A PILOT RANDOMIZED CONTROLLED TRIAL OF A COACHING INTERVENTION FOR COLLEGE STUDENTS WITH ADHD

by

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College students with attention deficit/hyperactivity disorder (ADHD) are at risk for poor outcomes including low academic achievement, difficulties in social functioning, and comorbid anxiety disorders. Treatment research for college students with ADHD is limited, and it is unclear if comorbid anxiety complicates or enhances treatment efforts. This study examined the acceptability and efficacy of a coaching intervention for college students with ADHD and investigated whether anxiety moderated the relationship between treatment status and psychoeducational outcomes. Twenty students were randomly assigned to an ADHD coaching treatment condition (n = 10) or a control condition (n = 10). Students who received the coaching treatment were significantly more satisfied and found the procedures significantly more acceptable compared to students in the control condition. The effects of coaching on psychoeducational outcomes over time were inconclusive, but trended in the anticipated direction with effect sizes in the small to moderate range. The results of simple moderation analyses indicated that student anxiety explains a small portion of the variance in student outcomes, with trends consistently suggesting that coaching was most impactful for college students with low anxiety. Implications of these findings are discussed along with suggestions for future research.

A PILOT RANDOMIZED CONTROLLED TRIAL OF A COACHING INTERVENTION FOR COLLEGE STUDENTS WITH ADHD

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CHAPTER I: INTRODUCTION AND LITERATURE REVIEW

College is usually an exciting—albeit challenging—transition for young adults. For many students it is the first time they have lived independently, which brings less supervision from parents and teachers, more unstructured time, and a more rigorous academic load than ever before (Blase et al., 2009). For young adults with attention-deficit/hyperactivity disorder (ADHD), the college experience can be especially challenging. In fact, some researchers argue that students with ADHD experience college with a "double deficit" (Fleming & McMahon, 2012, p. 311); specifically, the brain structures involved in higher order cognitive functions (e.g., planning, organization, goal setting, delaying gratification) are still developing during young adulthood, and these skills tend to be poorer in students with ADHD than in typically developing individuals. Along with this double deficit in executive functioning, the context of college adds another dimension of difficulty as there is a sudden loss of structure and parental supervision. Moreover, there are increased demands for long-term planning and organization and wider availability of immediate, short-term rewards (e.g., enjoyable social events). Overall, the demands on executive functioning increase substantially during college, but the drastic reduction in individualized resources and assistance within the college context coupled with underdeveloped executive functioning skills among students with ADHD makes it especially challenging for them to meet the increased demands.

Researchers have recently begun to examine college students with ADHD and the academic, psychological, neuropsychological, and social issues they face. In general, it appears that college students with ADHD are impaired in several domains, including academic achievement, psychological adjustment, emotional expression, social interactions, occupational functioning, and driving performance (DuPaul, Weyandt, O'Dell, & Varejao, 2009; Fleming &

McMahon, 2012; Weyandt & DuPaul, 2008). Most of these impairments reflect predictable challenges as individuals with ADHD transition from adolescence to young adulthood, but other findings are surprising. For example, college students with ADHD appear to be at an increased risk for comorbid anxiety disorders when compared to typically developing college peers (e.g., Prevatt, Dehili, Taylor, & Marshall, 2015). It is also unclear whether comorbid anxiety interferes with treatment attempts or improves students' response to interventions (Prevatt & Yelland, 2015). In any event, few researchers have investigated psychosocial treatments for this population (DuPaul et al., 2009). The purpose of this study is threefold: (a) to investigate the feasibility of and participants' satisfaction with an innovative treatment package for college students with ADHD; (b) to determine the degree to which the intervention improves outcomes for students when compared to typical, campus-based service provision; and (c) to explore the degree to which treatment response depends on symptoms of anxiety.

Overview of ADHD Symptoms

ADHD is characterized by atypical and chronic levels of inattention and/or hyperactivity/impulsivity that significantly impact one's functioning (Fleming & McMahon, 2012). Although ADHD was once believed to be limited to childhood, current research has shown that ADHD often persists into adolescence and adulthood, particularly for symptoms of inattention (Resnick, 2005). In adulthood, hyperactive/impulsive symptoms can present as impatience, excessive talkativeness, impulsively shifting jobs or relationships, poor driving performance, and engaging in sensation-seeking behavior (Prevatt & Levrini, 2015). Inattentive symptoms in adulthood are often experienced as forgetfulness, disorganization, frequently losing personal belongings, chronic lateness, difficulty with decision making, and getting distracted easily. Symptoms of inattention among college-aged students predict difficulties with academic

adjustment, career efficacy, and study skills more so than symptoms of hyperactivity (Norwalk, Norvilitis, & MacLean, 2009).

It is difficult to estimate the exact prevalence of ADHD among college students because students are not required to disclose disabilities. Additionally, many studies examining prevalence rates rely on student self-report of ADHD symptoms and do not assess the age of symptom onset or degree of impairment, which are two criteria for diagnosis (Green & Rabiner, 2012). DuPaul and colleagues (2009) synthesized the results of several studies examining the prevalence of ADHD in various universities and concluded that approximately 2% to 8% of college students report clinically significant ADHD symptoms. Furthermore, it is estimated that about 25% of students who receive disability services while in college are diagnosed with ADHD (Wolf, 2001). Thus, it seems clear that there are a number of college students with symptoms consistent with ADHD, despite the methodological limitations associated with prevalence research.

ADHD and Academic Impairment

In theory, students with ADHD who pursue higher education represent an unusually high-functioning subgroup of individuals with ADHD when compared to comparable peers who do not attend college. More specifically, college students with ADHD likely possess several resiliency factors, such as higher cognitive ability and effective compensatory skills (Frazier, Youngstrom, Glutting, & Watkins, 2007). Still, college students with ADHD perform well-below their typically developing peers. For instance, several reviews of the literature have indicated that college students with ADHD tend to have lower GPAs than students without ADHD (DuPaul et al., 2009; Fleming & McMahon, 2012, Green & Rabiner, 2012, Weyandt & DuPaul, 2008). Students with ADHD have also been found to perform worse on weekly class

assignments when compared to students without ADHD (Weyandt et al., 2013). A meta-analysis investigating the achievement of children, adolescents, and adults with ADHD revealed a significant, moderate to large effect of ADHD (d = 0.71) on academic achievement, indicating that individuals with ADHD perform well below their typically developing peers on academic achievement measures through young adulthood (Frazier et al., 2007). College students with ADHD also have lower graduation rates (Wolf, 2001) and are more likely to be on academic probation compared to typically developing peers (Frazier et al., 2007).

ADHD and Anxiety

In addition to academic impairment, researchers have begun to investigate how ADHD affects psychological adjustment among college students. However, there is less research regarding psychological adjustment than other areas like academic functioning (Dupaul et al., 2009; Weyandt & DuPaul, 2008). Results have been inconsistent, but in general, college students with ADHD experience more psychological difficulty and are at risk for psychological distress and low self-esteem (Green & Rabiner, 2012; Weyandt & DuPaul, 2008). Specifically, reviews of the literature indicate that college students with ADHD are considered at higher risk for depression than their typically developing peers, and they may be at risk for substance abuse. The relationship between ADHD and anxiety, however, is less clear. Although it is well documented that children with ADHD are at risk for elevated anxiety, there are currently few studies investigating anxiety among college students with ADHD (Nelson & Gregg, 2012; Prevatt et al., 2015).

Prevatt and colleagues (2015) found significantly higher levels of self-reported anxiety among college students with ADHD (n = 473) compared to typically developing peers (n = 200), and students with ADHD tended to report more anxiety in relation to school than in their daily

lives. Weyandt and colleagues (2013) surveyed college students with (n = 24) and without (n = 26) ADHD across two universities and found that students with ADHD self-reported significantly higher levels of anxiety compared to their typically developing peers. However, it is important to note that college students' self-reported levels of anxiety fell within normal limits relative to the standardization sample of the self-report measure. Lewandowski, Gathje, Lovett, and Gordon (2013) assessed test anxiety among college students with ADHD and found that students with ADHD (n = 35) reported significantly higher levels of test anxiety compared to typically developing peers (n = 85) after taking several timed, computerized reading tests. In contrast, Nelson and Gregg (2012) did not find significant differences in self-reported anxiety between college students with ADHD, dyslexia, or ADHD and dyslexia. There also were no significant differences in self-reported anxiety between these three groups and typically developing college students. Overall, college students with ADHD may experience more anxiety compared to typically developing peers, but research is needed to clarify the nature, degree, and impact of comorbid anxiety in this population.

Additionally, it is unclear whether anxiety can serve a beneficial function for college students with ADHD. As mentioned previously, students with ADHD who attend college likely have attributes that make them more resilient than other students with ADHD who do not attend college. Perhaps some degree of anxiety can serve as a protective factor for college students with ADHD. Research in this area is limited, but there are a few studies investigating the impact of anxiety on the performance of college students with ADHD. Prevatt and colleagues (2015) examined cognitive functioning among college students with ADHD and comorbid anxiety (N = 453). They found an interaction between anxiety and inattention where students with high anxiety but low levels of inattention performed the best on memory tasks as well as verbal and

nonverbal reasoning tasks. Based on these findings, the researchers speculated that there may be some benefits to anxiety symptoms that are comorbid with ADHD. However, in a study investigating the impact of symptoms of anxiety and depression on outcomes in a coaching treatment intervention, lower initial levels of anxiety and depression were correlated with higher change scores in learning and study strategies, and students with higher initial levels of anxiety and depression were less likely to experience positive gains in skills (Prevatt & Yelland, 2015). The authors interpreted this finding as indicating that high anxiety and depression are barriers for making progress in treatment. However, the lack of a control group in this study limits the possible conclusions that can be drawn regarding the impact of anxiety on response to treatment. It is possible that the students with low anxiety have more to gain from treatment compared to students with high anxiety, but the lack of a control condition did not allow the researchers to examine this possibility.

Treatment Options in College

Accommodations. College students with ADHD are clearly impaired in several domains relative to peers, but there are few treatments targeted to this population. One common practice is for students to receive accommodations through disability support services on college campuses. Such services are provided to comply with the Americans with Disabilities Amendments Act and Section 504 of the Rehabilitation Act of 1973 (Hamblet, 2014). These laws define what constitutes a disability, prohibit discrimination against individuals with disabilities in schools and in the work place, and require institutions to ensure that students with disabilities have equal access to education (Jacob, Decker, & Hartshorne, 2011). Students must self-identify with a disability and seek out the accommodations provided via disability support offices in order to receive them. Some examples of common academic accommodations

provided for college students with ADHD include extended time on exams and testing in distraction-free environments (Ramsey & Rostain, 2006).

There are few studies investigating the efficacy of academic accommodations for college students with ADHD, so it is unclear what impact these accommodations have on student outcomes (DuPaul et al., 2009; Green & Rabiner, 2012; Lee, Osborne, Hayes, & Simoes, 2008; Trammell, 2014; Weyandt & DuPaul, 2008). A correlational study examined the relationship between specific accommodations and end-of-year GPA among randomly sampled students at a four-year college who had self-identified as having a learning disability (LD), ADHD, or both (Trammell, 2014). Students with ADHD and students with both ADHD and LD who used audiobooks, extended time on tests, a separate testing environment, and audio-recorded classes had higher end-of-year GPAs than students who did not use accommodations. However, the statistical significance for each accommodation was not reported, so it is unclear whether the differences were meaningful. Interestingly, the mean GPA for the entire sample was highest when only one accommodation was used.

An experimental study investigated the potential benefit of computer-based testing by comparing the outcomes of self-paced and computer-paced testing formats for college students with ADHD (Lee, Osborne, Hayes, & Simoes, 2008). There were no significant differences in test scores between the two conditions, but a concurrent qualitative analysis of participants' perceptions indicated that computer-based testing was beneficial for the students overall, and students preferred the distraction-free testing environment created by computers. The potential benefits of computer-based testing were addressed in a follow-up study (Lee, Osborne, & Carpenter, 2010). In this investigation, researchers examined the performance of college students with ADHD on a computerized versus a paper-pencil test, and compared their

performance with extended versus regular time within each testing format. Students who took the computerized tests performed significantly better than students who took the paper-pencil tests, regardless of the amount of time received, indicating that computer testing may be beneficial for college students with ADHD. In contrast to previous findings, the majority of students in this study reported that they preferred paper-pencil tests to computerized tests. Overall, results regarding the benefits for computer-based testing for college students with ADHD are equivocal thus far.

Based on these investigations, it is unclear to what extent extended time enhances student performance. Several studies have investigated the impact of extended time on the performance of college students with learning disabilities; however, overall results from such studies are equivocal as some researchers have found increased performance with extended time and others have not (Lee et al., 2008). Therefore, due to the lack of experimental research investigating the efficacy of accommodations for college students with ADHD and methodological limitations of correlational investigations, it is currently unclear to what degree the accommodations typically offered by campus disability services enhance the academic performance of college students with ADHD. Moreover, these findings may indicate that academic accommodations alone are ineffective.

Medications. Although medication is commonly recommended as a viable treatment option for college students with ADHD (e.g., Staufer & Greydanus, 2005) there is little relevant research (DuPaul et al., 2009). Surveys have indicated that students with ADHD who take medication experience a similar amount of impairment compared to students with ADHD who do not take medication, suggesting that medication may not enable students to overcome the impairments (Advokat, Lane, & Luo et al., 2010; Blase et al., 2009). To date, only one double-

blind, placebo-controlled trial has been conducted with college students investigating the efficacy of stimulant medication (i.e., Lisdexamfetamine Dimesylate [LDX]; trade named Vyvanse). In this study, 24 students with ADHD from two different four-year universities in the United States participated in a five-phase study design (Dupaul et al., 2012). The week-long phases included a no-medication baseline, a placebo, and 30mg, 50mg, and 70mg doses of LDX. ADHD symptoms, executive functioning, behavior regulation, verbal learning/memory, psychological functioning, social functioning, and alcohol/substance use were assessed. A group of 26 college students without ADHD also completed the outcome measures so that the performance of students with ADHD could be compared to that of typically developing students attending the universities. Results indicated that symptoms of inattention/memory problems, hyperactivity/restlessness, overall ADHD symptoms, and executive functioning (e.g., organization, study skills, time management, planning) significantly improved with increased dosages of LDX compared to the no-medication baseline and placebo conditions. These results are consistent with medication trials with adult populations and support the efficacy of LDX for treating ADHD among college students. However, students with ADHD were still impaired in attention and executive functioning compared to the sample of typically developing college students, indicating that college students often need psychosocial treatment in addition to medication. Unfortunately, research on psychosocial treatments for college students is lacking.

