

1-1-2013

# Self-regulated learning strategies in college students with ADHD tendencies

Christopher Shelton

*Eastern Illinois University*

This research is a product of the graduate program in [Psychology](#) at Eastern Illinois University. [Find out more](#) about the program.

---

## Recommended Citation

Shelton, Christopher, "Self-regulated learning strategies in college students with ADHD tendencies" (2013). *Masters Theses*. 1144.  
<http://thekeep.eiu.edu/theses/1144>

This Thesis is brought to you for free and open access by the Student Theses & Publications at The Keep. It has been accepted for inclusion in Masters Theses by an authorized administrator of The Keep. For more information, please contact [tabruns@eiu.edu](mailto:tabruns@eiu.edu).

**\*\*\*\*\*US Copyright Notice\*\*\*\*\***

**No further reproduction or distribution of this copy is permitted by electronic transmission or any other means.**

**The user should review the copyright notice on the following scanned image(s) contained in the original work from which this electronic copy was made.**

**Section 108: United States Copyright Law**

**The copyright law of the United States [Title 17, United States Code] governs the making of photocopies or other reproductions of copyrighted materials.**

**Under certain conditions specified in the law, libraries and archives are authorized to furnish a photocopy or other reproduction. One of these specified conditions is that the reproduction is not to be used for any purpose other than private study, scholarship, or research. If a user makes a request for, or later uses, a photocopy or reproduction for purposes in excess of "fair use," that use may be liable for copyright infringement.**

**This institution reserves the right to refuse to accept a copying order if, in its judgment, fulfillment of the order would involve violation of copyright law. No further reproduction and distribution of this copy is permitted by transmission or any other means.**

**THESIS MAINTENANCE AND REPRODUCTION CERTIFICATE**

TO: Graduate Degree Candidates (who have written formal theses)

SUBJECT: Permission to Reproduce Theses

An important part of Booth Library at Eastern Illinois University's ongoing mission is to preserve and provide access to works of scholarship. In order to further this goal, Booth Library makes all theses produced at Eastern Illinois University available for personal study, research, and other not-for-profit educational purposes. Under 17 U.S.C. § 108, the library may reproduce and distribute a copy without infringing on copyright; however, professional courtesy dictates that permission be requested from the author before doing so.

By signing this form:

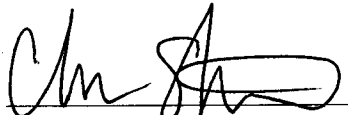
- You confirm your authorship of the thesis.
- You retain the copyright and intellectual property rights associated with the original research, creative activity, and intellectual or artistic content of the thesis.
- You certify your compliance with federal copyright law (Title 17 of the U.S. Code) and your right to authorize reproduction and distribution of all copyrighted material included in your thesis.
- You grant Booth Library the non-exclusive, perpetual right to make copies of your thesis, freely and publicly available without restriction, by means of any current or successive technology, including but not limited to photocopying, microfilm, digitization, or Internet.
- You acknowledge that by depositing your thesis with Booth Library, your work is available for viewing by the public and may be borrowed through the library's circulation and interlibrary department or accessed electronically.
- You waive the confidentiality provisions of the Family Educational Rights and Privacy Act (FERPA) (20 U.S.C. § 1232g; 34 CFR Part 99) with respect to the contents of the thesis, including your name and status as a student at Eastern Illinois University.

**Petition to Delay:**

I respectfully petition that Booth Library delay maintenance and reproduction of my thesis until the date specified and for the reasons below. I understand that my degree will not be conferred until the thesis is available for maintenance and reproduction.

Date:

Reasons:



Author's Signature

7/24/13

Date

**This form must be submitted in duplicate.**

**Self-Regulated Learning Strategies in College Students with ADHD Tendencies**

BY

Christopher Shelton

**THESIS**

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS  
FOR THE DEGREE OF

**Master of Arts in Clinical Psychology**

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY  
CHARLESTON, ILLINOIS

2013  
YEAR

I HEREBY RECOMMEND THIS THESIS BE ACCEPTED AS FULFILLING  
THIS PART OF THE GRADUATE DEGREE CITED ABOVE

Walter Ali 7/17/13  
THESIS COMMITTEE CHAIR DATE

[Signature] 7/17/13  
DEPARTMENT/SCHOOL CHAIR DATE  
OR CHAIR'S DESIGNEE

[Signature] 7-17-13  
THESIS COMMITTEE MEMBER DATE

\_\_\_\_\_  
THESIS COMMITTEE MEMBER DATE

[Signature] 7/17/13  
THESIS COMMITTEE MEMBER DATE

\_\_\_\_\_  
THESIS COMMITTEE MEMBER DATE

Running head: ADHD TENDENCIES & SRL STRATEGIES IN COLLEGE

Self-Regulated Learning Strategies in College Students with ADHD Tendencies

Christopher Shelton

Eastern Illinois University

Copyright 2013 by Christopher R. Shelton

### Abstract

College students with Attention Deficit Hyperactivity Disorder (ADHD) are often faced with many challenges throughout their academic careers. While research examining the effects of ADHD on college students is on the rise, much is still unknown. It is thought that significant problems exist even in students with ADHD symptoms below the clinical threshold. Therefore, the present study examined the relationship between self-regulated learning (SRL) strategies and college students with ADHD tendencies. In addition, the study examined the relationship between SRL strategies and GPA, ADHD tendencies and GPA, and ADHD tendency subtypes and SRL strategy use. Participants included of 310 college students (73.2% women and 26.8% men) from Eastern Illinois University who completed the current and child form of the Barkley Adult ADHD Rating Scale-IV (BAARS-IV), and the Motivated Strategies for Learning Questionnaire (MSLQ). Results indicated several significant differences in reported use of SRL strategies between students with and without ADHD tendencies. Across the different analyses, students with ADHD tendencies consistently displayed deficits in their use of Self-Efficacy for Learning and Performance, Extrinsic Goal Orientation, Time and Study Environment, and Effort Regulation strategies. The clinical implications, limitations, and suggestions for future research are discussed.

### Acknowledgements

I would like to express my utmost appreciation to my thesis committee (Dr. Addison, chair; Dr. Gruber committee member; and Dr. HaileMariam committee member) for their dedication to this endeavor. Throughout this process you all have been very giving of your time and knowledge and without your guidance none of this would have been possible. I would also like to sincerely thank my wife, Lauren, for standing by me throughout this long process. You have always been and continue to be, my rock. Finally, I would like to thank my parents – Patricia and Russell – for never letting me forget that anything is possible as long as I strive for it.



## Table of Contents

Abstract .....	2
Acknowledgements.....	3
Table of Contents .....	4
Introduction.....	7
Diagnostic Criteria.....	8
Issues related to diagnosis.....	8
Rationale for using ADHD tendencies .....	10
Nature of ADHD .....	10
Possible causes.....	10
Executive functioning .....	12
ADHD Research .....	13
Children and adolescents .....	13
Behavioral and psychosocial difficulties .....	14
Academic concerns .....	14
Subtype differences.....	15
College students .....	16
Behavioral and psychosocial difficulties .....	18
Academic concerns .....	19
Subtype differences.....	20
Self-Regulated Learning .....	21
SRL models.....	22
Findings from SRL studies .....	25

NonADHD college populations.....	25
ADHD populations .....	27
Summary .....	28
Research Questions.....	29
Method.....	30
Participants.....	30
Measures .....	31
Barkley Adult ADHD Rating Scale-IV .....	31
Motivated Strategies for Learning Questionnaire.....	34
Procedure .....	36
Results.....	37
Internal Consistency of the Various Measures .....	37
Research Question 1 – 6 .....	37
Discussion.....	42
ADHD Tendencies and Motivation Strategies .....	43
ADHD Tendencies and Learning Strategies.....	44
SRL Strategies and GPA.....	45
ADHD Tendencies and GPA .....	46
SRL Strategies and ADHD Subtype Symptoms.....	46
Clinical Implications.....	47
Study Limitations and Suggestions for Future Research.....	48
Conclusion .....	49
References.....	51

Tables.....66

Appendices.....77

    Appendix A: DSM-IV-TR Criteria for ADHD.....77

    Appendix B: BAARS-IV Childhood Form.....79

    Appendix C: BAARS-IV Current Form .....81

    Appendix D: MSLQ.....84

    Appendix E: Demographic Questionnaire .....91

## Self-Regulated Learning Strategies in College Students with ADHD Tendencies

The main purpose of the present study is to examine the relationship between self-regulated learning strategies (SRL) and college students with Attention Deficit Hyperactivity Disorder (ADHD) tendencies. According to the American Psychiatric Association (2000), ADHD is a developmental disorder that is characterized by inappropriate levels of attention, hyperactivity, and impulse control that lead to impairment in social, academic, and occupational settings.

ADHD is one of the most common disorders diagnosed in childhood (Akinbami, Liu, Pastor, & Reuben, 2011); it affects 9% of children and adolescents aged 5 – 17 in the United States (Wolraich et al., 2011). Weyandt and Dupaul (2012) found the rates of ADHD in college students to be between 2 and 8%. Simon, Czobor, Balint, Meszaros, and Bitter (2009) conducted a meta-analysis on adults with ADHD and found a world-wide prevalence rate of 2.5%. However, these authors note many factors, including diagnostic limitations, which may have resulted in an underestimation of the true prevalence rates in adults.

The influence of sex on childhood and adolescent ADHD is less known and needs to be examined further. According to Willoughby (2003), because ADHD has long been considered a disorder predominantly affecting males, it was not until the mid 1990s that research seriously began to look at ADHD in females. In terms of ADHD diagnoses by gender, men outnumber women (Wolraich et al., 2005). The gender ratio of adolescent ADHD is approximately 2:1 to 3:1 (Willoughby, 2003).

Outcomes for people with ADHD diagnosis appear to be less positive for some individuals. Overall, college students with ADHD tend to have academic problems, lower

high school GPA, lower college GPA, and lower ACT scores (Advokat, Lane, & Luo, 2011; DuPaul, Weyandt, O'Dell, & Varejao, 2009; Heiligenstein, Guenther, Levy, Savino, & Fulwiler, 1999; Rabiner, Anastopoulos, Costello, Hoyle, & Swartzwelder, 2008; Weyandt & DuPaul, 2006). They have a greater need for academic support, such as remedial classes (Wolf, 2001), they are more likely to be on academic probation (Heiligenstein et al., 1999; Weyandt & DuPaul, 2006), and have problems with study habits and study skills (Norwalk, Norvilitis, & MacLean, 2009). Given the academic difficulties college students with ADHD face and the limited research on the subject, it is important that more research is conducted to better understand the relationship between ADHD and self-regulated learning strategies.

### **ADHD Diagnostic Criteria**

According to the DSM-IV-TR (2000), ADHD is a neurobehavioral disorder generally characterized by a lack of attention, a general inability to focus on and complete tasks, failure to listen and adhere to instructions, an inability to sit still for even moderate periods of time, and an inability to control impulses. ADHD is comprised of three main subtypes: predominantly inattentive type (ADHD-I), predominantly hyperactive-impulsive type (ADHD-H), and combined type (ADHD-C).

As can be seen in Appendix A, in order to be currently diagnosed with ADHD, one must show multiple symptoms that cause clinically significant impairment, the symptoms must be present in multiple settings, and the onset of symptoms must have occurred prior to the age of 7. However, research suggests that there may be significant problems to overcome in terms of diagnosis. Many studies have posited that the current criteria may be inadequate in diagnosing ADHD, especially in adults (Faraone,

Biederman, Doyle, et al., 2006; Faraone, Biederman, Spencer, et al., 2006; McGough & Barkley, 2004).

For example, according to several studies, ADHD symptomatology is easily faked (Harrison, Edwards, & Parker, 2007; Lee Booksh, Pella, Singh, & Drew Gouvier, 2010). According to Harrison et al. (2007), college students may feign ADHD symptoms in order to gain access to additional academic accommodations, as well as stimulant medications.

Additionally, Heiligenstein and Keeling (1995) suggested that ADHD is difficult to diagnose and may often be overlooked in childhood. Specifically, they found that in college students who met the criteria for childhood ADHD but were never diagnosed, a common theme was that the children's symptoms were seen as being tolerable by parents and teachers. The researchers posit that without the aid of medication or behavioral therapies, the children may have developed coping mechanisms that served to mask some of the symptoms of ADHD.

More serious issues regarding ADHD diagnosis include changes in symptomatology overtime, and the possible need for additional criteria. According to Thome and Reddy (2009), ADHD symptoms can change as an individual ages, which suggests that subtype changes may also occur throughout an individual's lifetime. For instance, Wolraich et al. (2005) suggest that hyperactive symptoms become less prevalent as one enters adolescence.

Finally, and perhaps most importantly, issues have been raised regarding the foundation of the diagnostic structure of ADHD in the DSM-IV-TR. According to Bell (2011), the current categorical model of ADHD diagnosis is being questioned by

researchers. Bell also suggested that a dimensional model may be better suited for diagnosing ADHD. To illustrate this point, a review by Loe and Feldman (2007) included several studies showing that there were adverse effects on academic achievement among school children with ADHD, as well as those with ADHD symptoms that fell below the diagnostic threshold. These findings lend credence to the idea that the current threshold may be too stringent.

If the current diagnostic criteria are inadequate and are leading to missed opportunities to diagnose people who need help, then more needs to be done. Therefore, this study will examine ADHD and its influence on self-regulated learning strategies at both diagnostic levels, as well as subthreshold levels.

### **Nature of ADHD**

ADHD has been diagnosed for almost a hundred years, but the names of the disorder have differed over time. At one time the disorder was labeled *minimal brain syndrome*, and at other times it was referred to as *hyperkinetic impulse disorder*. More recently the disorder was separated into two classifications by the DSM-III, and labeled either as attention deficit disorder or as attention deficit hyperactivity disorder (Barkley, 2013).

The fact that this disorder is so common has led to a substantial amount of research in hopes of determining a cause of this disorder. Although research on the etiology of ADHD has been ongoing for decades, there still is no definitive cause for the disorder (Weyandt, Swentosky, & Gudmundsdottir, 2013). However, there are strong indications that genetics and neurological factors play a significant role. Environmental

factors may also play a role, although to a much lesser extent than neurological or genetic factors (Barkley, 2013; Willcutt, 2005).

Genetic studies on ADHD are conducted in several ways, including family studies, adoption studies, twin studies and individual differences studies. Barkley (2013) and Willcutt (2005) found results across a number of studies that consistently suggest significant links between ADHD and heredity.

Neurological studies have used a variety of techniques, including diffusion tensor imaging (DTI), magnetic resonance imaging (MRI), functional magnetic resonance imaging (fMRI), and positron emission tomography (PET) to examine brain function in individuals with ADHD (Konrad, Neufang, Hanisch, Fink, & Herpertz-Dahlmann, 2006; Weyandt et al., 2013). According to Barkley (2013), individuals with ADHD show significant differences in multiple regions of the brain. These differences include size and symmetry of specific regions of the brain, as well as differing levels of blood flow and neural activity. The various differences in brain regions can affect everything from an individual's visual and sensorimotor systems to their levels of cognitive functioning (Casey, Durston, & Fossella, 2001; Cortese et al., 2012; Hart, Radua, Nakao, Mataix-Cols, & Rubia, 2013).

There have also been studies conducted to examine the influence of environmental factors on ADHD. Willcutt (2005) identified several environmental influences on ADHD development in prenatal and perinatal children. These factors include: low birth weight, fetal distress, family problems during pregnancy, and alcohol and/or tobacco consumption during pregnancy. All of these factors had small but significant correlations with ADHD development in children.



