of Attention Disorders*, 13, 297-309. doi:10.1177/1087054709334446.
- Brown, R.T., & Borden, K.A. (1986). Hyperactivity at adolescence: Some misconceptions and new directions. *Journal of Clinical Child Psychology*, 15, 194-209. doi:10.1207/s15374424jccp1503_1.
- Burns, R., & Burns, R. (2008). Logistic Regression. In *Business Research Methods and Statistics Using SPSS*. (pp. 568-588). London: SAGE Publications.
- Canu, W.H., & Carlson, C.L. (2003). Differences in heterosocial behavior and outcomes of ADHD-symptomatic subtypes in a college sample. *Journal of Attention Disorders*, 6, 123-133. doi:10.1177/108705470300600304.
- Chapman, L.J., & Chapman, J.P. (1986). *Infrequency scale for personality measures*. Available from T.R. Kwapil, Department of Psychology, University of North Carolina Greensboro, P.O. Box 26164, Greensboro, NC 27402
- Chew, B.L., Jensen, S.A., & Rosen, L.A. (2009). College students' attitudes toward their ADHD peers. *Journal of Attention Disorders*, 13, 271-276. doi:10.1177/1087054709333347.
- Chronis, A. M., Lahey, B. B., Pelham, W. E., Williams, S.H., Baumann, B. L., Kipp, H., ... Rathouz, P.J. (2007). Maternal depression and early positive parenting predict future conduct problems in young children with attention-deficit/hyperactivity disorder. *Developmental Psychology*, 43, 70-82. doi:10.1037/0012-1649.43.1.70.
- Clay, K. (2013). Mental health issues in college on the rise. *Monitor on Psychology*, 44, 54.

- Cohen, J. (1992). A power primer. *Psychological Bulletin* 112(1), 155–159.
doi:10.1037/00332909.112.1.155.
- Conners, C. K., Erhardt, J. N., Epstein, D., Parker, J. D. A., Sitarenios, G., & Sparrow, E. (1999). Self-rating of ADHD symptoms in adults I: Factor structure and normative data. *Journal of Attention Disorders*, 3(3), 141–151.
- Costello, E.J., Foley, D.L., & Angold, A. (2006). 10-year research update review: The epidemiology of child and adolescent psychiatric disorders: II. Developmental epidemiology. *Journal of the American Academy of Child and Adolescent Psychiatry*, 45, 8-25. doi:10.1097/01.chi.0000184929.41423.c0.
- Culpepper, L. (2011a). Recognizing and diagnosing ADHD in college students [Abstract]. *Journal of Clinical Psychiatry*, 72, e33.
- Culpepper, L. (2011b). Prevalence and impact of ADHD in college students [Abstract]. *Journal of Clinical Psychiatry*, 72, e30.
- Danforth, J.S., Barkley, R.A., & Stokes, T.F. (1991). Observations of parent-child interactions with hyperactive children: Research and clinical implications. *Clinical Psychology review*, 11, 703-727. doi:10.1016/0272-7358(91)90127-G.
- de Graaf, R., Kessler, R.C., Fayyad, J., ten Have, M., Alonso, J., Angermeyer, M., ... Posada-Villa, J. (2008). The prevalence and effects of adult attention-deficit/hyperactivity disorder (ADHD) on the performance of workers: Results from the WHO World Mental Health Survey Initiative. *Occupational and Environmental Medicine*, 65, 835-842. doi:10.1136/oem.2007.038448.

- Dooling-Litfin, J.K. & Rosen, L.A. (1997). Self-esteem in college students with a childhood history of attention deficit hyperactivity disorder. *Journal of College Student Psychotherapy, 11*, 69-82. doi:10.1300/J035v11n04_06.
- Dozois, D., Dobson, K., & Ahnberg, J. (1998). A psychometric evaluation of the Beck Depression Inventory-II. *Psychological Assessment, 10*, 83-89. doi:10.1037//1040-3590.10.2.83.
- DuPaul, G.J., Power, T.J., Anastopoulos, A.D., & Reid, R. (1998). *ADHD Rating Scale-IV: Checklist, norms, and clinical interpretation*. New York, NY: Guilford Press.
- DuPaul, G.J., Schaugency, E.A., Weyandt, L.L., Tripp, G., Kiesner, J., Ota, K., & Stanish, H. (2001). Self-report of ADHD symptoms in university students: Cross-gender and cross-national prevalence. *Journal of Learning Disabilities, 34*, 370-379. doi:10.1177/002221940103400412.
- DuPaul, G. J., Weyandt, L. L., O'Dell, S. M., & Varejao, M. (2009). College students with ADHD: Current status and future directions. *Journal of Attention Disorders, 13*(3), 234-250. doi:10.1177/1087054709340650.
- DuPaul, G.J., Weyandt, L.L., Rossi, J.S., Vilaro, B.A., O'Dell, S.M., Carson, K.M.,... Swentosky, A. (2012). Double-blind, placebo-controlled, crossover study of the efficacy and safety of lisdexamfetamine dimesylate in college students with ADHD. *Journal of Attention Disorders, 16*, 202-220.
- Eisenberg, D., Gollust, S.E., Golberstein, E., & Hefner, J.L. (2007). Prevalence and correlates of depression, anxiety, and suicidality among university students.

American Journal of Orthopsychiatry, 77, 534-542. doi:10.1037/0002-9432.77.4.534.

Erhardt, J. N., Epstein, D., Conners, C. K., Parker, J. D. A., & Sitarenios, G. (1999). Self-ratings of ADHD symptoms in adults II: Reliability, validity, and diagnostic sensitivity. *Journal of Attention Disorders*, 3(3), 153–158.

doi:10.1177/108705479900300304.

First, M. B., Spitzer, R. L., Gibbon, M., & Williams, J..W. (1996). *Structured Clinical Interview for DSM-IV Axis I Disorders, Clinician Version (SCID-CV)*.

Washington, D.C.: American Psychiatric Press, Inc.

Fischer, M., Barkley, R.A., Fletcher, K., & Smallish, L. (1993). The adolescent outcome of hyperactive children diagnosed by research criteria: V. Predictors of outcome.

Journal of the American Academy of Child and Adolescent Psychiatry, 32, 324-332. doi:10.1097/00004583-199303000-00013.

Fischer, M., Barkley, R.A., Smallish, L., & Fletcher, K. (2002). Young adult follow-up of hyperactive children: Self-reported psychiatric disorders, comorbidity, and the role of childhood conduct problems. *Journal of Abnormal Child Psychology*, 30,

463-475. doi:10.1023/A:1019864813776.

Flory, K., Molina, B.S.G., Pelham, W.E., Gnagy, E., Smith, B. (2006). Childhood ADHD predicts risky sexual behavior in young adulthood. *Journal of Clinical Child and Adolescent Psychology*, 35, 571-577.

Frazier, T.W., Youngstrom, E. A., Glutting, J. J., & Watkins, M. W. (2007). ADHD and achievement: Meta-analysis of the child, adolescent, and adult literatures and a

- concomitant study with college students. *Journal of Learning Disabilities*, 40(1), 49-65. doi:10.1177/00222194070400010401.
- Gjervan, B., Torgersen, T., Nordahl, H.M., & Rasmussen, K. (2011). Functional impairment and occupational outcome in adults with ADHD. *Journal of Attention Disorders*, 15, 1-9. doi:10.1177/1087054711413074.
- Glutting, J.J., Youngstrom, E.A., & Watkins, M.W. (2005). ADHD and college students: Exploratory and confirmatory factor structures with student and parent data. *Psychological Assessment*, 17, 44-55. doi:10.1037/1040-3590.17.1.44.
- Goodman, S.H., & Brand, S.R. (2009). Depression and early adverse experiences. In I. Gotlib & C. Hammen (Eds.), *Handbook of Depression* (pp. 249-274). New York, NY: The Guilford Press.
- Green, S.B. & Salkind, N.J. (2008). *Using SPSS for Windows and Macintosh: Analyzing and Understanding Data (5th Ed.)*. Upper Saddle River, NJ: Pearson Education, Inc.
- Grenwald-Mayes, G. (2002). Relationship between current quality of life and family of origin dynamics for college students with attention-deficit/hyperactivity disorder. *Journal of Attention Disorders*, 5, 211-222. doi:10.1177/108705470100500403.
- Gudjonsson, G.H., Sigurdsson, J.F., Eyjolfsdottir, G.A., Smari, J., & Young, S. (2009). The relationship between satisfaction with life, ADHD symptoms, and associated problems among university students. *Journal of Attention Disorders*, 12, 507-515. doi:10.1177/1087054708323018.