Psychosocial coaching. There are currently few studies investigating the impact of psychosocial and academic interventions for college students with ADHD (DuPaul et al., 2009; Fleming & McMahon, 2012; Green & Rabiner, 2012; Weyandt & DuPaul, 2008), and the studies that have been completed lack methodological rigor. As a result, the conclusions that can be drawn from treatment studies to date are limited. One potentially promising treatment option is

coaching. Coaching involves a collaborative relationship between a coach and the student with ADHD. Coaches primarily use a Socratic process to empower students to develop and use strategies to compensate for ADHD (Swartz, Prevatt, & Proctor, 2005), often focusing on time management, note taking methods, study skills, organization, and psychoeducation about ADHD in general (Zwart & Kallemeyn, 2001). Additionally, coaches guide students in setting long-term goals and help students work toward weekly objectives. Usually coaches meet with students weekly or biweekly and help them monitor their progress toward goals, often using their own reward systems. Ideally, the students internalize the coach's questions, allowing them to self-regulate their strategy use and monitor their own progress (Swartz et al., 2005). Finally, differs from psychotherapy in that coaches do not explore severe emotional, cognitive, or behavioral problems with the student (Goldstein, 2005). Thus, coaching is not intended to replace psychotherapy and tends to be more of a psychoeducational process as compared to a therapeutic experience.

Although coaching has become popular during the past decade, there is insufficient evidence to support its efficacy for college students with ADHD (Fleming & McMahon, 2012; Goldstein, 2005). Nevertheless, one randomized controlled trial, several quasi-experimental investigations, and several qualitative studies have been conducted. For example, Field, Parker, Sawilowsky, and Rolands (2010) investigated the efficacy of the Edge coaching model among college students with ADHD. The Edge model involves 24 weekly phone or Skype sessions targeting organization, prioritizing, scheduling, confidence building, goal setting, focusing, and task persistence. Students with a diagnosis of ADHD and other comorbid conditions were recruited from disability offices across 10 college campuses to participate in this study. A total of 127 students participated and were randomly assigned to receive the coaching treatment (n =

88) or a control group (n = 39). Students completed the *Learning and Study Strategies Inventory* (LASSI; Weinstein & Palmer, 2002) pre and post intervention. The researchers analyzed group differences on LASSI total scores and subscale scores (self-regulation, skill, and will) and found significantly greater gains in all areas among students in the coaching condition relative to the control condition. The researchers also collected data on GPA and completed credit hours, but no significant differences in changes in these domains between the treatment and control condition were found. Additionally, the researchers developed the College Well-being survey and compared well-being between conditions at posttest. Students in the treatment condition reported significantly higher well-being at posttest relative to the control condition. Based on these findings, the authors concluded that the Edge coaching model is a highly effective intervention for college students with ADHD. It is important to note that this study was published in a report submitted to the Edge Foundation and has not been subjected to peer review. Nevertheless, the randomized controlled design is a strength of this study. Overall, this study provides preliminary evidence of the efficacy of coaching for college students with ADHD.

Prevatt and Yelland (2015) conducted an investigation of the efficacy of a coaching intervention for college students with ADHD over a five-year period at a university in the Southeastern United States. A total of 148 students participated in this study, with all students receiving an 8-week coaching intervention delivered individually, face-to-face on a weekly basis. Similarly to the other quantitative studies mentioned above, Prevatt and Yelland (2015) found significant pre-post improvement in LASSI subscale scores, self-esteem, and symptom distress, social role, and total score measured by the *Outcome Questionaire-45* (OQ-45, Lambert & Finch, 1999). As mentioned previously, the researchers also examined correlations between initial

levels of anxiety and depression and found that lower anxiety was correlated with bigger change scores from pre to posttest. The lack of a control group and the reliance on self-report measures are limitations of this study. Additionally, the correlational analysis of the impact of anxiety on changes overtime does not allow for a nuanced examination of how anxiety influences outcomes.

Zwart and Kallemeyn (2001) investigated the impact of a peer-based coaching program on college students' self-efficacy and study skills with a quasi-experimental design. Twenty-seven students were recruited from the disabilities office at a four-year college to participate in a semester-long coaching program. An additional 23 students were recruited from the office to serve as a no treatment control group. The participants were diagnosed with either ADHD (72%), LD (22%), both ADHD and LD (22%), or no diagnosis but struggling academically (6%). The coaching program utilized peer coaches who were hired via professor recommendation. The peer coaches were given basic information on ADHD and LD and trained to help students with time management skills, self-advocacy, study skills, note taking skills, and organization. Peer coaches also helped participants monitor their progress. The results of this study indicated that students in the peer coaching group experienced significant improvements compared to the control group in their motivation for completing school-related tasks, time management, anxiety about performance in school, ability to select main ideas, and test preparation as measured by self-report on the LASSI. Therefore, peer-based coaching appears to be a promising intervention for college students with disabilities. However, it is unclear how the program impacts students with ADHD because students with LD and with no diagnosis were included in this study. Additionally, the study relied solely on students' self-report, which limits the outcomes to a single, subjective measure.

Three qualitative studies have investigated college students' perceptions of coaching. Parker and Boutelle (2009) interviewed seven students who received coaching services at a two-year postsecondary institution during the 2006 to 2007 school year. Overall themes that emerged from the qualitative analysis were that coaching helped students improve their self-awareness and helped them clarify and accomplish goals. Students also stated that coaching helped them learn to break larger projects into smaller tasks, manage their time more effectively, and use self-talk as a means to accomplish their goals. Additionally, coaching seemed to enhance students' quality of life by reducing stress and anxiety. Although the authors noted that severe anxiety is best treated in a therapeutic setting, they speculated that coaching may help alleviate stress among students, which could lead to a reduction in anxiety.

Similar themes emerged in a second qualitative study investigating students' perceptions of a semester-long coaching program offered at a selective four-year university (Parker, Hoffman, Sawilowsky, & Rolands, 2011). Seven college students diagnosed with ADHD and registered with the disability support office on campus participated in this study. Coaching involved weekly phone calls and typically targeted scheduling, goal setting, confidence building, organizational skills, focus, prioritizing skills, and persisting at tasks. Most of the students who participated were successful academically, even before the start of the program. Overall, students reported that coaching helped them approach their goals more effectively, improved their time management skills and ability to break large tasks down into smaller parts, boosted their confidence, and helped them learn how to manage and minimize daily stress. GPA was also analyzed as a part of this study and overall, the group mean GPA improved after the semester of coaching. Interestingly, only one student attributed improved grades specifically to coaching. The LASSI was also administered before and after treatment and positive trends were

observed in the three cluster scores (skill, will, and self-regulation), with the largest increase observed in self-regulation.

In another qualitative study, 19 students across 10 universities participated in a yearlong coaching program with the coaching sessions conducted over the phone (Parker, Hoffman, Sawilowsky, & Rolands, 2013). The program focused on seven major areas: goal setting, confidence building, scheduling, organizing, prioritizing, persisting at tasks, and focusing. Although students did not report with certainty that coaching helped them improve their GPA, they did feel that coaching helped them work toward goals in a more effective manner by helping them develop better time management skills, organization systems, and individualized learning/study strategies. Coaching also helped students develop better coping strategies by enhancing their use of self-talk, and it helped them overcome difficulties associated with ADHD such as poor time management, distractibility, or restlessness. Another theme was that coaching helped students be more productive in goal setting by teaching them to set more realistic goals, reflect on goals, maintain motivation especially because of the accountability involved, and create more specific plans to attain goals. Finally, students also reported having more effective learning approaches, greater self-efficacy, and a better overall wellbeing. Taken together, the results of these qualitative studies indicate that coaching appears to improve students' self regulation and goal setting ability, helps with stress management/reduction, and helps students develop specific strategies such as organization skills or better time management. Moreover, students tend to view coaching positively. However, conclusions regarding the extent to which coaching results in objective changes in students' functioning are untenable based on qualitative studies alone.

Finally, Swartz and colleagues (2005) conducted a case study to examine the effectiveness of an eight-week coaching program for a young woman in her senior year of college who had been diagnosed with ADHD, depression, and anxiety. The coaching process focused mostly on time management. After eight weeks, the student self-reported improvements in concentration, time management, use of study aides, and test strategies as measured by the LASSI. It was not reported whether these gains were clinically significant. All of the measures used in this case study were based on self-report, and although the results of the case study seem to support the use of coaching for treating academic impairments in college students with ADHD, more research is needed with larger samples to determine if these results are sustainable and generalizable to other students.

Academic strategy instruction. A related type of treatment for college students with ADHD was examined by Allsopp, Minskoff, and Bolt (2005). In this study, 46 college students with LD (57%), ADHD (21%), or both (17%) received individualized course-specific strategy instruction for at least one semester. Strategy instruction began with the instructors examining course syllabi and assignments for each student to determine the demands of each course. Additionally, students completed both formal and informal measures to select appropriate learning strategies to focus on. Instructors provided explicit strategy instruction in organization, test taking, studying skills, note taking, reading, writing, math, and critical thinking. The explicit instruction methods used to teach these skills included using advanced organizers of session components, modeling strategy use, engaging in guided practice, having the student independently practice using the strategy, and monitoring the students' application of the strategy. Students generally received at least one instructional session per week. Although skills similar to those targeted in the previously discussed coaching interventions were addressed, the

explicit instruction in how to use these strategies differs from the collaborative processes used in coaching.

Students' GPAs during the semester in which they received the intervention were significantly greater than their overall GPAs the semester before they received the intervention. Students also maintained their improved GPAs one semester after they completed the intervention. Furthermore, there was a large effect of strategy instruction on students' GPAs in the specific course content areas targeted in the intervention ($d = 1.01$). Strategy instruction worked particularly well for students who were on academic probation prior to the intervention as there were significant increases in their GPAs during the intervention compared to their overall GPAs before the intervention. The authors also conducted a qualitative analysis of case notes to determine if students were independently using strategies. Overall, the authors concluded that about half of the students' improvements in GPA could be attributed to strategy instruction, based on the analysis of the case notes. Therefore, course-specific strategy instruction seems to have beneficial results for college students with ADHD. However, this study did not include a control group. Additionally, there were no separate analyses based on diagnosis, so it is unclear how strategy instruction affects students with ADHD specifically. Other studies investigating the efficacy of course-specific strategy instruction for college students with ADHD appear to be lacking.

Cognitive behavioral therapy. Cognitive behavior therapy (CBT) is a treatment approach in which therapists address clients' maladaptive thoughts, teach coping strategies, and help clients develop more adaptive ways to think about their self, their future, and the world (Ramsay & Rostain, 2006). As mentioned previously, college students with ADHD are likely to face an array of adversities during college that could cause them to develop maladaptive, self-

critical thinking patterns. CBT is thus an approach that would likely help address such maladaptive thinking and improve overall functioning. Individual and group CBT approaches appear to be effective approaches for reducing ADHD symptoms among adults (Fleming & McMahon, 2012; Green & Rabiner, 2012). Two studies have investigated the effectiveness of CBT programs for college students with ADHD. In one study, students participated in ACCESS, which is an eight-week CBT treatment program followed by a maintenance phase that consists of two booster sessions (Anastopoulos & King, 2014). ACCESS includes psychoeducation, behavioral skills instruction, and cognitive restructuring. Through these components, the program is intended to increase students' knowledge of ADHD, teach students skills such as organization and time management, and enhance students' adaptive thinking. ACCESS includes both group and individual sessions. The group sessions target psychoeducation, behavioral skills, and cognitive restructuring through lectures and discussions, and there are eight group sessions included in this program. There are also two booster group sessions that are used for troubleshooting and refining skills. In addition to the group sessions, participants also concurrently receive mentoring. Mentors help students apply the strategies they learn in the group sessions, help students set goals, and monitor students' progress. The mentoring sessions also occur during the maintenance phase, but are guided by students' individual needs. One of the main goals of ACCESS is to assist students in making connections with other resources available on campus.

During the two-year open trial of this program, 43 students received the treatment. Significant improvements in students' self-reported knowledge of ADHD and use of organizational, time management, and other behavioral strategies along with a decrease in students' maladaptive thinking were found. Additionally, after participating in the program,

students' self-reported inattention and total ADHD symptoms significantly decreased. There were also fewer students under academic probation during the semester of intervention compared to the semester before treatment, and students reported an increase in their use of other disability services on campus after participating in ACCESS. The increased utilization of such resources after treatment indicates that ACCESS may be successful in empowering students to make connections with campus-based resources. However, the quasi-experimental nature of this study limits the conclusions that can be drawn from these data. Similar to other studies reviewed above, most of the measures in the ACCESS study relied on students' self-report.

A similar study investigated the impact of a brief, individual CBT program on self-reported ADHD symptoms and functional impairment among four college students with ADHD attending either a public university or community college (Eddy, Canu, Broman-Fulks, & Michael, 2014). The CBT program included four modules which targeted (a) psychoeducation, organization, planning, and problem solving skills; (b) reducing distractibility; (c) adaptive thinking; and (d) additional skills (covered procrastination prevention, review of program, and maintenance planning). Based on four case studies, there appeared to be a trend toward improvement of ADHD symptoms, whereby hyperactivity and overall ADHD symptomology improved more than inattentive symptoms. Participants' self-reported functional impairment in the family, work, school, life skills, self-concept, and risky behavior domains tended to show consistent improvement as three out of the four participants reported less functional impairment post-intervention. However, the small sample size, lack of a control group, and absence of group significance testing limits the strength and generalizability of the results. Nevertheless, CBT is a treatment for college students with ADHD that shows promise.

