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Predictors and Moderators if Qualify of Life Among College Students with and without ADHD

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Predictors and Moderators of Quality of Life Among College Students with and without ADHD

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ABSTRACT

Although studies have investigated differences in the subjective evaluation of quality of life (QoL) between individuals with ADHD and their peers without ADHD, college students with ADHD are relatively understudied. The current study uses a large, longitudinal sample of college students with and without ADHD to (1) examine the extent to which college students with and without ADHD differ with respect to their subjective evaluations of QoL, (2) the role of medication in QoL of college students with ADHD, (3) the role of comorbidity, drug use, and psychosocial treatment in QoL of college students with and without ADHD, and (4) the total impact of these variables on QoL. Results indicate that ADHD, psychiatric psychopathology, and engaging with psychosocial treatment are predictors of lower QoL. QoL did not differ as a function of whether individuals with ADHD took medication, and the presence or absence of the three potential moderators did not significantly impact the relationship between ADHD and QoL. QoL is best predicted by a model that includes ADHD, psychopathology, and psychosocial treatment.

Chapter I

Introduction

Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder characterized by hyperactivity, impulsivity, and/or inattention (American Psychiatric Association, 2013). These symptoms are associated with clinically significant impairment in multiple domains of functioning, including academic achievement, psychological functioning, social performance, and occupational functioning. Prior to the 1990's, ADHD was predominantly considered to be a childhood disorder (Biederman et al., 1993). Although the majority of research examining ADHD has continued to focus on children, research has increasingly recognized the chronicity of ADHD across the lifespan. As such, researchers have increasingly focused on ADHD in older populations including adolescents and adults.

ADHD among Adult Populations

ADHD in the general adult population. Estimates of the prevalence of ADHD among the adult population of the United States vary based on factors such as assessment methods and populations measured. Kessler and colleagues (2005, 2006), using a nationally representative sample of 3199 adults from the United States aged 18-44, estimate that 4.4% of the total adult population meets full criteria for ADHD. Individuals who are male, white, and/or unemployed are all disproportionately represented among adults with ADHD. Biederman and colleagues (2011), in an 11-year follow-up of young adults initially identified as having ADHD at age 11, found that 35% of individuals continued to meet full criteria for ADHD as young adults, and an additional 37% reported symptoms or impairment falling short of full diagnostic threshold. Factors that predict ADHD persisting into adulthood include the presence of comorbid

psychological diagnoses, severe impairment during childhood, and the presence of maternal psychopathology.

ADHD among college students. Although adults with ADHD continue to lag behind their peers without ADHD with regard to college enrollment, an increasingly large portion of young adults with ADHD have enrolled in college (Barkley, 2015; Weyandt & DuPaul, 2006). International estimates of the prevalence of clinically significant ADHD symptomatology among college and university students range from 2-8% (DuPaul, Schaughency, Weyandt, Tripp, & Kiesner, 2001; DuPaul, Weyandt, O'Dell, Varejo, 2009). In the US, approximately 6% of students in the enrolling 2014 cohort reported having been diagnosed with ADHD, which makes it the most common disability among college students (Eagan et al., 2015).

There are several factors that conceptually distinguish college students with ADHD from the general adult population. First, because these students have successfully gained admission into colleges and universities that apply the same admission standards to students regardless of disability status, they may represent the most successful and resilient portion of children and adolescents with ADHD (Frazier, Youngstrom, Glutting, & Watkins, 2007; Green & Rabiner, 2012; Wilmshurst, Peele, & Wilmshurt, 2011). As such, college students may have less severe or less impairing symptoms of ADHD than what is observed in broader populations of adults with ADHD. Second, the transition to college generally coincides with the removal of structure that may minimize the impact of ADHD such as parental supervision, informal classroom accommodations, and a highly structured course schedule (Green & Rabiner, 2012; Meaux, Green, & Broussard, 2009; Wolf, Simkowitz, & Carlson, 2009). Because of these two distinguishing features, college students with ADHD should be studied as a separate population that is distinct from adults or adolescents more broadly.

Several reviews of relevant literature (e.g. Weyandt & DuPaul, 2006; Weyandt & DuPaul, 2008) note methodological weaknesses in studies of college students with ADHD. First, many studies rely solely on clinical populations, such as students receiving counseling services or who formally register as students with disabilities. Although these students tend to be identified using fairly strict criteria, they likely only represent approximately one third of college students with ADHD (Advokat, Lane, & Luo, 2011). Second, studies that address the impact of ADHD by drawing from the broader college community tend not to rigorously confirm diagnoses and/or draw conclusions about students with ADHD based on predominantly subclinical symptoms. With these limitations noted, several studies have investigated whether academic and psychosocial differences noted in other populations with ADHD extend to college students.

Academic impairment. Academic impairment is the most extensively investigated and consistently observed impairment among college students with ADHD. College students with ADHD tend to perform worse than their peers without ADHD on measures of academic success such as grade point average (GPA) and course failure (Blase et al., 2009; DuPaul et al., 2009; Fleming & McMahon, 2012; Weyandt & DuPaul, 2006; Weyandt & DuPaul, 2008). In a meta-analysis of the relationship between ADHD and achievement across 72 studies, Frazier and colleagues (2007) found a moderate effect of ADHD on the academic achievement of adults (*d* =.57). A portion of this academic impairment is likely associated with deficits in academic-related skills, which become especially relevant to postsecondary students, given the unstructured and demanding nature of college (Green & Rabiner, 2012; Wolf, Simkowitz, & Carlson, 2009). For example, ADHD inattentive symptoms are associated with poorer academic adjustment to college and poorer study skills, and college students with ADHD are worse than

their peers at planning or evaluating how long tasks take to complete (Advokat, Lane, and Luo, 2011; Norwalk, Norvilitis, & MacLean, 2009; Prevatt, Proctor, Baker, Garrett, & Yelland, 2010).

Psychological and social impairment. Both social and psychological outcomes of college students with ADHD are relatively understudied compared to academic outcomes (DuPaul et al., 2009). Reviews of the existing literature investigating social and psychological functioning among college students with ADHD have generally been more equivocal than those of academic impairment (Blase et al., 2009; DuPaul et al, 2009; Weyandt & DuPaul 2006; Weyandt & DuPaul, 2008). Although various studies have observed psychological or social impairment among students with ADHD on measures of impairment such as stress, adjustment, coping styles, depression, anxiety, and obsessive-compulsive behaviors (e.g. Overbey, Snell, & Callis, 2009; Richards, Rose, & Ramirez, 1999; Shaw-Zirt, Popali-Lehane, Chaplin, & Bergman, 2005; Weyandt et al., 2013), other studies have failed to find a significant group-based difference on similar measures (e.g. Heiligenstein, Guenther, Levy, Savino, & Fulwiler, 1999; Nelson & Gregg, 2010).

ADHD and Quality of Life

The various impairments associated with ADHD all impact areas relevant to an individual's quality of life (QoL), or the evaluations they make about their life either globally or with regard to specific domains (Wehmeier, Schacht, & Barkley, 2010). QoL has two major perspectives—objective quality of life, which measures ability to do specific concrete tasks, and subjective quality of life, which measures an individual's subjective evaluation of their own life (Huebner, 2004). These subjective evaluations are further differentiated by being either global or domain-specific. Subjective domain-specific QoL captures an individual's evaluation of their life as pertaining to a given area, such as work or school, whereas global subjective QoL provides an

overall snapshot that incorporates broad considerations of functioning and happiness and impairment thereof in all areas relevant to an individual's life. QoL is increasingly viewed as an important outcome, particularly among adults receiving physical or mental healthcare. The importance of QoL stems, in part, from its conceptual ties with healthcare and helping professions. Spitzer and colleagues (1995) argue that the main goal of healthcare is to improve patients' perceptions of their health and to reduce the extent to which problems reduce their QoL. As such, as individuals grow older and more autonomous in their personal care decisions, QoL increasingly reflects their subjective evaluation of their own need for impairment-reducing services such as psychological and medical care.

There is no single agreed upon best practice to measure subjective QoL in adults. Therefore, subjective QoL is measured in a variety of ways by researchers and practitioners, including single-item global "snapshots" or multi-item scales assessing domain-specific QoL, such as health-related QoL (Bowling, 2005). Bowling suggests using a single item, such as a 1-10 scale, may be most appropriate when QoL is the outcome of interest in a given study, as multi-question assessments may too closely link the definition of QoL to its more objective underlying contributors.

Measures of QoL have been administered to college students in order to evaluate the need for various services on college campuses and in order to monitor the effectiveness of improvements on QoL over time (Audin, Davy, & Barkham, 2003; Lounsbury, Saudargas, Gibson, & Leong, 2005). Additionally, authors have investigated whether QoL can function as an early predictor of student retention (Frisch et al., 2005). This study, which followed 2179 college students, found both measures to have similarly poor predictive power: they found GPA to have a sensitivity of .58 and specificity of .68, whereas QoL had a sensitivity of .57 and

specificity of .61. Although several authors point to findings such as these as evidence that subjective QoL should be systematically tracked in order to provide better college experiences and enhance outcomes for students (e.g. Audin, Davy, & Barkham, 2003; Cha, 2003), empirical research into subjective QoL of college students is fairly limited and often uses students as a sample of convenience rather than as a population of interest.

As QoL has increasingly become an outcome of interest among researchers, a large portion of research has begun to investigate QoL outcomes associated with various physical and psychological conditions (Bowling, 2005). As such, a large number of studies have investigated whether individuals with ADHD differ from individuals without ADHD with regard to QoL. A systematic review of 36 studies investigating QoL in children with ADHD indicates that QoL is similar among children with and without ADHD when the child is self-reporting QoL, but that parents of children with ADHD tend to rate their child's QoL lower than the parents of children without ADHD (Danckaerts et al., 2009). A similar review of QoL in adults with ADHD across 36 studies found that adults with ADHD rate their QoL significantly lower than their peers without ADHD (Agarwal, Goldberg, Perry, & Ishak, 2012). Taken together, these two reviews suggest that adults, but not children, with ADHD tend to consider their lives to be of lower quality than their peers.