Similar to how the full etiology of ADHD is still debated, there are also many questions relating to what core deficits are the best predictors for studying and diagnosing ADHD (Miller, Loya, & Hinshaw, 2013; Pennington & Ozonoff, 1996; Schachar, Tannock, Marriott, & Logan, 1995; Willcutt, Doyle, Nigg, Faraone, & Pennington, 2005).

***Executive Functioning.*** Although the DSM-IV-TR bases diagnosis of ADHD on symptoms relating to inattention, impulsivity, and hyperactivity, an increasing amount of research suggests that other criteria may play a role in ADHD (Nigg, 2001; Quay, 1997). In fact, research suggests that the domain of executive functioning may, in part, be a better predictor of ADHD (Barkley, 2013; Barkley, Murphy, & Fischer, 2008). For example, Barkley et al. (2008) found that symptom criteria based on poor executive functioning rather than hyperactivity was a better predictor of ADHD.

However, the operating definition for the domain of executive functions is less than clear (Barkley, 2012; Best & Miller, 2010). According to a theoretical model developed by Barkley (1997), executive functioning can be broken down into four overall areas: working memory (nonverbal), internalization of speech (verbal working memory), self-regulation of effect/motivation/arousal, and reconstitution. These areas affect many different processes, such as inhibition, working memory, planning, self-monitoring, verbal regulation, motor control, maintaining and changing mental set and emotional regulation. Further, research suggests these four areas directly affect one's response inhibition, which is thought to be a core deficit in ADHD (Barkley, 1997, 2013)

## **ADHD Research**

The literature on ADHD is extensive. Over the last several decades, thousands of studies have been devoted to examining ADHD (Willoughby, 2003). However, this literature has largely focused on children. The focus on ADHD in children was due in large part to the commonly held notion that children grow out of ADHD as they begin puberty and enter adolescence (Eisenberg, 1966). It was not until the 1980s that researchers began to recognize that ADHD may be a burden that many individuals carry with them throughout their lives. Thus, most research on adolescents and adults with ADHD did not begin until this point (Harpin, 2005; Young, 2000). The literature on college populations specifically is in its infancy, with most research only having been done in the last decade (DuPaul et al., 2009).

However, research findings demonstrate that it is important to have a full understanding of the developmental pathology of ADHD. Barkley (2013) found evidence supporting the neurological basis of ADHD as a lifelong event. Research by Thome and Reddy (2009), found that the lifetime course of ADHD is not linear. Further, the DSM-IV-TR requires retroactive symptom onset for diagnosis (Appendix A). Given that much less is known about ADHD in college populations than in child and adolescent populations (Weyandt & Dupaul, 2008), a brief review of the child and adolescent ADHD research follows.

**Children and adolescents.** Because the literature on childhood ADHD has been ongoing for so long, there is a great deal known about the effects of ADHD on children. According to Harpin (2005), children with ADHD often have behavioral, psychosocial, and academic difficulties growing up.

***Behavioral and psychosocial difficulties.*** Children and adolescents with ADHD are prone to comorbid disorders, such as oppositional defiance disorder and conduct disorder (Willoughby, 2003). The rate of involvement with criminal activity increases, as does the likelihood of arrest (Young, 2000). Substance use and abuse are also an issue for children and adolescents with ADHD (Brand, Dunn, & Greb, 2002). A meta-analysis conducted by Lee, Humphreys, Flory, Liu, and Glass (2011) revealed that children with ADHD have an increased risk of using substances, such as nicotine, marijuana, and cocaine, but not alcohol. Additionally, when compared to controls, children with ADHD had significantly higher rates of substance abuse and dependence across all substances, including alcohol.

Wolraich et al. (2005) suggested that as children age, social interactions become both more complex and more meaningful. This complexity only increases with age, as relationship dynamics continue to grow and take on new meaning. Any deficits a child may have in this area become more noticeable, further complicating an already difficult transition. Deficits can include difficulties adjusting to social and emotional problems (Brand et al., 2002), and maintaining appropriate social behaviors, which can often lead to relationship problems with family, friends, and peers (Loe & Feldman, 2007; Willoughby, 2003).

***Academic concerns.*** Research on academic difficulties in children and adolescents with ADHD is extensive. Frazier, Youngstrom, Glutting, and Watkins (2007) found that ADHD in childhood and adolescence can significantly impact one's academic achievement in many areas. Furthermore, these academic difficulties are persistent across time and tend to become more of an issue as the student ages (Wolraich et al., 2005).

There is a plethora of academic difficulties seen in children and adolescents with ADHD; including deficits in academic abilities, performance, attainment, and behavior. Deficits related to academic abilities include problems with acquisition and application of new material and increased difficulties with math and reading (Loe & Feldman, 2007). Deficits in academic performance include low test scores and grades, poor performance in the classroom, and noncompletion of homework and grades (Brand et al., 2002; Loe & Feldman, 2007; Willoughby, 2003). Attainment is also affected in that the student is more apt to drop out of school, take longer to graduate from high school, and is less likely to attend or graduate from college (Brand et al., 2002; Loe & Feldman, 2007; Willoughby, 2003). Academic behavior is also significantly affected in children and adolescents with ADHD, due to a significant increase in the rate of delinquency, suspensions and expulsion in this cohort (Brand et al., 2002; Loe & Feldman, 2007).

*Subtype differences.* While there have been some conflicting results regarding ADHD subtype differences (Lahey, Pelham, Loney, Lee, & Willcutt, 2005), the majority of research available seems to confirm that there are indeed distinct differences (Loe & Feldman, 2007). Todd et al. (2002) found significant rates of academic testing deficits, as well as use of special education programs in children with ADHD-I and ADHD-C when compared to children with ADHD-H and children with no ADHD. However, Loe and Feldman (2007) and Marshall, Hynd, Handwerk, and Hall (1997) found that children with ADHD-I were more prone to have overall learning disabilities than were children with either ADHD-H or ADHD-C. Specifically, individuals with ADHD-I had greater deficits in mathematical domains than individuals with either ADHD-H or ADHD-C (Marshall et al., 1997). ADHD-I individuals were also more likely to fail school or be

rated below average than individuals with ADHD-I or ADHD-C (Loe & Feldman, 2007). Further, when compared to individuals with ADHD-C, those with ADHD-I had fewer behavioral problems at school; however, they exhibited greater levels of social and psychological impairment than individuals with ADHD-C. Moreover, when compared to individuals without ADHD, those with ADHD-I or ADHD-C had lower levels of academic attainment (Wolraich et al., 2005).

**ADHD in college students.** Less is known about ADHD in college students than ADHD in children, adolescents, and adults (Norwalk et al., 2009). It was not until the past 10 – 20 years that researchers began to investigate ADHD in college students (Weyandt & DuPaul, 2006). Thus, the body of research on ADHD in college students is relatively limited (Frazier et al., 2007; Weyandt & Dupaul, 2008; Wolf, Simkowitz, & Carlson, 2009).

Weyandt and DuPaul's (2006) review of the relationships between ADHD in college students and domains of functioning was the first of its kind. In that review, the authors were only able to identify 23 studies that fit the criteria for inclusion. In a follow-up review, DuPaul et al. (2009) found a dramatic increase in the literature, citing a total of 89 studies. Moreover, the pace of research may increase even faster now with the advent of adult-oriented ADHD scales developed recently, such as the Barkley Adult ADHD Rating Scale-IV (BAARS-IV) (Barkley, 2011). Overall however, these figures point to the scarcity of literature on ADHD in college students.

Presently, research suggests that college ADHD outcomes might be different than childhood and adolescent ADHD outcomes (Frazier et al., 2007). Weyandt and Dupaul (2008) and Wolf et al. (2009) suggest that this difference is because college ADHD

students may be a fundamentally distinct subset of the ADHD population. College students with ADHD likely have been able to develop better adaptive coping mechanisms for the disorder. It is also likely that a college student with ADHD has had greater academic success leading up to college, than did students with ADHD who did not go on to college. Therefore, the problems found in college students with ADHD may be different than problems found in the general ADHD population of the same age (Frazier et al., 2007; Rabiner et al., 2008).

While college students with ADHD may represent a unique subset in the general ADHD population, they are still likely to experience significant difficulties. College is different from grade school and high school; it requires more intellectually, while at the same time offering a less structured environment, which may provide more distractions (Norwalk et al., 2009). Wolf (2001) suggested that students with ADHD may be unprepared for the additional requirements placed on them in college.

Perhaps best highlighting the importance of research on ADHD in college students are several studies that have shown increases in the number of individuals with ADHD who are attending college (Blase et al., 2009; DuPaul et al., 2009; Wolf, 2001). Adding to this research are studies suggesting that a significant number of college students may be undiagnosed (Wolf et al., 2009). Garnier-Dykstra, Pinchevsky, Caldeira, Vincent, and Arria (2011) conducted a large-scale study of 1,080 college students to add to the literature on ADHD prevalence rates in college populations. They analyzed the distribution of ADHD symptoms among college students with confirmed ADHD diagnoses and college students who had never been diagnosed with ADHD. Among students with no ADHD diagnosis, 10.3% had symptom levels high enough to meet the

current DSM-IV-TR threshold for diagnosis. Across the entire sample, 12.3% had symptom levels in the clinical range.

Also highlighting the need for research are findings that suggest that even if ADHD symptoms decline over time, many people who had ADHD will still struggle with deficits. Biederman, Mick, and Faraone (2000) found that among individuals who no longer meet the criteria for ADHD, 90% continue to suffer with ADHD symptoms, even if they are not severe enough to meet the current diagnostic threshold.

***Behavioral and psychosocial difficulties.*** Literature on the emotional and psychological functioning of college students with ADHD is scarce (Blase et al., 2009; DuPaul et al., 2009; Weyandt & Dupaul, 2008). In terms of emotional functioning, Dooling-Litfin and Rosen (1997) found that ADHD in college students was related to lower self-esteem. Shaw-Zirt, Popali-Lehane, Chaplin, and Bergman (2005) found college students with ADHD had significantly lower levels of college adjustment, social skills, and self-esteem than students without ADHD. However, self-esteem accounted for part of the relationship between ADHD and college adjustment. This partial mediation demonstrates the importance of self-esteem in students with ADHD. Shaw et al. suggest that interventions to increase self-esteem may be useful to help students with ADHD achieve success in college. Finally, evidence suggests that college students with ADHD experience increases in levels of overall distress, internal restlessness, and aggression compared to controls (Blase et al., 2009; Weyandt & DuPaul, 2006). Conversely, Heiligenstein et al. (1999) did not find differences in levels of psychological functioning between college students with ADHD and controls. It should be noted, however, that

Heiligenstein et al. (1999) excluded students with ADHD and another comorbid disorder, which may have affected the results.

Findings from research on the relationship between substance use and ADHD in college students are also inconsistent (Weyandt & Dupaul, 2008; Wolf et al., 2009). In their cross-sectional study, Blase et al. (2009) found increases in alcohol, marijuana, and cigarette use in both past and current ADHD-diagnosed college students. In the longitudinal study described in the same paper, Blase et al., found that ADHD in college was a risk factor for increased alcohol and cigarette use, but did not predict marijuana initiation or cocaine use. However, Heiligenstein et al. (1999) and Rabiner et al. (2008) found no increases in alcohol or drug use in college students with ADHD.

*Academic concerns.* In a meta-analysis, Frazier et al. (2007) found just four studies that focused on the relationship between academic achievement and actual ADHD diagnosis in college samples. However, the results of the studies conducted thus far are generally consistent. Overall, findings suggest that ADHD symptoms in college populations are related to deficits in academic functioning (Frazier et al., 2007; Norwalk et al., 2009). These findings are similar to findings from the child and adolescent ADHD literature.

In both their cross-sectional and longitudinal studies, Blase et al. (2009) found significant increases in academic concerns over grades and performance in students with ADHD compared to their peers without ADHD. Of particular interest in the cross-sectional study was the finding that only students with current, but not prior ADHD diagnoses, showed decreased GPA levels. However, other researchers found no



detriments in the GPAs of college students with ADHD (Norwalk et al., 2009; Sparks, Javorsky, & Philips, 2004).

Further, individuals with ADHD tend to exhibit problems with college attendance, retention, and graduation. Loe and Feldman (2007) found individuals with ADHD were less likely to attend college. Individuals with ADHD who do attend college are more likely to enroll in two-year programs rather than four-year or post-doctoral programs (Wolf, 2001), more likely to drop out of college classes (Advokat et al., 2011), and less likely to graduate from college (DuPaul et al., 2009; Murphy, Barkley, & Bush, 2002; Weyandt & DuPaul, 2006).

While it is clear that college students with ADHD suffer from significant academic deficits, the reasons for these deficits are less clear (Weyandt & DuPaul, 2006). Studies suggest that college students with ADHD have cognitive impairments, such as inattention, internal restlessness, intrusive thoughts, and forgetfulness (DuPaul et al., 2009; Resnick, 2005; Weyandt & DuPaul, 2006; Weyandt et al., 2003). Students with ADHD also suffer from deficits in executive functioning, the ability to focus on rules, and academic coping strategies, such as organizational skills, study skills, and time management skills (DuPaul et al., 2009; Resnick, 2005; Weyandt & DuPaul, 2006, 2008). Overall, it is clear that more research is needed to identify the specific deficits that affect academic achievement in college students with ADHD.

***ADHD subtypes.*** Although there is ambiguity regarding how to conceptualize ADHD and subtypes (Glutting, Youngstrom, & Watkins, 2005; Willcutt et al., 2012), researchers have still found several differences between ADHD subtypes in college students. First, as individuals age, hyperactive and impulsive symptoms tend to decline

(Biederman et al., 2000; Heiligenstein, Conyers, Berns, & Miller, 1998), whereas inattentive symptoms seem to remain stable across time (Biederman et al., 2000). Furthermore, Wolf et al. (2009) found that ADHD-H in college students is more related to behavioral and social problems, while ADHD-I in college students is more related to academic problems. Students with ADHD-I have also been found to be more susceptible to problems with executive functioning (Wasserstein, 2005).

Subtype differences also exist with relation to academic achievement and motivation strategies in college students with ADHD. Although some conflicting results have been found, most of the literature points to the fact that ADHD-I and not ADHD-H in college students is significantly related to increased academic difficulties, such as lower GPA and SAT scores, increased academic concerns, and decreased study skills (Frazier et al., 2007; Norwalk et al., 2009; Rabiner et al., 2008; Wolf et al., 2009). Further, Carlson, Booth, Misung, and Canu (2002) found subtype differences in motivational styles of college students. Students with ADHD-C had more competitive motivational strategies while students in the ADHD-I subtype preferred more cooperative strategies. In addition, regardless of subtype, college students with ADHD suffered from motivational deficits; students with ADHD had less determination, and they often preferred work that was effortless.

### **Self-Regulated Learning**

The term self-regulated learning (SRL) is part of the overarching framework of self-regulation that is used in many different domains (Wolters, 2010). SRL broadly defines the ways in which students plan, adapt, and regulate their thinking and behavior to help achieve their academic goals. Most studies suggest that SRL occurs through the

use of cognitive and metacognitive strategies, and resource management. In addition, many theorists now believe that motivation plays an integral part in SRL and academic achievement (Lichtinger & Kaplan, 2011; Pintrich, 1999, 2000; Puustinen & Pulkkinen, 2001; Vanderstoep, Pintrich, & Fagerlin, 1996; Zimmerman, 1990).