Dialectical behavior therapy. Dialectical behavior therapy (DBT) is a form of treatment that incorporates elements of CBT and mindfulness/acceptance training (Fleming, McMahon, Moran, Peterson, & Dreessen, 2015). Fleming and colleagues (2015) conducted a randomized controlled trial examining the impact of a DBT program on ADHD symptoms, executive functioning, and quality of life for college students with ADHD (n = 17) compared with a self-guided skills training via handouts (n = 16). The DBT program consisted of eight weekly group sessions targeting psychoeducation, mindfulness, scheduling and organization strategies, structuring the environment, emotional regulation, and generalization strategies. The participants in the DBT condition also received weekly coaching phone calls to help with skill generalization and participated in one booster session the following semester to enhance maintenance of skills. Students in the DBT condition self-reported significant improvement in executive functioning and mindfulness at post-treatment and at a three-month follow-up. Significant improvements in quality of life were found at post-treatment in the DBT condition but were not maintained at the three-month follow-up. Additionally, there were trends toward improvement in self-reported ADHD symptoms and a neuropsychological measure of attention among students in the DBT condition. Students also rated the DBT treatment as more acceptable than the self-guided control condition. Overall, this study indicates that DBT is a promising treatment for college students with ADHD.

Assisted reading software. The use of technology rather than one-on-one interaction with a coach or therapist is a different treatment approach for college students with ADHD that was investigated by Hecker, Elkind, Elkind, and Katz (2002). The effects of assisted reading software have been studied for students with reading disabilities, but this is the first study that investigated the impact of assistive reading software for college students with ADHD. Twenty

students with ADHD, five of whom had either an additional diagnosis of a reading disability or low reading scores that indicated a suspected reading disability, participated in this AB case study. Each student served as his/her own control as all students participated in both an unassisted and assisted reading condition. The material used throughout the study was from a required English course, and participants recorded the time they spent reading, number of pages read, the number of times they recognized their mind wandering from their reading (termed *canceled mind trip*), along with completing a reading comprehension test. The assistive reading software involved concurrent visual and auditory presentation of text, with the words being highlighted on the screen as they were read aloud by the computer. It also included electronic dictionaries and study skill tools such as section preview features, glossaries, and different color highlighting for different aspects of text. Additionally, it enabled students to create automatic outlines and study guides and allowed students to take notes by typing, copying, or dictating.

During an extended reading task, which involved reading for 35 minutes without the software and then reading for 35 minutes with the software (condition order was balanced between participants), the median amount of self-reported canceled mind trips was significantly lower in the assisted condition compared to unassisted condition. However, self-reported canceled mind trips are a subjective measure, and students with ADHD may have a more difficult time monitoring their attention. A linear regression analysis indicated that students who reported the most distractions in the unassisted condition experienced the greatest decline in distractions during the assisted reading, which suggests that assisted reading may help students sustain their attention during times of extensive reading. Reading rate was significantly faster and students reported less stress and fatigue with assisted reading, and no significant differences in reading comprehension were found between assisted versus unassisted reading conditions.

The results of this study indicate that assisted reading software may be beneficial in improving attention and reading rate among college students with ADHD. However, further investigations with a randomized design, larger sample, and more objective measures of attention are needed to gain a better understanding of the impact of assisted reading software.

Working memory training. Working memory training programs are a relatively new intervention approach and are designed to enhance individuals' cognitive functioning through computer-based games (Melby-Lervåg & Hulme, 2013). Such programs aim to improve individuals' ability to temporarily store, rehearse, process, update, and manipulate verbal and nonverbal information (Rapport, Orban, Kofler, & Friedman, 2013). To date, one randomized controlled trial investigating the effectiveness of working memory training among college students with ADHD/LD has been conducted. In this study, 39 students participated in a five-week, online working memory training program consisting of tasks requiring the manipulation and short-term storage of visual and verbal information, and 23 students were in a wait-list control condition (Gropper, Gotlieb, Kronitz, & Tannock, 2014). The working memory training also included weekly phone calls or emails with a coach who helped monitor participants' progress. The researchers investigated whether the training program improved performance on similar, untrained verbal and visuospatial working memory tasks (near-transfer effects). They also investigated far-transfer effects, defined as self-reported ADHD symptoms and cognitive failures (errors in perception, memory, and motor function), neuropsychological measures of sustained and selective attention, and performance on standardized academic achievement measures. The results indicated that the working memory training program was feasible due to a high rate of program completion. The working memory training significantly improved participants' performance on near-transfer measures, and participants self-reported significantly

fewer ADHD symptoms and cognitive failures than the wait-list control group. However, the training did not lead to significant improvements in the far-transfer neuropsychological measures of attention, reading comprehension, or math reasoning. These results are comparable to findings from meta-analyses investigating the efficacy of working memory training for children with ADHD that suggest that working memory training has larger effects for near-transfer measures of working memory but does not consistently lead to improvements in far-transfer domains (Hodgson, Hutchinson, & Denson, 2014; Melby-Lervåg & Hulme, 2013; Rapport et al., 2013; Sonuga-Barke et al., 2013).

Statement of the Problem and Significance of the Study

College students with ADHD experience significant impairment in academics and may be at risk for difficulties in psychological and social functioning relative to their peers (e.g., DuPaul et al., 2009; Fleming & McMahon, 2012). Unfortunately, research on treatments for college students with ADHD is limited. Some preliminary analyses have indicated that coaching appears to help college students develop strategies to better manage their academic impairments due to ADHD (e.g., Park & Boutelle, 2009; Swartz et al., 2005); however, a majority of the studies conducted to date has been quasi-experimental or qualitative in nature. A potential treatment complication is introduced by higher potential rates of comorbid anxiety for young adults with ADHD relative to non-affected peers. However, it remains unclear how anxiety affects college-relevant outcomes (Prevatt et al., 2015). The proposed study will address gaps in the literature by conducting a pilot randomized controlled study investigating (a) the acceptability of and students' satisfaction with a coaching treatment package; (b) the degree to which the intervention improves GPA, ADHD symptoms, executive functioning, and learning and study skills; (c) the moderating effect of anxiety on treatment outcomes. As discussed

previously, the research on the efficacy of coaching for college students with ADHD is limited. Therefore, the pilot design was used to evaluate the feasibility of the intervention, investigate whether the intervention produced any adverse events, and to examine effect sizes in an attempt to predict an appropriate sample size for future large-scale research and to improve upon the overall design prior to conducting a full-scale study. It is important to conduct preliminary small sample evaluations prior to investing in large-scale studies to ensure that the methodology is feasible and appropriate.

The specific hypotheses of this study are as follows:

1. Consistent with previous literature, college students with ADHD will be satisfied with coaching treatment and find it acceptable. Additionally, students in the treatment condition will be significantly more satisfied and rate the intervention as significantly more acceptable/feasible compared to students in the control condition.
2. College students who received the treatment will have better outcomes compared to the control group in some or all measured outcome areas. More specifically:
    a. Students in the treatment condition will experience greater gains in GPA from the pretest to posttest compared to the control condition.
    b. Students in the treatment condition will report a larger decrease in severity reported on the total ADHD symptoms from pretest to posttest relative to the control condition.
    c. Students in the treatment condition will report a significant decrease in global executive functioning and metacognitive impairment from pretest to posttest when compared to the control condition.

    d. Students in the treatment condition will report a significant increase in organizational and time management skills from pretest to posttest relative to the control condition.

3. When predicting outcomes, there will be a significant interaction between treatment condition and anxiety, indicating that anxiety moderates the relationship between treatment status and outcomes.

CHAPTER II: METHOD

Participants

Participants for this study were recruited from Disability Support Services (DSS) at East Carolina University. Undergraduate students between the ages of 18 to 24 who provided documentation to DSS indicating a diagnosis of ADHD and who were approved for accommodations were eligible to participate. In order to be registered with DSS, students must submit a comprehensive diagnostic report from a qualified service provider. Recruitment began during the summer 2015 semester and continued through the start of the fall 2015 semester. Several methods of recruitment were used. All students registered with DSS ($N = 650$) were notified via an email about the study, and interested students were asked to email the researcher for more information. Approximately 400 of the students registered with DSS were identified as having a primary diagnosis of ADHD at the time the email was distributed. In addition to the email, flyers were posted in the DSS office. The flyers gave a brief overview of the study along with the researcher's contact information. Finally, eligible students were informed about the study in person by the researcher or the Director of Student Services in DSS when they visited the office for appointments, and interested students were given the flyer with the researcher's contact information.

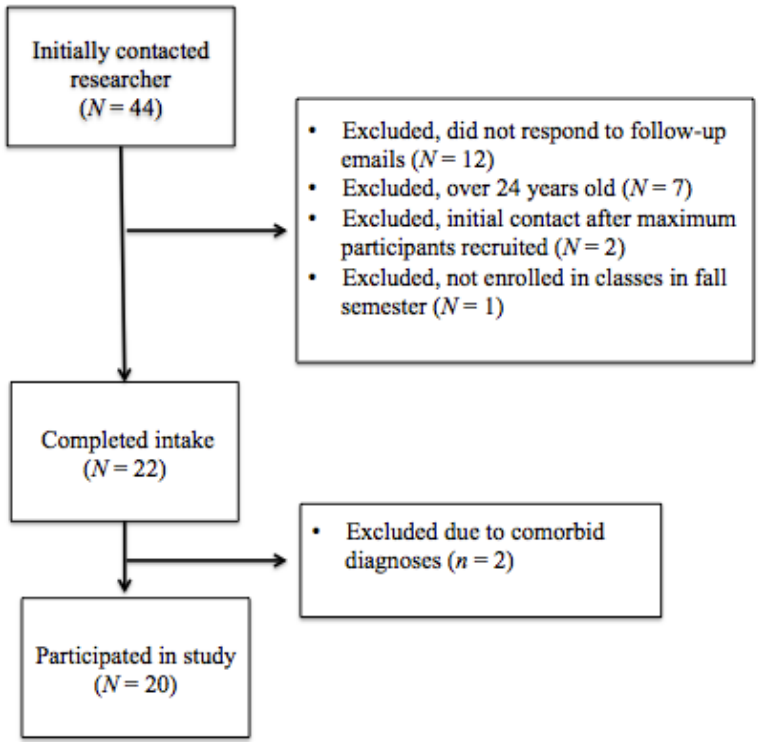
All interested students who expressed interest in the study and met with the researcher received informed consent procedures approved by the Institutional Review Board at ECU and then completed a self-report ADHD screening measure to support a diagnosis of ADHD. Participants also completed a brief self-report measure assessing borderline personality disorder, which was used to screen out students with borderline personality disorder because these individuals would likely need more intensive intervention than what would be offered through

coaching (Goldstein, 2005). If the participant endorsed seven or more symptoms on the borderline personality disorder screener, the participant was excluded from the study, given information about the ECU Center for Counseling and Student Development (the on-campus counseling center), and encouraged to make an appointment there to further discuss their symptoms with a mental health professional. The researcher also administered a semi-structured clinical interview to screen for psychosis, bipolar disorder, post-traumatic stress disorder, major depression, oppositional defiant disorder, and conduct disorder. Again, if the interview indicated that the student met criteria for a comorbid condition, the student was encouraged to make an appointment at the ECU Center for Counseling and Student Development and was excluded from the study. The researcher collaborated with the Director of Student Services after an informed consent was signed to ensure that potential participants were well-matched with the coaching intervention.

A total of 44 students responded to the emails and flyers expressing interest in being involved in the study and, following the intake procedures, 20 individuals were accepted into the study. Figure 1 depicts the flow chart of inclusion and exclusion for participation in the study.

Figure 1

Recruitment Flow Chart



All students who completed the intake ($N = 22$) received a $25 gift card for their participation in the intake procedures. The 20 eligible participants were then randomly assigned to the ADHD coaching treatment group ($n = 10$) or a control group ($n = 10$). At the end of the semester, the students who participated in the study ($N = 20$) received a $50 gift card after completing posttest questionnaires. The 20 participants included in this study were primarily white (90%) women (65%) in their junior year of college (50%). The average age of participants was 19.5 years (*range* = 18-23), and 95% of the participants were taking medication for ADHD. Demographic information is summarized in Table 1.

Table 1

Sample Demographics (N = 20)

Variable	*n*	%
Gender		
Women	13	65%
Men	7	35%
Race		
White	18	90%
African American	1	5%
Biracial	1	5%
Year in School		
Sophomore	4	20%
Junior	10	50%
Senior	5	25%
Senior +	1	5%

Measures

After signing the informed consent, participants completed the following measures.

The *Adult ADHD Self Report Scale* (ASRS-V1.1; Kessler et al., 2005) is a six-item instrument designed to screen for ADHD. This instrument was used to confirm participants' symptoms of ADHD at intake. The ASRS-V1.1 has been found to have adequate sensitivity (69%) and high specificity (99.5%) in identifying ADHD among adults living in the United States.

The *McLean Screening Instrument for Borderline Personality Disorder* (MSI-BPD; Zanarini et al., 2003) was administered to screen for symptoms consistent with borderline personality disorder. The MSI-BPD is a 10-item self-report measure designed to detect possible borderline personality disorder. Scores of seven or above indicate a high likelihood of meeting criteria for borderline personality disorder. Students who scored a seven or higher on this measure were excluded from the study and made aware of the counseling resources available on

campus. The MSI-BPD has been found to have adequate sensitivity (81%) and specificity (85%) for borderline personality diagnoses, as well as adequate internal (α = .74) and test-retest (r_s = .72) reliability.