Despite the various studies of QoL in adults with ADHD, only two studies to date have inspected the impact of ADHD on college students. Gudjonsson and colleagues (2009) investigated the impact of ADHD symptoms within 369 Icelandic students from the general university population on their global QoL. Within a larger model, ADHD symptoms had standardized regression weights of -.06 and -.14 among males and female, respectively, which indicates a small but significant negative impact of ADHD on QoL. Although this study provides

preliminary evidence that ADHD symptoms impact QoL, it suffers from several methodological limitations. Most notably, the researchers used a general population sample including only a single student meeting criteria for ADHD. Although the participants with more symptoms of ADHD reported lower QoL, the sample's symptomatology was generally quite low; on a scale measuring attention and hyperactivity/impulsivity on 0-27 scales, the respondents' averaged scores of 5.0 and 3.9, respectively. Grenwald-Mayes (2001) compared QoL between 37 students with ADHD (36 of whom were identified by academic resource centers) and 59 comparison students without ADHD. On the 15 scales and global scores produced by their measure of QoL, the ADHD group reported lower scores on domain-specific QoL measuring parent-child relations, political behavior, personal growth, and social desirability. The study's findings were therefore mixed, and were limited by their small sample and restricting their sample to only students receiving formal disability services. Taken together, although there is preliminary evidence to suggest that QoL may be lower in college students with ADHD compared to their peers without ADHD, no study to date has definitively found such a difference using a general population sample of college students with and without ADHD.

Other indicators of QoL among college students with ADHD. Several other factors conceptually related to QoL may have special relevance for college students with ADHD. One such example is comorbid psychiatric diagnoses (Wolf, 2001). Substantial evidence exists that additional psychological diagnoses such as depressive disorder and oppositional defiant disorder increase impairment among individuals with ADHD, and that the presence of additional psychological diagnoses may result in lower QoL relative to individuals with ADHD alone (Barnard-Brak, Sulak, & Fearon, 2010; Brod, Johnson, Able, & Swindle, 2006; Danckaerts et al., 2009; Overbey, Snell, & Callis, 2009). Although, as noted previously, few studies have

investigated comorbid psychopathology among college students with ADHD, there is substantial evidence that adults with ADHD are at higher risk for psychological diagnoses relative to their peers without ADHD (Biederman et al., 1993; Kessler et al., 2006). More recent research with college students has confirmed that college students with ADHD are at greater risk for other psychological diagnoses than their peers without ADHD (Anastopoulos et al., 2014; Weyandt et al, 2013).

The use of alcohol, tobacco, and other drugs (ATOD), a common problem at colleges in the United States, has special relevance to college students with ADHD (Wolf, 2001). Research has generally found that college students with ADHD use tobacco, marijuana, and other illicit drugs at a greater rate than college students without ADHD (Baker, Prevatt, & Proctor, 2011; Glass & Flory, 2012; Higher Education Research Institute, 2011; Overbey, Snell, & Callis, 2009). Although the evidence about alcohol consumption is generally less conclusive than other drugs, college students with ADHD generally report greater problems associated with drinking, such as aggression while intoxicated or a lack of control over drinking (Baker, Prevatt, & Proctor, 2011; Glass & Flory, 2012; Rooney, Chronis-Tuscano, & Yoon, 2011). These problems associated with alcohol consumption, in turn, tend to predict reductions in the QoL of college students (Murphy, Hoyme, Colby, & Borsari, 2006).

ADHD and other psychological diagnoses are often treated with prescription medication. In fact, whereas only one third of college students with ADHD receive formal disability services from their university, over 78% use medication to manage their behavior (Advokat, Lane, & Luo, 2011). Medication has previously been found to improve QoL in adults with ADHD and to reduce ADHD symptoms among college students with ADHD, although it may not fully close

the gap between students with and without ADHD (Advokat, Lane, & Luo, 2011; Blase et al., 2009; DuPaul et al., 2012; Rabiner, Anastopoulos, Costello, Hoyle, & Swartzwelder, 2008).

Finally, colleges offer a number of services designed to improve the quality of life of college students with disabilities. Students with disabilities can register with their university to access resources for students with disabilities, including quiet testing rooms, coaching, additional time for assignments, priority seating, and use of technology (Parker & Benedict, 2002; Wolf, Simkowitz, & Carlson, 2009). Students with ADHD and/or learning disabilities comprise 40% of the students accessing college disability services (Weyandt & DuPaul, 2006). Additionally, a number of services are often available to college students in general, including counseling centers, tutors, and writing centers. There is limited evidence suggesting that utilizing campus services improves subjective self-evaluations (Meaux, Green, & Broussard, 2009; Zwart & Kallemeyn, 2001). Although reviews of relevant literature have found a lack of empirical investigation into psychosocial treatment for ADHD among college students (Fleming & McMahon, 2012; Green & Rabiner, 2012; Weyandt & DuPaul, 2006; Weyandt & DuPaul, 2008), more recent research provides preliminary evidence supporting psychosocial interventions for college students with ADHD such as cognitive behavioral therapy (CBT), couples therapy, mindfulness, and cognitive restructuring (Anastopoulos & King, 2015; Canu & Wymbs, 2015; Eddy, Canu, Broman-Fulks & Michael, 2015; LaCount, Hartung, Shelton, Clapp, & Clapp, 2015; Wymbs & Molina, 2015).

Purpose and Description of Current Study

QoL is an outcome with particular relevance to adults with disabilities. Although previous studies have investigated how children and adults with ADHD evaluate their own QoL relative to their peers without ADHD, only two studies have done so with a population of college

students (Grenwald-Mayes, 2001; Gudjonsson et al., 2009). These studies suffered from methodological limitations and produced limited findings. In addition to ADHD, several other factors have particular relevance to college students with ADHD that might be expected to impact their QoL, including the presence of other psychopathology, their use of ATOD, and their use of psychopharmacological and psychosocial treatment.

The current study seeks to build on the current research in two ways. First, the current study follows a large sample of general population college students with confirmed diagnostic statuses over time, thereby overcoming a number of methodological limitations often found in studies of college students with ADHD. Second, the study investigates the relationship between QoL and a number of other services and behaviors relevant to college students with ADHD. By placing the relationship between QoL and ADHD in context, the current study explores potential opportunities to intervene and improve the QoL of college students with ADHD.

To achieve these goals, the current study offers four research questions. First, among college students, are there differences in subjective global QoL associated with psychopathology, problematic use of ATOD, utilization of psychosocial and psychopharmacological treatment, and in particular ADHD? It is hypothesized that college students with ADHD, other psychopathology, problematic ATOD use, or who access psychopharmacological and psychosocial treatment will report lower qualities of life than those without each of these conditions, as indicated by a main effect of each variable. Second, how does the QoL of college students with ADHD who take medication to manage ADHD symptoms compare to those students with ADHD who do not take medication and to college students without ADHD? It is hypothesized that college students with ADHD who take medication to manage their symptoms have a greater QoL than those who do not, but that their QoL lags behind college students

without ADHD. Third, do key behaviors and qualities relevant to the transition to college mitigate or exacerbate the relationship between ADHD and global subjective QoL? Specifically, does comorbid psychopathology, problematic use of ATOD and/or the use of psychosocial treatment moderate this relationship? It is hypothesized that these variables significantly moderate the relationship between ADHD and QoL as indicated by interaction effects between ADHD status and the presence of each potential moderating variable. Specifically, it is hypothesized that the relationship between ADHD and QoL is mitigated (i.e., smaller) in the presence of psychosocial treatment and exacerbated (i.e., larger) in the presence of additional psychopathology or problematic use of ATOD. Finally, among college students with and without ADHD, to what extent is subjective global QoL predicted by the significant variables and interactions identified in questions 1, 2, and 3? Because this question is exploratory, no specific hypothesis is offered other than that a significant portion of the variance in QoL is explained by the identified predictor variables.

CHAPTER II

Review of Literature

College students with ADHD represent a unique and under-studied population of individuals. Based on a review of the literature, the current study offers four hypotheses related to the relationships among six variables of interest: ADHD status; the use of ADHD medication; dangerous use of ATOD; the presence of additional psychiatric psychopathology; use of psychosocial treatment; and subjective global QoL. In order to explore the research driving these hypotheses in greater detail, this chapter reviews the literature as it pertains to each of the aforementioned five concepts. First, QoL among adults is reviewed, including how it is conceptualized, how it is measured, and how it has been applied to college students as a subset of the adult population. Next, the relationship between QoL and ADHD is reviewed, with particular care to its relationship among college students with ADHD. This section addresses research question 1—the main effect of ADHD on QoL. Next, the impact ADHD medication has on the quality of life of adults with ADHD is reviewed. This section focuses on research question 2—the impact of ADHD medication on QoL of student with ADHD. Finally, each of the potential moderator variables are reviewed in order—psychopathology, ATOD, and psychosocial treatment. These sections examine the relationship between each respective variable and QoL among adults, as well as evidence for its impact on the QoL of adults with ADHD in particular. These sections address research questions 1 and 3—the main and interaction effects of the moderator variables.

Quality of Life among Adults

Quality of life can be conceptualized in two broad domains—objective and subjective. Objective QoL includes concrete markers of being able do certain things judged by researchers

to be relevant to as good life, such as being able to walk up stairs, avoid going to the doctor's office too often, or operate a motor vehicle (Huebner, 2004). Implicit in objective QoL is a value judgment made by the assessor based on the items measured being critical to a "good" life and the items not measured as being unimportant. The other major domain is subjective QoL, which is an individual's own evaluation of how they are doing relative to a set of standards (i.e. set by other people, where they'd like to be, or the best/worst life they can imagine). Huebner (2004) notes that the two domains are only modestly associated with one another—an individual's own subjective evaluation of their life is difficult to capture through selecting concrete indicators. Lyubomirsky and Lepper (1999), in their review of QoL, note that only modest long term effects have been observed between objective significant life events (e.g. winning the lottery) and QoL. Similarly, other informants' measures of an individual's QoL are often very different from their subjective evaluation. Lucas, Diener, and Suh (1996) assessed life satisfaction among a sample of 212 college students, each of whom gave four friends and/or family members informant scales to complete. The informants' responses correlated moderately with self-report (r= .48).