Although SRL has been studied extensively, the literature on SRL in college students with ADHD is scarce. It is clear that SRL can impact academic achievement (Pintrich, 1999; Rachal, Daigle, & Rachal, 2007; Vanderstoep et al., 1996); yet studies have shown that regardless of deficits, anyone can improve his or her SRL performance through training and practice (Schunk, 2005; Wolters, 2010; Zusho & Edwards, 2011).

All students face difficulties when entering college that may affect their academic achievement. College students typically have workloads with increases in both difficulty and scale in relation to prior experiences in middle school and high school (Wolf, 2001; Wolf et al., 2009). Entering college for most students also means a loss of close support and supervision that were previously provided by teachers and parents, because college is much less structured (Wolf, 2001; Wolf et al., 2009). To manage these changes effectively, college students need to be able to plan, organize, manage, and follow through with required tasks. However, these are areas in which college students with ADHD typically have deficits (Weyandt & Dupaul, 2008).

**SRL models.** Researchers have developed models to help conceptualize SRL (Boekaerts, Niemivirta, Monique, Paul, & Moshe, 2000; Borkowski, 1996; Pintrich, 2000; Winne & Hadwin, 1998; Zimmerman, 2000). According to Puustinen and Pulkkinen (2001), all of the models have common elements, including phase development, preparatory phase, performance phase, and appraisal phase. Furthermore,

all of the theories posit that the phases of SRL have a cyclical pattern. By advancing to the appraisal phase, students determine what gains have been made, as well as what deficits still remain. These deficits are then used as the basis for phase development, thereby beginning the cycle again.

The Pintrich (2000) and the Zimmerman (2000) models are similar. Puustinen and Pulkkinen (2001) suggested that the two theories were built on the same theoretical background of social cognitive theory, with similar definitions and components. The framework for SRL suggested by Pintrich (2000) is comprised of four phases of self-regulation: forethought, planning, and activation; monitoring; control; and reaction and reflection. In addition, there are four areas for self-regulation that are included in each phase: cognition, motivation, behavior, and context.

Forethought, planning, and activation refer to the assessment of prior knowledge of the topic being studied, planning the use of different strategies, and setting academic goals. Monitoring involves students' keeping track of their progress to make sure they are conforming to the academic goals that they set. During this phase, students often self-test to make sure they understand the material (Pintrich, 1999). Control refers to strategies that involve correcting any behaviors that are impeding progress. Strategies to regulate the students' attention and behavior include redirecting and putting focus back on a goal when it has wandered (Pintrich, 1999). Reaction and reflection comprise the evaluation phase. Reaction occurs when students assess their efficacy at planning, adapting, and regulating their thinking and behavior to help achieve their academic goals. Reflection helps students to determine areas of strengths and weaknesses to keep in mind when using this strategy again for other academic goals.

The area of cognition for self-regulation includes setting goals, assessing prior knowledge, and activating metacognitive knowledge. To master the area of cognition, there are three different types of cognitive strategies used: rehearsal, elaboration, and organization. These strategies are thought to help the student actively engage in the material. Research shows that these strategies are significantly related to academic achievement (Pintrich, 1999). Rehearsal strategies involve the repeated presentation of items to be learned, through flashcards or other means, so that the student learns through repetition. Elaboration strategies involve processing the new information learned and expanding upon it by paraphrasing or creating analogies. Organizational strategies involve identifying ideas or themes in the material and organizing the new material into different forms, which can be accomplished through creating outlines, charts, and graphs, among other things.

The activation of metacognitive knowledge includes assessing one's knowledge of the different cognitive strategies available, as well as knowledge regarding oneself. By assessing how and when cognitive strategies are best used, as well as one's own strengths and weaknesses, a student is better able to determine the best way of accomplishing his or her academic goals.

Motivation and affect refer to a student's use of beliefs, goal orientation, and perception to help accomplish set goals. There are two forms of belief: self-efficacy and task value. Self-efficacy refers to an individual's belief in his or her own abilities to accomplish a task. Task value beliefs take into account the value, interest, and importance an individual places on a particular goal. Goal orientations involve a student's reasoning for completing a given goal. Reasons may include setting goals to gain mastery and

learning of the task, getting good grades, and or earning rewards. Perceptions of difficulty and ease of learning refer to a student's evaluation of the material to determine the complexity and engagement required to master the material and accomplish the academic goal.

Finally, behavioral areas of self-regulation include time and effort planning, as well as assessment of different methods available with which to assess progress toward a goal. Contextual areas of self-regulation involve perceptions of the task and the context in which the task will take place (Pintrich, 1999).

**Findings from SRL studies.** Common skills needed by all students to increase the likelihood of successful outcomes in college include the ability to plan and set goals; initiate and sustain attention; organize, monitor and manage time and materials; as well as the ability to follow through (Wolf, 2001). Students who are capable and proficient in these skills often have higher academic achievement (Zusho & Edwards, 2011).

***NonADHD college populations.*** Montalvo and Torres (2004) suggested that overall, college students can be differentiated by their use of SRL. Students using SRL have a greater knowledge of all three cognitive strategies. They also have a greater knowledge of metacognitive strategies, as well as motivational beliefs (Montalvo & Torres, 2004). Vanderstoep et al. (1996) found that among college students using SRL, all three cognitive strategies were correlated with academic achievement. In addition, academic performance was positively correlated with the use of metacognitive strategies (Vanderstoep et al., 1996). It should be noted that Vanderstoep et al. measured SRL strategies using the Motivated Strategies for Learning Questionnaire (MSLQ), which is also used in the current study and is discussed in more detail in the method section.

In terms of motivation and affect, adaptive motivational beliefs, as well as self-efficacy beliefs are positively correlated with academic performance (Pintrich, 1999; Vanderstoep et al., 1996). Pintrich (1999) also found that self-efficacy beliefs are positively correlated with all three cognitive strategies, all metacognitive strategies, and overall SRL.

Moreover, Vanderstoep et al. (1996) found that task value beliefs were positively correlated with academic performance among college students. Pintrich (1999) found positive correlations between task value beliefs and all three cognitive strategies (Pintrich, 1999). Additionally, self-reported use of both interest and value strategies were positively correlated with self-reported use of monitoring strategies (Pintrich, 1999).

In terms of goal orientations, the mastery goal appears to be the best strategy for SRL success in college students. Moderate positive correlations have been found between mastery goals and academic performance. In addition, mastery goals were positively correlated with all cognitive and metacognitive strategies, as well as SRL overall (Pintrich, 1999; Zusho & Edwards, 2011).

In college students, the role of extrinsic goals and SRL is less clear-cut. Extrinsic goals are negatively correlated with rehearsal strategies and self-regulation (Pintrich, 1999), as well as motivation and learning (Zusho & Edwards, 2011). The inverse relationship between extrinsic goals and SRL may be in part because extrinsic goals do not tend to lead to deep processing of the information as mastery goals do (Pintrich, 1999; Zusho & Edwards, 2011). However, Pintrich (1999) also found positive correlations between extrinsic goals and elaboration and organization strategies, as well as with academic performance.

*ADHD college populations.* Reaser, Prevatt, Petscher, and Proctor (2007) sought to determine correlates between college ADHD populations and learning strategies using the Learning and Study Strategies Inventory (LASSI), a self-report scale used to assess learning and study strategies in students. They found that college students with ADHD had lower information processing and self-testing abilities when compared to nonADHD students. Furthermore, the control phase, specifically the ability to follow directions, was a significant predictor of GPA for college students with ADHD (Wallace, Winsler, & NeSmith, 1999). However, the authors also noted that the LASSI may not be the best instrument to use when assessing academic achievement in an ADHD sample (Reaser et al., 2007).

In terms of cognitive strategies, research has shown that college students with ADHD tend to have less effective overall test strategies and are worse at selecting main ideas than college students without ADHD (Reaser et al., 2007). Additionally, those students self-reporting high ADHD symptomatology were significantly less organized than students self-reporting low ADHD symptomatology (Turnock, Rosen, & Kaminski, 1998).

There are also differences in motivation, affect, and behavior among college students with and without ADHD. According to Wallace et al. (1999), among college students with ADHD, confidence and competence significantly predicted GPA. College students with ADHD are also more likely to have lower levels of motivation when compared to college students without ADHD (Reaser et al., 2007). Additionally, Turnock et al. (1998) found significantly lower levels of self-control and self-discipline among students self-reporting high ADHD symptomatology.



Finally, differences in resource management have been found among college students with and without ADHD. College students with ADHD do not manage their time well (Reaser et al., 2007), and thus have difficulty with timed tests (Lewandowski, Lovett, Coddling, & Gordon, 2008). Additionally, high self-reported ADHD symptomatology is associated with increases in procrastination and decreases in note taking and studying (Advokat et al., 2011; Turnock et al., 1998).

### **Summary**

Examining the issue of self-regulated learning strategies in college students with ADHD tendencies is important for a number of reasons. First, several studies have shown that the number of college students with ADHD is increasing (Blase et al., 2009; DuPaul et al., 2009; Wolf, 2001). Research also shows that college students with ADHD suffer across a variety of domains including: academic, psychological, and social functioning (Shaw-Zirt et al., 2005; Weyandt & Dupaul, 2008). These individuals are also prone to have deficits in executive functioning and self-regulation (Wolf et al., 2009). It is not surprising that ADHD can decrease overall quality of life in college students (Grenwald-Mayes, 2001).

Additionally, although SRL has been studied extensively, the literature on SRL in college students with ADHD is scarce. What is known, however, is that anyone, regardless of deficits, can improve their SRL performance (Schunk, 2005; Wolters, 2010; Zusho & Edwards, 2011). It is therefore important to understand how ADHD tendencies in college students are related to SRL. Through better understanding of this relationship, more effective intervention strategies can be developed.

## Research Questions

Many questions remain regarding ADHD in college populations. Most significantly, self-regulated learning strategies among ADHD populations may not be homogeneous; instead there may be significant diversity in the self-regulated learning strategies used by individuals with ADHD tendencies. It is, therefore, the aim of the current study to investigate the ways college students with ADHD tendencies use self-regulated learning strategies. Additionally, the study will investigate whether differences exist in the use of self-regulated learning strategies by students with specific ADHD subtype symptoms.

Biederman et al. (2000) suggested that of the individuals who no longer meet the criteria for ADHD, 90% still suffer from ADHD symptoms, even though they do not meet the threshold for diagnosis designated by the DSM-IV-TR. Therefore, the current study will examine ADHD symptomatology and its relationship to self-regulated learning strategies and academic achievement at both diagnostic levels, as well as subthreshold levels.

Given these unknowns, the current study aims to answer the following research questions:

1. Which motivation and learning strategies are associated with ADHD tendencies? Of those that are associated, which is the strongest predictor?
2. How do college students with ADHD tendencies differ from students with no ADHD tendencies on their use of each motivation and learning strategy?
3. Which motivation and learning strategies are associated with GPA? Of those that are associated, which is the strongest predictor?

4. Are ADHD tendencies associated with GPA?
5. How do students with ADHD tendencies differ from students without ADHD tendencies on GPA?

Moreover, ADHD subtype differences in college populations also requires further examination (Weyandt & DuPaul, 2006). Research suggests that ADHD subtypes do not remain stable across time (Biederman et al., 2000; Heiligenstein et al., 1998), and that academic outcomes differ depending upon ADHD subtype (Wolf et al., 2009). Therefore, the current study will examine whether there are differences in the self-regulated learning strategies used by students with specific ADHD subtype symptoms. The research questions include:

6. How do college students with exclusively inattentive symptoms differ from students with exclusively hyperactive and or impulsive symptoms in their use of each motivation and learning strategy?

## **Method**

### **Participants**

Participants in this study were college students at Eastern Illinois University. Participant recruitment occurred through the Experiment Management System (SONA), but also through word of mouth from professors at the university. Introductory psychology classes, as well as other psychology classes served as the primary source of participant recruitment. In addition, recruitment of participants also took place in several journalism courses. Participation was voluntary and all participants received a small amount of class credit as an incentive for their involvement.

The total sample size of the study was ( $N = 326$ ). The data from 16 participants (4.91%) were excluded from the final sample. The data were excluded primarily due to incomplete responses on the three scales included in the survey. For both of the BAARS-IV scales, no more than one item could be missing to be considered valid. For the MSLQ, no more than one item could be missing from each of the subscales to be considered valid. Other reasons for exclusion from the final sample were random responses ( $N = 2$ ), as determined by patterns drawn with answers, and completion of the survey in under 5 minutes ( $N = 2$ ), when the pretest of the survey determined time to completion was approximately 15 minutes.

The final sample ( $N = 310$ ) was comprised mainly of women ( $N = 227, 73.2\%$ ). The ages of the participants ranged from 18 to 59, with 97.4% between the ages of 18 and 25 ( $M = 20.56, SD = 4.04$ ). Of the participants who reported their ethnicity, 205 (66.1%) were Caucasian, 75 (24.2%) African American, 11 (3.5%) Hispanic or Latino, 7 (2.3%) Asian / Pacific Islander, and 10 (3.2%) other. The participants were also asked about prior ADHD diagnosis. Of those that responded ( $N = 308$ ), 18 (5.8%) indicated that they received a diagnosis of ADHD at some point in their lives. Of those 18 participants, 9 indicated that they were diagnosed as combined type, 8 as predominantly inattentive type, and 1 as predominantly hyperactive impulsive type.

## Measures

**Barkley Adult ADHD Rating Scale-IV (BAARS-IV).** The BAARS-IV (Barkley, 2011) is a scale designed to measure ADHD. The BAARS-IV is available in many formats, including self-report, observer report, and interviews. The scale measures current and childhood ADHD symptoms, as well as other areas of impairment, such as

Sluggish Cognitive Tempo (SCT), which the author believes may be a new subtype of ADHD in adults. According to Silverman (2012), Barkley developed the BAARS-IV as an update to the Current Symptoms Scale. The self-report scales are divided into two similar forms; the first form (Appendix B) measures retrospective symptoms and functioning from childhood, specifically for the ages of 5 – 12, whereas the second form (Appendix C) measures current symptoms and functioning over the previous 6 months.

The childhood form is comprised of 20 items divided into two sections to separately measure symptoms of inattention and hyperactivity-impulsivity. The current symptom form is comprised of 50 items divided into sections to separately measure symptoms of inattention, hyperactivity, impulsivity, and sluggish cognitive tempo. The items are based on the symptom criteria in the DSM-IV-TR (2000) for ADHD (Appendix A), with the exception that the items on the current form were modified slightly to allow for use with adults. According to Silverman (2012), the modifications largely consisted of replacing words, such as “school” and “play” with more general adult terms, such as “fun.”

To complete the forms participants rate how often they have experienced each symptom using a 4-point Likert scale ranging from 1 = “Never or rarely” to 4 = “Very often.” Additionally, they are instructed to provide details about any symptoms they report (e.g., age of onset of symptoms and areas affected, such as home, school, work and social relationships). The BAARS-IV takes 5 – 7 minutes to complete. To score the BAARS-IV forms, first a score is derived for each section (e.g., inattention and sluggish cognitive tempo) by adding the item answers for that section. To obtain an ADHD total score, the score from each section, with the exception of the sluggish cognitive tempo

section, is added together. ADHD symptom counts are determined by summing the total number of times items are endorsed with either a 3 “Often” or 4 “Very Often”, for each section. A score of either 3 or 4 is viewed as a clinically significant indicator of that symptom.

The scale was normed on a sample of ( $N = 1,249$ ) adults aged 18 – 89.