- Harris, M. (October, 2011). Living. Learning. Communities. *UNCG Magazine*. Retrieved from http://www.uncg.edu/ure/alumni_magazineT2/2011_spring/
- Hechtman, L. (2009). ADHD in Adults. In T.E. Brown (Ed.), *ADHD Comorbidities: Handbook for ADHD Complications in Children and Adults*. Washington, D.C.: American Psychiatric Publishing.
- Heiligenstein, E., Conyers, L.M., Berns, A.R., & Miller, M.A. (1998). Preliminary normative data on DSM-IV attention deficit hyperactivity disorder in college students. *Journal of American College Health, 46*, 185-188.
doi:10.1080/07448489809595609.
- Heiligenstein, E., Guenther, G., Levy, A., Savino, F., & Fulwiler, J. (1999). Psychological and academic functioning in college students with attention deficit hyperactivity disorder. *Journal of American College Health, 47*, 181-185.
doi:10.1080/07448489909595644.
- Heiligenstein, E. & Keeling, R.P. (1995). Presentation of unrecognized attention deficit hyperactivity disorder in college students. *Journal of American College Health, 43*, 226-228. doi:10.1080/07448481.1995.9940481.
- Hesslinger, B., Tebartz van Elst, L., Mochan, F., & Ebert, D. (2003). A psychopathological study into the relationship between attention deficit hyperactivity disorder in adult patients and recurrent brief depression. *Acta Psychiatrica Scandinavica, 107*, 385-389. doi:10.1034/j.1600-0447.2003.00112.x
- Hines, A.M., & Shaw, G.A. (1993). Intrusive thoughts, sensation seeking, and drug use in college students. *Bulletin of the Psychonomic Society, 31*, 541-544.

- Hinshaw, S.P., Owens, E.B., Sami, N., & Fargeon, S. (2006). Prospective follow-up of girls with attention-deficit/hyperactivity disorder into adolescence: Evidence for continuing cross-domain impairment. *Journal of Consulting and Clinical Psychology, 74*, 489-499. doi:10.1037/0022-006X.74.3.489.
- Hollon, S. D., & Kendall, P. C. (1980). Cognitive self-statements in depression: Development of an automatic thoughts questionnaire. *Cognitive Therapy and Research, 4* (4), 383-395. doi:10.1007/BF01178214.
- Hofmann, W., Friese, M., & Strack, F. (2009). Impulse and self-control from a dual-systems perspective. *Perspectives on Psychological Science, 4*, 162–176. doi:10.1111/j.1745-6924.2009.01116.x.
- Howell, A.J., & Watson, D.C. (2007). Procrastination: Associations with achievement goal orientation and learning strategies. *Personality and Individual Differences, 43*, 167-178. doi:10.1016/j.paid.2006.11.017.
- Johnston, C., & Mash, E.J. (2001). Families of children with attention-deficit/hyperactivity disorder: Review and recommendations for future research. *Clinical Child and Family Psychology Review, 4*, 183-207. doi:10.1023/A:1017592030434.
- Kent, K.M., Pelham, W.E., Molina, B.S., Sibley, M.H., Waschbusch, D.A., Yu, J., ... Karch, K.M. (2010). The academic experience of male high school students with ADHD. *Journal of Abnormal Child Psychology, 39*, 451-462. doi:10.1007/s10802-010-9472-4.

- Kern, R.M., Rasmussen, P.R., Byrd, S.L., & Wittschen, L.K. (1999). Lifestyle, personality, and attention deficit hyperactivity disorder in young adults. *Journal of Individual Psychology, 55*, 186-199.
- Kessler, R.C., Adler, L., Barkley, R., Biederman, J., Conners, C.K., Demler, O., ... Howes, M.J. (2006). The prevalence and correlates of adult ADHD in the United States: Results from the National Comorbidity Survey Replication. *American Journal of Psychiatry, 163*, 716-723. doi:10.1176/appi.ajp.163.4.716.
- Kessler, R.C., Berglund, P., Demler, O., Jin, R., Koretz, D., Merikangas, K.R., ... Wang, P.S. (2003). The epidemiology of major depressive disorder: Results from the National Comorbidity Survey Replication (NCS-R). *Journal of the American Medical Association, 289*, 3095-4105. doi:10.1001/jama.289.23.3095.
- Klimkeit, E., Graham, C., Lee, P., Morling, M., Russo, D., & Tonge, B. (2006). Children should be seen and heard: Self-report of feelings and behaviors in primary-school-age children with ADHD. *Journal of Attention Disorders, 10*, 181-191. doi:10.1177/1087054706289926.
- Kuperman, S., Schlosser, S.S., Kramer, J.K., Bucholz, K., Hesselbrock, V., Reich, T., & Reich, W. (2001). Developmental sequence from disruptive behavior diagnosis to adolescent alcohol dependence. *American Journal of Psychiatry, 158*(12), 2022-2026. doi:10.1176/appi.ajp.158.12.2022.
- Langberg, J.M., Dvorsky, M.R., Choi, C., & Elnasseh, A. (2013, November). Predictors of academic functioning in a clinical sample of college students diagnosed with

ADHD. Symposium presented at the 47th annual conference of the Association of Behavioral and Cognitive Therapies, Nashville, TN.

Larochette, A., Harrison, A.G., Rosenblum, Y., & Bowie, C.R. (2011). Additive neurocognitive deficits in adults with attention-deficit/hyperactivity disorder and depressive symptoms. *Archives of Clinical Neuropsychology*, *26*, 385-395.
doi:10.1093/arclin/acr033.

Latimer, W.W., August, G.J., Newcomb, M.D., Realmuto, G.M., Hektner, J.M., & Mathy, R.M. (2003). Child and familial pathways to academic achievement and behavioral adjustment: A prospective six-year study of children with and without ADHD. *Journal of Attention Disorders*, *7*, 101-116.
doi:10.1177/108705470300700204.

Lee, D.H., Oakland, T., Jackson, G., & Glutting, J. (2008). Estimated prevalence of attention-deficit/hyperactivity disorder symptoms among college freshmen: Gender, race, and rater effects. *Journal of Learning Disabilities*, *41*, 371-384.
doi:10.1177/0022219407311748.

Lewandowski, L. J., Lovett, B. J., Coddling, R. S., & Gordon, M. (2008). Symptoms of ADHD and academic concerns in college students with and without ADHD diagnoses. *Journal of Attention Disorders*, *12*(2), 156-161.
doi:10.1177/1087054707310882.

Lewinsohn, P.M. (1974). A behavioral approach to depression. In R. Friedman & M. Katz (Eds.), *The Psychology of Depression: Contemporary Theory and Research* (pp. 157-186). Washington, D.C.: Hemisphere Publishing Corporation.

- Lewinsohn, P.M., Steinmetz, J.L., Larson, D.W., & Franklin, J. (1981). Depression-related cognitions: Antecedent or consequence? *Journal of Abnormal Psychology*, *90*, 213-219.
- List Randomizer (n.d.). Retrieved from www.random.org/lists.
- Mannuzza, S., Gittelman-Klein, R., Bessler, A., Malloy, P., & LaPadula, M. (1993). Adult outcome of hyperactive boys: Educational achievement, occupational rank, and psychiatric status. *Archives of General Psychiatry*, *50*, 565-576.
doi:10.1001/archpsyc.1993.01820190067007.
- Mannuzza, S., Klein, R.G., Bonagura, N., Malloy, P., Giampino, T.L., & Addalli, K. (1991). Hyperactive boys almost grown up: V. Replication of psychiatric status. *Archives of General Psychiatry*, *48*, 77-83.
doi:10.1001/archpsyc.1991.01810250079012.
- Mannuzza, S., Klein, R., Bessler, A., Malloy, P., & LaPadula, M. (1998). Adult psychiatric status of hyperactive boys grown up. *American Journal of Psychiatry*, *155*, 493-498.
- McKee, T.E. (2008). Comparison of a norm-based versus criterion-based approach to measuring ADHD symptomatology in college students. *Journal of Attention Disorders*, *11*, 677-688. doi:10.1177/1087054707308501.
- Meaux, J.B., Green, A., & Broussard, L. (2009). ADHD in the college student: A block in the road. *Journal of Psychiatric and Mental Health Nursing*, *10*, 248-256.
doi:10.1111/j.1365-2850.2008.01349.x.