Children's Interview for Psychiatric Syndromes **(ChIPS; Weller, Weller, Rooney, & Fristad, 1999)** was used to screen for additional comorbid conditions, including oppositional defiant disorder, conduct disorder, major depression, mania, psychosis, and post-traumatic stress disorder. Additionally, the researcher also administered the ADHD module if more information was needed to confirm participants' diagnosis of ADHD after the ASRS-V1.1 was administered. The ChIPS is a brief, structured interview designed to help with the identification of psychiatric disorders according to DSM-IV criteria among children ages 6-18. Minor changes in wording were made to ensure that the questions were appropriate for young adults. The ChIPS was chosen as opposed to an interview developed for adult populations because the existing adult interviews do not include modules for ADHD, oppositional defiant disorder (ODD), or conduct disorder (CD). Given the high comorbidity of ODD and CD among individuals with ADHD (e.g., Schultz & Evans, 2015), it was important to use a structured interviews that included these modules. The ChIPS has been found to be a reliable and valid screener for disorders across several studies (Weller, Weller, Fristad, Rooney, & Schecter, 2000). For example, diagnostic agreement between the ChIPS and another clinical interview, the Diagnostic Interview for Children and Adolescents-Revised-Child Version (DICA-R-C) was compared among a community sample of children (N = 40; Fristad et al., 1998). Concordance of syndrome identification was high between the two interview schedules, ranging from 77.5% agreement to 100% agreement. Moreover, there was 100% agreement with 70% of the various syndromes indicating a high level of concurrent validity.

The *Behavior Intervention Rating Scale* (BIRS; Elliott & Treuting, 1991) was used to assess treatment appropriateness and satisfaction. The BIRS is a 24-item measure with a six-point Likert response format that gauges the acceptability and perceived effectiveness of interventions. Participants completed this measure at the end of the fall 2015 semester. For the purposes of this study, 13 items pertaining to the acceptability of the treatment were used and assessed whether students found the intervention appropriate and reasonable in meeting their needs. Internal consistency is high (α = .97) for the original 15 items assessing treatment acceptability. Additionally, the results of a factor analysis indicated that the BIRS has three clear factors, treatment effectiveness, acceptability, and time. This factor structure supports the content and construct validity of the instrument. The following open-ended questions were also used to assess the feasibility of the intervention: 1) How often would you have liked to meet with your coach? 2) What session length would you find most helpful? 3) What barriers if any did you encounter that made it difficult to attend sessions? 4) Would you recommend this treatment approach to others? Why or why not?

***Treatment Satisfaction Survey* (Canu & Bearman, 2011).** To assess participant's satisfaction with treatment, participants completed an adaptation of the *Treatment Satisfaction Survey* at the end of the semester. The *Treatment Satisfaction Survey* is a five item self-report measure in a five-point Likert response format that assesses participants' impressions of and satisfaction with treatment. The *Treatment Satisfaction Survey* has been shown to have high internal reliability (α = .81). Three additional qualitative questions were added to the survey to further assess students' satisfaction with the intervention. Specifically, the questionnaire was modified to ask: 1) What aspects were the most helpful? 2) What aspects were the least helpful? 3) Is there anything you would change about the intervention?

Conners' *Adult ADHD Rating Scale, Self-Report, Long Version* (CAARS-S:L; Conners et al., 1999) was administered at the start and end of the semester to provide an estimate of the presence and severity of ADHD symptoms. The CAARS-S:L is a 66-item self-report instrument that assesses four factors associated with ADHD: inattention/cognitive problems, hyperactivity/restlessness, impulsivity/emotional lability, and problems with self-concept. The measure also yields an overall ADHD Index that identifies individuals who are most likely to be diagnosed with ADHD. The CAARS-S:L has adequate internal consistency (α > .86; Erhardt, Epstein, Conners, Parker, & Sitarenios, 1999). Additionally, test-retest reliability indicates adequate consistency between repeated administrations of the CAARS (r = .89). In regards to validity, an assessment of discriminant validity revealed that the CAARS correctly classified 85% of a sample containing individuals with and without an ADHD diagnosis. Additionally, the adults with ADHD scored significantly higher on various the subscales compared to the control group without ADHD. Construct validity analyses revealed significant correlations ranging from r = .37 to r = .67 between childhood reports of ADHD on the *Wender Utah Rating Scale* (Ward, Wender, & Reimherr, 1993) and the CAARS-S:L. Additionally, moderate to high correlations were found between the CAARS-S:L and observer ratings of current ADHD symptomology.

The *Behavior Rating Inventory of Executive Function—Adult Version* (BRIEF-A; Roth, Isquith, & Goia, 2005) was administered at the start and end of the semester to provide an estimate of their self-regulation and their higher order cognitive skills (executive functions). The BRIEF-A is a 75-item self-report instrument in a Likert response format that contains nine scales assessing executive functioning: emotional control, self-monitoring, initiation, working memory, planning/organization, task monitoring, and organization of materials (Roth et al., 2005). The

measure also has three composite scales: the Behavior Regulation Index, and the Metacognition Index, and the Global Executive Composite. The BRIEF-A has adequate internal consistency (α > .73) and test-retest reliability over a four-week span (r = .82-.93). The BRIEF-A also has adequate validity as significant moderate to strong correlations between the BRIEF-A and other measures of executive function such as the *Frontal Systems Behavior Scale* (Grace & Mallory, 2002), the *Dysexecutive Questionnaire* (Wilson, Alderman, Burgess, Emslie, & Evans, 1996), and *Cognitive Failures Questionnaire* (Broadbent, Cooper, Fitzgerald, & Parkes, 1982) have been found. Exploratory factor analyses have also supported the two-factor structure of the BRIEF-A (Roth et al., 2005).

The *School Motivation and Learning Strategies Inventory, College Form* (SMALSI; Stroud & Reynolds, 2006) was administered at the start and end of the study. The SMALSI is a 164-item self-report Likert scale that assesses 10 constructs involved in academic motivation, learning strategies, and study strategies. Specifically, the SMALSI measures study strategies, note-taking/listening skills, reading/comprehension strategies, writing/research skills, test-taking strategies, organizational techniques, time management, low academic motivation, test anxiety, and concentration/attention difficulties. The SMALSI College Form standardization sample included 1,534 college students from 11 colleges and universities in the United States. The proportion of men and women and the various ethnic backgrounds included in the sample were representative of the U.S college student population and the U.S population in general. The SMALSI has adequate internal consistency within all 10 subscales (α > .67).

Grade Point Average (GPA). Participants' overall grade point averages for the 2015 spring semester and 2015 fall semester were collected as an index of academic achievement.

Participants' cumulative GPA at the end of both semesters was collected as well. Additionally, students were asked to report their SAT/ACT scores.

Beck Anxiety Inventory **(BAI; Beck & Steer, 1993)** was administered at the start of the study to measure comorbid anxiety symptoms. The BAI is a 21-item self-report that assesses the severity of an individual's anxiety symptoms. The BAI has adequate internal consistency ($\alpha >$ .85) and consistency between repeated administrations one week apart (r = .75; Nelson & Gregg 2012). A meta-analysis of reliability estimates reported in studies utilizing the BAI also found adequate internal consistency ($\alpha >$ .83; de Ayala, Vonderharr-Carlson, & Doyoung, 2005). Test-retest reliability estimates were lower ranging from r = .35 to r = .83. Additionally, the BAI is moderately correlated with other anxiety measures indicating adequate convergent validity (Nelson & Gregg, 2012). Furthermore, the BAI has lower correlations with depression measures than other anxiety scales. Anxiety measures are often highly correlated with measures of depression, and the lower correlations found between the BAI and depression measures is support of discriminant validity.

Demographics questionnaire. Students were asked to fill out a demographics questionnaire designed specifically for this study to gather information about participant age, date of birth, race, previous GPA, SAT/ACT scores, and ADHD medication use. Students were asked to report any changes in medication that occur during the course of the study.

Procedure

Following random assignment, students in the treatment condition met with the researcher face-to-face approximately once every two weeks for coaching sessions. With a 12-week semester, there was a target of six sessions for each participant. Coaching sessions lasted 20 to 30 minutes. Initially, the researcher worked to identify each student's main concerns and

identified a specific skill to target (organization, assignment tracking/time management, note taking, or study skills). All 10 participants chose to work on time management. In addition to focusing on time management, two students worked on organizing school materials, two worked on study strategies, and three students worked on note-taking strategies. Interventions in these areas were adapted from two sources: the *Challenging Horizons Program* (CHP; Schultz & Evans, 2015) and the *CBT Treatment for Adults with ADHD* treatment manual (Solanto, 2011).

Independent Variable

The CHP is a school-based consultation program designed to target high school students' organization, assignment tracking, note taking, study skills, and challenging behaviors. These target areas are comparable to skills addressed in commonly used coaching interventions. By directly teaching adolescents specific behavioral skills, including assignment tracking, organization, and self-monitoring, the interventions used in the CHP are acceptable, feasible, age-appropriate, and effective. Specifically, previous research showed moderate improvements in parent rating of students' inattention, peer relationships, family functioning, and academic impairment. A detailed treatment manual has been developed for the CHP, and the interventions described in the manual were modified to suit college students, similarly to how they were modified by Evans and colleagues (2014) from previous studies with middle school students (e.g., Evans, Serpell, Schultz, & Pastor, 2007; Schultz, Evans, & Serpell, 2009). For instance, the assignment tracking intervention used with middle school students involves students recording assignments in a specific agenda and getting teacher signatures to verify that assignments have been recorded accurately. With college students, the focus was on guiding students to come up with their own assignment tracking/time management systems (e.g., using a

planner) and helping them develop a system to self-monitor their time management (e.g., setting alarms in phone to remember assignments, breaking down big assignments into smaller pieces).

Solanto's (2011) treatment manual is a CBT intervention developed for adults with ADHD. Specific behavioral strategies for time management and organization included in the manual were also used to supplement the material from the CHP. For instance, the manual outlines a strategy for maintaining a daily planner. Participants were not told this information directly, but the coach used this information to help guide the questioning process and to help students evaluate the strategies that they came up with. Therefore, consistent with the coaching literature, the coach in the current study used collaborative strategies and nondirective techniques to assist the students in choosing which behaviors to prioritize while developing their own systems for improving target skills. Material from Prevatt and Levrini (2015), a textbook created for mental health professionals with information about conducting coaching for individuals with ADHD, was reviewed and used to help guide sessions and coaching strategies.

Students in the control condition were sent six newsletters via email approximately once every two weeks. The newsletters were developed by the researcher for the study and contained brief tips and strategies regarding long and short-term goal setting, organization, note-taking, time management, and psychoeducation about ADHD. The newsletters were intended to provide participants with information that is similar to what was covered in coaching sessions albeit in a different format. All participants continued to access DSS services throughout the course of the study.

Design and Data Analysis

This study used an experimental design with random assignment of participants to the treatment and control conditions. Quantitative analyses were conducted to examine the overall

feasibility and satisfaction with the program, the degree to which the intervention improved outcomes, and the degree to which anxiety moderated treatment effects. Additionally, student responses to open-ended questions were summarized to help interpret the results.

To examine the success of randomization and determine whether the treatment and control groups were equivalent at the start of the study, a series of independent samples *t*-tests were employed with all pretest measures. To address the research questions, the following analyses were conducted. First, to assess the acceptability of and participants' satisfaction with the coaching program, independent samples *t*-tests were conducted comparing the BIRS and the *Treatment Satisfaction Survey* between conditions. Student responses to the open-ended questions were summarized to identify common themes regarding coaching. Second, to determine the degree to which the coaching intervention improved outcomes for students, a series of two-way repeated measure ANOVAs with treatment group as the between subjects factor and time as the within subjects factor (consisting of two time points) were employed. Effect sizes were calculated to determine if the results were trending in the expected direction. Finally, in regards to anxiety, the mean anxiety score for the entire sample from the beginning of the study was evaluated in relation to the standardization sample of the BAI to determine whether college students report clinically significant levels of anxiety. Following this, a series of moderation analyses were conducted to determine the degree to which anxiety impacted treatment outcomes (Hayes, 2013).

CHAPTER III: RESULTS

The results of all the planned analyses are presented in this chapter. For each outcome variable, the results of initial data screening are reported to provide an overview of the data that were collected, including distributions and ranges. Please refer to Table 2 for an overview of the means and standard deviations for all outcome measures and to Table 3 for the correlation matrix including all outcome measures. Following data screening results, all relevant statistical tests are reported along with model parameters in the order of the research questions. The statistical software package *IBM Statistical Package for the Social Sciences* (SPSS) version 22 was used for all quantitative analyses.

Table 2

Means and Standard Deviations for Outcome Measures

	Pretest				Posttest			
	Treatment		Control		Treatment		Control	
Variable	***M***	(SD)	***M***	(SD)	***M***	(SD)	***M***	(SD)
BIRS					**69.10**	(5.86)	**56.30**	(8.55)
Treatment Satisfaction Survey					**22.60**	(2.11)	**19.20**	(3.26)
GPA	**2.94**	(0.58)	**2.98**	(0.69)	**3.24**	(0.43)	**2.87**	(0.80)
CAARS								
ADHD Total Symptoms	**25.30**	(12.06)	**26.70**	(10.40)	**21.10**	(9.52)	**25.70**	(11.26)
BRIEF-A								
Metacognition Index	**79.50**	(11.62)	**78.80**	(14.15)	**73.70**	(16.93)	**81.40**	(14.49)
Global Executive Composite	**127.70**	(16.89)	**135.40**	(24.04)	**121.00**	(26.23)	**137.20**	(23.95)
SMALSI								
Organization	**19.80**	(7.36)	**19.20**	(6.60)	**24.20**	(7.94)	**21.30**	(6.09)
Time Management	**19.70**	(6.46)	**16.10**	(7.20)	**25.00**	(5.29)	**17.60**	(8.59)
BAI	**9.50**	(9.66)	**11.00**	(7.12)				

Note: Independent samples t-tests on all pretest scores were conducted. No significant differences between conditions were found.