Participants’ ADHD total scores and symptom counts can be compared to the norms to determine ADHD tendency levels. The BAARS-IV categorizes scores into six tendency groups based on total scores (Barkley, 2011). In general, participants scoring below the 76th percentile are considered non-symptomatic. Those scoring between the 76th and 83rd percentile are termed marginal symptomatic; 84th to 92nd borderline or somewhat symptomatic; 93rd to 95th mildly symptomatic; 96th to 98th moderately symptomatic; and the 99th percentile and up are termed markedly or severely symptomatic.

According to Barkley (2011), the BAARS-IV has strong internal consistency ratings ranging from .78 to .95, with all scales except for two above .90. The lowest subscale, at .78 is Current ADHD Hyperactivity, while the highest, at .95 is Childhood ADHD total score. Further the test-retest reliability and interobserver agreement and disparity ratings are strong, with Pearson’s  $r$  values ranging from .66 to .88 and from .67 to .70, respectively. Moreover, both the childhood and current self-report forms have high construct and face validity.

Because this study was largely exploratory in nature, the criterion used to categorize participants into either the ADHD tendencies or no ADHD tendencies group was the broadest possible. As such, participants with a total ADHD score in the 76th percentile or higher were categorized as having ADHD tendencies.

Further, it was necessary to code participants into subtype groups. As can be seen in Appendix A, a code of predominantly inattentive type or predominantly hyperactive-impulsive type requires a person to have at least six or more symptoms from only one of the categories. The code for combined type requires a person to have at least six or more symptoms of both inattention and hyperactivity/impulsivity. However, because the current study was looking at a wide range of subthreshold tendency levels, it was not possible to categorize the participants based on these criteria. Instead, an examination of ADHD subtype differences occurred by forming two groups: participants with exclusively inattentive symptoms and those with exclusively hyperactive impulsive symptoms at the 76th percentile and higher. Because the study was looking at tendency levels rather than clinical threshold levels, it was not feasible to define and examine the combined subtype.

**Motivated Strategies for Learning Questionnaire (MSLQ).** The MSLQ (Pintrich, Smith, García, & McKeachie, 1991) is a self-report scale designed to measure motivation and learning strategies of college students in a specific course (Appendix D). The motivation strategy section consists of 6 scales that assess value (Intrinsic Goal Orientation, Extrinsic Goal Orientation, and Task Value), expectancy (Control of Learning Beliefs and Self-Efficacy for Learning and Performance), and affective (Test Anxiety) components. The learning strategies section includes 9 scales that assess cognitive and metacognitive strategies (Rehearsal, Elaboration, Organization, Critical Thinking, and Metacognitive Self-Regulation), as well as resource management strategies (Time and Study Environment, Effort Regulation, Peer Learning, and Help Seeking). The 15 scales can be administered either separately or together (Pintrich et al., 1991).

The MSLQ is comprised of 81 items total, 31 for the motivation strategy section and 50 for the learning strategies section. Students are asked to rate how each item relates to their experiences in a specific class. All of the items are rated using a 7-point Likert scale ranging from 1 = “Not at all true of me” to 7 = “Very true of me.” For example, items on the MSLQ include: “I believe I will receive an excellent grade in this class,” “When I take tests I think of the consequences of failing,” and “I like the subject matter of this course” (Pintrich et al., 1991). The scale takes 20-30 minutes to complete and is scored by calculating the mean for items on each of the 15 scales.

According to Pintrich, Smith, García, and McKeachie (1993), the MSLQ has internal consistency ratings ranging from .52 to .93, with most scales between .62 and .79. The lowest subscale, at .52 is Help Seeking, while the highest, at .93 is Self-Efficacy for Learning and Performance. The MSLQ also demonstrates predictive validity when correlated to student’s final grade in a class, although the correlation is modest. The MSLQ has not been normed, as the authors believe that motivation and learning strategies can change depending on the person’s environment; they suggest creating local norms if one wishes to do comparative analyses (Pintrich et al., 1991).

The current study used a modified version of the MSLQ. The modifications served to generalize the instrument so that it was no longer specific to a single course. Students rate how true the items are for all of their classes in general. These changes can be seen in items, such as “I believe I will receive excellent grades in my classes,” “When I take tests I think of the consequences of failing,” and “I like the subject matter of my courses.”



**Procedure**

Administration of the survey occurred both electronically, as well as in person. Prior to the start of either type of survey administration, all participants received information about the nature of the survey, as well as the need to access their student records to retrieve academic information regarding their grade point average and credit hours. In addition, the participants received information that explained any potential risks associated with the survey, that the survey data would be kept confidential, and that they were free to withdraw from the study at any time without consequence.

After signing informed consent forms, the participants were either handed a sheet of paper with login instructions for them to begin the electronic survey on one of the computers provided, or they were given a paper copy of the survey to complete. An online survey program called Qualtrics was used to collect data from the electronic version of the survey.

The survey consisted of both the childhood and current symptom versions of the BAARS-IV, as well as the MSLQ, and a demographics questionnaire (Appendix E). The presentation of the two BAARS-IV scales and the MSLQ scale was counterbalanced to eliminate any order effects. The demographics questionnaire was the last form presented to participants.

Following completion of the study, participants received a debriefing statement that explained the premise of the study and what exactly the researchers were looking at. The debriefing statement also included contact information for the researchers of the study, as well as for the Student Success Center and the Counseling Center at the

university, in case participants felt the need to follow up with more qualified experts in regard to something they experienced during their participation in the study.

## Results

### Internal Consistency of the Measures

Cronbach's alpha coefficients indicated that all measures used in the study had excellent internal consistency overall, ranging from .92 on the BAARS-IV Childhood Form to .95 on the MSLQ. See Table 1; *Internal Consistency of the Various Measures* ( $N = 310$ ). It should be noted that three of the MSLQ subscales showed questionable internal consistency. The three subscales were Intrinsic Goal Orientation (.68), Control of Learning Beliefs (.65), and Help Seeking (.65).

### **Research Question One: Which motivation and learning strategies are associated with ADHD tendencies? Of those that are associated, which is the strongest predictor?**

The results of a multiple regression analysis conducted to examine the association between ADHD tendencies and the 6 MSLQ motivation strategies indicate that this association accounted for 14% of the overall variance in ADHD tendencies  $F(6, 303) = 8.51, p < .001$ . Among the associated variables, both Extrinsic Goal Orientation and Self-Efficacy for Learning and Performance accounted for the most variance (4%),  $p < .01$  and  $p < .05$ , respectively. Decreased use of Extrinsic Goal Orientation and Self-Efficacy for Learning and Performance strategies were associated with increased ADHD tendencies. Further, Test Anxiety accounted for (3%),  $p < .01$  of the variance. Increased endorsement of Test Anxiety was associated with increased ADHD tendencies. The remaining factors did not achieve statistical significance. See Table 2 for a summary of results.

The results of a multiple regression analysis conducted to examine the association between ADHD tendencies and the 9 MSLQ learning strategies indicate that this association accounted for 16% of the overall variance in ADHD tendencies  $F(9, 300) = 6.46, p < .001$ . Of the two associated factors, Effort Regulation accounted for the most variance (5%),  $p < .01$ . Decreased use of Effort Regulation strategies was associated with increased ADHD tendencies. Further, Time and Study accounted for (3%),  $p < .05$ , of the variance. Decreased use of Time and Study strategies was associated with increased ADHD tendencies. The remaining factors did not achieve statistical significance. See Table 3; *Summary of Multiple Regression Analysis on the Association between MSLQ Learning Strategies and ADHD Tendencies*.

**Research Question Two: How do college students with ADHD tendencies differ from students with no ADHD tendencies on their use of each motivation and learning strategy?**

Multiple independent sample  $t$  tests were conducted on the differences between students with no ADHD tendencies and those with ADHD tendencies on the 6 MSLQ motivation strategies. Results of these  $t$  tests with a Bonferroni correction indicate that at an alpha level of .008 per comparison, students with no ADHD tendencies endorsed greater use of Intrinsic Goal Orientation ( $M = 5.04, SD = .95$ ) than those with ADHD tendencies ( $M = 4.70, SD = 1.10$ ),  $t(308) = 2.86, p < .008$ . Students with no ADHD tendencies endorsed greater use of Extrinsic Goal Orientation ( $M = 6.11, SD = .88$ ) than those with ADHD tendencies ( $M = 5.63, SD = 1.11$ ),  $t(243.14) = 4.09, p < .001$ . Moreover, students with no ADHD tendencies endorsed greater use of Task Value ( $M = 5.63, SD = .90$ ) than those with ADHD tendencies ( $M = 5.13, SD = 1.07$ ),  $t(252.48) =$

4.33,  $p < .001$ . Lastly, students with no ADHD tendencies endorsed greater use of Self-Efficacy for Learning and Performance ( $M = 5.60$ ,  $SD = .80$ ) than those with ADHD tendencies ( $M = 5.04$ ,  $SD = .94$ ),  $t(308) = 5.66$ ,  $p < .001$ . The remaining factors did not achieve statistical significance using the Bonferroni correction. However, it should be noted that both remaining factors, Control of Learning Beliefs and Test Anxiety did achieve significance of  $p < .05$ . See Table 4; *Differences in MSLQ Motivation Strategy Means for College Students with ADHD Tendencies and Those with No ADHD Tendencies*.

Nine independent sample  $t$  tests were conducted on the differences between students with no ADHD tendencies and those with ADHD tendencies among the nine MSLQ learning strategies. Results of these  $t$  tests with a Bonferroni correction indicate that at an alpha level of .006 per comparison, students with no ADHD tendencies endorsed greater use of Rehearsal ( $M = 5.36$ ,  $SD = 1.17$ ) than those with ADHD tendencies ( $M = 4.95$ ,  $SD = 1.25$ ),  $t(308) = 2.93$ ,  $p < .006$ . Students with no ADHD tendencies endorsed greater use of Elaboration ( $M = 5.11$ ,  $SD = 1.04$ ) than those with ADHD tendencies ( $M = 4.70$ ,  $SD = 1.18$ ),  $t(308) = 3.31$ ,  $p < .006$ . Further, students with no ADHD tendencies endorsed greater use of Organization ( $M = 4.82$ ,  $SD = 1.24$ ) than those with ADHD tendencies ( $M = 4.29$ ,  $SD = 1.36$ ),  $t(308) = 3.58$ ,  $p < .001$ . Students with no ADHD tendencies endorsed greater use of Metacognitive Self-Regulation ( $M = 4.72$ ,  $SD = .89$ ) than those with ADHD tendencies ( $M = 4.21$ ,  $SD = .97$ ),  $t(308) = 4.82$ ,  $p < .001$ . Additionally, students with no ADHD tendencies endorsed greater use of Time and Study Environment ( $M = 5.23$ ,  $SD = 1.01$ ) than those with ADHD tendencies ( $M = 4.47$ ,  $SD = 1.04$ ),  $t(308) = 6.52$ ,  $p < .001$ . Lastly, students with no ADHD tendencies

endorsed greater use of Effort Regulation ( $M = 5.29$ ,  $SD = 1.05$ ) than those with ADHD tendencies ( $M = 4.56$ ,  $SD = 1.14$ ),  $t(308) = 5.86$ ,  $p < .001$ . The remaining factors did not achieve statistical significance. See Table 5; *Differences in MSLQ Learning Strategy Means for College Students with ADHD Tendencies and Those with No ADHD Tendencies*.

**Research Question Three: Which motivation and learning strategies are associated with GPA? Of those that are associated, which is the strongest predictor?**

The results of a multiple regression analysis conducted to examine how the 6 MSLQ motivation strategies predicted GPA in college students indicate that this set of predictors accounted for 8% of the overall variance in student GPA  $F(6, 296) = 4.52$ ,  $p < .001$ . The only variable found to be a significant predictor of GPA was Self-Efficacy for Learning and Performance, which accounted for 5% of the variance,  $p < .01$ . Increased use of Self-Efficacy for Learning and Performance strategies was predictive of a higher GPA. See Table 6; *Summary of Multiple Regression Analysis on the Association between MSLQ Motivation Strategies and GPA*.

The results of a multiple regression analysis conducted to examine how the 9 MSLQ learning strategies predicted GPA in college students indicate that this set of predictors accounted for 13% of the overall variance in student GPA  $F(9, 293) = 5.05$ ,  $p < .001$ . Of the associated variables, Effort Regulation accounted for the most variance 7%,  $p < .01$ . Increased use of Effort Regulation strategies was predictive of a higher GPA. Elaboration accounted for 5%,  $p < .05$ , of the variance. Increased use of Elaboration strategies was predictive of a higher GPA. Finally, Critical Thinking accounted for 4% of the variance,  $p < .05$ . Decreased use of Critical Thinking strategies

was predictive of a higher GPA. The remaining factors did not achieve statistical significance. See Table 7; *Summary of Multiple Regression Analysis on the Association between MSLQ Learning Strategies and GPA*.

**Research Question Four: Are ADHD tendencies associated with GPA?**

A Pearson's  $r$  was computed to examine the relationship between ADHD tendencies in college students and GPA. There was a significant negative correlation between the two variables, ( $r = -.11, p < .05$ ). This result suggests that as ADHD tendencies increase GPA scores decrease. See Table 8; *Correlations between ADHD Tendencies and GPA*.

**Research Question Five: How do students with ADHD tendencies differ from students without ADHD tendencies on GPA?**

The results of a  $t$  test for independent means conducted on GPA show that students with no ADHD tendencies had significantly higher GPAs ( $M = 3.08, SD = .63$ ) than those with ADHD tendencies ( $M = 2.92, SD = .64$ ),  $t(301) = 2.10, p < .05$ . These results suggest ADHD tendencies can negatively impact GPA. See Table 9; *GPA Means for College Students with and without ADHD Tendencies*.

**Research Question Six: How do college students with exclusively inattentive symptoms differ from students with exclusively hyperactive and or impulsive symptoms in their use of each motivation and learning strategy?**

Six independent sample  $t$  tests were conducted on the differences between students with exclusively inattentive symptoms and those with exclusively hyperactive impulsive symptoms among the six MSLQ motivational strategies. Results of these  $t$  tests with a Bonferroni correction indicate that at an alpha level of .008 per comparison,

students with exclusively hyperactive impulsive symptoms endorsed greater use of Self-Efficacy for Learning and Performance ( $M = 5.67, SD = .81$ ) than those with exclusively inattentive symptoms ( $M = 4.97, SD = 1.04$ ),  $t(102) = -3.48, p = .001$ . The remaining factors did not achieve statistical significance. See Table 10; *MSLQ Motivation Strategy Means for College Students with Specific ADHD Subtype Tendencies*.

Nine independent sample  $t$  tests were conducted on the differences between students with exclusively inattentive symptoms and those with exclusively hyperactive impulsive symptoms among the nine MSLQ learning strategies. Results of these  $t$  tests with a Bonferroni correction indicate that at an alpha level of .006 per comparison, students with exclusively hyperactive and or impulsive symptoms endorsed greater use of Metacognitive Self-Regulation ( $M = 4.79, SD = .82$ ) than those with exclusively inattentive symptoms ( $M = 4.17, SD = .98$ ),  $t(102) = -3.08, p < .006$ . Further, students with exclusively hyperactive and or impulsive symptoms endorsed greater use of Time and Study Environment ( $M = 5.26, SD = 9.6$ ) than those with exclusively inattentive symptoms ( $M = 4.26, SD = .77$ ),  $t(102) = -4.72, p < .001$ . Finally, students with exclusively hyperactive and or impulsive symptoms endorsed greater use of Effort Regulation ( $M = 5.35, SD = .91$ ) than those with exclusively inattentive symptoms ( $M = 4.48, SD = 1.02$ ),  $t(102) = -4.01, p < .001$ . The remaining factors did not achieve statistical significance. See Table 11; *MSLQ Learning Strategy Means for College Students with Specific ADHD Subtype Tendencies*.