- de Meneses-Gaya, C., Zuardi, A.W., Loureiro, S.R., & Crippa, J.A.S. (2009). Alcohol Use Disorders Identification Test (AUDIT): An updated systematic review of psychometric properties. *Psychology & Neuroscience, 2*, 83-97.
- Molina, B. S., Marshal, M. P., Pelham, W. E., & Wirth, R. J. (2005). Coping skills and parent support mediate the association between childhood attention-deficit/hyperactivity disorder and adolescent cigarette use. *Journal of Pediatric Psychology, 30*(4), 345-357. doi:10.1093/jpepsy/jsi029.
- Mowbray, C.T., Mandiberg, J.M., Stein, C.H., Kopels, S., Curlin C., Megivern, D., ... Lett, R. (2006). Campus mental health services: Recommendations for change. *American Journal of Orthopsychiatry, 76*, 226-237. doi:10.1037/0002-9432.76.226
- Murphy, K. (2005). Psychosocial treatments for ADHD in teens and adults: A practice-friendly review. *Journal of Clinical Psychology/In Session, 61*, 607-619. doi:10.1002/jclp.20123.
- Murphy, K., & Barkley, R.A. (1996). Prevalence of DSM-IV symptoms of ADHD in adult licensed drivers: Implications for clinical diagnosis. *Journal of Attention Disorders, 1*, 147-161. doi:10.1177/108705479600100303.
- Murphy, K.R., Barkley, R.A., & Bush, T. (2002). Young adults with ADHD: Subtype differences in comorbidity, educational, and clinical history. *Journal of Nervous and Mental Disease, 190*, 147-157. doi:10.1097/00005053-200203000-00003.

- Nelson, J.M. & Gregg, N. (2012). Depression and anxiety among transitioning adolescents and college students with ADHD, Dyslexia, or comorbid ADHD/dyslexia. *Journal of Attention Disorders, 16*, 244-254.
- Nolen-Hoeksema, S., & Hilt, L.M. (2009). Gender differences in depression. In I. Gotlib & C. Hammen (Eds.), *Handbook of Depression* (pp. 386-404). New York, NY: The Guilford Press.
- Norvilitis, J.M., Ingersoll, T., Zhang, J., & Jia, S. (2008). Self-reported symptoms of ADHD among college students in China and the United States. *Journal of Attention Disorders, 11*, 558-567. doi:10.1177/1087054707308496.
- Norwalk, K., Norvilitis, J.M., & MacLean, M.G. (2009). ADHD symptomatology and its relationship to factors associated with college adjustment. *Journal of Attention Disorders, 13*, 251-258. doi:10.1177/1087054708320441.
- Pallant, J. (2007). *SPSS Survival Manual: A Step-By-Step Guide to Data Analysis Using SPSS for Windows, 3rd Ed.* Berkshire, England: Open University Press.
- Parker, D.R., & Benedict, K.B. (2002). Assessment and intervention: Promoting successful transitions for college students with ADHD. *Assessment for Effective Intervention, 27*, 3-24. doi:10.1177/073724770202700302.
- Pliszka, S.R. (2000). Patterns of psychiatric comorbidity with attention-deficit/hyperactivity disorder. *Child and Adolescent Psychiatric Clinics of North America, 9*, 525-540.
- Rabin, L.A., Fogel, J., & Nutter-Upham, K.E. (2011). Academic procrastination in college students: The role of self-reported executive function. *Journal of Clinical*

and Experimental Neuropsychology, 33, 344-357.

doi:10.1080/13803395.2010.518597.

Rabiner, D.L., Anastopoulos, A.D., Costello, J., Hoyle, R.H., & Swartzwelder, H.S.

(2008). Adjustment to college in students with ADHD. *Journal of Attention Disorders*, 11, 689-699. doi:10.1177/1087054707305106.

Ramirez, C.A., Rosen, L.A., Deffenbacher, J.F., Hurst, H., Nicoletta, C., Rosencranz, T.,

& Smith, K. (1997). Anger and anger expression in adults with high AD/HD symptoms. *Journal of Attention Disorders*, 2, 115-128.

doi:10.1177/108705479700200205.

Rasmussen, P., & Gillberg, C. (2001). Natural outcome of ADHD with developmental

coordination disorder at age 22 years: A controlled, longitudinal, community-based study. *Journal of the American Academy of Child and Adolescent Psychiatry*, 39, 1424-1431. doi:0890-8567/00/3911-1424.

Reilley, S.P. (2005). Empirically informed attention-deficit/hyperactivity disorder

evaluation with college students. *Journal of College Counseling*, 8, 153-164. doi:10.1002/j.2161-1882.2005.tb00082.x.

Richards, T. L., Deffenbacher, J. L., Rosen, L. A., Barkley, R. A., & Rodricks, T. (2006).

Driving anger and driving behavior in adults with ADHD. *Journal of Attention Disorders*, 10, 54-64. doi:10.1177/1087054705284244.

Richards, T.L. Rosen, L.A., & Ramirez, C.A. (1999). Psychological functioning

differences among college students with confirmed ADHD, ADHD by self-report only, and without ADHD. *Journal of College Student Development*, 40, 299-304.

- Rohde, P., Lewinsohn, P.M., & Seeley, J.R. (1991). Comorbidity of unipolar depression: II. Comorbidity with other mental disorders in adolescents and adults. *Journal of Abnormal Psychology, 100*, 214-222. doi:10.1037//0021-843X.100.2.214.
- Roy-Byrne, P., Scheele, L., Brinkley, J., Ward, N., Wiatrak, C., Russo, J. ... Varley, C. (1997). Adult attention-deficit hyperactivity disorder: Assessment guidelines based on clinical presentation to a specialty clinic. *Comprehensive Psychiatry, 38*, 133-140. doi:10.1016/S0010-440X(97)90065-1.
- Safren, S.A., Sprich, S., Chulvick, S., & Otto, M.W. (2004). Psychosocial treatments for adults with attention-deficit/hyperactivity disorder. *Psychiatric Clinics of North America, 27*, 349-360. doi:10.1016/S0193-953X(03)00089-3.
- Sanford, C., Newman, L., Wagner, M., Cameto, R., Knokey, A.M., & Shaver, D. (2011). *The post-high school outcomes of young adults with disabilities up to 6 years after high school: Key findings from the National Longitudinal Transition Study-2 (NLTS2)* (NCSE 2011-3004). Menlo Park, CA: SRI International.
- Sarkar, S.K., Midi, H., & Rana, S. (2011). Detection of outliers and influential observations in binary logistic regression: An empirical study. *Journal of Applied Sciences, 11*, 26-35.
- Schmidt, K.L., Stark, K.D., Carlson, C.L., & Anthony, B.J. (1998). Cognitive factors differentiating attention-deficit/hyperactivity disorder with and without a comorbid mood disorder. *Journal of Consulting and Clinical Psychology, 66*, 673-679. doi:10.1037//0022-006X.66.4.673.

- Settersten, R.A., Jr., & Ray, B. (2010). What's Going on With Young People Today? The Long and Twisting Path to Adulthood. *Transition to Adulthood*, 20(1). Retrieved from http://futureofchildren.org/futureofchildren/publications/docs/20_01_02.pdf.
- Shaffer, D., Fisher, P., Lucas, C.P., Dulcan, M.K., & Schwab-Stone, M.E. (2000). NIMH Diagnostic Interview Schedule for Children Version IV (NIMH DISC-IV): Description, differences from previous versions, and reliability of some common diagnoses. *Journal of the American Academy of Child and Adolescent Psychiatry*, 39, 28-38. doi:10.1097/00004583-200001000-00014.
- Shaw, G., & Giambra, L. (1993). Task unrelated thoughts of college students diagnosed as hyperactive in childhood. *Developmental Neuropsychology*, 9, 17-30. doi:10.1080/87565649309540541.
- Shaw-Zirt, B., Popali-Lehane, L., Chaplin, W., & Bergman, A. (2005). Adjustment, social skills, and self-esteem in college students with symptoms of ADHD. *Journal of Attention Disorders*, 8, 109-120. doi:10.1177/1087054705277775.
- Solanto, M.V. (2011). *Cognitive-behavior therapy for adult ADHD: Targeting executive dysfunction*. New York, NY: The Guilford Press.
- Sollman, M.J., Ranseen, J.D., & Berry, D.T. (2010). Detection of feigned ADHD in college students. *Psychological Assessment*, 22, 325-335. doi:10.1037/a0018857.
- Spencer, T., Wilens, T., Biederman, J., Wozniak, J., & Harding-Crawford, M. (2000). Attention-deficit/hyperactivity disorder with mood disorders. In T.E. Brown (Ed.), *Attention-Deficit Disorders and Comorbidities in Children, Adolescents, and Adults* (pp. 79-124). Washington, DC: American Psychiatric Press.