Helping research, such as psychology and medicine, has increasingly measured subjective QoL as an outcome of interest. Interest in QoL largely stems from its conceptual alignment with intervention. For example, Spitzer and colleagues (1995) argue that interventionists have an obligation to measure subjective QoL because increasing a client's subjective evaluations about their own life is often the impetus for intervention. More recently, Coghill (2010) echoed this sentiment in arguing that QoL has become increasingly relevant as medicine has moved from a life-preserving to a health-promoting science.

Global, subjective QoL is closely related to, and sometimes used interchangeably with, subjective well-being (SWB; Diener, 2000). Orley, Saxena, and Herrman (1998) distinguish

measures of QoL from SWB only insofar as QoL involves objective (rather than subjective) evaluations about an individual's life. The field of SWB is largely populated by studies conducted by a group of researchers led by Ed Diener. Diener and colleagues (1999) propose that subjective evaluations of QoL are driven by social comparison theory such that individuals judge their own QoL based on their impressions of their own QoL relative to others. Diener and Suh (1997) present a framework for assessing global, subjective QoL rather than objective or domain-specific markers. The researchers argue that using a subjective global QoL allows for individuals to assign their own relative weight to specific domains or tasks, rather than assigning weights within the assessment tool, and that subjective QoL captures an individual's cognitive and affective evaluations, which may differ substantially from the assumptions of researchers. Diener and colleagues have also examined cultural and international differences in perceptions of QoL. In a review of literature, Diener, Oishi, and Lucas (2003) noted that subjective life evaluations are predicted by personality measures including extraversion and neuroticism, but that this relationship is moderated in part by cultural factors such as wealth, cultural importance of individual well-being, and an individual's score on a measure of relative vs avoidant interpersonal styles. Similarly, Diener (2000) reviewed international levels of subjective well-being based on samples of 1000 individuals from 29 countries and found that people's resting state tends to be positive—the international means (out of 10) range from 5.03 in Bulgaria to 8.36 in Switzerland. The mean in the United States is near the top of their international list, with a mean rating of 7.73 out of 10.

Measurement of QoL. A broad review of the literature suggests that there is little consistency in how QoL is defined or measured across studies. Generally, the way studies conceptualize and measure QoL varies as a function of two axes: global vs domain-specific QoL

and single vs multi-item measurements of QoL. Bowling (2005) discusses the long history of single-item measures of QoL dating back to the 1940s and explains advantages and disadvantages of each of the four possible conceptualizations. Generally, a single-item, global scale provides a "snapshot" of someone's life and incorporates a broad range of relevant evaluations while limiting burden on the participant. Bowling further suggests that single item measures are best used as outcomes of interest, rather than predictors, because many multi-item global QoL scales are based on the sum of domain-specific ratings. As such, when these multi-item measures are used as dependent variables, it is likely that independent variables used to predict them are in some way also captured in the items contained within the multi-item measure.

Although there is no single agreed upon single-item QoL measure, it generally involves variations on asking participants to evaluate their lives "in general," with 1 being the worst their life could be and 10 being the best their life could be. Various single-item measures have been psychometrically evaluated, including their test-retest reliability, their sensitivity to major life events that would be expected to impact QoL, and their convergent validity with multi-item measures of QoL. For example, Atkinson (1982) used a sample of 2162 Canadian adults to determine that the "Ladder scale," a commonly used 1-10 global, subjective QoL measure, has a test/retest reliability of .40 across 2 years and that it is sensitive to the presence of major life events over that same timespan. Similarly, Lyubomirsky and Lepper (1999) found that single item, global QoL measures correlated at a rate between .52 and .70 with multi-item global measures among a population of 2732 college students.

QoL among college students. Few studies have investigated the ways in which QoL can be applied to college student populations, and many of the studies that do investigate QoL in college students use college students as a sample of convenience, rather than a specific

population of interest. Despite this, there is evidence that college students should be considered a special population of adults. Vaez, Kristenson, and Laflamme (2004) compared the QoL of Swedish young adults who were attending college or who were working and had never attended college. College students have reported significantly lower QoL than their working peers, and also reported significantly lower expectations for their future QoL. Within the research that investigates QoL among college students specifically, Sirgy, Grzeskowiak, and Rahtz (2007) divide studies into three categories: those which investigate the relationship between QoL and other factors, those developing QoL measures specifically for college students, and those which develop domain-specific measures focusing on factors specific to college (e.g. perceived quality of dorm rooms, perceived quality of professors).

Sirgy, Grzeskowiak, and Rahtz (2007) tested a model of "Quality of College Life," which was a measure of students' global satisfaction with their QoL at their school. Their proposed model tested whether satisfaction with college facilities is associated with satisfaction with academic and social aspects, and whether satisfaction within these two domains in turn predicted their subjective overall impressions of their college quality of life. Based on questionnaire responses of 790 students, the model showed adequate fit and satisfaction with academic and social aspects were significantly associated with global quality of student life (β = .35 and .18, respectively), and their total model predicted 23% of the variance in quality of college life. The authors suggest that measuring QoL among college students can inform decisions made by university officials, such as altering college facilities in order to increase student satisfaction and attract more students. More recently, Hicks and Heastie (2008) conducted a similar study and concluded that the QoL of students living on campus is negatively impacted by subjective perceptions of roommates and housing conditions.

Several other groups of researchers have argued for the utility of measuring QoL among college and university students, most notably in order to predict college retention and drop out. DeBerard, Spielmans, and Julka (2004) proposed a model of mental health QoL in order to predict dropout and retention among a group of university students. The researchers assessed the mental health QoL of 204 college students after enrollment in college, and then obtained their GPA and enrollment status the following fall. Although mental health QoL predicted GPA above and beyond the effects of high school GPA and SAT scores, the model did not predict retention. More recently, Frisch and colleagues (2005) conducted a similar study using a global measure of QoL and using a larger sample of 2179 college students who presented for counseling at universities. Students' retention was measured from 12-36 months following their counseling session, and the authors concluded that QoL was able to predict student retention at a rate similar to GPA. Audin, Davy, and Barkham (2003) propose that the findings of college QoL studies can be used by faculty to "close the loop" by responding to student concerns that lower QoL in order to raise QoL. Based on a sample of 790 university students, they identified physical accommodations, quality of academic support, quality of counseling services, effectiveness of teaching, financial concerns, and social support to be among the variables associated with higher QoL.

Two studies have investigated the extent to which college-specific QoL is associated with global QoL. Benjamin and Hollings (1995) used discriminant analysis to determine which of a list of variables were best predictive of college satisfaction and which were best predictive of life satisfaction in samples of 197 and 149 college students. The two concepts were moderately correlated (r^2 = .30), but were predicted by very different variables. College satisfaction was most powerfully predicted by fair grading, emotional health, and housing comfort, whereas life

satisfaction was most powerfully predicted by college satisfaction, coherence, and self-perception. Similarly, Lounsbury and colleagues (2005) found that their own model of college satisfaction correlated moderately (r =.51) with global life satisfaction among a group of 552 college students. Within this sample, global life satisfaction is largely accounted for (r^2 = .45) by personality traits, most prominently emotional stability (r^2 = .35). Personality predicted a greater portion of general life satisfaction than college satisfaction, and college satisfaction made only small improvements in a model of general life satisfaction above and beyond personality traits (Δr^2 = .059).

Finally, various studies have investigated the extent to which various independent variables are associated with QoL among college students. These studies are generally cross-sectional, and involve administering questionnaires to large groups of college students, often in introductory psychology classes. By definition, risk factors or negative life events are generally associated with lower QoL. For example, Damush, Hays, and DiMatteo (1997) demonstrated that QoL is sensitive to recent life events among a sample of 350 university students. Pilcher (1998) surveyed 72 college student and found that satisfaction with life was predicted by depression, vigor, confusion, frequency of illness, and negative affect. Cha (2003) surveyed a sample of 350 Korean university students, and found that optimism was most strongly associated with QoL (β = .29), but that QoL was also significantly associated with self-esteem.

Quality of Life and ADHD among Adults

QoL has increasingly become an outcome of interest among individuals diagnosed with ADHD. Wehmeier, Schacht, and Barkley (2010) describe QoL as a multidimensional concept that reflects a number of subjective physical, social, and psychological aspects of health relevant to ADHD, but also caution that it is distinct from symptoms or objective functional outcome

associated with the diagnosis. To date, a number of studies have inspected the QoL of individuals with ADHD, and these are summarized in two major reviews of the literature.

Denckaerts and colleagues (2009) conducted a systematic review of 36 articles inspecting the impact of ADHD on the quality of children's lives. Based on these studies, the reviewers concluded that children with ADHD often report QoL similar to children without ADHD, but that their parents generally rate their child's QoL as being 1.5-2 SD lower than the parents of children without ADHD. The reviewers note that the studies generally draw from clinical samples of children, rather than the general population, and that lower QoL is associated with more severe symptom severity, functional impairment, and comorbidity. Although a number of general and ADHD-specific measures of QoL have been developed, there is no single measure that is widely used to measure QoL among children with ADHD.

More recently, Agarwal, Goldberg, Perry, and Ishak (2012) conducted a similar review using studies of adults. The researchers identified 36 articles inspecting QoL among adults with ADHD. Like the review conducted by Denckaerts and colleagues (2009), the researchers found wide variation as to how QoL was measured, both with regard to specific instruments and the utilization of general QoL or ADHD-specific QoL. The authors found that most of the 36 studies could be divided into three different classes of studies—studies examining measures of QoL in populations of adults with ADHD (6 studies), studies of the impact of ADHD among adults (9 studies), and studies of the impact of treatment on QoL of adults with ADHD (9 studies). All 9 of the treatment studies measured the impact of prescription medication, such as stimulants, on the QoL of adults with ADHD. The authors conclude that, unlike children, adults with ADHD generally report their QoL to be lower than their peers without ADHD. Taken together, the two

reviews suggest that as children with ADHD grow older, they begin to make more negative evaluations about their own lives relative to their peers without ADHD.