### **Discussion**

The current study was based in part on the work of Biederman et al. (2000), which suggested that individuals may still suffer from ADHD symptoms, even when they

no longer meet the symptom level criteria for ADHD diagnosis, as defined by the DSM-IV-TR. Overall, the results of the study demonstrate a number of significant findings in the use of SRL strategies by college students with ADHD tendencies.

### **ADHD Tendencies and Motivation Strategies**

An examination of the differences in motivation strategies between students with and without ADHD tendencies yielded significant differences in Intrinsic and Extrinsic Goal Orientation, Self-Efficacy for Learning and Performance, and Task Value. Interestingly, the factors were all in the same direction as well; students with no ADHD tendencies used each of the strategies more than those with ADHD tendencies.

The significant finding for Self-Efficacy for Learning and Performance may be related to findings from research done by Dooling-Litfin and Rosen (1997), which showed associations between ADHD in college students and low self-esteem. According to Pintrich et al. (1991), this learning strategy, “includes judgments about one’s ability to accomplish a task, as well as one’s confidence in one’s skills to perform that task” (p. 13).

In addition to these findings, when motivation strategy scores were correlated with ADHD tendency scores as a whole, Extrinsic Goal Orientation and Self-Efficacy for Learning and Performance remained significant, with each factor accounting for 4% of the variance. Interestingly, this analysis showed that Test Anxiety was a significant predictor of ADHD tendencies as well, accounting for 3% of the variance.

The finding that students with and without ADHD tendencies did not differ in Test Anxiety scores was surprising, given research suggesting that students with ADHD have more concerns regarding their performance than those without ADHD (Blase et al.,



2009). However, it should be noted that this difference would have been significant at  $p < .05$  had the Bonferroni correction not been used.

### **ADHD Tendencies and Learning Strategies**

An examination of the differences in learning strategies between college students with and without ADHD tendencies yielded several significant results. Students with no ADHD tendencies used all four of the Cognitive and Metacognitive Strategies: Rehearsal, Elaboration, Organization, and Metacognitive Self-Regulation more than those students with ADHD tendencies. This finding is consistent with results showing that Elaboration is generally a good indicator of performance (Pintrich et al., 1991). Other research has shown that ADHD tends to be associated with deficits in organization (Reaser et al., 2007; Resnick, 2005) and self-control and discipline (Turnock et al., 1998). The other two significant factors were Effort Regulation and Time and Study Environment. Again, students in the no ADHD tendency group were found to use these strategies significantly more than those with ADHD tendencies. This is consistent with research showing that college students with ADHD tend to have issues involving time management, procrastination, note taking and study skills (Advokat et al., 2011; Kern, Rasmussen, Byrd, & Wittschen, 1999; Norwalk et al., 2009; Reaser et al., 2007; Turnock et al., 1998).

In addition to these findings, when learning strategy scores were correlated with ADHD tendency scores as a whole, Effort Regulation and Time and Study Environment not only remained significant but they predicted 5% and 3% of the variance, respectively. Of all the learning strategies, these two were found to be significant in almost every analysis conducted, which is not surprising given the literature on executive functions and self-regulation relating to ADHD. According to Barkley (2012, 2013), executive

functions play a significant role in helping individuals to organize, plan, and manage tasks.

### **SRL Strategies and GPA**

It was somewhat surprising that between both motivation and learning strategies, only four strategies were found to be significant predictors of GPA: Self-Efficacy for Learning and Performance, Effort Regulation, Elaboration, and Critical Thinking. The direction of the correlations was the same across all factors, and consistent with predictions – increased use of the strategy was predictive of increased GPA – except for Critical Thinking.

Surprisingly, Critical Thinking was inversely related to GPA. This finding could be due to a number of reasons. For example, it may be a result of the amount of time the current sample has spent in college. According to Pintrich et al. (1991), Critical Thinking, “refers to the degree to which students report applying previous knowledge to new situations in order to solve problems, reach decisions, or make critical evaluations with respect to standards of excellence.” An examination of the credit hours used to determine GPA revealed that they ranged from 8 to 140 credit hours ( $M = 42.25$ ,  $SD = 29.22$ ). Total credit hours was non-normally distributed, with skewness of .86 ( $SE = .14$ ) and kurtosis of -.12 ( $SE = .28$ ). In total, 40.6% of participants were in their first or second semester of college. Thus, the inverse relationship may be explained by the relative lack of experience and knowledge they have in college, on which to base critical evaluations.

Also of note was the significant finding between Elaboration and GPA. While this finding coincides with research by Vanderstoep et al. (1996), in this study significance was not found between the other cognitive strategies and GPA, which Vanderstoep et al.

did. This finding is consistent with Elaboration being a better predictor of achievement than the other cognitive strategies (Pintrich et al., 1991).

### **ADHD Tendencies and GPA**

An examination of relationship between ADHD tendencies as a continuous variable and GPA found a negative correlation. Similarly, there was a significant difference between the GPAs of students with and without ADHD tendencies; those without ADHD tendencies had higher GPAs. Although these findings are consistent, the literature on this association is not. Many studies found a relationship between ADHD and GPA in college students (DuPaul et al., 2009; Heiligenstein et al., 1999; Rabiner et al., 2008) and in children (Loe & Feldman, 2007), but studies by Norwalk et al. (2009) and Sparks et al. (2004) did not find GPA differences. Additionally, Blase et al. (2009) found an inverse relationship between GPA and ADHD only in students with current, but not prior diagnosis. Perhaps the conflicting results are due to other factors that account for the variance in GPA. As can be seen in this study, significant differences were found, but they were weak.

### **SRL Strategies and ADHD Subtype Symptoms**

An examination of motivation strategies compared to symptoms reflective of inattentive and hyperactive impulsive subtypes revealed only one significant difference, Self-Efficacy for Learning and Performance. The analyses of the learning strategies yielded significant differences in Metacognitive Self-Regulation, Effort Regulation, and Time and Study Environment. All of these differences were in the same direction: students who reported exclusively hyperactive impulsive symptoms used the strategies significantly more than those with exclusively inattentive symptoms. These findings are

similar to those from earlier research (Wolf et al., 2009) indicating that ADHD-I is more closely associated with academic problems than is ADHD-H or ADHD-C. Moreover, because all three of the learning strategies involve self-regulation, which is a significant part of executive functioning, it can be inferred that these findings coincide with research indicating that executive functioning problems are associated more closely with ADHD-I (Wasserstein, 2005).

### **Clinical Implications**

The current findings show a number of consistent SRL strategies that are associated with deficits in college students with ADHD tendencies. They include, Self-Efficacy for Learning and Performance, Extrinsic Goal Orientation, Time and Study Environment, and Effort Regulation. These factors consistently showed significant differences across the different statistical analyses performed, which emphasizes their importance in determining deficits of ADHD tendencies. Ideally, treatment protocols can be developed to help increase the use of these strategies by students with ADHD tendencies.

According to the literature, there are a wide variety of forms that such treatment could take. For instance, medication may help to increase the focus of a student and allow for increased Effort Regulation, or Time and Study Environment strategies. Researchers found that several different medications can be used to effectively treat ADHD, including stimulants (Banaschewski, Roessner, Dittmann, Santosh, & Rothenberger, 2004; Wender, Wolf, & Wasserstein, 2001) and non-stimulants, such as antidepressants and even certain types of blood-pressure medication (Banaschewski et al., 2004; Biederman & Spencer, 2000).

A second form of treatment that has been found to be effective, and may be well suited to teach SRL strategies is psychosocial and behavioral interventions. This approach consists of compensatory behavior training, classroom interventions, parent training, social skills training, and cognitive-behavioral oriented interventions (Abramowitz, Eckstrand, O'Leary, & Dulcan, 1992; Pelham Jr & Gnagy, 1999). It should be noted however, that in general the most effective treatment for ADHD is multimodal, a combination of both medication and psychosocial therapy (Chronis, Jones, & Raggi, 2006; Murphy, 2005; Ramsay, 2007; Steer, 2005).

### **Study Limitations and Suggestions for Future Research**

There are a number of limitations with the current study. For example, the size of the sample, while adequate for the statistical analyses, was still small. Had the sample size been larger, more specific tests could have been conducted, such as analyzing the ADHD tendencies at each cut-off level listed in the BAARS-IV manual (Barkley, 2011).

Further, because the study only used self-report measures, the validity of the data could be called into question. Response sets, such as social desirability could have influenced the responses. Additionally, the participants may not have fully understood the questions.

Perhaps the most salient limitation was the homogeneity of the sample. Although the sample was from a college population, which is the intended target of this research, the sample came from only one Midwestern state university. In addition, the sample included a disproportionate number of psychology students, women, and underclassmen. All of these factors can limit the ability to generalize the findings to the population of college students.

While the current study has answered many questions, others still remain. In order to increase the generalizability of these findings, it would be useful to conduct the study at multiple colleges, while trying to maintain an even distribution across gender, race, year in college, and major. Additionally, this study could be expanded by increasing the sample size such that each individual tendency group could be examined to find differences in the use of SRL strategies. Further, it would be useful in future studies to include students with verified ADHD diagnoses so that they can be compared to those with tendencies across all BAARS-IV levels.

Another question that deserves attention is how substance use affects students with ADHD and how that might interact with their academic performance. Because the literature on the connection between students with ADHD and substance use issues is not conclusive (Wolf et al., 2009) many questions remain. A review of research on nonADHD college populations by Arria, Caldeira, Bugbee, Vincent, and O'Grady (2013) found substantial evidence linking deficits in academic achievement and performance in college students with substance use issues. Therefore, it is likely that substance use does play a role in students with ADHD as well. However, future studies should look at whether substance use is related to any changes in SRL usage by students with ADHD. If that is the case, separate interventions may be needed to help that specific population.

## **Conclusion**

There is little dispute that students with ADHD face many difficulties in college; however, research is still needed to determine exactly where those difficulties lie. While research on college students with ADHD is still in its infancy, the literature is expanding at ever increasing rates. With more research, better interventions may become available

to help students with ADHD. The current study added to the literature by exploring how students with ADHD tendencies use SRL strategies. The findings are consistent with prior research that suggests ADHD symptoms may cause problems even when below the diagnostic threshold level. In general, the results showed deficits in the use of the specific SRL strategies among students with ADHD tendencies. These findings have the potential to guide future interventions to help students with ADHD increase their use of SRL strategies.

## References

- Abramowitz, A. J., Eckstrand, D., O'Leary, S. G., & Dulcan, M. K. (1992). ADHD children's responses to stimulant medication and two intensities of a behavioral intervention. *Behavior Modification, 16*(2), 193-203. doi: 10.1177/01454455920162003
- Advokat, C., Lane, S. M., & Luo, C. (2011). College students with and without ADHD: Comparison of self-report of medication usage, study habits, and academic achievement. *Journal of Attention Disorders, 15*(8), 656-666. doi: 10.1177/1087054710371168
- Akinbami, L. J., Liu, X., Pastor, P. N., & Reuben, C. A. (2011). Attention deficit hyperactivity disorder among children aged 5-17 years in the United States, 1998-2009. *NCHS data brief* (70), 1-8.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: Author.
- Arria, A. M., Caldeira, K. M., Bugbee, B. A., Vincent, K. B., & O'Grady, K. E. (2013). *The academic opportunity costs of substance use during college*. College Park, MD: Center on Young Adult Health and Development.
- Banaschewski, T., Roessner, V., Dittmann, R. W., Santosh, P. J., & Rothenberger, A. (2004). Non-stimulant medications in the treatment of ADHD. *European Child & Adolescent Psychiatry, 13*(1), 102-116. doi: 10.1007/s00787-004-1010-x
- Barkley, R. A. (1997). Behavioral inhibition, sustained attention, and executive functions: constructing a unifying theory of ADHD. *Psychological Bulletin, 121*(1), 65. doi: 10.1037//0033-2909.121.1.65



- Barkley, R. A. (2011). *Barkley Adult ADHD Rating Scale--IV (BAARS-IV)*. New York, NY: The Guilford Press.
- Barkley, R. A. (2012). *Executive functions: What they are, how they work, and why they evolved* (1 ed.). New York, NY: Guilford Publication.
- Barkley, R. A. (2013). *ADHD: Nature, course, outcomes, and comorbidity*. Retrieved from <http://www.continuingeducation.net/active/courses/course003.php>
- Barkley, R. A., Murphy, K. R., & Fischer, M. (2008). *ADHD in adults: What the science says*. New York, NY: Guilford Publications.
- Bell, A. S. (2011). A critical review of ADHD diagnostic criteria: What to address in the DSM-V. *Journal of Attention Disorders, 15*(1), 3-10. doi: 10.1177/1087054710365982
- Best, J. R., & Miller, P. H. (2010). A developmental perspective on executive function. *Child Development, 81*(6), 1641-1660. doi: 10.1111/j.1467-8624.2010.01499.x
- Biederman, J., Mick, E., & Faraone, S. V. (2000). Age-dependent decline of symptoms of attention deficit hyperactivity disorder: impact of remission definition and symptom type. *American Journal of Psychiatry, 157*(5), 816-818. doi: 10.1176/appi.ajp.157.5.816
- Biederman, J., & Spencer, T. (2000). Non-stimulant treatments for ADHD. *European Child & Adolescent Psychiatry, 9*(1), 51-59. doi: 10.1007/s007870070019
- Blase, 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*(3), 297-309. doi: 10.1177/1087054709334446

- Boekaerts, M., Niemivirta, M., Monique, B., Paul, R. P., & Moshe, Z. (2000). Self-regulated learning: Finding a balance between learning goals and ego-protective goals. *Handbook of Self-Regulation*, 417-450.
- Borkowski, J. G. (1996). Metacognition: Theory or chapter heading? *Learning and Individual Differences*, 8(4), 391-402. doi: 10.1016/S1041-6080(96)90025-4
- Brand, S., Dunn, R., & Greb, F. (2002). Learning styles of students with attention deficit hyperactivity disorder: Who are they and how can we teach them? *Clearing House: A Journal of Educational Strategies, Issues and Ideas*, 75(5), 268. doi: 10.1080/00098650209603953
- Carlson, C. L., Booth, J. E., Misung, S., & Canu, W. H. (2002). Parent-, teacher-, and self-rated motivational styles in ADHD subtypes. *Journal of Learning Disabilities*, 35(2), 104. doi: 10.1177/002221940203500202
- Casey, B. J., Durston, S., & Fossella, J. A. (2001). Evidence for a mechanistic model of cognitive control. *Clinical Neuroscience Research*, 1(4), 267-282. doi: 10.1016/S1566-2772(01)00013-5
- Chronis, A. M., Jones, H. A., & Raggi, V. L. (2006). Evidence-based psychosocial treatments for children and adolescents with attention-deficit/hyperactivity disorder. *Clinical Psychology Review*, 26(4), 486-502. doi: 10.1016/j.cpr.2006.01.002
- Cortese, S., Kelly, C., Chabernaud, C., Proal, E., Di Martino, A., Milham, M. P., & Castellanos, F. X. (2012). Toward systems neuroscience of ADHD: a meta-analysis of 55 fMRI studies. *American Journal of Psychiatry*, 169(10), 1038-1055. doi: 10.1176/appi.ajp.2012.11101521