Table 3

Correlation Matrix

Variable	Spring GPA	Fall GPA	Pre Symp	Pre GEC	Pre MCI	Pre Org	Pre Time	Post Symp	Post GEC	Post MCI	Post Org	Post Time	BIRS	Sat
Spring GPA														
Fall GPA	.29													
Pre Symptoms	.04	-.29												
Pre GEC	-.15	-.53*	.77**											
Pre MCI	-.30	-.52*	.75**	.88**										
Pre Org	.17	.38	-.28	-.50*	-.61**									
Pre Time	.13	.35	-.44	-.62**	-.65**	.63**								
Post Symptoms	.10	-.38	.73**	.61**	.55*	-.22	-.44							
Post GEC	-.16	-.55*	.55*	.74**	.58**	-.26	-.49*	.80**						
Post MCI	-.19	-.59**	.55*	.69**	.68**	-.36	-.54*	.82**	.94**					
Post Organization	.04	.35	-.10	-.32	-.40	.74**	.58**	-.39	-.49*	-.61**				
Post Time Manage	-.05	.58**	-.30	-.63**	-.50*	.54*	.79**	-.54*	-.65**	-.64**	.67**			
BIRS	-.03	.27	-.04	-.05	.03	-.09	.13	-.27	-.42	-.44	.25	.34		
Satisfaction	-.21	.39	-.17	-.23	-.14	.10	.31	-.50*	-.53*	-.58**	.48*	.58**	.80**	
BAI	.22	.38	-.06	-.18	-.03	.20	.11	.02	.16	.05	.05	-.05	-.007	-.13

Feasibility and Satisfaction

BIRS. The total score on the BIRS was the dependent variable used to assess treatment feasibility. According to the procedure recommended by Field (2005), skewness and kurtosis values for the BIRS (*skewness* = -.285; *kurtosis* = -.722) were transformed into *z*-scores. The *z*-scores fell below 2.58, which is the recommended critical value for small sample sizes, indicating there was non significant skewness and kurtosis. Additionally, the Kolmogorov-Smirnov test of normality indicated that the distribution for the BIRS was not significantly different from normal, $KS(20) = .153$, $p = .20$. In general, the distribution of scores are consistent with expectations, suggesting that there were no data entry errors or unusual cases.

An independent samples *t*-test was employed to compare the feasibility ratings on the BIRS between the treatment and control conditions at the posttest assessment. Levene's test indicated that the assumption of homogeneity of error variances was met, $F(1,18) = .76$, $p = .40$. Overall, participants in the treatment condition rated the intervention as significantly more reasonable and acceptable for meeting their needs compared to students in the control condition, $t(18) = 3.91$, $p = .001$. Additionally, students attended an average of 5.8 sessions (*range* = 4 to 7). Regular appointment times were attempted for all participants; however, due to holiday breaks and student schedules, modifications were made as necessary. There was a 5.3% rate of no-shows to scheduled appointments across the 10 participants in the treatment condition during the semester.

Participants' responses to the four open-ended questions regarding feasibility were also summarized. Eight out of the 10 participants indicated that meeting biweekly was reasonable for this intervention. One student indicated meeting every week would be preferable and another student indicated meeting biweekly was most realistic given other responsibilities but that

meeting every week would be helpful. The majority of students found a 30-minute session length as most appropriate (80%). Two students felt that a slightly longer 45-minute session would be most helpful. In regards to barriers for accessing treatment, scheduling conflicts with other school or personal commitments was the most common theme identified (40%), and forgetting appointments was another common barrier (40%). All 10 of the participants indicated that they would recommend the coaching intervention to their peers.

Satisfaction. The total score on the *Treatment Satisfaction Survey* was the dependent variable used in this analysis. *Z*-scores for skewness and kurtosis values fell below 2.58, *skewness* = -.599, *kurtosis* = -.581. The Kolmogorov-Smirnov test of normality indicated that the distribution for the *Treatment Satisfaction Survey* was not significantly different from normal, $KS(20) = .162$, $p = .175$. Taken together, these results suggest that the data were entered correctly and no unusual cases were encountered.

An independent samples *t*-test was employed to compare the satisfaction ratings on the between the treatment and control conditions at the posttest assessment. Levene's test indicated appropriate homogeneity of error variances, $F(1,18) = 3.57$, $p = .075$. Overall, students in the treatment condition were highly satisfied with the intervention. The individual item ratings among students in the treatment condition ranged from a mean of 4.3 to 4.7 out of 5. Moreover, students in the treatment condition were significantly more satisfied with the intervention compared to students in the control condition $t(18) = 2.77$, $p = .013$. Three major themes were identified in a summarization of student responses regarding the most helpful aspects of coaching: learning specific strategies/skills (60%), the collaborative nature of the relationship (30%), and increasing motivation (20%). The majority of the students did not identify any unhelpful aspects of the coaching intervention (60%).

GPA

Spring GPA values ranged from 1.96 to 3.94 in the treatment condition and 1.86 to 4.0 in the control condition. Fall GPA values ranged from 2.61 to 4.0 in the treatment condition and 0.96 to 3.85 in the control condition. According to the procedure recommended by Field (2005), skewness and kurtosis values for the spring GPA (*skewness* = -.008; *kurtosis* = -.815) and fall GPA (*skewness* = -1.64; *kurtosis* = 4.78) were transformed into *z*-scores. The *z*-scores for spring GPA fell below 2.58, which is the recommended critical value for small sample sizes, indicating there was non significant skewness and kurtosis. The *z*-scores for fall GPA fell above 2.58 for both skewness ($z = 3.22$) and kurtosis ($z = 4.82$). An examination of the box-and-whisker-plots indicated that there was one outlier giving the distribution a negative skew. However, one outlier in a sample of this size can be reasonably expected, and the Kolmogorov-Smirnov tests of normality indicated that the distribution for fall 2015 GPA was not significantly different from normal, $KS(20) = .150$, $p = .20$. The distribution for spring 2015 GPA was also not significantly different from normal $KS(20) = .094$, $p = .20$.

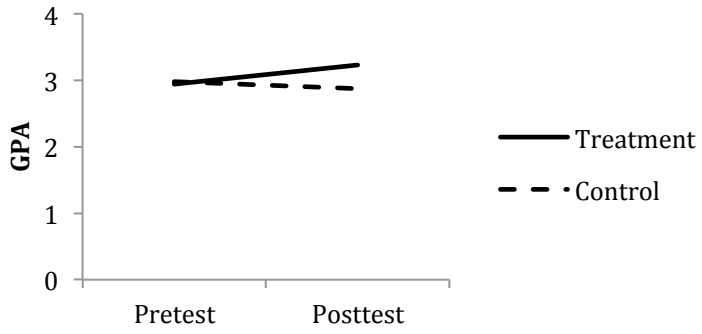
A repeated measures ANOVA was conducted to determine if there were significant differences in changes in GPA between the two conditions. Levene's test indicated appropriate homogeneity of error variances, spring 2015 GPA $F(1,18) = .437$, $p = .517$; fall 2015 GPA $F(1,18) = 1.096$, $p = .309$. Visual examination of the distribution of standardized residuals along with Kolmogorov-Smirnov tests of normality indicated that the error variances were normally distributed, spring GPA $KS(20) = .095$, $p = .20$; fall GPA $KS(20) = .132$, $p = .20$. Residuals ranged from -1.75 to 1.61 for spring GPA and -2.97 to 1.52 for fall GPA.

There were no significant main effects for time $F(1,18) = .320$, $p = .578$ or condition $F(1,18) = .504$, $p = .487$. Additionally, there was not a significant Time X Condition interaction,

$F(1,18) = 1.387$, $p = .254$. Nevertheless, results were trending in the expected direction as depicted in Figure 2, and according Cohen's (1988) guidelines for effect size interpretation, a small effect size for the Time X Condition interaction was calculated ($r = .27$).

Figure 2

Pre-Post Changes in GPA by Condition



ADHD Symptoms

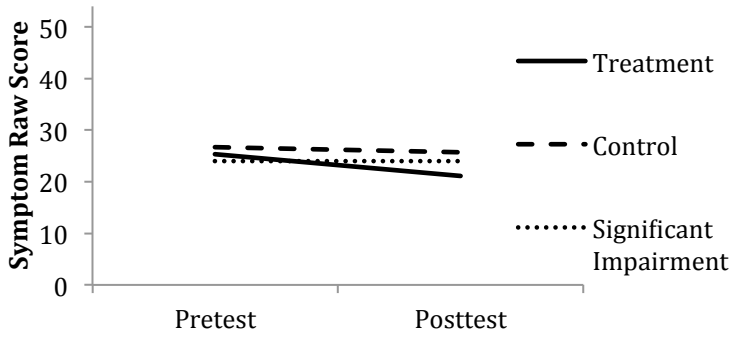
The total ADHD symptoms index on the CAARS was the dependent variable used in this analysis (pretest *range* = 7 - 45; posttest *range* = 8 - 48). ADHD symptoms raw scores of 24 and above are indicative of significant impairment for women, and raw scores of 19 and above are indicative of significant impairment for men. *Z*-scores for skewness and kurtosis values fell below 2.58, pretest *skewness* = .133, *kurtosis* = .721; posttest *skewness* = .724, *kurtosis* = -.013. The Kolmogorov-Smirnov tests of normality indicated that the distributions for pretest scores were not significantly different from normal, $KS(10) = .142$, $p = .20$. Similar results were found for posttest total symptoms normality, $KS(10) = .153$, $p = .20$. Taken together, these results suggest that the data were entered correctly, and no unexpected values were encountered.

A repeated measures analysis was conducted to determine whether significant changes in total ADHD symptoms occurred between the two conditions. Levene's test revealed appropriate equality of error variances, pretest $F(1, 18) = 1.022$ $p = .325$; posttest $F(1, 18) = .569$ $p = .460$. Visual inspection of the distribution of standardized residuals along with the Kolmogorov-Smirnov tests of normality indicated that the error variances were normally distributed, pretest $KS(20) = .166$, $p = .15$; posttest $KS(20) = .115$, $p = .20$. Residuals ranged from -1.66 to 1.63 for pretest values and -1.26 to 2.14 at posttest.

There were no significant main effects for time $F(1, 18) = 2.17$ $p = .158$ or condition $F(1, 18) = .441$ $p = .515$. Additionally, there was not a significant Time X Condition interaction in overall self-reported ADHD symptoms from pretest to posttest $F(1, 18) = .822$, $p = .377$. A small effect size for the within-subject Time X Condition interaction was calculated ($r = .21$), indicating that results were trending in the expected direction with the overall symptoms declining at a steeper rate in the treatment condition relative to the control condition (see Figure 3). Scores falling above the line labeled as significant impairment are indicative of significant impairment in the ADHD symptoms subscale relative to the normative sample for women.

Figure 3

Pre-Post Changes in ADHD Symptoms by Condition



Executive Functioning

Changes in executive functioning were analyzed using the Global Executive Composite (GEC; pretest *range* = 104 - 179, posttest *range* = 95 - 178) and the Metacognition Index (MCI; pretest *range* = 55 - 98, posttest *range* = 53 - 103) from the BRIEF-A. GEC raw scores of 126 and above are indicative of significant impairment in general executive functioning, and MCI raw scores of 73 and above are indicative of significant impairment in metacognition.

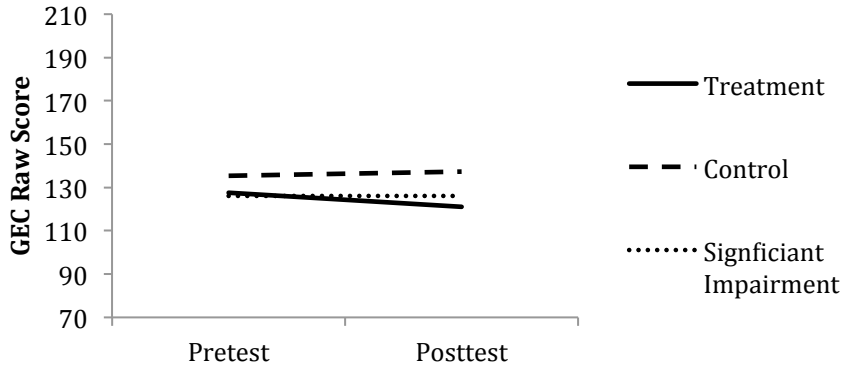
GEC. *Z*-scores for pre and posttest GEC values for each condition revealed no concerns with skewness or kurtosis, pretest *skewness* = .401, *kurtosis* = -.149; posttest *skewness* = .624, *kurtosis* = -.807. The Kolmogorov-Smirnov test of normality indicated that the distribution for pretest GEC was not significantly different from normal $KS(20) = .116$ $p = .20$. The posttest GEC distribution was significantly different from normal, $KS(20) = .202$, $p = .032$, but this was not due to an unexpected value. Rather, there was a cluster of six scores at the higher end of the distribution indicating that a few individuals reported much higher impairment in executive functioning compared to the rest of the group. These values were not extreme enough to be considered outliers relative to the rest of the distribution. Taken together, these results suggest that the data were entered correctly, and no unexpected values were encountered.

Assumptions of normality were met for the repeated measures ANOVA; Levene's test revealed appropriate homogeneity of error variances for pretest data, $F(1,18) = .816$, $p = .378$ and posttest data, $F(1,18) = .001$, $p = .97$. Visual examination of the distributions of standardized residuals along with Kolmogorov-Smirnov tests of normality indicated that the error variances were normally distributed, pretest $KS(20) = .129$, $p = .20$; posttest $KS(20) = .183$, $p = .079$. Residuals ranged from -1.46 to 2.10 at pretest and from -1.32 to 1.83 at posttest.

The repeated measures ANOVA revealed no main effects for time, $F(1, 18) = .399$, $p = .535$, or condition, $F(1, 18) = 1.565$, $p = .227$. Additionally there was a nonsignificant Time X Condition interaction, $F(1, 18) = 1.202$, $p = .287$. A small effect size for the Time X Condition interaction was calculated ($r = .25$), trending in the expected direction with the GEC decreasing in the treatment condition (indicating improvement) and increasing slightly in the control condition overtime (see Figure 4). Scores falling above the line labeled as significant impairment are indicative of significant impairment in the GEC relative to the normative sample.