- Tannock, R. (1994). Attention-deficit hyperactivity disorder with anxiety disorders. In T.E. Brown (Ed.), *Attention-deficit disorders and comorbidities in children, adolescents, and adults* (pp. 125-170). Washington, DC: American Psychiatric Press.
- Waxmonsky, J. (2003). Assessment and treatment of attention deficit hyperactivity disorder in children with comorbid psychiatric illness. *Current Opinion in Pediatrics, 15*, 476-482. doi:10.1097/00008480-200310000-00006.
- Weinstein, C.E., & Palmer, D.R. (2002). *Learning and study strategies inventory (LASSI): User's manual* (2nd ed.). Clearwater, FL: H & Publishing.
- Weiss, G., & Hechtman, L. T. (1993). *Hyperactive children grown up, 2nd Ed.: ADHD in children, adolescents, and adults*. New York, NY: The Guilford Press.
- Weiss, G., Hechtman, L., Milroy, T., & Perlman, T. (1985). Psychiatric status of hyperactives as adults: A controlled prospective 15-year follow-up of 63 hyperactive children. *Journal of the American Academy of Child Psychiatry, 23*, 211-220. doi:10.1016/S0002-7138(09)60450-7.
- Weitzman, E.R. (2004). Poor mental health, depression, and associations with alcohol consumption, harm, and abuse in a national sample of young adults in college. *The Journal of Nervous and Mental Disease, 192*, 269-277. doi:10.1097/01.nmd.0000120885.17362.94.
- Wender, P. (1995). *Attention-deficit hyperactivity disorder in adults*. New York, NY: Oxford University Press.

- Weyandt, L.L., & DuPaul, G. (2006). ADHD in college students. *Journal of Attention Disorders, 10*, 9-19. doi:10.1177/1087054705286061.
- Weyandt, L.L. & DuPaul, G. (2008). ADHD in college students: Developmental findings. *Developmental Disabilities Research Reviews, 14*, 311-319. doi: 10.1002/ddrr.38.
- Weyandt, L.L., Linterman, I., & Rice, J.A. (1995). Reported prevalence of attention deficits in a sample of college students. *Journal of Psychopathology and Behavior Assessment, 17*, 293-304. doi:10.1007/BF02229304.
- Weyandt, L.L., Rice, J.A., Linterman, I., Mitzlaff, L., & Emert, E. (1998). Neuropsychological performance of a sample of adults with ADHD, developmental reading disorder, and controls. *Developmental Neuropsychology, 14*, 643-656. doi:10.1080/87565649809540734.
- Wolf, L.E. (2001). College students with ADHD and other hidden disabilities: Outcomes and interventions. In J. Wasserstein, L.E. Wolf, & F.F. LeFever (Eds.), *Adult attention deficit disorder: Brain mechanisms and life outcomes* (pp. 385-395). New York, New York: New York Academy of Sciences.
- Wolf, L.E., Simkowitz, P., & Carlson, H. (2009). College students with attention-deficit/hyperactivity disorder. *Current Psychiatry Reports, 11*, 415-421.

APPENDIX A

TABLES AND FIGURES

Table 1

Demographic Characteristics of ADHD and Control Groups

	ADHD (n = 46)	Non-ADHD (n = 46)	Total Sample (N = 92)
	<u>M (SD)</u>	<u>M (SD)</u>	<u>M (SD)</u>
Age	20.46 (2.03)	20.22 (1.86)	20.34 (1.94)
Grade Point Average*	2.63 (.69)	3.10 (.61)	2.68 (.68)
	<u>% (n)</u>	<u>% (n)</u>	<u>% (n)</u>
Gender			
Male	32.6% (15)	32.6% (15)	32.6% (30)
Female	67.4% (31)	67.4% (31)	67.4% (62)
Race/Ethnicity			
African American/Black	17.4% (8)	15.2% (7)	16.3% (15)
Asian	2.2% (1)	8.7% (4)	5.4% (5)
Caucasian/White	56.5% (26)	56.5% (26)	56.5% (52)
Hispanic/Latino	17.4% (8)	13.0% (6)	15.2% (14)
Biracial	2.2% (1)	2.2% (1)	2.2% (2)
Other	4.3% (2)	4.3% (2)	4.3% (4)
Class Rank			
Freshman	28.3% (13)	32.6% (15)	30.4% (28)
Sophomore	23.9% (11)	30.4% (14)	27.2% (25)
Junior	28.3% (13)	19.6% (9)	23.9% (22)
Senior	19.6% (9)	17.4% (8)	18.5% (17)

* $p < .01$

Table 2

Psychological Characteristics of ADHD and Control Groups

	ADHD (n = 42)	Non-ADHD (n = 42)
	<u>M (SD)</u>	<u>M (SD)</u>
ADHD-RS		
HI Total Symptom Count**	6.96 (1.95)	.98 (1.16)
IA Total Symptom Count**	4.73 (2.36)	1.07 (1.02)
BDI Total Score	9.58 (8.25)	5.59 (4.98)
BAI Total Score	12.13 (10.84)	9.15 (8.55)
CAARS (T-scores)		
Inattention/Memory Problems	74.21 (9.50)	---
Hyperactivity/Restlessness	63.66 (9.86)	---
Impulsivity/Emotional Lability	62.46 (11.68)	---
Problems with Self-Concept	64.02 (10.91)	---
DSM-IV IA Symptoms	85.35 (10.48)	---
DSM-IV HI Symptoms	65.09 (13.85)	---
DSM-IV Total ADHD Symptoms	78.59 (11.51)	---
ADHD Index	69.29 (7.55)	---
ADHD Interview		
HI Total Symptom Count	4.74 (1.29)	---
IA Total Symptom Count	7.57 (1.39)	---
Mental Health		
	<u>% (n)</u>	<u>% (n)</u>
Current ADHD medication	43.5% (20)	--
Current self-reported mood disorder diagnosis	28.3% (13)	10.9% (5)
Current self-reported anxiety disorder diagnosis	32.6% (15)	6.5% (3)

Note. ADHD-RS = ADHD-Rating Scale Adult Version; HI = Hyperactive-Impulsive; IA = Inattentive; BDI = Beck Depression Inventory; BAI = Beck Anxiety Inventory; CAARS = Conners' Adult ADHD Rating Scale; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders, 4th Edition.

** $p < .001$.

Table 3

Correlations Among Variables for Final Sample (N = 89)

	Variable	1	2	3	4	5	6	7	8	9	10
1	ADHD-RS IA Symptom Count (current)	---									
2	ADHD-RS HI Symptom Count (current)	.76**	---								
3	BDI Total	.30**	.24*	---							
4	ATQ-R Depression Total	.48**	.17	.75**	---						
5	ATQ-R ADHD Total	.51**	.52**	.47**	.97**	---					
6	BAI Total	.20	.22*	.60**	.62**	.39**	---				
7	AUDIT Total	.20	.13	.10	.15	.18	.16	---			
8	CSS Total	.25*	.37**	.10	.15	.14	.24*	.36**	---		
9	IRS College Severity	.52**	.55**	.44**	.46**	.59**	.37**	.18	.28**	---	
10	IRS Childhood Severity	.62**	.58**	.34**	.32**	.52**	.33**	.25*	.28**	.62**	---

Note. ADHD-RS = ADHD Rating Scale-IV; IA = Inattention; HI = Hyperactivity/Impulsivity; BDI = Beck Depression Inventory; ATQ-R = Automatic Thoughts Questionnaire, Revised; BAI = Beck Anxiety Inventory; AUDIT = Alcohol Use Disorders Identification Test; CSS = Childhood Symptom Scale; IRS = Impairment Rating Scale.

* $p < .05$. ** $p < .01$.