- 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*(4), 69-82. doi: 10.1300/J035v11n04\_06
- 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
- Faraone, S. V., Biederman, J., Doyle, A., Murray, K., Petty, C., Adamson, J. J., & Seidman, L. (2006). Neuropsychological studies of late onset and subthreshold diagnoses of adult attention-deficit/hyperactivity disorder. *Biological Psychiatry, 60*(10), 1081-1087. doi: 10.1016/j.biopsych.2006.03.060
- Faraone, S. V., Biederman, J., Spencer, T., Mick, E., Murray, K., Petty, C., . . . Monuteaux, M. C. (2006). Diagnosing adult attention deficit hyperactivity disorder: are late onset and subthreshold diagnoses valid? *American Journal of Psychiatry, 163*(10), 1720-1729. doi: 10.1176/appi.ajp.163.10.1720
- 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
- Garnier-Dykstra, L. M., Pinchevsky, G. M., Caldeira, K. M., Vincent, K. B., & Arria, A. M. (2011). Self-reported adult attention-deficit/hyperactivity disorder symptoms among college students. *Journal of American College Health, 59*(2), 133-136. doi: 10.1080/07448481.2010.483718

- 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*(1), 44-55. doi: 10.1037/1040-3590.17.1.44
- Grenwald-Mayes, G. (2001). Relationship between current quality of life and family of origin dynamics for college students with attention-deficit/hyperactivity disorder. *Journal of Attention Disorders, 5*(4), 211-222. doi: 10.1177/108705470100500403
- Harpin, V. A. (2005). The effect of ADHD on the life of an individual, their family, and community from preschool to adult life. *Archives of Disease in Childhood, 90*(1), 2 - 7. doi: 10.1136/adc.2004.059006
- Harrison, A. G., Edwards, M. J., & Parker, K. C. (2007). Identifying students faking ADHD: Preliminary findings and strategies for detection. *Archives of Clinical Neuropsychology, 22*(5), 577-588. doi: 10.1016/j.acn.2007.03.008
- Hart, H., Radua, J., Nakao, T., Mataix-Cols, D., & Rubia, K. (2013). Meta-analysis of functional magnetic resonance imaging studies of inhibition and attention in attention-deficit/hyperactivity disorder: Exploring task-specific, stimulant medication, and age effects. *JAMA, 70*(2), 185-198. doi: 10.1001/jamapsychiatry.2013.277
- 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*(4), 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*(4), 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*(5), 226-228. doi: 10.1080/07448481.1995.9940481
- 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*.
- Konrad, K., Neufang, S., Hanisch, C., Fink, G. R., & Herpertz-Dahlmann, B. (2006). Dysfunctional Attentional Networks in Children with Attention Deficit/Hyperactivity Disorder: Evidence from an Event-Related Functional Magnetic Resonance Imaging Study. *Biological Psychiatry, 59*(7), 643-651. doi: 10.1016/j.biopsych.2005.08.013
- Lahey, B. B., Pelham, W. E., Loney, J., Lee, S. S., & Willcutt, E. (2005). Instability of the DSM-IV subtypes of ADHD from preschool through elementary school. *Archives of General Psychiatry, 62*(8), 896-902. doi: 10.1001/archpsyc.62.8.896
- Lee Booksh, R., Pella, R. D., Singh, A. N., & Drew Gouvier, W. (2010). Ability of college students to simulate ADHD on objective measures of attention. *Journal of Attention Disorders, 13*(4), 325-338. doi: 10.1177/1087054708329927

- Lee, S. S., Humphreys, K. L., Flory, K., Liu, R., & Glass, K. (2011). Prospective association of childhood attention-deficit/hyperactivity disorder (ADHD) and substance use and abuse/dependence: a meta-analytic review. *Clinical Psychology Review, 31*(3), 328-341. doi: 10.1016/j.cpr.2011.01.006
- 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. doi: 10.1177/1087054707310882
- Lichtinger, E., & Kaplan, A. (2011). Purpose of engagement in academic self-regulation. *New Directions for Teaching and Learning, 2011*(126), 9-19. doi: 10.1002/tl.440
- Loe, I. M., & Feldman, H. M. (2007). Academic and educational outcomes of children with ADHD. *Journal of Pediatric Psychology, 32*(6), 643-654. doi: 10.1093/jpepsy/jsl054
- Marshall, R. M., Hynd, G. W., Handwerk, M. J., & Hall, J. (1997). Academic underachievement in ADHD subtypes. *Journal of Learning Disabilities, 30*(6), 635-642. doi: 10.1177/002221949703000607
- McGough, J. J., & Barkley, R. A. (2004). Diagnostic controversies in adult attention deficit hyperactivity disorder. *American Journal of Psychiatry, 161*(11), 1948-1956. doi: 10.1176/appi.ajp.161.11.1948
- Miller, M., Loya, F., & Hinshaw, S. P. (2013). Executive functions in girls with and without childhood ADHD: developmental trajectories and associations with symptom change. *Journal of Child Psychology and Psychiatry*. doi: 10.1111/jcpp.12074

- Montalvo, F. T., & Torres, M. C. G. (2004). Self-regulated learning: Current and future directions. *Electronic Journal of Research in Educational Psychology*, 2(1), 1-34.
- Murphy, K. R. (2005). Psychosocial treatments for ADHD in teens and adults: a practice-friendly review. *Journal of Clinical Psychology*, 61(5), 607-619. doi: 10.1002/jclp.20123
- Murphy, K. R., Barkley, R. A., & Bush, T. (2002). Young adults with attention deficit hyperactivity disorder: subtype differences in comorbidity, educational, and clinical history. *Journal of Nervous and Mental Disease*, 190(3), 147-157. doi: 10.1097/00005053-200203000-00003
- Nigg, J. T. (2001). Is ADHD a disinhibitory disorder? *Psychological Bulletin*, 127(5), 571. doi: 10.1037//0033-2909.127.5.571
- 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(3), 251-258. doi: 10.1177/1087054708320441
- Pelham Jr, W. E., & Gnagy, E. M. (1999). Psychosocial and combined treatments for ADHD. *Mental Retardation and Developmental Disabilities Research Reviews*, 5(3), 225-236. doi: 10.1002/(sici)1098-2779(1999)5:3<225::aid-mrdd9>3.0.co;2-e
- Pennington, B. F., & Ozonoff, S. (1996). Executive functions and developmental psychopathology. *Journal of Child Psychology and Psychiatry*, 37(1), 51-87. doi: 10.1111/j.1469-7610.1996.tb01380.x

- Pintrich, P. R. (1999). The role of motivation in promoting and sustaining self-regulated learning. *International Journal of Educational Research*, 31(6), 459-470. doi: 10.1016/S0883-0355(99)00015-4
- Pintrich, P. R. (2000). The role of goal orientation in self-regulated learning. *Handbook of Self-Regulation*, 451, 502. doi: 10.1016/B978-012109890-2/50043-3
- Pintrich, P. R., Smith, D. A. F., García, T., & McKeachie, W. J. (1991). *A manual for the use of the Motivated Strategies for Learning Questionnaire (MSLQ)*. Ann Arbor, Michigan: University of Michigan ; U.S. Dept. of Education, Office of Educational Research and Improvement, Educational Resources Information Center.
- Pintrich, P. R., Smith, D. A. F., García, T., & McKeachie, W. J. (1993). Reliability and predictive validity of the Motivated Strategies for Learning Questionnaire (MSLQ). *Educational and Psychological Measurement*, 53(3), 801-813. doi: 10.1177/0013164493053003024
- Puustinen, M., & Pulkkinen, L. (2001). Models of self-regulated learning: A review. *Scandinavian Journal of Educational Research*, 45(3), 269-286. doi: 10.1080/00313830120074206
- Quay, H. C. (1997). Inhibition and attention deficit hyperactivity disorder. *Journal of Abnormal Child Psychology*, 25(1), 7-13.
- 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(6), 689-699. doi: 10.1177/1087054707305106



- Rachal, K. C., Daigle, S., & Rachal, W. S. (2007). Learning problems reported by college students: Are they using learning strategies? *Journal of Instructional Psychology*, 34(4), 191.
- Ramsay, J. R. (2007). Current status of cognitive-behavioral therapy as a psychosocial treatment for adult attention-deficit/hyperactivity disorder. *Current Psychiatry Reports*, 9(5), 427-433. doi: 10.1007/s11920-007-0056-0
- Reaser, A., Prevatt, F., Petscher, Y., & Proctor, B. (2007). The learning and study strategies of college students with ADHD. *Psychology in the Schools*, 44(6), 627-638. doi: 10.1002/pits.20252
- Resnick, R. J. (2005). Attention deficit hyperactivity disorder in teens and adults: they don't all outgrow it. *Journal of Clinical Psychology*, 61(5), 529-533. doi: 10.1002/jclp.20117
- Schachar, R., Tannock, R., Marriott, M., & Logan, G. (1995). Deficient inhibitory control in attention deficit hyperactivity disorder. *Journal of Abnormal Child Psychology*, 23(4), 411-437. doi: 10.1007/BF01447206
- Schunk, D. H. (2005). Self-regulated learning: The educational legacy of Paul R. Pintrich. *Educational Psychologist*, 40(2), 85-94. doi: 10.1207/s15326985ep4002\_3
- 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(3), 109-120. doi: 10.1177/1087054705277775

- Silverman, S. B. (2012). *Assessing attention-deficit/hyperactivity disorder in adults| A review of rating scales*. (Doctor of Psychology), Pepperdine University, Pepperdine University.
- Simon, V., Czobor, P., Balint, S., Meszaros, A., & Bitter, I. (2009). Prevalence and correlates of adult attention-deficit hyperactivity disorder: meta-analysis. *British Journal of Psychiatry, 194*(3), 204-211. doi: 10.1192/bjp.bp.107.048827
- Sparks, R. L., Javorsky, J., & Philips, L. (2004). College students classified with ADHD and the foreign language requirement. *Journal of Learning Disabilities, 37*(2), 169-178. doi: 10.1177/00222194040370020701
- Steer, C. R. (2005). Managing attention deficit/hyperactivity disorder: unmet needs and future directions. *Archives of Disease in Childhood, 90*(1), 19-25. doi: 10.1136/adc.2004.059352
- Thome, J., & Reddy, D. P. (2009). The current status of research into Attention Deficit Hyperactivity Disorder: Proceedings of the 2nd International Congress on ADHD: From Childhood to Adult Disease. *ADHD Attention Deficit and Hyperactivity Disorders, 1*(2), 165-174. doi: 10.1007/s12402-009-0016-0
- Todd, R. D., Sitdhiraksa, N., Reich, W., Ji, T. H., Joyner, C. A., Heath, A. C., & Neuman, R. J. (2002). Discrimination of DSM-IV and latent class attention-deficit/hyperactivity disorder subtypes by educational and cognitive performance in a population-based sample of child and adolescent twins. *Journal of the American Academy of Child and Adolescent Psychiatry, 41*(7), 820-828. doi: 10.1097/00004583-200207000-00014

- Turnock, P., Rosen, L. A., & Kaminski, P. L. (1998). Differences in academic coping strategies of college students who self-report high and low symptoms of attention deficit hyperactivity disorder. *Journal of College Student Development, 39*(5), 484-493.
- Vanderstoep, S. W., Pintrich, P. R., & Fagerlin, A. (1996). Disciplinary differences in self-regulated learning in college students. *Contemporary Educational Psychology, 21*, 345-362. doi: 10.1006/ceps.1996.0026
- Wallace, B. A., Winsler, A., & NeSmith, P. (1999). *Factors associated with success for college students with ADHD: Are standard accommodations helping?* Paper presented at the American Education Research Association Annual Conference, Montreal, Canada.
- Wasserstein, J. (2005). Diagnostic issues for adolescents and adults with ADHD. *Journal of Clinical Psychology, 61*(5), 535-547. doi: 10.1002/jclp.20118
- Wender, P. H., Wolf, L. E., & Wasserstein, J. (2001). Adults with ADHD. An overview. *Annals of the New York Academy of Sciences, 931*, 1-16. doi: 10.1111/j.1749-6632.2001.tb05770.x
- Weyandt, L. L., & DuPaul, G. J. (2006). ADHD in college students. *Journal of Attention Disorders, 10*(1), 9-19. doi: 10.1177/1087054705286061
- Weyandt, L. L., & Dupaul, G. J. (2008). ADHD in college students: Developmental findings. *Developmental Disabilities Research Reviews, 14*(4), 311-319. doi: 10.1002/ddrr.38

- Weyandt, L. L., & Dupaul, G. J. (2012). Introduction to special series on college students with ADHD: psychosocial issues, comorbidity, and treatment. *Journal of Attention Disorders, 16*(3), 199-201. doi: 10.1177/1087054711427300
- Weyandt, L. L., Iwaszuk, W., Fulton, K., Ollerton, M., Beatty, N., Fouts, H., . . . Greenlaw, C. (2003). The internal restlessness scale: performance of college students with and without ADHD. *Journal of Learning Disabilities, 36*(4), 382-389. doi: 10.1177/00222194030360040801
- Weyandt, L. L., Swentosky, A., & Gudmundsdottir, B. G. (2013). Neuroimaging and ADHD: fMRI, PET, DTI findings, and methodological limitations. *Developmental Neuropsychology, 38*(4), 211-225. doi: 10.1080/87565641.2013.783833
- Willcutt, E. G. (2005). The etiology of ADHD: behavioral and molecular genetic approaches. In D. Barch (Ed.), *Cognitive and Affective Neuroscience of Psychopathology*: Oxford University Press.
- Willcutt, E. G., Doyle, A. E., Nigg, J. T., Faraone, S. V., & Pennington, B. F. (2005). Validity of the executive function theory of attention-deficit/hyperactivity disorder: a meta-analytic review. *Biological Psychiatry, 57*(11), 1336-1346. doi: 10.1016/j.biopsych.2005.02.006
- Willcutt, E. G., Nigg, J. T., Pennington, B. F., Solanto, M. V., Rohde, L. A., Tannock, R., . . . Lahey, B. B. (2012). Validity of DSM-IV attention deficit/hyperactivity disorder symptom dimensions and subtypes. *Journal of Abnormal Psychology, 121*(4), 991-1010. doi: 10.1037/a0027347

- Willoughby, M. T. (2003). Developmental course of ADHD symptomatology during the transition from childhood to adolescence: a review with recommendations. *Journal of Child Psychology and Psychiatry*, *44*(1), 88-106. doi: 10.1111/1469-7610.t01-1-00104
- Winne, P. H., & Hadwin, A. F. (1998). Studying as self-regulated learning. In D. J. Hacker, J. Dunlosky & A. C. Graesser (Eds.), *Metacognition in Educational Theory and Practice* (pp. 277-304). Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers.
- Wolf, L. E. (2001). College students with ADHD and other hidden disabilities. Outcomes and interventions. *Annals of the New York Academy of Sciences*, *931*, 385-395. doi: 10.1111/j.1749-6632.2001.tb05792.x
- Wolf, L. E., Simkowitz, P., & Carlson, H. (2009). College students with attention-deficit/hyperactivity disorder. *Current Psychiatry Reports*, *11*(5), 415-421. doi: 10.1007/s11920-009-0062-5
- Wolraich, M. L., Brown, L., Brown, R. T., Dupaul, G. J., Earls, M., Feldman, H. M., . . . Visser, S. (2011). ADHD: Clinical practice guideline for the diagnosis, evaluation, and treatment of attention-deficit/hyperactivity disorder in children and adolescents. *Pediatrics*, *128*(5), 1007-1022. doi: 10.1542/peds.2011-2654
- Wolraich, M. L., Wibbelsman, C. J., Brown, T. E., Evans, S. W., Gotlieb, E. M., Knight, J. R., . . . Wilens, T. (2005). Attention-deficit/hyperactivity disorder among adolescents: A review of the diagnosis, treatment, and clinical implications. *Pediatrics*, *115*(6), 1734-1746. doi: 10.1542/peds.2004-1959