Figure 4

Pre-Post Changes in GEC by Condition



MCI. *Z*-scores for pre and posttest MCI values for each condition revealed no concerns with skewness or kurtosis, pretest *skewness* = .401, *kurtosis* = -.149; posttest *skewness* = .29, *kurtosis* = -.964. Scores on this measure at pretest ranged from 55 to 98 and from 53 to 103 at posttest. The Kolmogorov-Smirnov tests of normality indicated that the distributions for pretest MCI were not significantly different from normal, $KS(20) = .177$, $p = .20$. Posttest MCI distributions were also not significantly different from normal, $KS(20) = .128$, $p = .20$. Taken

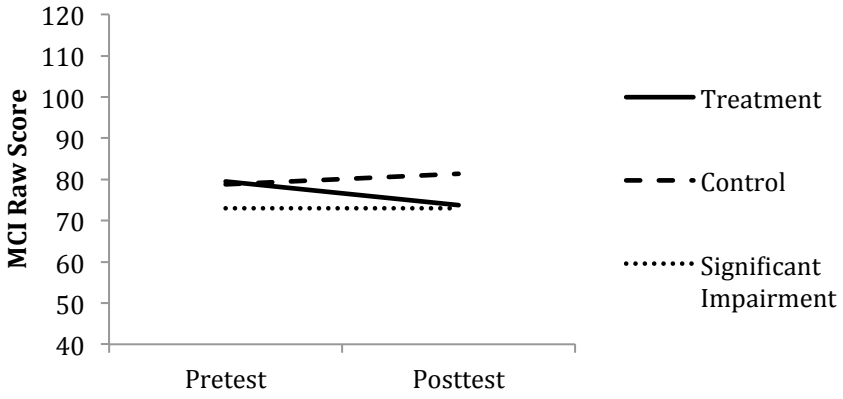
together, these results suggest that the data were entered correctly and no unanticipated values were encountered.

The assumption of equality of error variances was met for the repeated measures ANOVA, pretest $F(1,18) = .777$, $p = .39$; posttest $F(1,18) = .142$, $p = .711$. Visual examination of the distribution of standardized residuals along with Kolmogorov-Smirnov tests of normality indicated that the error variances were normally distributed, pretest MCI $KS(20) = .169$, $p = .135$; posttest MCI $KS(20) = .184$, $p = .073$. Residuals ranged from -1.84 to 1.48 at pretest and from 1.31 to 1.73 at posttest.

There was not a significant main effect of time $F(1,18) = .404$, $p = .533$ or condition $F(1,18) = .348$, $p = .563$. Additionally, the Time X Condition interaction was not significant $F(1,18) = 2.78$, $p = .113$. A moderate effect size for the Time X Condition interaction was calculated ($r = .37$). As depicted in Figure 5, results were trending in the expected direction with MCI improving in the treatment condition overtime and deteriorating in the control condition overtime. Scores falling above the line labeled as significant impairment are indicative of significant impairment in the MCI relative to the normative sample.

Figure 5

Pre-Post Changes in MCI by Condition



Academic Motivation and Learning Strategies

The organization and time management subscales for the SMALSI were the dependent variables in this analysis (organization pretest *range* = 10 - 35, posttest *range* = 11 - 34; time management pretest *range* = 5 - 30, posttest *range* = 0 - 32). Organization raw scores of 16 and below are indicative of significant difficulty with organization. Time management raw scores of 17 and below are indicative of significant difficulty with time management.

Organization. The analyses of *z*-scores along with the Kolmogorov-Smirnov tests revealed that the distribution for pretest organization scores did not significantly differ from normal, *skewness* = .76, *kurtosis* = -.016, *KS*(20) = .187, *p* = .065. Additionally, the distribution of posttest organization scores did not significantly differ from normal, *skewness* = .165, *kurtosis* = -1.06, *KS*(20) = .15, *p* = .20. Taken together, these results suggest that the data were entered correctly, and no unexpected values were encountered.

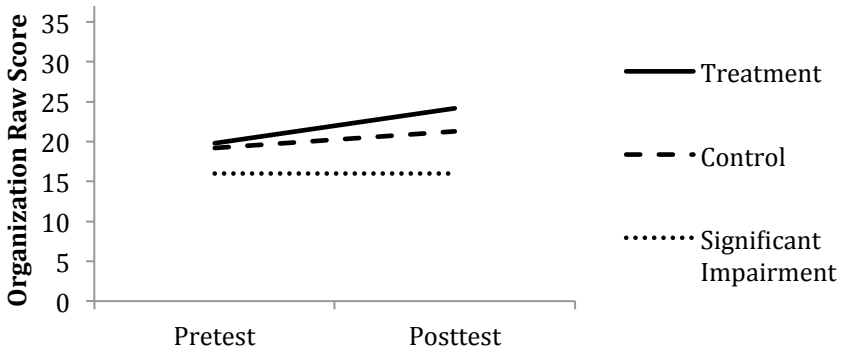
The assumption of equality of error variances was met for the repeated measures ANOVA, pretest $F(1,18) = .002$, $p = .964$; posttest $F(1,18) = 1.183$, $p = .291$. However, the

Kolmogorov-Smirnov test indicated that the error variances were not normally distributed for pretest organization scores $KS(20) = .197$, $p = .041$. Visual examination of the distribution of standardized residuals revealed a positively skewed distribution. The standardized value of the outlier was 2.17. In regards to posttest error variances, visual inspection and the Kolmogorov-Smirnov test indicated that the posttest error variances were normally distributed, $KS(20) = .146$, $p = .20$.

The repeated measures ANOVA revealed a significant main effect of time $F(1,18) = 8.352$, $p = .01$, indicating that both the treatment and control conditions reported significant improvements in organization skills over the course of the semester. The main effect for condition was not significant $F(1,18) = .355$, $p = .559$. The Time X Condition interaction was also not significant $F(1,18) = 1.046$, $p = .32$. The calculated effect size for the Time X Condition interaction was small ($r = .23$). As illustrated in Figure 6, results were trending in the expected direction with the rate of improvement in the treatment condition being steeper compared to the control condition. Scores falling below the line labeled as significant impairment are indicative of significant impairment in the organization subscale relative to the normative sample.

Figure 6

Pre-Post Changes in Organization by Condition



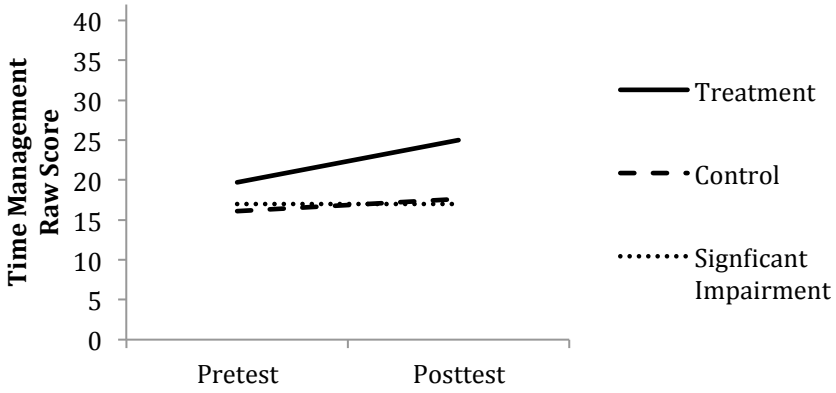
Time Management. Examining *z*-scores and results of the Kolmogorov-Smirnov test indicated that the distribution for time management scores did not significantly differ from normal at pretest, *skewness* = -.083, *kurtosis* = -.885, *KS*(20) = .123, *p* = .20. The posttest distribution also did not significantly differ from normal, *skewness* = -.994, *kurtosis* = 1.373, *KS*(20) = .113, *p* = .20. Taken together, these results suggest that the data were correctly entered and all values fell within an expected range.

Levene's test indicated that the assumption of homogeneity of error variances was met for the repeated measures analysis at pretest, $F(1,18) = .084$, $p = .776$, and posttest, $F(1,18) = 1.337$, $p = .263$. Visual examination of the distribution of standardized residuals along with Kolmogorov-Smirnov tests of normality indicated that the error variances were normally distributed, pretest time management *KS*(20) = .162, *p* = .178; posttest time management *KS*(20) = .117, *p* = .20. Residuals ranged from -1.62 to 1.51 at pretest and from -2.47 to 1.74 at posttest.

The ANOVA revealed a significant main effect of time, $F(1,18) = 10.6$, $p = .004$, and the main effect of condition was not significant, $F(1,18) = 3.483$, $p = .078$. Additionally, the Time X Condition interaction was not significant, $F(1,18) = 3.31$, $p = .086$. Results were trending in the expected direction with the treatment condition reporting greater improvement in time management over the course of the semester relative to the control condition (see Figure 7). Scores falling below the line labeled as significant impairment are indicative of significant impairment in the time management subscale relative to the normative sample. The calculated effect size for the Time X Condition interaction is moderate ($r = .39$).

Figure 7

Pre-Post Changes in Time Management by Condition



Anxiety

Overall, the participants in this sample reported a mild level of anxiety on the BAI (M = 10.25, SD = 8.30; range = 0 - 29). More specifically, 40% of participants reported a minimal level of anxiety, 35% reported mild anxiety, 20% reported moderate anxiety, and 5% reported severe anxiety. Results from the independent samples t-test indicated that the treatment and control condition were not significantly different in level of anxiety at pretest, $t(18) = -.395$, $p = .697$.

Moderation Analyses

A series of moderation analyses were conducted to determine the degree to which anxiety impacted changes in GPA, ADHD symptoms, executive functioning, and academic skills between the treatment and control conditions. Changes in these outcome variables were computed as simple difference scores from pre- to post-treatment. The PROCESS plug-in for SPSS (Hayes, 2013) was used to conduct the analyses. Before the moderation analyses were conducted, the assumptions regarding homoscedasity, multicollinarity, and independent errors for linear regression were examined by conducting a series of linear regression analyses with

treatment status, anxiety, and their interaction as the predictor variables and difference scores in GPA, ADHD symptoms, MCI, GEC, time management and organization as the dependent variables. Examination of values for Cook's distance and Mahalanobis distance indicated that no one case exerted a major influence on the regression equations across all of the separate regression analyses. Additionally, tolerance was above 0.1 and the variance inflation factor was below 10 for the predictor variables in each regression analysis indicating no significant issues with multicollinearity. Visual inspection of the residual plots supported the assumption of homoscedasity. The Durbin-Watson statistic was above 1 and below 3, which are the minimum and maximum values recommended by Field (2005), in all regression analyses indicating the assumption of independent errors was met.

GPA. A moderation analysis was conducted to determine the influence of anxiety on the changes in GPA between the treatment and control conditions. The full model explained 15.1% of the variance in GPA, $F(3,16) = .95$, $p = .44$, $R^2 = .151$. The interaction between condition and anxiety was not significant $t(15) = .94$, $p = .36$, and accounted for a 4.7% increase in the variance explained by the model, $F(1,16) = .89$, $p = .36$, $R^2 = .047$. Regression coefficients are displayed in Table 4.

Table 4

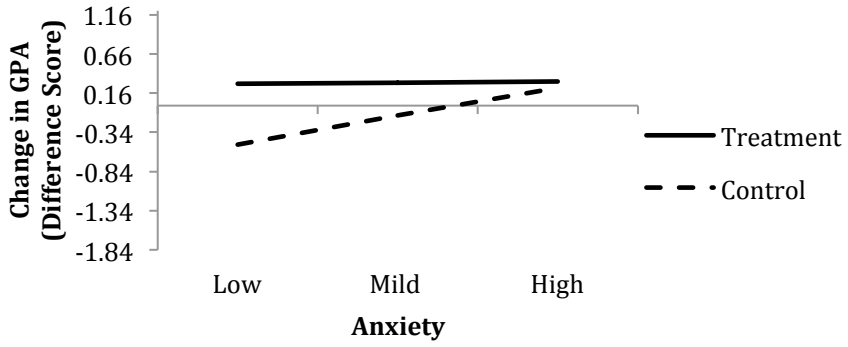
Model Summary for Predicting GPA

Variable	*b*	*SE*	*t*	*p*
Anxiety	-.04	.83	1.36	.19
Condition	-.86	.58	-1.49	.16
Interaction	.04	.04	.94	.36
			$R^2 = .15$, *MSE* = .58	

An analysis of simple slopes was conducted to evaluate the conditional effects of treatment status on GPA changes at low (-1 *SD*), mean, and high (+1 *SD*) levels of anxiety. None of the conditional effects were significant. When anxiety was low, there was a non significant, negative relationship between treatment status and changes in GPA, $b = -.78$, $t = -1.52$, $p = .15$. At mean levels of anxiety, there was a non significant, negative relationship between treatment status and GPA changes, $b = -.43$, $t = -1.26$, $p = .23$. At high levels of anxiety, the relationship between treatment status and GPA changes was negative and not significant, $b = -.08$, $t = -.17$, $p = .87$. The range of significance for the conditional effects of treatment status on GPA was probed using the Johnson-Neyman technique, and the results were inconclusive at all levels of anxiety. Nevertheless, as depicted in Figure 8, students with high anxiety in both the treatment and control conditions experienced positive gains in GPA. Students with low and mild anxiety in the treatment condition experienced positive gains of similar magnitude to students with high anxiety. Students in the control condition with low anxiety experienced the greatest decreases in GPA.

Figure 8

Conditional Effects of Anxiety on GPA



ADHD symptoms. The full model evaluating the moderating impact of anxiety on changes in ADHD symptoms between conditions accounted for 6.1% of the variance in ADHD symptoms, $F(3,16) = .347$, $p = .79$ $R^2 = .061$. The interaction between condition and anxiety was not significant $t(15) = -.38$, $p = .71$, and accounted for a 0.9% increase in variance explained, $F(1,16) = .144$, $p = .71$, $R^2 = .009$. Regression coefficients are displayed in Table 5.