Table 4

SCID-CV Mood Disorder Module Diagnoses by Group

	ADHD (n = 46)	Control (n = 46)	χ^2 (1 df)
	<u>% (n)</u>	<u>% (n)</u>	
Current Major Depressive Episode	13 (6)	13 (6)	.00
Past Major Depressive Episode in College	35 (16)	14 (6)	4.92*
Past Major Depressive Episode Prior to College	39 (18)	24 (11)	2.47
Current Dysthymic Disorder	9 (4)	11 (5)	.12
Past Dysthymic Disorder	11 (5)	13 (6)	.10
Depression Anytime in College ¹	39 (18)	26 (12)	1.78

¹ Includes current major depressive episode, past major depressive episode in college, and current dysthymic disorder

* $p < .05$.

Table 5

Hierarchical Logistic Regression Analyses Predicting Depressive Episode in College from Past and Current Protective Factor Variables

Predictor	β	SE	Wald	Sig.	Nagelkerke R^2	Model χ^2
Step 1					0.68	54.77***
ADHD Status	-0.13	0.80	0.03	0.88		
Depression Prior to College	4.64***	0.88	28.15	0.00		
Step 2					0.77	10.52**
Total Past Protective Factors	0.61**	0.24	6.76	0.01		
Total Current Protective Factors	-0.15	0.19	0.59	0.44		

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Table 6

Hierarchical Multiple Regression Analyses Predicting Depression From Past and Current Protective Factor Variables

Analysis	ΔR^2	β	ΔF
Regression 1: BDI score			
Step 1	0.16		8.28**
ADHD Status		0.23*	
Depression Prior to College		0.29**	
Step 2	0.04		2.12
Total Protective Factors Prior to College		0.05	
Total Protective Factors During College		-0.22	
Regression 2: BDI score			
Step 1	0.16		8.28**
ADHD Status		0.23*	
Depression Prior to College		0.29**	
Step 2 (Past Protective Factors)	0.03		0.78
Parental Help with Schoolwork		0.04	
Academic Supports		-0.07	
Services for ADHD		-0.16	
Services for Other Psychiatric Problem		0.13	
Step 3 (Current Protective Factors)	0.16		3.74**
Academic Supports in College		0.11	
Psychological Supports in College		-.01	
Support from Friends in College		-.27**	
Support from Family in College		-.15	
Current Use of ADHD Medication		-.24	

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Table 7

Crosstabs: Incidents of Depression in ADHD Group Before and After Entering College (n = 46)

		<u>SCID: Depression Prior to College</u>		
		no	yes	Total
SCID: Depression Anytime in College	no	23	6	28
	yes	5	12	18
<u>Total</u>		28	18	46

Table 8

Crosstabs: Incidents of Depression in Control Group Before and After Entering College (n = 46)

		<u>SCID: Depression Prior to College</u>		
		no	yes	Total
SCID: Depression Anytime in College	no	34	1	34
	yes	1	10	12
<u>Total</u>		35	11	46

Table 9

Hierarchical Multiple Regression Analysis Predicting BDI Score From Impairment During College, Impairment Prior to College, and Depressive Cognitions

Predictor	ΔR^2	β	ΔF
Step 1	0.16		8.28**
ADHD Status		0.23*	
Depression Prior to College		0.29**	
Step 2	0.15		6.72**
Impairment During College (IRS)		0.40**	
Impairment Prior to College (IRS)		-0.04	
Step 3	0.30		29.09***
Depressive Cognitions (ATQ-R)		0.65***	
ADHD Cognitions (ATQ-R)		0.01	

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

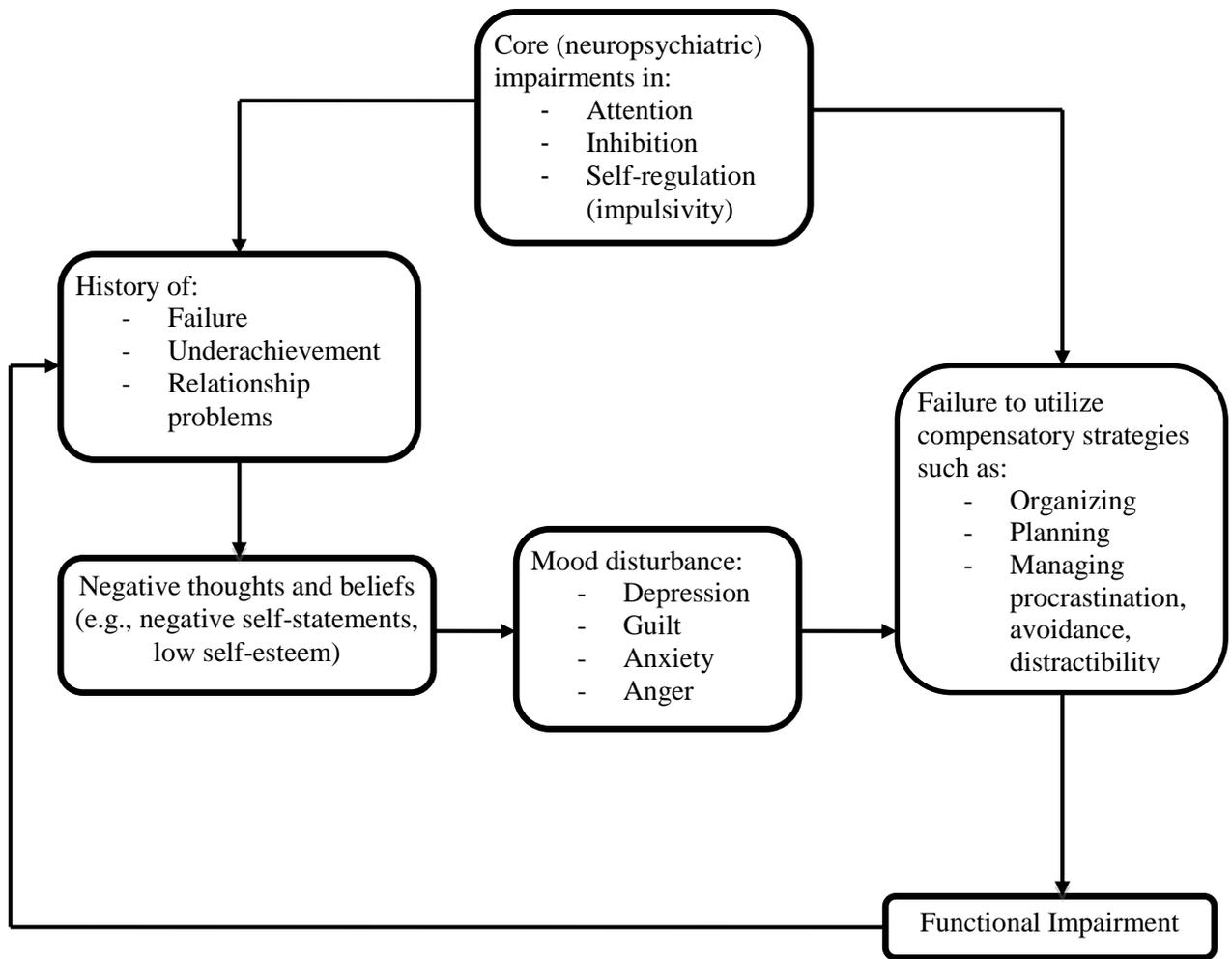


Figure 1. Safren's (2004) Cognitive-Behavioral Model of Impairment in Adult ADHD.