Two examples of individual studies investigating the impact of ADHD on QoL include the investigations by Brod, Johnston, Able, and Swindle (2006) and Landgraf (2007). Both of these studies developed scales to measure QoL among populations of adults with ADHD and were collecting evidence of validity, such as construct validity, known groups validity, and convergent validity. Brod and colleagues tested their measure, the Adult ADHD QoL scale (AAQoL), in a sample of 985 adults. The participants had either screened positive for or self-reported a diagnosis of ADHD, or screened negative. The researchers found that QoL is positively correlated with depression, overall health, interpersonal conflict, social contacts, and emotional disruption, that adults who screened positive for ADHD reported significantly lower QoL than those who screened negative, and that higher symptom severity was associated with lower QoL. Landgraf investigated QoL in the context of developing the ADHD Impact Module-AIM-Adult Version (AIM-A), which is the measure of ADHD used in the current study. The AIM-A includes both global, single-item measures of general QoL and multi-item measures of QoL in domains specific to ADHD. This study followed 317 adult participants enrolled in a study of ADHD medication, and found that as compared to individuals with low to moderate clinician-reported impairment, adults with marked or severe impairment had significantly lower QoL across domains, and that the effect sizes associated with impairment were moderate (.30-.58).

QoL and ADHD among college students. To date, only two studies have inspected the impact of ADHD on college students' QoL. Grenwald-Mayes (2001) assessed 37 college students with ADHD and 59 college students without ADHD. All but one student with ADHD

had been identified through registering with their college's office for students with disabilities. Their QoL measure included 15 domain-specific scales and a total QoL scale. Relative to their group of comparison college students, college students with ADHD reported significantly lower scores for domains measuring QoL related to personal growth, parent-child relationships, political behavior, and social desirability. They failed to find significant differences in QoL with regard to the other 11 domains or the total QoL score. The study provides limited evidence that college students with ADHD make lower self-evaluations about their QoL than college students without ADHD, but is limited by its use of a small, clinical sample and by its mostly null findings. However, it is the only study to date to directly compare college students with and without ADHD.

A more recent study by Gudjonsson and colleagues (2009) assessed the relationship between ADHD and QoL among a sample of 369 university students from a university in Iceland. Unlike Grenwald-Mayes (2001), the researchers examined ADHD as a continuum of symptoms, rather than a categorical disorder, and drew participants from the general college population. The researchers found that ADHD symptoms were inversely correlated with QoL. They also conducted a multiple regression to measure the extent to which a model including measures of ADHD impairment and depression, anxiety, and stress accounted for QoL. The total models explained 22% of the variance among college males and 25% of the variance among college females. Although this study used a more representative population, the authors note that only one of their 369 participants actually met criteria for ADHD, and their sample's impairment was generally quite low. For example, their measure of ADHD symptoms assessed inattention and hyperactivity/impulsivity on scales from 0-27, and their participants averaged mean scores of 5.0 and 3.9, respectively, on the two scales. Taken together, these studies provide preliminary

evidence that QoL among college students with ADHD is lower than QoL among college students without ADHD, but the studies have a number of limitations that the current study seeks to address, including using a large general population sample of college students both with and without confirmed diagnoses of ADHD.

Quality of Life and ADHD Medication among Adults and College Students

Much of the research examining QoL as an outcome among populations of adults with ADHD has been conducted with relation to the impact of prescription ADHD medication. These studies often follow outcomes related to both subjective QoL and ADHD symptoms in order to determine whether medication for ADHD reduces both the subjective and objective impairment associated with ADHD.

Several reviews of recent literature have concluded that individuals with ADHD can significantly improve their subjective QoL through treatment involving prescription medication. The reviews by Denckaerts and colleagues (2009) and Agarwal and colleagues (2012) concluded that prescription medication improves the QoL of children and adults with ADHD. More specifically, Agarwal and colleagues noted that the improvement in subjective QoL may even occur in cases where objective QoL, such as ADHD symptoms, do not change. For example, Adler and colleagues (2008) conducted a double blind placebo controlled study of atomoxetine with 410 adults with ADHD. Individuals in the ADHD group had nonsignificant gains in their measure of objective QoL (work productivity) relative to the placebo group, but had significant gains in subjective QoL. Coghill (2010) conducted a systematic review designed to assess the impact of medications on the QoL of children and adults with ADHD. The literature review found 25 studies, 5 of which inspected QoL among adults with ADHD. The researcher concluded that medication for ADHD is associated with gains in QoL across age groups and

medication types. Further, Coghill argues that QoL may be a more important outcome of medication than short-term symptom reductions, given that these reductions may be meaningless absent changes in QoL.

One of the studies reviewed by Coghill (2010) is the study conducted by Landgraf (2007), described previously, which utilizes the same measure of QoL used in the current study (AIM-A). Landgraf compared the domain-specific QoL scores reported by adults who had ever taken medication for ADHD with those who reported having never taken medication. Individuals who had taken medication reported significantly greater QoL across domains, with effect sizes ranging from .29 to .69.

Several more recent studies have found that prescription ADHD medication can improve QoL. Brown and Landgraf (2010) conducted two randomized control trials of mixed amphetamine salts using 472 and 211 adults with ADHD. Medication was associated with significant gains on all domains of the AIM-A, and these gains correlated with gains in executive functioning. Similar findings across domains of the AIM-A were reported by Casas and colleagues (2013) based on a sample of 279 adults with ADHD receiving methylphenidate. Finally, Weiss and colleagues (2010) followed 725 adults being treated in a community setting over 8 months. The researchers found that all domains on the AIM-A dropped following treatment with medication. Significant moderators that predicted greater QoL gains included not having received medication previously, being female, being young, and having greater symptom severity. Improvements in attention and medication satisfaction partially mediated the relationship between medication and QoL, and gains in QoL happened concurrently with symptoms reduction.

To date, no studies have investigated whether ADHD medication improves the subjective QoL of college students with ADHD specifically. Despite that, there is evidence that medication is effective in treating ADHD in college students (e.g. DuPaul et al., 2012). DuPaul and colleagues (2012) conducted a double blind, placebo controlled study of lisdexamfetamine in 24 college students with ADHD with a comparison group of 26 college students without psychopathology. Although this study did not investigate subjective QoL as an outcome, the authors found that lisdexamfetamine was associated with large improvement in executive functioning and small improvements in psychosocial functioning, but that these improvements still lagged behind the levels of functioning reported by college students without ADHD. Given the observed effectiveness of ADHD medication in college students with ADHD combined with findings that medication can improve the QoL of adults with ADHD, medication may also improve the QoL of college students with ADHD although it is unclear how their QoL would compare to the QoL reported by college students without ADHD.

Quality of Life and Psychopathology among Adults

Given the central role that impairment plays in most psychological diagnoses, a defining element of psychopathology is its negative impact on QoL. The negative impact of psychopathology on subjective life evaluations can be in part explained through social comparison theory (Diener et al., 1999), which emphasizes the extent to which individuals base subjective evaluations of QoL on how they perceive others to be doing, and that this evaluation of others shapes conceptualizations of "normal."

Quality of life researchers argue that QoL is a meaningful outcome of individuals with psychopathology because of the negative impact psychopathology has on QoL (Orley, Saxena, & Herrman, 1998; Spitzer et al., 1995). Spitzer and colleagues (1995) suggest that the very purpose

of mental healthcare is to address the negative impact that psychopathology has on QoL. When self-reports of subjective QoL are used as an outcome of treatment, results can be used to inform future treatment and to better understand how services impact individuals with disabilities (Hueber, 2004).

Many studies have demonstrated the negative relationship between psychopathology and QoL. For example, Spitzer and colleagues (1995) assessed the QoL of 1000 adults who were recruited through a primary care facility. Adults being treated for psychopathology or subclinical mental health problems reported significantly lower QoL across domains than those being seen for physical disorders, and a greater portion of QoL was accounted for by psychological problems than physical problems. Similarly, Vaez and Laflamme (2003) observed a powerful relationship between psychological health and QoL among university students. In a sample of over 2100 university students, QoL was much more powerfully associated with psychological health (r = .52) than physical health (r= .32). Various other studies among adults have found that psychopathology, such as depression, stress (Abbey & Andrews, 1985) and social phobia (Ghaedi et al., 2009) are associated with lower QoL among adult populations broadly and college populations specifically.

Despite the association between QoL and psychopathology, a sizable minority of individuals with disabilities, particularly individuals with physical disabilities, are resilient to their disability's impact on QoL. Albrecht and Devlieger (1999) describe the resilience of many individuals' QoL as the "disability paradox" in which individuals with low objective QoL often report their subjective QoL to be similar to that of their nondisabled peers. These researchers used a sample of 152 adults with both psychological and physical disabilities, and found that 54.3% reported "good" or "excellent" global subjective QoL, as compared to 80-85% of

individuals in a typical population. They found that reports of low QoL were associated with pain, fatigue, and loss of bodily control. Their findings confirm that, as a group, individuals with disabilities tend to report lower QoL, but also highlight the extent to which subjective QoL varies within a given group.

Quality of life and comorbidity among college students and adults with ADHD. Although only two studies have investigated how comorbid diagnoses impact the QoL of adults with ADHD, the findings of both of these studies as well as studies using related populations have consistently found that comorbid diagnoses negatively impact QoL. The study by Gudjonsson and colleagues (2009), described previously, is the only study to inspect the impact of comorbidity on the QoL of college students with ADHD. The authors examined QoL among university students using a prediction model including symptoms of ADHD as well as depression, anxiety, and stress. Within the model, depression was a particularly important predictor of QoL, especially among females (β = -.19). Brod and colleagues (2006), also described previously, found that comorbidity was common among adults with ADHD—136 of their participants reported no comorbid diagnoses, whereas 216 reported having at least one. Those with at least one comorbid diagnosis reported significantly lower QoL both globally and across domains, with generally moderate or large effect sizes. Other studies using similar methodologies with different populations have come to similar conclusions. For example, the review of the impact of ADHD on the QoL of children conducted by Denckaerts and colleagues (2009) concluded that comorbidity is a predictor of finding a difference in QoL between children with ADHD and their peers without ADHD. Finally, Sentissi and colleagues (2008) investigated the impact of comorbidity with ADHD among a sample of 73 outpatients adults being treated for

bipolar disorder. Comorbidity was associated with lower QoL relating to social functioning, social adjustment, and vitality.