Table 5

Model Summary for Predicting ADHD Symptoms

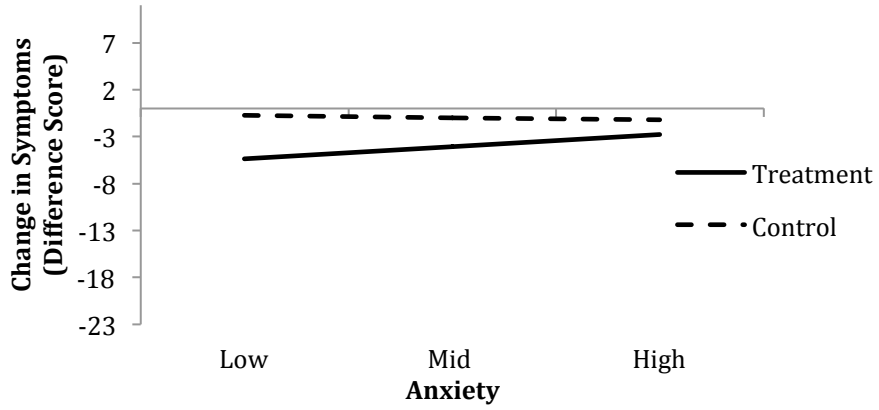
Variable	*b*	*SE*	*t*	*p*
Anxiety	.34	.69	.49	.63
Condition	4.98	6.27	.79	.44
Interaction	-.18	.48	-.38	.71
			$R^2 = .06$, *MSE* = 68.82	

An analysis of simple slopes was conducted to evaluate the conditional effects of treatment status on ADHD symptom changes at low (-1 *SD*), mean, and high (+1 *SD*) levels of anxiety. None of the conditional effects were significant. When anxiety was low, there was a non significant, positive relationship between treatment status and changes in symptoms, $b = 4.63$, $t = .83$, $p = .42$. At mean levels of anxiety, there was a non significant, positive relationship between treatment status and symptom changes, $b = 3.11$, $t = .83$, $p = .42$. At high levels of anxiety, the relationship between treatment status and symptom changes was positive and not significant $b = 1.59$, $t = .29$, $p = .77$. The Johnson-Neyman technique was used to probe the range of significance for the conditional effects of treatment status on changes in ADHD symptoms, and the results were inconclusive at all levels of anxiety. Figure 9 illustrates the conditional effects and shows that students with low anxiety in the treatment condition reported

the largest improvements (decreases) in ADHD symptoms. Students in the control condition reported similar, small magnitude improvements in ADHD symptoms across all three levels of anxiety.

Figure 9

Conditional Effects of Anxiety on ADHD Symptoms



GEC. The moderation analysis revealed that the full model including treatment status, anxiety, and their interaction accounted for 10.7% of the variance in global executive functioning difference scores, $F(3,16) = .64$, $p = .60$ $R^2 = .107$. The interaction between treatment status and anxiety was not significant $t(15) = -.89$ $p = .38$, and accounted for a 4.5% change in the variance explained by the model, $F(1,16) = .799$, $p = .38$, $R^2 = .045$. Regression coefficients are displayed in Table 6.

Table 6

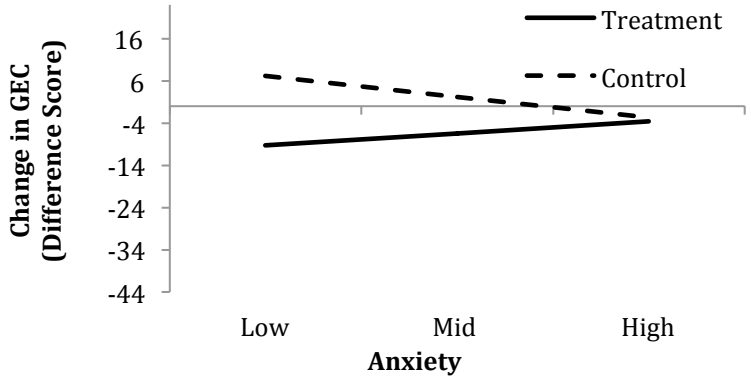
Model Summary for Predicting GEC

Variable	*b*	*SE*	*t*	*p*
Anxiety	1.27	1.50	.85	.41
Condition	18.25	13.58	1.34	.20
Interaction	-.93	1.04	-.89	.38
			R^2 = .107, *MSE* = 322.14	

An analysis of simple slopes was conducted to evaluate the conditional effects of treatment status on GEC changes at low (-1 *SD*), mean, and high (+1 *SD*) levels of anxiety. None of the conditional effects were significant. When anxiety was low, there was a non significant, positive relationship between treatment status and changes in GEC, $b = 16.43$, $t = 1.37$, $p = .19$. At mean levels of anxiety, there was a non significant, positive relationship between treatment status and GEC changes, $b = 8.69$, $t = 1.08$, $p = .30$. At high levels of anxiety, the relationship between treatment status and GEC changes was positive and not significant $b = .94$, $t = .08$, $p = .94$. The Johnson-Neyman technique was used to probe the range of significance for the conditional effects of treatment status on changes in GEC, and the results were inconclusive at all levels of anxiety. Figure 10 illustrates the conditional effects, and indicates that students with low anxiety in the treatment condition reported the most improvement in GEC while students with low anxiety in the control condition reported the most deterioration in GEC. Students with highest anxiety in both conditions reported a similar, small magnitude of improvement.

Figure 10

Conditional Effects of Anxiety on GEC



MCI. The full model evaluating the moderating impact of anxiety on changes in metacognition between conditions accounted for 17.6% of the variance in the MCI, $F(3,16) = 1.14$, $p = .36$ $R^2 = .176$. The interaction between condition and anxiety was not significant $t(15) = -.84$, $p = .41$, and accounted for a 3.7% increase in variance explained, $F(1,16) = .712$ $p = .41$, $R^2 = .037$. Regression coefficients are displayed in Table 7.

Table 7

Model Summary for Predicting MCI

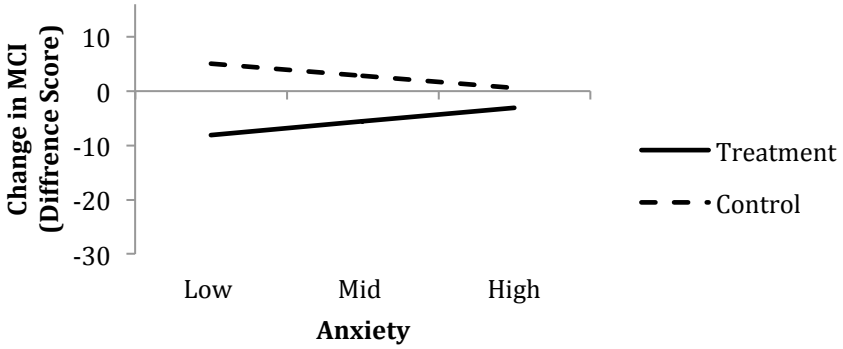
Variable	*b*	*SE*	*t*	*p*
Anxiety	0.88	0.97	.90	.38
Condition	14.24	8.8	1.61	.13
Interaction	-.57	0.68	-.84	.41
			$R^2 = .176$, *MSE* = 135.84	

An analysis of simple slopes was conducted to evaluate the conditional effects of treatment status on MCI changes at low (-1 *SD*), mean, and high (+1 *SD*) levels of anxiety. None

of the conditional effects were significant. When anxiety was low, there was a non significant, positive relationship between treatment status and changes in MCI, b = 13.12, t = 1.68, p = .11. At mean levels of anxiety, there was a non significant, positive relationship between treatment status and MCI changes, b = 8.37, t = 1.60, p = .12. At high levels of anxiety, the relationship between treatment status and MCI changes was positive and not significant b = 3.63, t = .48, p = .64. The Johnson-Neyman technique was used to probe the range of significance for the conditional effects of treatment status on changes in MCI, and the results were inconclusive at all levels of anxiety. Nevertheless, similarly to the pattern found in the other moderation analyses, students in the treatment condition with low anxiety reported the greatest improvement in the MCI whereas students in the control condition with low anxiety reported the greatest worsening in the MCI (see Figure 11). The changes in the MCI were similar and of small magnitude among those with high anxiety in the treatment and control conditions.

Figure 11

Conditional Effects of Anxiety on MCI



Organization. A moderator analysis was employed to examine the impact of anxiety on difference scores in organization between treatment conditions. The full model accounted for

11.5% of the variance in the organization, $F(3,16) = .696$ $p = .57$ $R^2 = .115$. The interaction between condition and anxiety was not significant $t(15) = .73$, $p = .48$, and accounted for a 2.96% increase in variance explained, $F(1,16) = .53$ $p = .48$, $R^2 = .0296$. Regression coefficients are displayed in Table 8.

Table 8

Model Summary for Predicting Organization

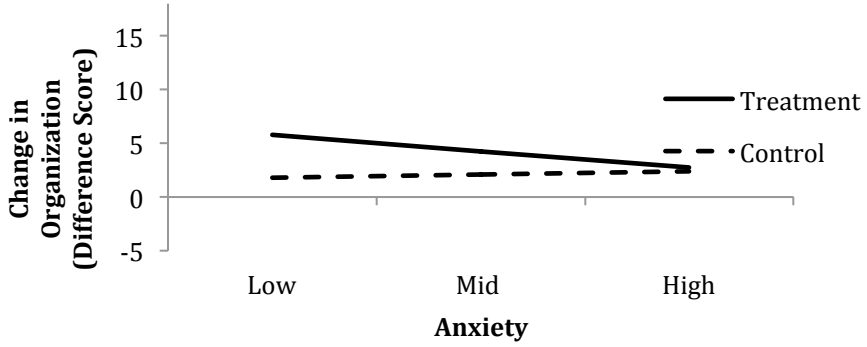
Variable	*b*	*SE*	*t*	*p*
Anxiety	-.40	.43	-.94	.36
Condition	-4.43	3.91	-1.14	.27
Interaction	.22	.30	.73	.48
			$R^2 = .115$, *MSE* = 26.63	

An analysis of simple slopes was conducted to evaluate the conditional effects of treatment status on organization changes at low (-1 *SD*), mean, and high (+1 *SD*) levels of anxiety. None of the conditional effects were significant. When anxiety was low, there was a non significant, negative relationship between treatment status and changes in organization, $b = -4.00$, $t = -1.16$, $p = .26$. At mean levels of anxiety, there was a non significant, negative relationship between treatment status and organization changes, $b = -2.19$, $t = -.94$, $p = .36$. At high levels of anxiety, the relationship between treatment status and organization changes was negative and not significant, $b = -.37$, $t = -.11$, $p = .91$. The Johnson-Neyman technique was used to probe the range of significance for the conditional effects of treatment status on changes in organization, and the results were inconclusive at all levels of anxiety. Figure 12 depicts the conditional effects and indicates that students in the treatment condition with low anxiety experienced the largest improvements in organization. Conversely, students with low anxiety in

the control condition reported the smallest increases in organization skills. Students with high anxiety in both conditions reported similar improvement of a small magnitude.

Figure 12

Conditional Effects of Anxiety on Organization



Time management. A final moderation analysis was conducted to examine the moderating effect of anxiety on changes in time management between conditions. The full model explained 23.5% of the variance in changes in time management, $F(3,16) = 1.64$, $p = .22$ $R^2 = .235$. The interaction between condition and anxiety was not significant $t(15) = .90$ $p = .38$, and accounted for a 3.9% change in the variance explained by the model, $F(1,16) = .81$, $p = .38$, $R^2 = .039$. Regression coefficients are displayed in Table 9.

Table 9

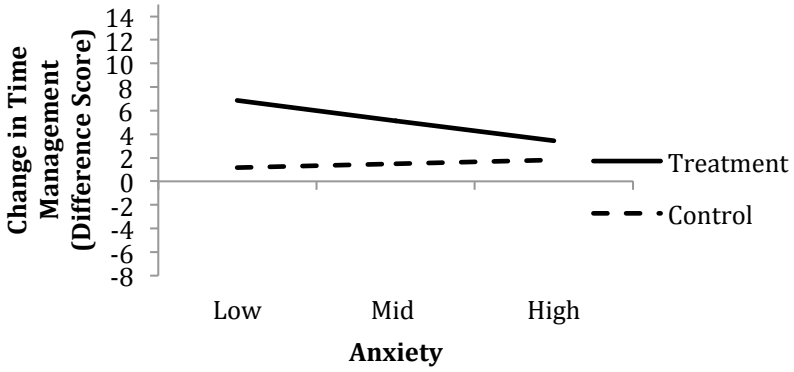
Model Summary for Predicting Time Management

Variable	*b*	*SE*	*t*	*p*
Anxiety	-.45	.39	-1.16	.26
Condition	-6.21	3.57	-1.74	.10
Interaction	.25	.27	.90	.38
			R^2 = .235, *MSE* = 22.23	

An analysis of simple slopes was conducted to evaluate the conditional effects of treatment status on time management changes at low (-1 *SD*), mean, and high (+1 *SD*) levels of anxiety. None of the conditional effects were significant. When anxiety was low, there was a non significant, negative relationship between treatment status and changes in time management, b = -5.72, t = -1.82, p = .09. At mean levels of anxiety, there was a non significant, negative relationship between treatment status and time management changes, b = -3.67, t = -1.73, p = .10. At high levels of anxiety, the relationship between treatment status and time management changes was negative and not significant, b = -.1.62, t = -.53, p = 60. The Johnson-Neyman technique was used to probe the range of significance for the conditional effects of treatment status on changes in time management, and the results were inconclusive at all levels of anxiety. As depicted in Figure 13, a pattern comparable to the other moderation analyses was found. Students in the treatment condition with low anxiety experienced the most improvement in time management. The degree of improvement was similar and of smaller magnitude between conditions among those with higher levels of anxiety. Students in the control condition with low anxiety experienced the least amount of improvement.

Figure 13

Conditional Effects of Anxiety on Time Management



Chapter IV: DISCUSSION

College students with ADHD are at-risk for poor outcomes in the college setting. There are several different treatment approaches for this population including medications, accommodations, and psychosocial treatments. Coaching is a psychosocial treatment approach that shows promise, but coaching research is in preliminary stages. The purpose of this pilot study was three-fold: (1) to examine students' perceptions of the feasibility of and their satisfaction with a coaching intervention, (2) to examine the degree to which the coaching intervention resulted in changes in students' GPA, ADHD symptoms, executive functioning, and academic strategies (time management and organization), and (3) to examine the level of anxiety among college students with ADHD and the moderating effects of anxiety on treatment outcomes.