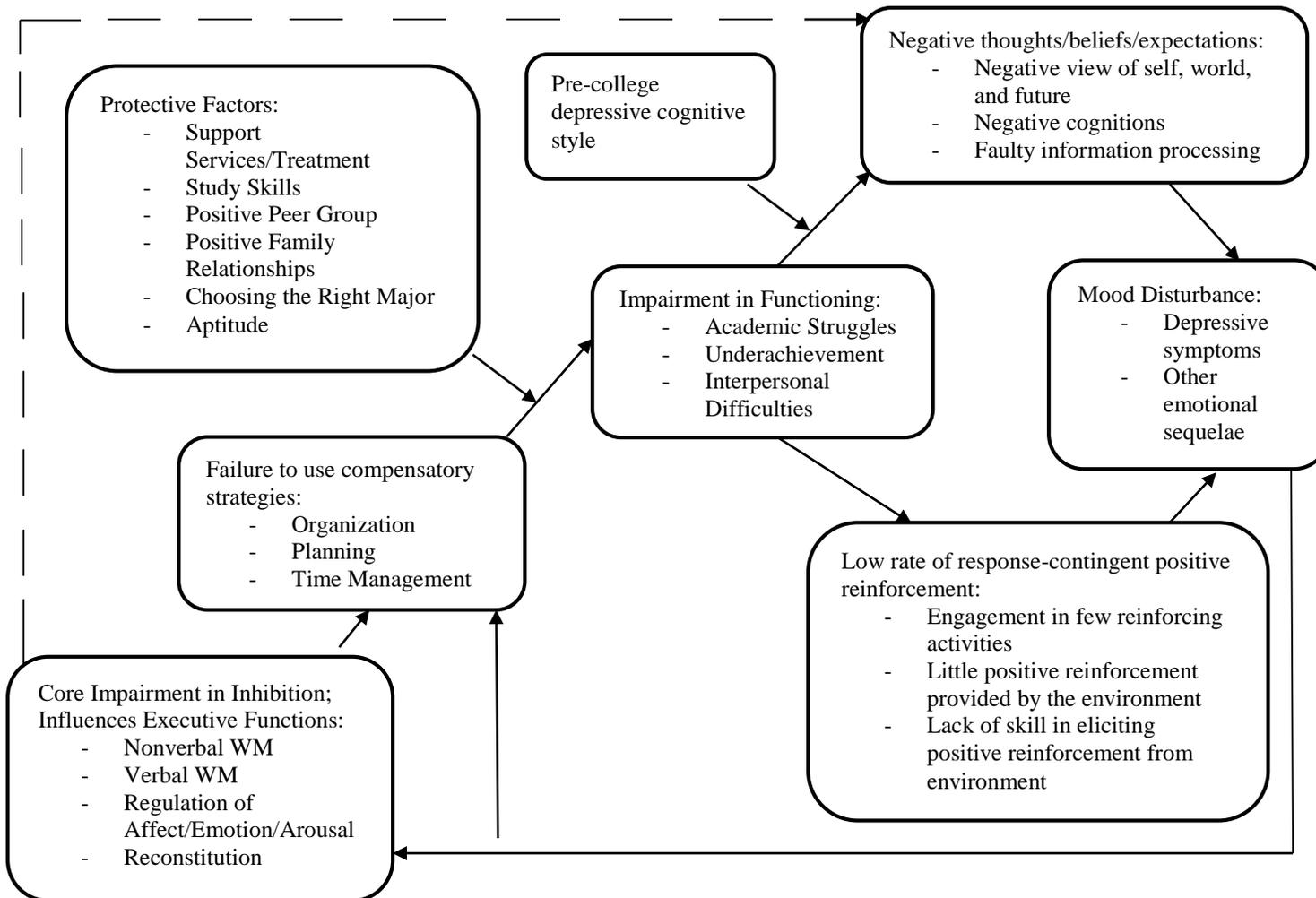


Figure 2. Hypothesized Model for the Development of Depressive Symptoms in College Students with ADHD.

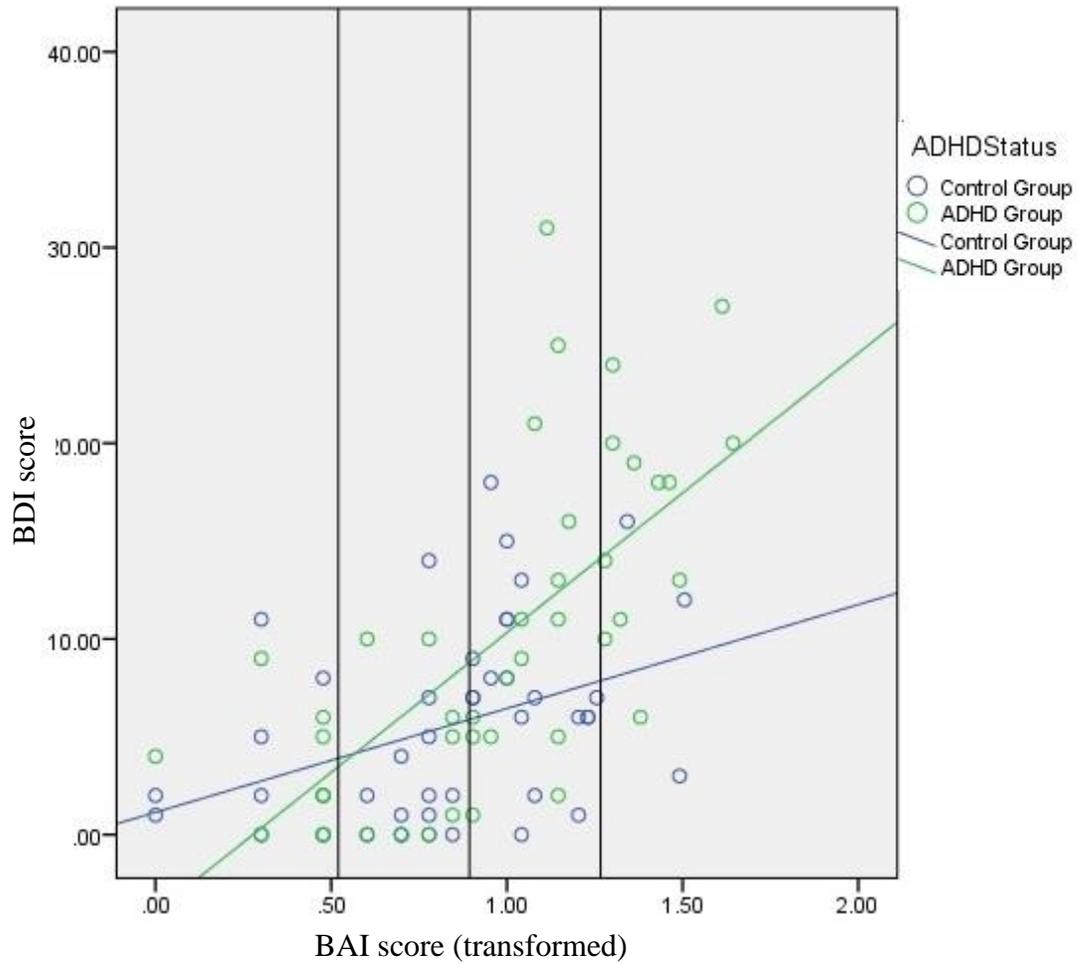


Figure 3. Simple Main Effects Analyses Depicting BDI Scores at High (1 *SD* above the mean), Medium (mean) and Low (1 *SD* below the mean) Levels of Anxiety (transformed BAI scores)

APPENDIX B

ADULT ADHD RATING SCALE – SELF REPORT

Indicate the number that best describes YOUR behavior during each of the following time periods.

0=Never or rarely 1=Sometimes 2=Often 3=Very Often

	Childhood (Ages 5 to 12)	Past 6 Months
1. Fail to give close attention to details or make careless mistakes in my work.	_____	_____
2. Fidget with hands or feet or squirm in my seat.	_____	_____
3. Difficulty sustaining my attention in tasks or fun activities.	_____	_____
4. Leave my seat in situations in which remaining seated is expected.	_____	_____
5. Don't listen when spoken to directly.	_____	_____
6. Feel restless. (In childhood, ran about or climbed excessively.)	_____	_____
7. Don't follow through on instructions and fail to finish work.	_____	_____
8. Have difficulty engaging in leisure activities or doing fun things quietly.	_____	_____
9. Have difficulty organizing tasks and activities.	_____	_____
10. Feel "on the go" or "driven by a motor."	_____	_____
11. Avoid, dislike, or feel reluctant to engage in work that requires sustained mental effort.	_____	_____
12. Talk excessively.	_____	_____
13. Lose things necessary for tasks and activities.	_____	_____
14. Blur out answers before questions have been completed.	_____	_____
15. Easily distracted.	_____	_____
16. Have difficulty awaiting my turn.	_____	_____
17. Forgetful in daily activities.	_____	_____
18. Interrupt or intrude on others.	_____	_____

APPENDIX C

COLLEGE LIFE QUESTIONNAIRE

1. Since becoming a college student (at UNCG or elsewhere), how often have you used these academic services:

	<i>Never/Rarely</i>	<i>Sometimes</i>	<i>Often</i>	<i>Very Often</i>
Learning Assistance Center <i>(includes Special Support Services program; Supplemental Instruction Program (SIP); Student Study Program; Student Success Center for tutoring or academic skills help)</i>	0	1	2	3
Students First Office	0	1	2	3
Student Academic Services <i>(for academic probation)</i>	0	1	2	3
Foundations for Learning course	0	1	2	3
Writing Center	0	1	2	3
Speaking Center	0	1	2	3
Office of Disability Services	0	1	2	3
Living & Learning Community	0	1	2	3
Tutoring through an academic department	0	1	2	3
Hired tutoring	0	1	2	3
Other (please list): _____	0	1	2	3

2. Since becoming a college student (at UNCG or elsewhere), how often have you used psychological supports:

	<i>Never/Rarely</i>	<i>Sometimes</i>	<i>Often</i>	<i>Very Often</i>
Counseling/therapy	0	1	2	3
Group therapy	0	1	2	3
Psychiatrist or physician for medication	0	1	2	3

3. Since becoming a college student (at UNCG or elsewhere), have you received a psychological evaluation (e.g., to assess for psychiatric diagnosis)?