Quality of Life and ATOD among Adults and College Students

Alcohol, tobacco, and other drugs (ATOD) have special relevance in studies of college populations, given the proliferation of drinking and drug use often found on college campuses (Zullig, 2005). A number of studies have studied the effects of ATOD on the QoL of college students. These studies tend to focus on alcohol specifically, meaning that findings related to other drugs are more limited. Generally, these studies have found that the use of ATOD as measured through frequency or quantity alone has little direct connection to QoL. For example, Vaez and Laflamme (2003), in the study described above, observed weak correlations (r =.06-.09) between alcohol consumption frequency and QoL among a university student sample. However, problematic use of ATOD, such as that which leads to social or health impairment, is associated with significant reductions in QoL or related outcomes. The finding that, among college students, there is little to no relationship between QoL and the frequency of ATOD use has been replicated across studies (e.g. Clifford, Edmundson, Koch, & Dodd, 1991; Murphy, McDevitt-Murphy, & Barnett, 2005).

In contrast to the finding that the frequency of ATOD use is not in itself impairing to QoL, studies that include impairment related to ATOD use in their predictive model have generally found that unhealthy, dangerous, or impairing ATOD consumption generally is associated with lower QoL. Murphy, McDevitt-Murphy, and Barnett (2005) utilized a cross-sectional design among 353 college students in order to observe associations among drinking-related problems, drinking frequency, and life satisfaction. Drinking frequency was generally unrelated to life satisfaction, with the exception that female non-drinkers reported a higher QoL

than women who regularly drank more than 4 drinks on a single occasion. However, alcohol-related problems, such as neglecting responsibilities or missing obligations due to alcohol consumption, were associated with decreases in life satisfaction (r = -.37- -.44). Murphy, Hoyme, Colby, and Borsari (2006) replicated these findings using a different sample of 196 college students, and found that whereas drinking frequency was unrelated to QoL, that alcohol-related problems were associated with reduced QoL within a regression model.

In addition to reconceptualizing the relationship between ATOD and QoL as a function of impairment rather than frequency, researchers have also inspected whether specific reasons college students use ATOD predict impacts on QoL. Two studies (Zullig, 2005; Zullig, Huebner, Gilman, Patton, and Murray, 2005) have explicitly inspected this relationship using the same sample of 522 college students. College students who reported drinking in order to fit in, because they were angry, or in order to escape their problems reported lower general life satisfaction and QoL as compared to students who did not drink. Taken together, the findings of these two studies suggest that college students will sometimes use ATOD as a coping strategy, and that doing so generally is associated with lower QoL evaluations.

Quality of life and ATOD use among college students with ADHD. A review of the literature did not produce any studies inspecting QoL, ADHD, and ATOD use in a single model utilizing college students as participants. However, a study by Glass and Flory (2012) has examined the role of ADHD in ATOD use among college students. This study assessed ADHD within a sample of 889 college students both as a spectrum of symptoms and categorically based on either the presence or absence of criteria for a diagnosis. The authors propose a model including sex, Greek life membership, age, race, conduct disorder symptoms, and either ADHD symptoms or ADHD status depending on whether ADHD is being considered categorically. The

model obtained limited findings related to ATOD use frequency—within this model, inattention symptoms and categorical ADHD predict a small but significant portion of the variance in cigarette smoking, but the overall models explain a small portion of the variance (R^2= .11 and .10, respectively). Both ADHD symptoms and diagnostic status were unrelated to alcohol use. However, inattention symptoms and diagnostic status were both related to increased alcohol-related problems and had relatively greater predictive power (R^2= .23 and .22, respectively). Finally, ADHD was not associated with lifetime marijuana or cocaine use. This study provides preliminary evidence that students with ADHD may be especially prone to negative consequences associated with ATOD use, which are conceptually related to reductions in QoL. Measures seeking to find a relationship between ATOD use and ADHD should include measures of impairment related to ATOD use, rather than merely considering frequency of use.

Quality of Life and Psychosocial Treatment among College Students

Colleges and college communities offer an array of psychosocial treatment options to students (Fleming & McMahon, 2012). These services, which vary in delivery model, availability, and theoretical orientation from one school to another, are available to students through a number of venues, including through university counseling centers, community mental health offices, and university services for students with disabilities. Reviewing the evidence for the effectiveness of psychosocial treatment for adults is beyond the scope of this review, but substantial bodies of literature exist assessing the effectiveness of various modalities of psychosocial intervention, including cognitive behavioral therapy, acceptance and commitment therapy, behavioral interventions for organization, and mindfulness among various adult populations (e.g. Anderson, 2006).

Quality of life and psychosocial treatment among college student with ADHD. A number of studies have demonstrated the effectiveness of psychosocial treatments among individuals with ADHD. For example, a recent review conducted by Evans, Owens, and Bunford (2013) concluded that various psychosocial treatments, such as organizational training, are effective among populations of children and adolescents with ADHD. However, the findings in support of psychosocial treatment among college students with ADHD are more limited, and most reviews of literature relating to college students with ADHD have concluded that psychosocial interventions for this population are understudied (e.g. Green & Rabibner, 2012; Weyandt & DuPaul, 2006).

Although no studies to date have inspected the impact of psychosocial interventions on the QoL of college students with ADHD, several studies have offered preliminary evidence for the effectiveness of psychosocial interventions among college students with ADHD. Most notably, a series of articles released in 2015 inspected the effectiveness of different interventions for college students with ADHD (Canu & Wymbs, 2015). Eddy, Canu, Broman-Fulks, and Michael (2015) piloted an 8-session CBT protocol with four college student with ADHD, and found evidence that the intervention may lead to fewer ADHD symptoms and fewer problems with self-concept. LaCount and colleagues (2015) employed a similar CBT procedure using a sample of 19 college students with ADHD. Unlike the intervention used by Eddy and colleagues, these researchers used more sessions (20 over 10 weeks) and used a group counseling component. Participants who completed the treatment had significant reductions in inattention symptoms, school impairment and work impairment. Anastopoulos and King (2015) conducted a similar CBT-based intervention with 43 college students with ADHD. This intervention utilized group-based CBT sessions and individual mentoring sessions and was associated with reductions

in ADHD and comorbid symptoms, as well as gains in organizational skills. Finally, Wymbs and Molina (2015) provided initial evidence that integrative couples therapy may be effective in reducing the severity of ADHD symptoms in young adults.

In addition to more recent studies investigating CBT for college students with ADHD, a number of studies have investigated the extent to which other psychosocial services may impact college students with ADHD. Meaux, Green, and Broussard (2009) conducted qualitative interviews with 18 college students with ADHD, and found utilization of college-based services (such as counseling or disability services) to be an important theme in their college experience. Parker and Boutelle (2009) conducted a similar study using a sample of 54 college students with ADHD and/or learning disabilities attending a college for adults with disabilities. These interviews provide evidence that students often perceive that receiving academic coaching from college staff increases their QoL. Zwart and Kallemeyn (2001) provide preliminary evidence that peer-based academic coaching may help improve the academic skills of college students with ADHD. The researchers contacted students to either receive peer coaching (22) or serve in the control group (20). Coaches received training in ADHD and were taught to help with self-advocacy and time-management, and provided 2-10 sessions to each of the students in the experimental group (M = 5.5). Coaching was associated with gains on a self-reported measure of self-efficacy and study skills (such as motivation, test preparation, and time management) relative to the control condition.

CHAPTER III

Methods

Participants

Participants for the current study were drawn from the Trajectories Related to ADHD in College (TRAC) Project, which is a longitudinal study following two cohorts of college students with and without ADHD. Participants included in the full study were recruited during their first year at any of nine different universities and colleges in North Carolina, Pennsylvania, and Rhode Island. In order to be eligible for the TRAC Project, the participants needed to be age 18 by the end of their first year of college. Additionally, participants needed to meet criteria for either the ADHD or comparison groups as captured by the Adult ADHD Rating Scales and Semi-Structured ADHD Interview (see below for complete criteria for the two experimental groups). Individuals who indicated some but not all criteria for the ADHD group, such as those who indicated a high level of ADHD symptoms during childhood but a low level of current symptoms, were excluded from the study. The resulting sample included 456 participants (51.8% female) who enrolled in college in the fall semesters of 2012 and 2013. This included 228 participants in the ADHD group and 228 participants in the comparison group. The sample was balanced across the two groups with respect to age, gender, race, and ethnicity. Full demographic information on the project sample is included in Table 1.

The current study draws from the first two years of each cohort's participation in the TRAC study. Due to the longitudinal nature of the study, some students were lost to attrition between their first and second years of college. The current study includes all participants who contributed data for their first two years of college, which includes over 80% of the total sample (See Table 2). Prior to main analyses, the current study employs a series of *t*-tests in order to

determine whether there are significant demographic differences between students who persisted and students who dropped out of the study.

Constructs and Measures

Several data management steps were used across measures in order to optimize the reliability of the data for the TRAC Project. 100% of the measures were scored by a graduate or post-graduate level researcher before being re-scored by a second researcher of the same qualifications. Additionally, 100% of data entry was double checked for fidelity to the participant's original responses. Discrepancies between the first and second scorer were considered on a case by case basis. Although systematic data of inter-rater agreement was not maintained, agreement was estimated to be found in excess of 99% of cases.

ADHD Status. ADHD status for the purposes of the research project was determined by a panel of four doctoral-level psychologists who considered the findings of the Adult ADHD Rating Scales and Semi-Structured ADHD Interview measures in making their diagnostic decision. The panel also reviewed the results of measures relevant to other psychopathology (Structured Clinical Interview for DSM Disorders, Beck Anxiety Inventory, Beck Depression Inventory-2nd Edition) to establish whether another psychological diagnosis (e.g. anxiety) better accounted for an individual's symptoms. This panel of psychologists was composed of the three primary investigators for the TRAC Project, each of whom has expertise in assessing for ADHD and other psychopathology, as well as a fourth doctoral level psychologist with expertise in researching, assessing, and diagnosing ADHD in children and adults.