- Wolters, C. A. (2010). Self-regulated learning and the 21 st century competencies. *USA: University of Houston.*
- Young, S. (2000). ADHD children grown up: An empirical review. *Counselling Psychology Quarterly, 13*(2), 191-200. doi: 10.1080/095150700411728
- Zimmerman, B. J. (1990). Self-regulated learning and academic achievement: An overview. *Educational Psychologist, 25*(1), 3-17. doi: 10.1207/s15326985ep2501\_2
- Zimmerman, B. J. (2000). A social cognitive perspective. *Handbook of Self-Regulation, 13.*
- Zusho, A., & Edwards, K. (2011). Self-regulation and achievement goals in the college classroom. *New Directions for Teaching and Learning, 2011*(126), 21-31. doi: 10.1002/tl.441

Table 1

*Internal Consistency of the Various Measures (N = 310)*

Measure	Cronbach's $\alpha$
Barkley Adult ADHD Rating Scale-IV (Childhood Form)	.92
Inattention	.89
Hyperactivity	.88
Barkley Adult ADHD Rating Scale-IV (Current Form)	.94
Inattention	.89
Hyperactivity	.74
Impulsivity	.77
Sluggish Cognitive Tempo	.88
Motivated Strategies for Learning Questionnaire	.95
Motivation Strategies	.87
Learning Strategies	.94
Value Component: Intrinsic Goal Orientation	.68
Value Component: Extrinsic Goal Orientation	.75
Value Component: Task Value	.85
Expectancy Component: Control of Learning Beliefs	.65
Expectancy Component: Self-Efficacy for Learning and Performance	.88
Affective Component: Test Anxiety	.81
Cognitive and Metacognitive Strategies: Rehearsal	.70
Cognitive and Metacognitive Strategies: Elaboration	.78
Cognitive and Metacognitive Strategies: Organization	.73
Cognitive and Metacognitive Strategies: Critical Thinking	.78
Cognitive and Metacognitive Strategies: Metacognitive Self-Regulation	.79
Resource Management Strategies: Time and Study Environment	.79
Resource Management Strategies: Effort Regulation	.71
Resource Management Strategies: Peer Learning	.71
Resource Management Strategies: Help Seeking	.65

Table 2

*Summary of Multiple Regression Analysis on the Association between MSLQ Motivation Strategies and ADHD Tendencies*

Variable	<i>B</i>	<i>SE B</i>	$\beta$
Value Component: Intrinsic Goal Orientation	-.50	.62	-.06
Value Component: Extrinsic Goal Orientation	-1.76	.62	-.19**
Value Component: Task Value	.02	.69	.00
Expectancy Component: Control of Learning Beliefs	.52	.62	.05
Expectancy Component: Self-Efficacy for Learning and Performance	-1.90	.77	-.19**
Affective Component: Test Anxiety	1.18	.39	.18**

*Note.*  $R^2 = .14$ ; adjusted  $R^2 = .13$ .

\* =  $p < .05$ , \*\* =  $p < .01$ .



Table 3

*Summary of Multiple Regression Analysis on the Association between MSLQ Learning Strategies and ADHD Tendencies*

Variable	<i>B</i>	<i>SE B</i>	$\beta$
Cognitive and Metacognitive Strategies: Rehearsal	.06	.58	.01
Cognitive and Metacognitive Strategies: Elaboration	1.04	.75	.13
Cognitive and Metacognitive Strategies: Organization	-.32	.55	-.05
Cognitive and Metacognitive Strategies: Critical Thinking	-.31	.57	-.04
Cognitive and Metacognitive Strategies: Metacognitive Self-Regulation	-.93	.92	-.10
Resource Management Strategies: Time and Study Environment	-1.51	.74	-.18*
Resource Management Strategies: Effort Regulation	-1.85	.66	-.23**
Resource Management Strategies: Peer Learning	.34	.49	.06
Resource Management Strategies: Help Seeking	.04	.54	.01

*Note.*  $R^2 = .16$ ; adjusted  $R^2 = .14$ .

\* =  $p < .05$ , \*\* =  $p < .01$ .

Table 4

*Differences in MSLQ Motivation Strategy Means for College Students with ADHD Tendencies and Those with No ADHD Tendencies*

	ADHD Tendencies		<i>t</i>	<i>df</i>
	No Tendencies	ADHD Tendencies		
Value Component: Intrinsic Goal Orientation	5.04(.95)	4.70 (1.10)	2.86**	308
Value Component: Extrinsic Goal Orientation	6.11(.88)	5.63 (1.11)	4.09***	243.14
Value Component: Task Value	5.63(.90)	5.13 (1.07)	4.33***	252.48
Expectancy Component: Control of Learning Beliefs	5.49(.86)	5.25 (.99)	2.26*	308
Expectancy Component: Self-Efficacy for Learning and Performance	5.60(.80)	5.04 (.94)	5.66***	308
Affective Component: Test Anxiety	4.06(1.40)	4.45 (1.34)	-2.46*	308

*Note.* Standard Deviations appear in the parentheses beside the means.

\* =  $p < .05$ , \*\* =  $p < .008$  significant based on a Bonferroni Correction ( $0.05/6 = .008$ ),

\*\*\* =  $p < .001$ .

Table 5

*Differences in MSLQ Learning Strategy Means for College Students with ADHD Tendencies and Those with No ADHD Tendencies*

	ADHD Tendencies		<i>t</i>	<i>df</i>
	No Tendencies	ADHD Tendencies		
Cognitive and Metacognitive Strategies: Rehearsal	5.36 (1.17)	4.95 (1.25)	2.93**	308
Cognitive and Metacognitive Strategies: Elaboration	5.11 (1.04)	4.70 (1.18)	3.31**	308
Cognitive and Metacognitive Strategies: Organization	4.82 (1.24)	4.29 (1.36)	3.58***	308
Cognitive and Metacognitive Strategies: Critical Thinking	4.41 (1.24)	4.19 (1.20)	1.53	308
Cognitive and Metacognitive Strategies: Metacognitive Self-Regulation	4.72 (.89)	4.21 (.97)	4.82***	308
Resource Management Strategies: Time and Study Environment	5.23 (1.01)	4.47 (1.04)	6.52***	308
Resource Management Strategies: Effort Regulation	5.29 (1.05)	4.56 (1.14)	5.86***	308
Resource Management Strategies: Peer Learning	3.53 (1.56)	3.50 (1.43)	.16	308
Resource Management Strategies: Help Seeking	4.08 (1.27)	3.99 (1.27)	.59	308

*Note.* Standard Deviations appear in the parentheses beside the means.

\* =  $p < .05$ , \*\* =  $p < .006$  significant based on a Bonferroni Correction ( $0.05/9 = .006$ ),

\*\*\* =  $p < .001$ .

Table 6

*Summary of Multiple Regression Analysis on the Association between MSLQ Motivation Strategies and GPA*

Variable	<i>B</i>	<i>SE B</i>	$\beta$
Value Component: Intrinsic Goal Orientation	-.03	.05	-.05
Value Component: Extrinsic Goal Orientation	.01	.05	.01
Value Component: Task Value	.07	.05	.11
Expectancy Component: Control of Learning Beliefs	-.04	.05	-.06
Expectancy Component: Self-Efficacy for Learning and Performance	.16	.06	.22**
Affective Component: Test Anxiety	-.06	.03	-.11

*Note.*  $R^2 = .08$ ; adjusted  $R^2 = .07$ .

\* =  $p < .05$ , \*\* =  $p < .01$ .

Table 7

*Summary of Multiple Regression Analysis on the Association between MSLQ Learning Strategies and GPA*

Variable	<i>B</i>	<i>SE B</i>	$\beta$
Cognitive and Metacognitive Strategies: Rehearsal	-.06	.04	-.11
Cognitive and Metacognitive Strategies: Elaboration	.13	.05	.23*
Cognitive and Metacognitive Strategies: Organization	-.03	.04	-.05
Cognitive and Metacognitive Strategies: Critical Thinking	-.10	.04	-.19*
Cognitive and Metacognitive Strategies: Metacognitive Self-Regulation	-.05	.07	-.08
Resource Management Strategies: Time and Study Environment	.05	.05	.09
Resource Management Strategies: Effort Regulation	.15	.05	.27**
Resource Management Strategies: Peer Learning	.02	.04	.05
Resource Management Strategies: Help Seeking	-.04	.04	-.07

*Note.*  $R^2 = .13$ ; adjusted  $R^2 = .11$ .

\* =  $p < .05$ , \*\* =  $p < .01$ .

Table 8

*Correlations between ADHD Tendencies and GPA*

	1	2
1) ADHD Tendencies	–	-.11*
2) GPA	-.11*	–

*Note.* \* =  $p < .05$ , \*\* =  $p < .01$ .

Table 9

*GPA Means for College Students with and without ADHD Tendencies*

	ADHD Tendencies		<i>t</i>	<i>df</i>
	No Tendencies	ADHD Tendencies		
Student GPA	3.08 (.63)	2.92 (.64)	2.10*	301

*Note.* Standard Deviations appear in the parentheses beside the means.\* =  $p < .05$ .

Table 10

*MSLQ Motivation Strategy Means for College Students with Specific ADHD Subtype Tendencies*

	ADHD Tendency Subtypes		<i>t</i>	<i>df</i>
	Inattentive Subtype	Hyperactive and Impulsive Subtype		
Value Component: Intrinsic Goal Orientation	4.47 (.85)	5.03 (.95)	-2.57*	102
Value Component: Extrinsic Goal Orientation	5.58 (1.16)	6.15 (.88)	-2.58*	102
Value Component: Task Value	5.17 (1.04)	5.51 (.88)	-1.59	102
Expectancy Component: Control of Learning Beliefs	5.16 (.96)	5.52 (.80)	-1.88	102
Expectancy Component: Self-Efficacy for Learning and Performance	4.97 (1.04)	5.67 (.81)	-3.48**	102
Affective Component: Test Anxiety	4.13 (1.35)	4.10 (1.44)	.09	102

*Note.* Standard Deviations appear in the parentheses beside the means.

\* =  $p < .05$ , \*\* =  $p < .008$  significant based on a Bonferroni Correction ( $0.05/6 = .008$ ).



Table 11

*MSLQ Learning Strategy Means for College Students with Specific ADHD Subtype Tendencies*

	ADHD Tendency Subtypes		<i>t</i>	<i>df</i>
	Inattentive Subtype	Hyperactive and Impulsive Subtype		
Cognitive and Metacognitive Strategies: Rehearsal	4.98 (1.03)	5.41 (1.21)	-1.59	102
Cognitive and Metacognitive Strategies: Elaboration	4.62 (.96)	5.19 (.98)	-2.52*	102
Cognitive and Metacognitive Strategies: Organization	4.48 (1.22)	4.84 (1.27)	-1.22	102
Cognitive and Metacognitive Strategies: Critical Thinking	3.83 (1.28)	4.39 (1.25)	-1.91	102
Cognitive and Metacognitive Strategies: Metacognitive Self-Regulation	4.17 (.98)	4.79 (.82)	-3.08**	102
Resource Management Strategies: Time and Study Environment	4.26 (.77)	5.26 (.96)	-4.72**	102
Resource Management Strategies: Effort Regulation	4.48 (1.02)	5.35 (.91)	-4.01**	102
Resource Management Strategies: Peer Learning	3.11 (1.72)	3.74 (1.47)	-1.76	102
Resource Management Strategies: Help Seeking	3.76 (1.19)	4.18 (1.37)	-1.37	102

*Note.* Standard Deviations appear in the parentheses beside the means.

\* =  $p < .05$ , \*\* =  $p < .006$  significant based on a Bonferroni Correction ( $0.05/9 = .006$ ).

## Appendices

## Appendix A: Diagnostic Criteria for Attention-Deficit/Hyperactivity Disorder (314.xx)

**Diagnostic criteria for Attention-Deficit/Hyperactivity Disorder (314.xx)**

## A. Either (1) or (2):

- (1) six (or more) of the following symptoms of **inattention** have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:

*Inattention*

- (a) often fails to give close attention to details or makes careless mistakes in schoolwork, work, or other activities
- (b) often has difficulty sustaining attention in tasks or play activities
- (c) often does not seem to listen when spoken to directly
- (d) often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behavior or failure to understand instructions)
- (e) often has difficulty organizing tasks and activities
- (f) often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (such as schoolwork or homework)
- (g) often loses things necessary for tasks or activities (e.g., toys, school assignments, pencils, books, or tools)
- (h) is often easily distracted by extraneous stimuli
- (i) is often forgetful in daily activities

- (2) six (or more) of the following symptoms of **hyperactivity-impulsivity** have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:

*Hyperactivity*

- (a) often fidgets with hands or feet or squirms in seat
- (b) often leaves seat in classroom or in other situations in which remaining seated is expected
- (c) often runs about or climbs excessively in situations in which it is inappropriate (in adolescents or adults, may be limited to subjective feelings of restlessness)
- (d) often has difficulty playing or engaging in leisure activities quietly
- (e) is often "on the go" or often acts as if "driven by a motor"
- (f) often talks excessively

*Impulsivity*

- (g) often blurts out answers before questions have been completed
- (h) often has difficulty awaiting turn

- (i) often interrupts or intrudes on others (e.g., butts into conversations or games)
- (3) Some hyperactive-impulsive or inattentive symptoms that caused impairment were present before age 7 years.
- (4) Some impairment from the symptoms is present in two or more settings (e.g., at school [or work] and at home).
- (5) There must be clear evidence of clinically significant impairment in social, academic, or occupational functioning.
- (6) The symptoms do not occur exclusively during the course of a Pervasive Developmental Disorder, Schizophrenia, or other Psychotic Disorder and are not better accounted for by another mental disorder (e.g., Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder).

*Code based on type:*

**314.01 Attention-Deficit/Hyperactivity Disorder, Combined Type:** if both Criteria A1 and A2 are met for the past 6 months

**314.00 Attention-Deficit/Hyperactivity Disorder, Predominantly**

**Inattentive Type:** if Criterion A1 is met but Criterion A2 is not met for the past 6 months

**314.01 Attention-Deficit/Hyperactivity Disorder, Predominantly Hyperactive Impulsive Type:** if Criterion A2 is met but Criterion A 1 is not met for the past 6 months

**Coding note:** For individuals (especially adolescents and adults) who currently have symptoms that no longer meet full criteria, "In Partial Remission" should be specified.

### **314.9 Attention-Deficit/Hyperactivity Disorder Not Otherwise Specified**

This category is for disorders with prominent symptoms of inattention or hyperactivity-impulsivity that do not meet criteria for Attention-Deficit/Hyperactivity Disorder.

Examples include

1. Individuals whose symptoms and impairment meet the criteria for Attention-Deficit/Hyperactivity Disorder, Predominantly Inattentive Type but whose age at onset is 7 years or after
2. Individuals with clinically significant impairment who present with inattention and whose symptom pattern does not meet the full criteria for the disorder but have a behavioral pattern marked by sluggishness, daydreaming, and hypoactivity

## Appendix B: Barkley Adult ADHD Rating Scale-IV Childhood Symptoms

Use the 4-point scale below to respond to each of the items.