Summary of Results

Feasibility and satisfaction. Results indicated that students in the treatment condition reported a high level of overall satisfaction with coaching. Additionally, students in the treatment condition were significantly more satisfied with coaching compared to students in the control condition who received the newsletters. Summarization of participants' responses to open-ended questions indicated that the majority of participants in the treatment condition found learning specific skills and strategies to be the most helpful aspect of coaching. The collaborative nature of the coaching relationship and the increase in motivation provided by the treatment were also cited as helpful aspects of coaching.

Students in the treatment condition found the coaching intervention feasible and acceptable as well. For instance, there was a low rate of no-shows to appointments, and 70% of students were able to attend six or more appointments indicating that the format of coaching was

feasible for most students. However, it is important to note that students were being reimbursed for participating in the study. The reimbursement may have influenced their appointment attendance, even though reimbursement was not tied to adherence. The summary of open-ended questions indicated that the majority of students viewed the biweekly format favorably and viewed 30-minute sessions as most reasonable. Common barriers to attending appointments were scheduling conflicts and forgetting. Although students encountered barriers in attending appointments, the low rate of no-shows and average number of sessions attended indicate that students were generally able to overcome these barriers. These findings indicate that brief treatment approaches are likely most suitable for college students. Students in the treatment condition also rated the coaching intervention as significantly more feasible and acceptable compared to students rating the newsletters.

Taken together, these findings indicate that college students with ADHD consider coaching both a useful and acceptable treatment. The high level of satisfaction and acceptability found in this study replicates the results from other qualitative analyses assessing students' perceptions of coaching (e.g., Parker & Boutelle, 2009). Furthermore, the results of this study allowed for a quantitative exploration of feasibility and satisfaction ratings, which strengthened the extant literature on students' favorable perceptions of coaching.

Treatment outcomes. The impact of coaching on treatment outcomes showed trends in the expected direction in all areas. More specifically, students in the treatment condition experienced improvements in GPA, ADHD symptoms, executive functioning, metacognition, organization skills, and time management relative to the control condition. Students in the treatment condition reported the largest improvements in time management relative to the control condition (r = .39). This finding is encouraging as all of the students in the coaching condition

focused on improving their time management. Students in the treatment condition also reported moderate improvements in metacognition relative to the control condition (r = .37). Metacognition is a measure of students' ability to think about their own thinking, and coaching is designed to help students internalize the coach's questioning process. The improvements in metacognition may indicate that students did in fact gain more insight into their internal cognitive processes.

However, it is important to note that none of the analyses of treatment outcomes reached the level of statistical significance, and therefore, the results of the current study may have occurred by chance and/or error in sampling or measurement. Nevertheless, the effect sizes calculated were of a small to moderate magnitude overall (*range* = .21 to .39), further supporting the assertion that results were trending in the expected direction. Moreover, the number of treatment sessions provided in this study was less than the number of sessions provided in the majority of other coaching treatment studies. An average of 5.8 sessions were provided in this study whereas several other investigations followed an eight session coaching model (Prevatt & Yelland, 2015; Swartz et al., 2005) and other studies included up to 24 sessions (Field et al., 2011). The small to moderate effect sizes obtained in this analysis despite the relatively small number of treatment sessions is further support for the efficacy of coaching. Perhaps larger gains would be found if the number of treatment sessions was comparable to the other investigations. However, it is also unclear whether changes of the small to moderate magnitude measured in this study led to clinically meaningful differences in students' performance. A broader range of outcome measures would help elucidate whether the small magnitude changes observed in this study actually led to meaningful changes for these students. For example, it would be important to investigate whether students experienced less academic impairment after receiving the

treatment. Examining outcomes such as graduation rates or number of students on academic probation could help elucidate whether coaching helped reduce academic impairment for college students with ADHD. Overall, the findings related to treatment outcomes are comparable to the existing coaching literature and support the feasibility, time, and cost of conducting a full-scale RCT study.

Moderating effect of anxiety. Participants in this study reported a mild level of anxiety overall. The majority of the participants reported a minimal level of anxiety, and only one participant reported a severe level of anxiety. As detailed previously, some researchers have found more substantial levels of anxiety among their samples (e.g., Prevatt et al., 2015; Weyandt et al., 2013) whereas others did not find significant levels of anxiety (Nelson & Gregg, 2012). More research is needed to determine the prevalence of comorbid anxiety among college students with ADHD.

The results of several moderation analyses indicate that the assessment of anxiety may be important because anxiety appears to have an influence on treatment outcomes. Although the moderating effect of anxiety accounted for small increases in the relationship between treatment status and outcomes (0.9% to 4.7%) and none of the moderation analyses yielded significant interactions, a consistent pattern was found. Students with low anxiety in the treatment condition consistently had the largest improvements across all self-reported outcome areas (ADHD symptoms, executive functioning, metacognition, organization skill, and time management). Moreover, students with low anxiety in the control condition consistently had the smallest improvements (organization skills, time management) or largest deteriorations (ADHD symptoms, executive functioning, and metacognition). Students with the highest levels of anxiety in both the treatment and control conditions experienced similar changes in outcomes

that were of smaller magnitude relative to those students with low anxiety. In regards to GPA, students with low anxiety in the control condition again experienced the largest deteriorations in GPA. Students in the treatment condition experienced similar gains in GPA regardless of anxiety level.

Limitations of the Present Study

Sample size. The small sample size is a major limitation of this study. The statistical software G*Power 3.1 was used to conduct a sensitivity power analysis and indicated that statistical power of .80 with the number of the participants in this study (N =20) and assuming a correlation of .5 between measures would only detect interaction effect sizes larger than 0.33 (Faul, Erdfelder, Lang, & Buchner, 2007). Additionally, with the obtained sample size (N = 20) and statistical power of .80, the three predictor regression models would only detect effect sizes larger than .70 (Faul, Erdfelder, Buchner, & Lang, 2009). In addition to the sensitivity power analyses, the observed power calculated through SPSS for interaction effects ranged from .08 to .41. Therefore, there was a high probability of Type II error in the analyses. The small sample size may account for the lack of statistically significant results obtained and is a limitation of this investigation. It was known at the start of this project that the sample size would be unpowered, hence the presentation of effect sizes and the examination of trends. However, this was acceptable for the current pilot study as the moderating influence of anxiety on treatment outcomes is a new area of study and was being explored with the intent of conducting future, larger-scale research.

Participants. Only recruiting students registered with DSS is another limitation of this study as these students may not be representative of the overall population of students with ADHD on campus. Students must self-identify will a disability and independently apply for

services through DSS, and such students may be different from students with ADHD who did not attempt to register with DSS. For instance, perhaps the students who seek out services are more motivated and, thus, would be more engaged in treatment. Alternatively, students who seek out services may be experiencing more difficulty with academics and be more impaired compared to students who did not register.

Measures. The instruments used in this study to assess ADHD symptoms, executive functioning, study skills, and anxiety were self-reports and, therefore, may not be an accurate measure of these constructs. As mentioned previously, students with ADHD tend to overestimate their abilities, so the use of self-reports is a limitation of this study. However, by comparing students who received coaching to a randomly assigned control group of other students with ADHD, the impact of overly positive self-assessments may have been negated. Additionally, there was not a wide variability in anxiety scores among this sample, which limited the scope of the moderation analysis. The majority of students reported anxiety in the minimal to mild range and there was only one student who reported severe anxiety. A sample with more variability in anxiety levels would allow for a stronger investigation of the moderating impact of anxiety. In the current study, it appeared that low anxiety is a risk factor for poor outcomes and that individuals with low anxiety respond best to treatment. However, it is possible that extremely high levels of anxiety could also function as a risk factor. It was not possible to evaluate the impact of extremely high levels of anxiety with this sample, and in future research it may be beneficial to modify recruitment procedures in order to ensure that the sample displays adequate variability in anxiety.

Implications for Future Research

Based on this study and the extant literature, coaching for college students with ADHD is a treatment approach that shows promise. Randomized controlled trials with adequately powered sample sizes should continue to be conducted in order to further establish the efficacy of coaching for college students with ADHD. It will also be important for measures other than self-report to be included in investigations. This investigation included GPA as an objective outcome measure, but GPA is still limited in terms of objectivity. Gathering informant reports may be a helpful way to cross-validate participants' self-reports, and perhaps objective measures of organization and time management (e.g., physically evaluating the participants' binder/planner using objective standards or tracking the number of late/missed assignments) could be utilized.

Additionally, longitudinal designs are needed in order to determine if coaching has long-term benefits for students with ADHD. To date, research has examined whether students experience improvements over the course of the semester or two, but there are no data to indicate whether improvements are maintained long-term. It is important to examine whether students benefit from coaching in the long-term because the objective of coaching is to enable students to be successful throughout their college careers and beyond. Without data to support whether coaching leads to maintained gains, it is unclear whether coaching is the most beneficial treatment option for college students with ADHD. Longitudinal research could also help determine dose-response relationships to treatment, which could help enable practitioners to deliver the most effective amount of treatment.

In regards to comorbid anxiety, there is preliminary evidence that anxiety may influence students' response to treatment. Low levels of anxiety among students with ADHD appeared to

function as a risk factor for poorer outcomes as students with low anxiety who were not exposed to the coaching treatment consistently experienced the worst outcomes. The coaching intervention appeared to mitigate the negative impact of low anxiety as students in the treatment condition who reported low anxiety experienced the greatest improvements. Additionally, the results indicate that high anxiety may serve as a protective factor. Students who did not receive the coaching treatment but who had high levels of anxiety experienced similar outcomes to students with high anxiety who did receive the treatment. However, this also indicates that students with high anxiety did not respond as significantly to the intervention compared to students with low anxiety. The finding that students with low anxiety responded best to the coaching intervention replicates the findings of Prevatt and Yelland (2015). Thus, coaching treatments may be most helpful for students with ADHD who also have low levels of anxiety. It is important to note that these conclusions are tentative as the small sample size greatly limits the confidence that can be placed on these findings. Nevertheless, the consistent pattern among the different analyses provides preliminary support for the validity of the findings, and further investigation is warranted. Therefore, investigations with adequate sample sizes to detect statistically significant effects in moderation analyses should be conducted. As mentioned previously, sampling procedures should also ensure adequate variability in anxiety levels. Such investigations will likely aide in determining how to target students for intervention. Researchers could examine at what level of anxiety the intervention is less likely to be impactful, which would help identify for whom the intervention is appropriate and, thus, maximize student response to intervention. For instance, it appears that students with low anxiety should be targeted for intervention, and students with higher levels of anxiety will likely not experience as large of benefits from coaching. Determining what cut-scores on anxiety screening measures are

indicative of high probability versus low probability of improvement in response to treatment could help maximize the use of resources and effectiveness of the intervention.

Conclusions

College students with ADHD experience poorer outcomes in college including poorer academic performance when compared to typically developing peers. A pilot randomized controlled trial was conducted to investigate the impact of a coaching intervention on GPA, ADHD symptoms, executive functioning, and academic skills. Additionally, the moderating impact of anxiety on treatment outcomes was examined. Overall, this study provides preliminary support for the efficacy of a brief coaching treatment for college students with ADHD and supports the need for larger scale designs. Students who received the coaching intervention experienced small to moderate improvements in GPA, ADHD symptoms, executive functioning, metacognition, organization, and time management. Additionally, there is preliminary evidence that students with low anxiety may experience the most improvement in outcomes as a result of coaching. Future research with larger sample sizes is needed in order to replicate these findings.

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APPENDIX A: IRB Documentation

RX: Your study has been approved

umcirb@ecu.edu

Tue 06/16/2015 07:37 AM

To:Kininger, Rachel Lynn <kiningerr13@students.ecu.edu>;

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board Office
4N-70 Brody Medical Sciences Building· Mail Stop 682
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Notification of Initial Approval: Expedited

From: Social/Behavioral IRB
To: Rachel Kininger
CC: Brandon Schultz
Date: 6/16/2015
Re: UMCIRB 15-000869
A Coaching Intervention for College Students with ADHD

I am pleased to inform you that your Expedited Application was approved. Approval of the study and any consent form(s) is for the period of 6/15/2015 to 6/14/2016. The research study is eligible for review under expedited category # 7. The Chairperson (or designee) deemed this study no more than minimal risk.

Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a continuing review/closure application to the UMCIRB prior to the date of study expiration. The Investigator must adhere to all reporting requirements for this study.

Approved consent documents with the IRB approval date stamped on the document should be used to consent participants (consent documents with the IRB approval date stamp are found under the Documents tab in the study workspace).

The approval includes the following items:

Name	Description
ASRS	Surveys and Questionnaires

Name	Description
Behavior Intervention Rating Scale	Surveys and Questionnaires
Demographic Questionnaire	Surveys and Questionnaires
Feasibility Open Ended Questions	Surveys and Questionnaires
Informed Consent	Consent Forms
McLean Screening for BPD	Surveys and Questionnaires
Recruitment Email	Recruitment Documents/Scripts
Recruitment Flyer	Recruitment Documents/Scripts
Satisfaction Open Ended Questions	Surveys and Questionnaires
Thesis Proposal	Study Protocol or Grant Application
Treatment Satisfaction Survey	Surveys and Questionnaires

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

IRB00000705 East Carolina U IRB #1 (Biomedical) IORG0000418
IRB00003781 East Carolina U IRB #2 (Behavioral/SS) IORG0000418

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Study.PI Name:
Study.Co-Investigators:

APPENDIX B: Demographics Questionnaire

Demographics Questionnaire

Code #: _____

Age: _____ **Date of Birth**: _____

Race: _____

Sex: Male Female Prefer not to answer

Year in School: Freshman Sophomore Junior Senior Senior+

Spring 2015 GPA: _____

Current Cumulative GPA: _____

SAT Scores: Verbal: _____ **Quantitative**: _____

ACT Score: _____

Are you taking medications for ADHD? Yes No

Please list ADHD medication: _____