Adult ADHD Rating scales (Parent Version, Childhood Version, Past 6 Months). Participants provided information about ADHD symptoms prior to age 12 and over the past six months using the Adult ADHD Rating Scale, which was modeled after the childhood ADHD

Rating Scale-IV (ADHD-IV; DuPaul, Power, Anastopoulos, & Reid, 1998). Participants completed Likert scales for each ADHD symptom (0 = Never, 1 = Sometimes, 2 = Often, 3 = Very Often). Responses of "Often" or "Very Often" indicated the presence of a symptom. Participants who were taking medication for ADHD completed each question twice in order to capture symptoms both when taking and when not taking medication. With consent of the student, parents completed a single rating scale that reported on the same student behaviors without medication both during childhood and within the past 6 months. Consistent with the ADHD-IV, all participants in the ADHD group exhibited (either via participant report or parent report) four or more symptoms of either hyperactivity/impulsivity or inattention both currently and prior to age 12 (DuPaul, Power, Anastopoulos, & Reid, 1998). Participants in the comparison group had three or fewer symptoms on each respective measure.

Although the Adult ADHD Rating Scales were developed specifically for the TRAC Project, several studies have investigated the ADHD-IV for evidence of reliability and validity in other populations. In samples of children, the ADHD-IV produces internal consistency scores (α) between .86 and .96 (DuPaul, Power, McGoey, Ikeda, & Anastopoulos, 1998). Evidence for concurrent validity includes large correlations with other measures of ADHD and other measures of disruptive behavior (r= .79-.81; DuPaul et al., 1998). The three versions of the Adult ADHD Rating Scale were assessed for internal consistency (i.e., coefficient α) for the current sample. This was calculated with SPSS version 22.0 and considered to be acceptable in cases where measures of internal consistency were at least .70 for participants with and without ADHD (see Chapter 4).

Semi-Structured ADHD Interview. Next, participants completed a semi-structured ADHD interview, which was developed to reflect DSM-IV-TR criteria for adult ADHD and adapted to

meet the DSM-5 criteria (American Psychiatric Association, 2000; American Psychiatric Association, 2013). This interview assessed for presence of the DSM-described ADHD symptoms via asking binary questions about each DSM-IV-TR symptom of ADHD. In the instance of a "yes" response, assessors followed up with unstructured questions in order to assess impairment. Each section ended with structured questions to determine age of onset and impairment. Consistent with the DSM-IV-TR definition of ADHD, all first cohort participants in the ADHD group endorsed at least 6 symptoms of inattention and/or hyperactivity/impulsivity, and indicated that they began prior to age 12. Individuals in the comparison group indicated fewer than 6 symptoms of both inattention and/or hyperactivity/impulsivity. As the DSM-5 was released between years 1 and 2 of the TRAC Project, inclusion criteria for the ADHD group were adjusted to include individuals with at least 5 symptoms for cohort 2. Because the Semi-Structured ADHD Interview was developed specifically for the project, it does not have documented psychometric properties but will be considered to be a reliable indicator for the current sample if it's internal consistency (i.e., coefficient α) for inattention and hyperactivity/impulsivity, calculated with SPSS version 22.0, is at least .70 for participants with and without ADHD on each scale.

Psychiatric psychopathology. The presence of additional psychiatric psychopathology was also determined by a four-psychologist panel based on their review of self-report of psychological diagnoses by a participant in addition to their responses to the following measures. The panel discussed any diagnostic disagreements until a consensus was achieved. Given the nature of the research question, the current study excluded cases of learning disability (LD) from consideration in determining the presence or absence of psychiatric psychopathology.

Structured Clinical Interview for DSM Disorders, Clinician Version (SCID-CV). The SCID-CV is a computer-based semi-structured interview based on the DSM-IV-TR criteria (APA, 2000) that is used to test for clinically significant presentations of psychiatric disorders (First, Spitzer, Gibbon, & Williams, 1996). For the purposes of the TRAC Project, only the modules for mood episodes, mood disorders, and anxiety, somatoform, and eating disorders were administered by trained graduate students. The most recent study examining the reliability of the SCID-CV, which also used the largest sample to date, was conducted by Lobbestael, Leurgans, and Arntz (2011). These researchers used audio recordings to examine inter-rater reliability across 12 diagnostic categories in a sample of 151 inpatient adults. The inter-rater agreement for the mood module ranged from .66 for depression to .81 for dysthymic disorder. For the anxiety module, reliability ranged from .60 for agoraphobia to .83 for social phobia. The SCID has been considered the "gold standard" clinically for accurate clinical diagnoses by a number of other psychometric investigations (e.g. Shear et al., 2000; Steiner et al., 1995).

Beck Depression Inventory, 2nd Edition (BDI-II). The BDI-II is a self-report measure of depression severity among adults (Beck, Steer, & Brown, 1996). Individuals complete 21 items, each with four-point Likert scales which correspond to various depressive symptoms over the past two weeks. These items combine to create a total score ranging from 0-63. The scale authors offer evidence of its reliability and validity based on the scale's development sample of adults, including internal consistency (α) scores of .91 and correlations of r= .68-.71 with various other measures of depression in adults. More recently, Sprinkle and colleagues (2002) provided evidence for the BDI-II's reliability and validity when used with a sample of college students. College students who receive mood disorder diagnoses using the SCID-I have significantly

higher BDI-II scores than those without mood disorders. Additionally, the authors present evidence of test-retest reliability (r =.96) using a sample of college students.

Beck Anxiety Inventory (BAI). The BAI is a self-report measure of anxiety severity (Beck & Steer, 1993). The scale has 21 items pertaining to anxiety over the past week that individuals complete using 4-point Likert scales ranging from 0 (not at all) to 3 (severely). These items combine to a total score ranging from 0-63 and include cut-off scores for different levels of severity. Beck, Epstein, Brown, and Steer (1988) investigated the psychometric properties of the BAI using a sample of adults. These researchers presented evidence for reliability, including an overall internal consistency (α) level of .92. More recently, De Ayala, Vonderharr-Carlson, and Kim (2005) aggregated reliability statistics of the BAI across 47 published studies, and found that studies using the BAI with college students had a median reliability estimate of α = .90. The BAI correlates moderately (r = .51) with other measures of anxiety, poorly with measures of depression exclusive of anxiety (r = .15), and returns higher scores in individuals with clinical anxiety relative to those with other psychopathology, all of which the authors offer as evidence of its concurrent and discriminant validity among adults.

Alcohol, tobacco, and other drug use. Participants completed the World Health Organization's *Alcohol, Smoking, and Substance Involvement Screening Test Version 3.0* (ASSIST*;* Humeniuk, Henry-Edwards, Ali, Poznyak, & Monteiro, 2010*)*. The ASSIST is a brief structured interview in which participants indicate lifetime and recent use of a list of substances, as well as social and functional impairment associated with their use of each substance. These responses generate scores specific to each substance. Each substance-specific score ranges from 0-39 with the exception of tobacco, which ranges from 0-31. Individuals scoring between 4-26 are considered at "moderate risk" of health and other problems associated with continued use of

a given substance, whereas those with scores above 27 are considered to be at "high risk." The criteria for "moderate risk" for alcohol is more lenient than other drugs: scores between 11 and 26 are considered "moderate risk." The ASSIST was developed using a sample of 1047 adults between ages 18 and 45 from primary care and substance treatment centers in seven countries, including a subset of participants with ADHD. The developers present evidence of the ASSIST's reliability and validity in assessing substance use in adults (Humeniuk, Ali, & ASSIST Phase II Study Group, 2006). Internal consistency (α) across substances ranges from .77-.94. The authors demonstrate evidence of convergent validity through moderate to large correlations with various other self-report measures, as well as discriminant validity when using the cutoff scores described above.

Psychosocial and psychopharmacological services. The Services for College Students Interview (SCSI) was developed for the purposes of the TRAC Project. This measure includes 13 questions about students' engagement and satisfaction with various services. In particular, it asks questions related to whether in a given year students have met with a professor or academic advisor outside of required meetings, received tutoring, received academic skills assistance, speaking/writing assistance, received career counseling, or formally registered in order to receive disability service accommodations. Additionally, the measure asks students about medication for ADHD, medication for other emotional or behavioral problems, and participation in individual or group counseling. For the purpose of the current study, participants are considered to have engaged in psychosocial treatment if they have met with a counselor or registered with disability services in the past year, and are considered to have engaged in psychopharmacological treatment for ADHD if they report having taken medication for ADHD within the past year.

Quality of Life. All participants in the ADHD group completed the ADHD Impact Module for Adults (AIM-A, Landgraf, 2007). The AIM-A is a self-report measure of QoL, and contains items intended to measure global QoL, as well as ADHD-specific QoL within 6 domains relevant to ADHD. For the TRAC Project, participants in the ADHD group completed the whole measure each year, whereas comparison participants completed three single-items related to global QoL as well as a single, multi-item domain specific scale related to performance and daily functioning at home, school, and work. For the purposes of the current study, only the global item ("On a Scale of 1-10, how would you rate the overall quality of your life right now?") was used. This item includes the anchors of "worst" for 1 and "best" for 10, and was selected for the current study for several reasons. First, it is indicated by the AIM-A to be indicative of "overall Quality of Life." Second, whereas domains were chosen by the AIM-A developers due to ADHD impairment associated with various domain-specific outcomes, using a global measure allows for comparisons on an outcome equally relevant to both groups but not explicitly biased against adults with ADHD. The AIM-A was developed using a sample of 317 adults with ADHD and 290 clinicians. There is little information about the psychometric properties of the AIM-A's global QoL item, as psychometric investigations of the AIM-A have focused on its multi-item, domain-specific measures of ADHD QoL, in part because the global item is extremely similar to other widely used single item measures of subjective global QoL.

The participants in the comparison group were provided with modified directions for the AIM-A and asked to only complete certain items that did not make reference to ADHD, including the global item. Although the AIM-A has not been validated for use with non-ADHD participants, single-item 1-10 scales of global subjective quality of life are widely used (Bowling, 2005). One such example is the widely used "ladder scale," which evidences test-

retest reliability (r =.40 p <.01) in samples of adults with a two-year latency between tests (Atkinson, 1982; Vaez & Laflamme, 2004). Single item subjective global QoL measures generally demonstrate acceptable test-retest scores, as well as evidence of validity in the form of strong correlations with multi-item QoL assessments and outcomes relevant to QoL (Bowling, 2005; Lyumbomirsky & Lepper, 1999).