Yes *No*

4. Since becoming a college student (at UNCG or elsewhere), how often...

	<i>Never/Rarely</i>	<i>Sometimes</i>	<i>Often</i>	<i>Very Often</i>
...Have you received emotional support from your <u>friends</u> when you wanted to?	0	1	2	3
...Have your <u>friends</u> helped you when you needed it (e.g., giving you a ride, loaning you \$5, sharing class notes, etc.)?	0	1	2	3

5. How many close friends do you have? _____

6. Overall, how satisfied are you with your current social life?

Not At All Satisfied *Somewhat Satisfied* *Very Satisfied*

7. Since becoming a college student (at UNCG or elsewhere), how often...

	<i>Never/Rarely</i>	<i>Sometimes</i>	<i>Often</i>	<i>Very Often</i>
...Have you received emotional support from a <u>family member</u> when you wanted to?	0	1	2	3
...Has a <u>family member</u> helped you when you needed it (e.g., giving you a ride, loaning you \$5, sharing class notes, etc.)?	0	1	2	3
...Do you have contact with a member of your immediate family?	0	1	2	3

8. Overall, how satisfied are you with your relationships with family members?

Not At All Satisfied *Somewhat Satisfied* *Very Satisfied*

9. Prior to becoming a college student (i.e., in elementary, middle, and/or high school), how often did your parents help you with schoolwork (e.g., studying, completing homework, and so forth)?

Never/rarely *Sometimes* *Often* *Very Often*

10. Prior to becoming a college student (i.e., in elementary, middle, and/or high school), how often did you use each of these academic accommodations:

	<i>Never/Rarely</i>	<i>Sometimes</i>	<i>Often</i>	<i>Very Often</i>
Extra time on tests or assignments	0	1	2	3
Testing in a separate room	0	1	2	3
Tutoring	0	1	2	3
Modified assignments	0	1	2	3
1-on-1 Classroom aide	0	1	2	3
Other (please list): _____	0	1	2	3

11. Prior to becoming a college student (i.e., in elementary, middle, and/or high school), did you receive any of the following services for ADHD?

Individual therapy	<i>Yes</i>	<i>No</i>
Family therapy	<i>Yes</i>	<i>No</i>
Group therapy	<i>Yes</i>	<i>No</i>
Psychiatric medication	<i>Yes</i>	<i>No</i>
(Please indicate: _____)		

12. Prior to becoming a college student (i.e., in elementary, middle, and/or high school), did you receive any services for a psychological problem OTHER than ADHD (e.g., depression, anxiety, or other):

Individual therapy	<i>Yes</i>	<i>No</i>
Family therapy	<i>Yes</i>	<i>No</i>
Group therapy	<i>Yes</i>	<i>No</i>
Psychiatric medication	<i>Yes</i>	<i>No</i>
(Please indicate: _____)		

APPENDIX D

IMPAIRMENT RATING SCALE

Please rate how frequently you have had difficulties in each of these areas of life activities *since being in college*:

Areas:	Never or Rarely	Sometimes	Often	Very Often
In my home life with my immediate family:	0	1	2	3
In my work or occupation:	0	1	2	3
In my social interactions with others:	0	1	2	3
In my activities or dealings in the community:	0	1	2	3
In any educational activities:	0	1	2	3
In my dating or marital relationship:	0	1	2	3
In my management of my money:	0	1	2	3
In my driving of a motor vehicle:	0	1	2	3
In my leisure or recreational activities:	0	1	2	3
In my management of my daily responsibilities:	0	1	2	3

Please rate how frequently you had difficulties in each of these areas of life activities *between the ages of 5 and 12*:

Areas:	Never or Rarely	Sometimes	Often	Very Often
In my home life with my immediate family:	0	1	2	3
In my social interactions with other children:	0	1	2	3
In my activities or dealings in the community:	0	1	2	3
In school:	0	1	2	3
In sports, clubs, or other organizations:	0	1	2	3
In learning to take care of myself:	0	1	2	3
In my play, leisure, or recreational activities:	0	1	2	3
In my handling of my daily chores or other responsibilities:	0	1	2	3

APPENDIX E

AUTOMATIC THOUGHTS QUESTIONNAIRE - REVISED

Directions: Listed below are a variety of thoughts that pop into people's heads. Please read each thought and indicate how frequently, if at all, the thought occurred to you over the last week. Please read each item carefully and fill in the blank with the appropriate number, using the following scale.

- 1 = Not at all
 2 = Sometimes
 3 = Moderately Often
 4 = Often
 5 = All the time

- | | |
|---|--|
| _____ 1. I need it now. | _____ 33. I can definitely finish this task in one sitting/one day. |
| _____ 2. I feel like I'm up against the world. | _____ 34. I hate myself. |
| _____ 3. I don't want to wait for what I could have right now. | _____ 35. I'll just do this one thing first. |
| _____ 4. I'm no good. | _____ 36. I'm worthless. |
| _____ 5. I'll just do it later. | _____ 37. Though this usually "sucks me in," I'll just do it for a minute. |
| _____ 6. Why can't I ever succeed? | _____ 38. I wish I could just disappear. |
| _____ 7. I do better waiting until the last minute. | _____ 39. There's no way I'll ever stick to a schedule. |
| _____ 8. No one understands me. | _____ 40. What's the matter with me? |
| _____ 9. I know I shouldn't, but I will. | _____ 41. Being impulsive is a big part of who I am. |
| _____ 10. I've let people down. | _____ 42. I'm a loser. |
| _____ 11. I'd like to have that right now—I just can't wait. | _____ 43. Being disorganized is a big part of who I am. |
| _____ 12. I don't think I can go on. | _____ 44. My life is a mess. |
| _____ 13. I didn't think that through. | _____ 45. Being organized just isn't "me." |
| _____ 14. I wish I were a better person. | _____ 46. I'm a failure. |
| _____ 15. I perform better under pressure. | _____ 47. My work is better if I wait until the last minute. |
| _____ 16. I'm so weak. | _____ 48. I'll never make it. |
| _____ 17. Even though this hasn't worked in the past, I know this time it will. | _____ 49. I can't stop right now. |
| _____ 18. My life's not going the way I want it to. | _____ 50. I feel so helpless. |
| _____ 19. I have plenty of time—I'll just do one more thing before I go. | _____ 51. I need to stop myself and think this through. |
| _____ 20. I'm so disappointed in myself. | _____ 52. Something has to change. |
| _____ 21. What am I supposed to be doing right now? | _____ 53. I won't because in the long term it would be more harmful than good. |
| _____ 22. Nothing feels good anymore. | _____ 54. There must be something wrong with me. |
| _____ 23. If I spend too much time studying, I'll forget the information. | _____ 55. I'd be better off waiting. |
| _____ 24. I can't stand this anymore. | _____ 56. My future is bleak. |
| _____ 25. I know I'm supposed to be doing something else, but I <i>need</i> to do this now. | _____ 57. Being overactive is just part of my personality. |

- _____ 26. I can't get started.
- _____ 27. It's better when I just "go with the flow."
- _____ 28. What's wrong with me?
- _____ 29. Being organized would just hamper my creativity.
- _____ 30. I wish I were somewhere else.
- _____ 31. I feel like I can't control myself.
- _____ 32. I can't get things together.