1	2	3	4
<i>Never or rarely</i>	<i>Sometimes</i>	<i>Often</i>	<i>Very often</i>

For the first 18 items, please circle the number next to each item below that best describes your behavior when you were a child BETWEEN 5 AND 12 YEARS OF AGE. Then answer the remaining two questions.

1.	Failed to give close attention to details or made careless mistakes in my work or other activities	1	2	3	4
2.	Had difficulty sustaining my attention in tasks or fun activities	1	2	3	4
3.	Didn't listen when spoken to directly	1	2	3	4
4.	Didn't follow through on instructions and failed to finish work or chores	1	2	3	4
5.	Had difficulty organizing tasks and activities	1	2	3	4
6.	Avoided, disliked, or was reluctant to engage in tasks that required sustained mental effort	1	2	3	4
7.	Lost things necessary for tasks or activities	1	2	3	4
8.	Was easily distracted by extraneous stimuli or irrelevant thoughts	1	2	3	4
9.	Was forgetful in daily activities	1	2	3	4
10.	Fidgeted with my hands or feet or squirmed in my seat	1	2	3	4
11.	Left my seat in classrooms or in other situations in which remaining seated was expected	1	2	3	4

		<i>Never or rarely</i>	<i>Sometimes</i>	<i>Often</i>	<i>Very often</i>
12.	Shifted around excessively or felt restless or hemmed in	1	2	3	4
13.	Had difficulty engaging in leisure activities quietly (felt uncomfortable, or was loud or noisy)	1	2	3	4
14.	Was "on the go" or acted as if "driven by a motor"	1	2	3	4
15.	Talked excessively	1	2	3	4
16.	Blurted out answers before questions had been completed, completed others' sentences, or jumped the gun	1	2	3	4
17.	Had difficulty awaiting my turn	1	2	3	4
18.	Interrupted or intruded on others (buted into conversations or activities without permission or took over what others were doing)	1	2	3	4

19. Did you experience any of these 18 symptoms at least "Often" or more frequently (Did you circle a 3 or a 4 above)?    **No**    **Yes**    *(Circle One)*

20. If so, in which of these settings did those symptoms impair your functioning? Place a check mark (✓) next to all of the areas that apply to you.

\_\_\_ School

\_\_\_ Home

\_\_\_ Social Relationships

## Appendix C: Barkley Adult ADHD Rating Scale-IV Current Symptoms

Use the 4-point scale below to respond to each of the items.

1	2	3	4
<i>Never or rarely</i>	<i>Sometimes</i>	<i>Often</i>	<i>Very often</i>

For the first 27 items, please circle the number next to each item below that best describes your behavior DURING THE PAST 6 MONTHS. Then answer the remaining three questions.

- |   |   |   |   |   |
|---|---|---|---|---|
| 1. Fail to give close attention to details or make careless mistakes in my work or other activities | 1 | 2 | 3 | 4 |
| 2. Difficulty sustaining my attention in tasks or fun activities                                    | 1 | 2 | 3 | 4 |
| 3. Don't listen when spoken to directly   | 1 | 2 | 3 | 4 |
| 4. Don't follow through on instructions and fail to finish work or chores                           | 1 | 2 | 3 | 4 |
| 5. Have difficulty organizing tasks and activities  | 1 | 2 | 3 | 4 |
| 6. Avoid, dislike, or am reluctant to engage in tasks that require sustained mental effort          | 1 | 2 | 3 | 4 |
| 7. Lose things necessary for tasks or activities  | 1 | 2 | 3 | 4 |
| 8. Easily distracted by extraneous stimuli or irrelevant thoughts                                   | 1 | 2 | 3 | 4 |
| 9. Forgetful in daily activities  | 1 | 2 | 3 | 4 |
| 10. Fidget with hands or feet or squirm in seat   | 1 | 2 | 3 | 4 |
| 11. Leave my seat in classrooms or in other situations in which remaining seated is expected        | 1 | 2 | 3 | 4 |

	<i>Never or rarely</i>	<i>Sometimes</i>	<i>Often</i>	<i>Very often</i>
12. Shift around excessively or feel restless or hemmed in	1	2	3	4
13. Have difficulty engaging in leisure activities quietly (feel uncomfortable, or am loud or noisy)	1	2	3	4
14. I am "on the go" or act as if "driven by a motor" (or I feel like I have to be busy or always doing something)	1	2	3	4
15. Talk excessively (in social situations)	1	2	3	4
16. Blur out answers before questions have been completed, complete others' sentences, or jump the gun	1	2	3	4
17. Have difficulty awaiting my turn	1	2	3	4
18. Interrupt or intrude on others (butt into conversations or activities without permission or take over what others are doing)	1	2	3	4
19. Prone to daydreaming when I should be concentrating on something or working	1	2	3	4
20. Have trouble staying alert or awake in boring situations	1	2	3	4
21. Easily confused	1	2	3	4
22. Easily bored	1	2	3	4
23. Spacey or "in a fog"	1	2	3	4
24. Lethargic, more tired than others	1	2	3	4
25. Underactive or have less energy than others	1	2	3	4

	<i>Never or rarely</i>	<i>Sometimes</i>	<i>Often</i>	<i>Very often</i>
26. Slow moving	1	2	3	4
27. I don't seem to process information as quickly or as accurately as others	1	2	3	4

28. Did you experience any of these 18 symptoms at least "Often" or more frequently (Did you circle a 3 or a 4 above)? **No** **Yes** (*Circle One*)

29. If so, how old were you when those symptoms began? (*Fill in the blank*)

I was \_\_\_\_\_ years old.

30. If so, in which of these settings did those symptoms impair your functioning? Place a check mark (✓) next to all of the areas that apply to you.

\_\_\_ School

\_\_\_ Home

\_\_\_ Work

\_\_\_ Social Relationships



## Appendix D: Motivated Strategies for Learning Questionnaire

Use the 7-point scale below to respond to each of the items, indicating how true each of the statements is about you. If you think the statement is very true of you, indicate a 7; if a statement is not at all true of you, indicate a 1. If the statement is more or less true of you, find the number between 1 and 7 that best describes you.

	1	2	3	4	5	6	7
	<i>Not at all true of me</i>				<i>Very true of me</i>		
1. I prefer course material that really challenges me so I can learn new things.	1	2	3	4	5	6	7
2. If I study in appropriate ways, then I will be able to learn the material in my courses.	1	2	3	4	5	6	7
3. When I take a test I think about how poorly I am doing compared with other students.	1	2	3	4	5	6	7
4. I think I will be able to use what I learn in most courses in other courses I take.	1	2	3	4	5	6	7
5. I believe I will receive excellent grades in my classes.	1	2	3	4	5	6	7
6. I'm certain I can understand the most difficult material presented in the readings assigned to me in my classes.	1	2	3	4	5	6	7
7. Getting good grades is the most satisfying thing for me right now.	1	2	3	4	5	6	7
8. When I take a test I think about items on other parts of the test I can't answer.	1	2	3	4	5	6	7
9. It is my own fault if I don't learn the material in a course.	1	2	3	4	5	6	7
10. It is important for me to learn the course material.	1	2	3	4	5	6	7

	not at all true of me						very true of me
11. The most important thing for me right now is improving my overall grade point average, so my main concern in my classes is getting good grades.	1	2	3	4	5	6	7
12. I'm confident I can learn the basic concepts taught in my courses.	1	2	3	4	5	6	7
13. If I can, I want to get better grades than most other students.	1	2	3	4	5	6	7
14. When I take tests I think of the consequences of failing.	1	2	3	4	5	6	7
15. I'm confident I can understand the most complex material presented by my instructors.	1	2	3	4	5	6	7
16. I prefer course material that arouses my curiosity, even if it is difficult to learn.	1	2	3	4	5	6	7
17. I am very interested in the content area of my courses.	1	2	3	4	5	6	7
18. If I try hard enough, then I will understand the course material.	1	2	3	4	5	6	7
19. I have an uneasy, upset feeling when I take an exam.	1	2	3	4	5	6	7
20. I'm confident I can do an excellent job on my assignments and tests.	1	2	3	4	5	6	7
21. I expect to do well in my classes.	1	2	3	4	5	6	7
22. The most satisfying thing for me in my courses is trying to understand the content as thoroughly as possible.	1	2	3	4	5	6	7
23. I think the course material in my classes is useful for me to learn.	1	2	3	4	5	6	7

	not at all true of me						very true of me	
	1	2	3	4	5	6	7	
24. When I have the opportunity, I choose course assignments that I can learn from even if they don't guarantee a good grade.	1	2	3	4	5	6	7	
25. If I don't understand the course material, it is because I didn't try hard enough.	1	2	3	4	5	6	7	
26. I like the subject matter of my courses.	1	2	3	4	5	6	7	
27. Understanding the subject matter of my courses is very important to me.	1	2	3	4	5	6	7	
28. I feel my heart beating fast when I take an exam.	1	2	3	4	5	6	7	
29. I'm certain I can master the skills being taught in my classes.	1	2	3	4	5	6	7	
30. I want to do well in my classes because it is important to show my ability to my family, friends, employer, or others.	1	2	3	4	5	6	7	
31. Considering the difficulty of my courses, the teachers, and my skills, I think I will do well.	1	2	3	4	5	6	7	
32. When I study the readings for my courses, I outline the material to help me organize my thoughts.	1	2	3	4	5	6	7	
33. During class time I often miss important points because I'm thinking of other things.	1	2	3	4	5	6	7	
34. When studying for a class, I often try to explain the material to a classmate or friend.	1	2	3	4	5	6	7	
35. I usually study in a place where I can concentrate on my course work.	1	2	3	4	5	6	7	
36. When reading for a class, I make up questions to help focus my reading.	1	2	3	4	5	6	7	

	not at all true of me						very true of me
37. I often feel so lazy or bored when I study that I quit before I finish what I planned to do.	1	2	3	4	5	6	7
38. I often find myself questioning things I hear or read to decide if I find them convincing.	1	2	3	4	5	6	7
39. When I study for my classes, I practice saying the material to myself over and over.	1	2	3	4	5	6	7
40. Even if I have trouble learning class material, I try to do the work on my own, without help from anyone.	1	2	3	4	5	6	7
41. When I become confused about something I'm reading for a class, I go back and try to figure it out.	1	2	3	4	5	6	7
42. When I study for a class, I go through the readings and my class notes and try to find the most important ideas.	1	2	3	4	5	6	7
43. I make good use of my study time.	1	2	3	4	5	6	7
44. If course readings are difficult to understand, I change the way I read the material.	1	2	3	4	5	6	7
45. I try to work with other students from my classes to complete the course assignments.	1	2	3	4	5	6	7
46. When studying for my classes, I read my class notes and the course readings over and over again.	1	2	3	4	5	6	7
47. When a theory, interpretation, or conclusion is presented in class or in the readings, I try to decide if there is good supporting evidence.	1	2	3	4	5	6	7

	not at all true of me						very true of me
48. I work hard to do well in my classes even if I don't like what we are doing.	1	2	3	4	5	6	7
49. I make simple charts, diagrams, or tables to help me organize course material.	1	2	3	4	5	6	7
50. When studying for a class, I often set aside time to discuss course material with a group of students from the class.	1	2	3	4	5	6	7
51. I treat the course material as a starting point and try to develop my own ideas about it.	1	2	3	4	5	6	7
52. I find it hard to stick to a study schedule.	1	2	3	4	5	6	7
53. When I study, I pull together information from different sources, such as lectures, readings, and discussions.	1	2	3	4	5	6	7
54. Before I study new course material thoroughly, I often skim it to see how it is organized.	1	2	3	4	5	6	7
55. I ask myself questions to make sure I understand the material I have been studying.	1	2	3	4	5	6	7
56. I try to change the way I study in order to fit the course requirements and the instructor's teaching style.	1	2	3	4	5	6	7
57. I often find that I have been reading assigned material, but don't know what it was all about.	1	2	3	4	5	6	7
58. I ask the instructor to clarify concepts I don't understand well.	1	2	3	4	5	6	7
59. I memorize key words to remind me of important concepts.	1	2	3	4	5	6	7

	not at all true of me						very true of me
60. When course work is difficult, I either give up or only study the easy parts.	1	2	3	4	5	6	7
61. I try to think through a topic and decide what I am supposed to learn from it rather than just reading it over when studying.	1	2	3	4	5	6	7
62. I try to relate ideas in my classes to those in other courses whenever possible.	1	2	3	4	5	6	7
63. When I study, I go over my class notes and make an outline of important concepts.	1	2	3	4	5	6	7
64. When reading for my classes, I try to relate the material to what I already know.	1	2	3	4	5	6	7
65. I have a regular place set aside for studying.	1	2	3	4	5	6	7
66. I try to play around with ideas of my own related to what I am learning in my courses.	1	2	3	4	5	6	7
67. When I study, I write brief summaries of the main ideas from the readings and my class notes.	1	2	3	4	5	6	7
68. When I can't understand the material in a course, I ask another student in the class for help.	1	2	3	4	5	6	7
69. I try to understand the material in my classes by making connections between the readings and the concepts from the lectures.	1	2	3	4	5	6	7
70. I make sure that I keep up with the weekly readings and assignments in my classes.	1	2	3	4	5	6	7
71. Whenever I read or hear an assertion or conclusion in a class, I think about possible alternatives.	1	2	3	4	5	6	7

	not at all true of me						very true of me
72. I make lists of important items for my courses and memorize the lists.	1	2	3	4	5	6	7
73. I attend class regularly.	1	2	3	4	5	6	7
74. Even when course materials are dull and uninteresting, I manage to keep working until I finish.	1	2	3	4	5	6	7
75. I try to identify students in my classes whom I can ask for help if necessary.	1	2	3	4	5	6	7
76. When studying for a course I try to determine which concepts I don't understand well.	1	2	3	4	5	6	7
77. I often find that I don't spend very much time on my courses because of other activities.	1	2	3	4	5	6	7
78. When I study, I set goals for myself in order to direct my activities in each study period.	1	2	3	4	5	6	7
79. If I get confused taking notes in class, I make sure I sort it out afterwards.	1	2	3	4	5	6	7
80. I rarely find time to review my notes or readings before an exam.	1	2	3	4	5	6	7
81. I try to apply ideas from course readings in other class activities such as lecture and discussion.	1	2	3	4	5	6	7

## Appendix E: Demographic Questionnaire

**Demographic Questions**

1. **How old are you?** \_\_\_\_\_
2. **What is your gender:** (Circle one)
  - Male
  - Female
3. **What is your ethnicity:** (Circle one)
  - White
  - Hispanic or Latino
  - Black or African American
  - Native American or American Indian
  - Asian / Pacific Islander
  - Other
4. **Have you ever been diagnosed with ADHD?** (Circle one)
  - Yes
  - No

**IF YOU ANSWERED YES TO QUESTION 4, PLEASE ANSWER THE FOLLOWING:**

5. **Were you diagnosed with:** (Circle one)
  - Primarily inattentive type
  - Primarily hyperactive/impulse type
  - Combined type
6. **At what age were you diagnosed?** \_\_\_\_\_
7. **Are you currently taking medication for ADHD?** (Circle one)
  - Yes
  - No
8. **Have you ever received medication treatment for your ADHD?** (Circle one)
  - Yes
  - No
9. **Have you ever received behavioral therapy for your ADHD?** (Circle one)
  - Yes
  - No