Procedures

Prospective participants were recruited through a number of means, including referrals made from university disability service offices, counseling and health centers, fliers, social media posts, university-wide announcements, peer referral, and sign-ups during orientation. Participants met with graduate student research assistants between 1-3 times per year for a total of approximately 2-4 hours in order to complete the measures. Graduate students were trained to administer rating scales and interviews by doctoral level psychologists or advanced graduate students, as well as through a video training module for the SCID-CV. Trainings included teleconferences with primary investigators and small groups with advanced graduate students acting as site managers. The scales were administered in a standard order using their standard instructions with the exception of the comparison participants completing the AIM-A. In order to assure that assessments happened close to one year apart, participants were re-assessed the following year in the same semester during which they had initially been assessed (e.g. fall or spring). Participants were compensated $100 per assessment year for their time.

Research Design and Plan for Analysis

Prior to analysis, the various measures were assessed for adequate psychometric properties and prepared for analysis. First, scales were assessed for internal consistency as described previously. In order to conduct moderation analysis, the three potential moderators

(psychopathology, problematic use of ATOD, psychosocial treatment) and ADHD medication were recoded into binary variables based on the presence or absence of each construct (Baron & Kenny, 1986). For psychopathology, participants were divided as to whether the panel determined the presence of a psychological diagnosis other than ADHD. For ATOD, participants were divided as to whether they have at least one substance for which they are considered at "moderate risk" of health and other problems associated with continued use of a given substance (i.e., a score greater than 11 for alcohol or four for any other substance). Finally, participants were considered to have received psychopharmacological treatment if they indicated having taken ADHD medication in the last year, and psychosocial treatment if they indicated registering with disability services or receiving counseling in the past year.

After descriptive analysis, a 4-way analysis of variance (ANOVA) was conducted in order to detect main effects of ADHD status on QoL as well as moderation by ATOD, psychopathology, and psychosocial treatment. Main and moderation effects were identified using the procedure outlined by Baron and Kenny (1986). Independent variables included ADHD status, additional psychopathology, problematic ATOD use, and use of psychosocial treatment. The dependent variable is Quality of Life. Psychopathology and ATOD behavior are based on information collected from participants during their first year of college, whereas QoL was based on responses provided by participants during their second year of college. Psychosocial treatment information was based on their retrospective responses provided during their second year, but addressing treatment received between their first and second years of involvement with the project. A power analysis performed with G*Power version 3.1 (Faul, Erdfelder, Lang, & Buchner, 2007) assuming 80% retention of the sample from year one to year two indicates that the TRAC sample has adequate power (β=.82) to detect main effects and 2-variable interaction

effects with a small-to-medium effect size (f= .15; p = .05). For the purposes of interpreting effect sizes, the guidelines offered by Cohen (1988; 1992) were employed. These suggest that considering *d* values of .8, .5, and .2 and partial eta squared values of .14, .06, and .01 as cut offs for large, medium, and small effect sizes respectively. These values are recommended to qualitatively interpret data when similar studies are not available to contextualize the magnitude of findings (Durlak, 2009).

Prior to conducting the two ANOVAs, data were inspected to determine whether the assumptions of the ANOVA procedure are met using the following *a priori* criteria. Results of these inspections are included in Chapter 4. First, the assumption of homogeneity of variances was checked using Levene's test, wherein nonsignificant results (p >.05) are considered indicative of having met the assumption. Second, the assumption of normality was checked by assessing skewness and kurtosis. Values between -2 and 2 are considered to be acceptable without caution (Lomax, 2001). Previous research (e.g. Diener, 2001; Vaez & Laflamme, 2004) has demonstrated that QoL in the United States tends to be positively skewed, with mean scores consistently near 7 out of 10. These researchers conclude that the data suggests that absent negative events, Americans tend to make positive evaluations about their QoL. In the case of a severely positive skew, the skewness may need to be reduced via transformation using the procedure recommended by Stevens (2009).

Within the ANOVA, the presence or absence of a main effect each independent variable addresses potential differences between groups with regard to subjective global QoL (Research Question 1). It is hypothesized that there are significant differences in QoL as a function of each independent variable, and that the presence of the variable is associated with lower QoL. In order to detect moderators (Research Question 3), variables that significantly interact with ADHD

status are considered moderators, in accordance with the procedures for detecting moderation described by Baron and Kenny (1986). It is hypothesized that each of the three variables significantly moderate the relationship between ADHD and QoL—more specifically, it is hypothesized that the relationship is exacerbated (i.e., greater) in the presence of problematic ATOD use and psychopathology and mitigated (i.e., smaller) in the presence of psychosocial treatment. Pairwise comparisons between groups were determined through the use of *Tukey's HSD post-hoc* comparisons.

In order to determine the impact of ADHD medication on ADHD (Research Question 2), a second ANOVA was conducted. The independent variable in this analysis is group membership with options being either ADHD with medication, ADHD without medication, or comparison students. Within the ANOVA *Tukey HSD post-hoc* comparisons are used in the presence of a main effect in order to determine the relative QoL of college students with ADHD on and off medication both in comparison with one another and also in comparison with individuals without ADHD. A preliminary power analysis conducted using G*Power version 3.1 (Faul, Erdfelder, Lang, & Buchner, 2007) based on 80% retention indicates that the current sample has adequate power (β=.83) to detect a small-to-medium effect size between the three groups (f= .17; p = .05).

Finally, in order to determine the total impact of the variables of interest on QoL (Research Question 4), the significant main effect and interaction terms observed in the two ANOVAs were entered into a hierarchical regression. Prior to analysis, the assumptions of regression analysis were checked using the data in order to determine whether the data are appropriate for a regression analysis. The assumption of multicollinearity is determined to be met in cases when the variance inflation factor (VIF) is under 10 (Myers, 1990). The assumptions of

homoscedasticity, normally distributed residuals, and linearity were tested via visual inspection of the relevant graphs (Field, 2009). Following assumption checking, the first step of the regression included the main effect of ADHD entered as an independent variable in step one, followed by significant main effects of other variables in step 2 and significant interactions and the effect of medication in step 3. For the purposes of regression, the effects of medication on ADHD are considered equivalent to a medication x ADHD status interaction. A preliminary power analysis conducted using G*Power version 3.1 (Faul, Erdfelder, Lang, & Buchner, 2007) based on 80% retention indicates that the current sample has adequate power (β=.99) to detect a small effect size for the total regression model (f= .10; p = .05) and power (β=.89) to detect a small-to-medium effect size of added predictors for the total regression model (f= .05; p = .05). It should be noted that the power of this analysis is the minimum power, and is subject to increase if main or interaction effects are not significant in research questions 1-3 and therefore not included in the model. Once again, QoL was used as the dependent variable of interest. In addition to answering question 4, this procedure allows the effects of ADHD to be quantified, as well as the added effects of moderations above and beyond their moderator's main effects.

CHAPTER IV

Results

Preliminary Analyses

Prior to addressing the research questions, several preliminary analyses were conducted in order to verify that measures were appropriate for the current study. Since the analyses use longitudinal data, participants with complete data for both years of the study were compared to the full sample with respect to demographic variables. Among the 456 students who consented to participate in the first year of the study, 393 (86.2%) completed a second year of the study. An additional 21 (4.6%) participants were excluded due to missing one or more measure used in the present study. This left 372 participants (81.6% of the full sample). These 372 participants were compared to the 84 non-completers with respect to gender, race distribution, ethnicity, ADHD status, age, and full scale IQ score. The individuals who completed the study were more likely to be female $t(454)= -2.05$, $p = .041$) and in the comparison group $t(454) = -3.67$, $p < .001$), but were equal with respect to IQ, age, ethnicity, and racial distribution (p's $\geq .05$). Full demographic information for the current sample is presented in Table 2 and descriptive data are presented in Table 3.

Next, the various measures of ADHD were assessed for internal consistency (i.e. coefficient α). The results of these analyses are presented in Table 4. All scales had adequate internal consistency (Cortina, 1993) and scores ranged from $\alpha=.77$ (the inattention, medication portion of the ADHD Rating Scale-Childhood Version) to $\alpha=.95$ (the inattention during childhood portion of the ADHD Rating Scale-Parent Version).

Research Question 1: Main Effects

The first set of analyses addressed whether there were differences in QoL as a function of ADHD status, psychopathology, ATOD risk, and participation in psychosocial interventions. In order to search for such differences, a 4-way ANOVA was conducted with ADHD status, psychopathology, ATOD risk, and psychosocial interventions as independent variables and QoL as the dependent variable. The assumptions of ANOVA were checked prior to analysis. The assumption of normality for the dependent variable was met based on the calculation of the skewness (-.815) and kurtosis (1.18) scores for this variable (Lomax, 2001). The assumption of homogeneity of the variance was tested through Levine's test. Although the assumption was met for this test with regard to ADHD status, ATOD Risk, and psychosocial treatment (p's > .05), Levene's test was significant for psychopathology (p =.002). Field (2009) notes that as sample sizes increase, small differences in variances are more likely to be detected as significant via Levene's test and as such recommends following a significant Levene's test with inspecting the variance ratio (Pearson & Hartley, 1954). In this case, the variance ratio is 1.77 which is above the relevant critical value. As such, the assumption of homogeneity of the variance is considered met for the current analysis.

Means and standard deviations for each main effect can be found in Table 5. Based on the results of the 4-way ANOVA, there was a significant main effect of ADHD status, $F(1, 356) = 9.453$, $p = .002$, partial $\eta^2 = .026$, $d = .32$. College students with ADHD reported lower global subjective QoL (M = 7.08) than college students without ADHD (M =7.94). This effect is considered to be small (Cohen, 1988; Cohen, 1992). Figure 1 displays the distribution of QoL as a function of ADHD status relative to the grand mean. Additionally, there was a significant main effect of psychiatric psychopathology, $F(1,356) = 14.210$, $p < .001$, partial $\eta^2 = .038$, $d = .43$.