- _____ 58. It's just not worth it.
- _____ 59. I'm careful in making decisions.
- _____ 60. I can't finish anything.
- _____ 61. I've got a lead foot.
- _____ 62. I think I did this in the wrong order.
- _____ 63. I usually don't notice my thoughts.

APPENDIX F

BACKGROUND INFORMATION FORM

Today's Date: ____/____/____

What is your gender? Male Female Other What is your age in years?

How do you identify yourself? (Please check only one)

- Asian-American
- African-American/Black
- Caucasian/White
- Latino-American/Hispanic
- Multiracial
- Native American
- Other

Based on completed credit hours, what is your class standing? (Please check only one)

- Freshman
- Sophomore
- Junior
- Senior

At this time, what is your overall cumulative grade-point average (GPA)? For example, if your overall GPA is 2.3, you could circle "2" in the first row and "3" in the second row.

- | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|--|
| 0 | 1 | 2 | 3 | 4 | | | | | | |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
- I don't have a GPA yet

Which situation best describes your current living quarters? (Please check only one)

- On campus in a residence hall/dorm
- Off campus apartment or rented house within a 10-minute drive from campus
- Off campus apartment or rented house more than a 10-minute drive from campus
- At home with parent(s)
- Fraternity or sorority house
- I own my own home

Are you a member of a fraternity or sorority at UNCG? Yes No

Are you a member of an athletic team at UNCG? Yes No

Have you ever been diagnosed with Attention-Deficit/Hyperactivity Disorder (AD/HD or ADD)?

- Yes
- No

If yes, were you diagnosed with Attention-Deficit/Hyperactivity Disorder (AD/HD or ADD) while in college? Yes No

Are you currently being treated with medication for AD/HD or ADD? Yes No

Do you currently have a mood disorder diagnosis (e.g., Depression, Bipolar Disorder)?

Yes No

Do you currently have an anxiety disorder diagnosis (e.g., Panic Disorder, Generalized Anxiety Disorder, Obsessive-Compulsive Disorder, Social Phobia)? Yes No

What is your father's occupation? _____

What is your mother's occupation? _____

APPENDIX G

UNIVERSITY OF NORTH CAROLINA AT GREENSBORO CONSENT TO ACT AS A HUMAN PARTICIPANT

Project Title: Depression in College Students with ADHD

Project Director: Arthur D. Anastopoulos, Ph.D. and Allison Bray, M.A.

Participant's Name (Please print):

What is the study about?

This is a research project. The purpose of this study is to examine whether ADHD (attention-deficit/hyperactivity disorder) is related to depression during college.

Why are you asking me?

You are being asked to participate because you are an undergraduate student at UNCG. You can participate even if you do not have ADHD or depression. Some students who participate will have recently completed an evaluation at the ADHD Clinic at UNCG. Other students are being asked to participate even if they do not have ADHD or have not gone through an evaluation. Only students at UNCG who are 18 years old or older are being asked to participate.

What will you ask me to do if I agree to be in the study?

You are being asked to complete a set of questionnaires and an interview that ask about your behavior, experiences as a college student, and psychological symptoms. These measures should take between 45 and 60 minutes to complete. You will complete questionnaires in a private room at the ADHD Clinic at UNCG.

Is there any audio/video recording?

No audio or video recording will be used for this project.

What are the dangers to me?

The Institutional Review Board at the University of North Carolina at Greensboro has determined that participation in this study poses minimal risk to participants. Some of the measures ask about personal information, such as depression and anxiety symptoms you may be feeling. These questions may cause you to feel uncomfortable, and you may call or speak to project staff to have your questions answered. Participation is completely voluntary. You may withdraw from the project at any time without penalty.

If you have any concerns about your rights, how you are being treated or if you have questions, want more information or have suggestions, please contact Eric Allen in the

Office of Research Compliance at UNCG toll-free at (855)-251-2351. Questions, concerns or complaints about this project or benefits or risks associated with being in this study can be answered by the student researcher, Allison Bray, M.A. who may be contacted at (336) 346-3192 x306 or alcovill@uncg.edu, or by the Principal Investigator, Arthur D. Anastopoulos, Ph.D., who may be contacted at (336) 346-3192 x303, or by

Are there any benefits to society as a result of me taking part in this research?

This project may help us better understand whether ADHD puts college students at risk for depression. This information could be used to help us better prevent or treat depression in college students with ADHD.

Are there any benefits to *me* for taking part in this research study?

There are no direct benefits to participants in this study.

Will I get paid for being in the study? Will it cost me anything?

If you learned about this project through your involvement with the ADHD Clinic or via posted flyer, you will receive a \$10 gift card after completing questionnaires. If you signed up for the study through an introductory psychology class, you will receive research credit or extra credit towards the class after completing study measures. If you completed interviews in order to determine whether you have ADHD, you will receive an additional \$10 gift card.

How will you keep my information confidential?

All information obtained in this study is strictly confidential unless disclosure is required by law. Specifically, if your answers tell us that you may be at risk for harming yourself or someone else, we will need to speak to you or talk to others in order to keep you safe. Names will not be on any of the questionnaires. The only people who will see information about you are the researchers involved in this project. Your name will not be used in any reports from this study. The forms that you complete will be stored in locked filing cabinets. Passwords will protect information that has been entered on a computer. All information will be destroyed three years after this study ends.

If you are a participant in another research study at the ADHD Clinic, such as “Anxiety in College Students with ADHD,” the information that you provide for this study may be shared with that research team so that you do not have to complete the same questionnaires more than one time.

If you complete part of this study online through Mass Screening, absolute confidentiality of data provided through the Internet cannot be guaranteed due to the limited protections of Internet access. Please be sure to close your browser when finished so no one will be able to see what you have been doing.

What if I want to leave the study?

You have the right to refuse to participate or to withdraw at any time, without penalty. If you do withdraw, it will not affect you in any way. If you choose to withdraw, you may request that any of your data which has been collected be destroyed

unless it is in a de-identifiable state.

What about new information/changes in the study?

If significant new information relating to the study becomes available which may relate to your willingness to continue to participate, this information will be provided to you.

Voluntary Consent by Participant:

By signing this consent form you are agreeing that you read, or it has been read to you, and you fully understand the contents of this document and are openly willing consent to take part in this study. All of your questions concerning this study have been answered. By signing this form, you are agreeing that you are 18 years of age or older and are agreeing to participate, or have the individual specified above as a participant participate, in this study described to you by _____.

Signature: _____ Date: _____

APPENDIX H

AUTHORIZATION TO DISCLOSE PROTECTED HEALTH INFORMATION

Ms. Allison C. Bray and Dr. Arthur D. Anastopoulos from the University of North Carolina at Greensboro are conducting a research study depression in college students diagnosed with ADHD. They have requested permission to contact college students who have recently received an evaluation at the ADHD Clinic at UNC Greensboro to see if they are willing to participate in this study.

By signing below, you are authorizing The ADHD Clinic at UNCG to release your name, date of birth, date of evaluation, phone number, and mailing address to Ms. Bray and Dr. Anastopoulos for contact about participating in their research study. In addition, the release of certain assessments that you completed as part of the evaluation process, including the ADHD-RS, ADHD semi-structured interview, ATQ-R, BDI, BAI, CAARS, and SCID may mean that these items would not need to be filled out again as part of this research study. This authorization will expire in 1 year, unless you revoke it in writing before that date. If you wish to revoke the authorization, contact Mr. Eric Allen, IRB Chair, the University of North Carolina at Greensboro, at (336) 256- 1482. A revocation will not apply to any personal health information that was released under this authorization before the date of revocation.

If you choose NOT to authorize release of this information, it will not affect your health care at the ADHD Clinic at UNCG. The ADHD Clinic at UNCG will not receive money or other benefit from releasing this information on you. You have a right to inspect or copy the information to be disclosed. You have a right to a copy of this authorization.

If you allow release of this information to Ms. Bray and Dr. Anastopoulos, the information will no longer be subject to the Health Information Portability and Accountability Act (HIPAA). Ms. Bray and Dr. Anastopoulos may disclose it without contacting you again for further authorization.

I authorize The ADHD Clinic at UNCG to release the following information to Ms. Allison Bray and Dr. Arthur Anastopoulos: name, date of birth, date of evaluation, phone number, mailing address, ADHD-RS, ADHD semi-structured interview, ATQ-R, BDI, BAI, CAARS, and SCID.

_____ Signed _____ Date