College students with current psychiatric psychopathology reported lower global subjective QoL (M=6.80) than college students without such psychopathology (M=7.86). This effect is considered to be small (Cohen, 1988; Cohen, 1992). Figure 2 displays the distribution of QoL relative to the grand mean as a function of psychopathology. There was also a significant main effect of psychosocial treatment, $F(1, 356) = 4.392$, $p = .037$, partial $\eta^2 = .012$, $d = .23$. College students who received psychosocial treatment reported lower QoL (M=7.14) than students who did not receive treatment (M=7.74). This effect is also considered to be small in size (Cohen, 1988; Cohen, 1992). Figure 3 displays the distribution of QoL relative to the grand mean as a function of psychosocial treatment. Finally, there was no significant main effect of ATOD Risk, $F(1, 356) = .022$, $p = .881$, partial $\eta^2 > .001$, $d = .02$. Although there was a total group-based difference, $t(370)=2.24$, $p = .026$, between individuals who were at risk for at least one substance (M=7.33) and those who were not (M=7.68), this difference was no longer significant when included in the larger model. The distribution of QoL relative to the grand mean as a function of the presence of absence of ATOD risk can be found in Table 4.

Research Question 2: ADHD Medication

A second ANOVA was conducted in order to further compare the QoL of college students without ADHD to that of college students with ADHD. In this analysis, college students with ADHD were divided based on whether they used medication to manage their symptoms. The ANOVA included ADHD/Medication Status as the independent variable and global subjective QoL as the dependent variable. Similar to research question 1, the assumptions of the ANOVA procedure were checked prior to analysis. The assumption of normality of QoL was demonstrated previously. The assumption of homogeneity of the variance was tested through Levine's test. This test was not significant, $p=.056$, which demonstrated evidence of

homogeneity of the variance. Four participants from the comparison group were excluded from this analysis because they reported taking ADHD medication despite not having ADHD.

Means and standard deviations can be found in Table 6. There was a significant main effect of ADHD/Medication Status, $F(2, 365) = 18.28$, $p < .001$, partial $\eta^2 = .091$. This effect is considered to be medium-sized (Cohen, 1988; Cohen, 1992). A *post hoc* Tukey's HSD test demonstrated that the comparison group reported QoL (M = 7.94) that was significantly greater than the QoL of participants with ADHD who took medication (M = 7.19; $d = .54$) and participants with ADHD who did not take medication (M = 6.94; $d = .75$). The two ADHD groups were not significantly different from one another ($p > .05$; $d = .17$).

Research Question 3: Moderation

The third analysis addressed whether other variables lessened or exacerbated the relationship between ADHD and QoL. This analysis used the same 4-way ANOVA presented previously in research question 1, in which ADHD status, psychopathology, ATOD risk, and participation in psychosocial interventions were set as independent variables predicting QoL. Unlike the first analysis, this research question focused on whether ADHD Status interacted with any of the other three independent variables. Means and standard deviations can be found in Table 7. ADHD status did not significantly interact with any of the other independent variables, including psychosocial treatment $F(1,356)=.534$, $p=.534$, partial $\eta^2 = .001$, psychopathology $F(1,356)=2.179$, $p=.141$, partial $\eta^2 = .006$ and ATOD Risk $F(1,356)=1.338$, $p=.248$, partial $\eta^2 =.004$. The presence of psychiatric psychopathology exacerbated the mean difference between groups from .40 to .93 and expanded the effect size from $d = .33$ to $d = .58$, but this moderation was not statistically significant. Similarly, the presence of psychosocial treatment reduced the differences between groups from .84 to .57 and reduced the effect size from $d = .67$ to $d = .36$,

but this moderation was also not statistically significant. Finally, the presence of ATOD risk was not associated with descriptive evidence of an interaction—there was a very small mitigation in the difference between groups (.83 without ATOD Risk compared to .81 with risk) and very small mitigation of effect size (d = .60 without ATOD risk compared to .57 with risk). This moderation was not significant.

Research Question 4: Regression

The final research question addressed the total portion of QoL explained by the significant factors in this study. Based on the parameters discussed in Chapter 3, a hierarchical linear regression with QoL as the dependent variable was conducted with three steps of independent variables. The first step included ADHD status, the second step included psychopathology and psychosocial treatment, and the third step included ADHD/Med Status. Prior to completing the regression, the assumptions of the procedure were checked. First, assumptions related to homoscedasticity, normally distributed residuals, and linearity were checked via visual inspection of their relevant graphs (Field, 2009). In order to check the assumption of homoscedasticity, the error values of data at both levels of each independent variable were graphed and compared. Given that the errors were similar at both levels of each variable, this assumption is considered to be met for the current analysis. In order to check the assumption of normal distribution, the normal probability plot of each variable was examined. The plots of data at each level of the independent variables were close to the expected trend relative to each other, which provides evidence in support of this assumption. Given the limited number of possible responses available for each independent variable, a curvilinear relationship between the independent variables as they have been defined and QoL is not possible. However, the assumption of linearity is bolstered because the previous ANOVAs have demonstrated that

the independent variables are related to QoL (rather than being unrelated). Finally, the VIF for all variables in the regression were under 10, which provides evidence for a lack of multicollinearity (Field, 2009).

The first step, which included ADHD status, significantly predicted QoL, $F(1, 366)=35.09$, $p<.001$. This model predicted 9% of the variance in QoL ($R^2 = .09$). Within the model, the presence of ADHD accounted for a reduction in QoL of .86 units on the AIM-A, or .27 standard deviations. The second step, which added psychopathology and psychosocial treatment, also significantly predicted QoL, $F(3, 364)=22.16$, $p<.001$. This model predicted 15% of the variance in QoL, which is a significant improvement from the original model ($R^2 = .15$, $\Delta R^2 = .067$, $p <.001$). In this model, the relative weight of ADHD was reduced such that the presence of ADHD predicted a reduction in QoL by .47 units on the AIM-A, or -.16 standard deviations. The presence of psychosocial treatment was associated with a reduction in QoL by .33 units on the AIM-A, or .11 standard deviations, and the presence of psychopathology was associated with a reduction of .8 units or .25 standard deviations. In this model, therefore, psychiatric psychopathology has the greatest relative impact on QoL, accounting for approximately 50% of the predictive power of the model as compared to about 30% from ADHD and 20% from psychosocial treatment. Finally, although adding medication produced a significant overall model, $F(4,363) =17.18$, $p<.001$, medication status was not a significant predictor of QoL within the model ($p = .154$) and adding the third step did not improve the overall predictive power of the model ($\Delta R^2 = .005$, $p =.154$). See Table 8 for model summaries and Table 9 for regression coefficients.

CHAPTER V

Discussion

The primary purpose of this study was to further investigate the relationship between ADHD and Quality of Life (QoL) among college students. In particular, this study sought to place this relationship in context by investigating the interrelationship between these two variables and other variables relevant to both ADHD and QoL. This is the first study to date to examine the relationship of QoL and ADHD among college students that uses a large, well-defined, longitudinal sample of college students both with and without ADHD. The findings from the present study indicate that several behaviors or characteristics evidenced during students' first year of college are associated with lower perceptions of QoL during their second year, including ADHD, psychiatric psychopathology, and seeking psychosocial treatment. Further, the findings suggest that the relationship between QoL and ADHD is not impacted by the presence or absence of medication to manage ADHD symptoms, psychiatric psychopathology, psychosocial treatment, or problematic substance use.

Research Question 1: Main Effects on QoL

Consistent with hypothesis, this study found that first year college students with ADHD report lower global subjective QoL during their second year of college. Figure 1 displays the distribution of QoL for college student with and without ADHD. The distributions of responses demonstrates that responses above 8 out of 10 were fairly rare among respondents with ADHD relative to students without ADHD, and that responses below 6, which were very uncommon among the comparison group, were relative common among students with ADHD. Although many individuals with ADHD report QoL similar to individuals without ADHD, responses at the extreme ends of the QoL scale are much more likely to belong to opposite groups.

The finding that college students with ADHD report lower QoL than their peers without ADHD is consistent with the findings of other research (e.g. Grenwald-Mayes, 2001; Gudjonsson et al, 2009), but builds on these studies in two ways. First, the current study is more methodologically rigorous. Whereas Grenwald-Mayes (2001) used a small, clinical sample and Gudjunsson and colleagues (2009) used a community sample with few or no cases of ADHD, the current study used a multi-method longitudinal assessment to generate and assess a large sample of students both with and without ADHD. Second, whereas Grenwald-Mayes (2001) found mostly null results and Gudjunsson and colleagues (2009) found results primarily in a sample of students without ADHD, the current study is able to make conclusive categorical comparisons between students with and without ADHD.

Compared to academic outcomes, psychosocial outcomes of college students with ADHD are relatively understudied (DuPaul et al., 2009; Weyandt & DuPaul 2006; Weyandt & DuPaul, 2008). The current study builds on this body of literature in finding that college students with ADHD exhibit a similar pattern of QoL as their non-collegiate adult peers (Agarwal, Goldberg, Perry, & Ishak, 2012). Previous researchers (e.g. Frazier, Youngstrom, Glutting, & Watkins, 2007; Green & Rabiner, 2012; Wilmshurst, Peele, & Wilmshurt, 2011) have articulated theories in which college students with ADHD, by virtue of their ability to gain admittance to college, would be resilient to impairment that is observed in the general population of adults with ADHD. The current study does not support this theory with regard to QoL as an indicator of psychosocial functioning. Although this study cannot conclude whether the impairment found in the current sample is comparable in *magnitude* to that which is observed in the general adult population, college students with ADHD exhibit a similar *pattern* of impairment to their non-collegiate peers with regard to QoL. That is, although it is possible that membership in a selective college

community makes their deficits relatively smaller, this study indicates that QoL deficits observed in the general population of adults with ADHD are also observed in college populations (Agarwal, Goldberg, Perry, & Ishak, 2012).

This study also found that college students with psychiatric psychopathology tended to experience a lower QoL than their peers without psychiatric diagnoses, which is consistent with hypotheses and previous research (e.g. Wolf, 2001). This finding further highlights the subjective impairment associated with psychological diagnoses. The distribution of responses for the two groups is displayed in Figure 2. In addition to reporting a significantly lower mean QoL, college students with psychopathology were much less likely than their peers to report an extremely high QoL (such as 9 or 10 out of 10) and much more likely to report a relatively low QoL (5 or below). College students who accessed psychosocial treatment (i.e. counseling or disability services) during their first year of college reported lower QoL during their second year of college. Similar to other variables, the distribution of responses displayed in Figure 3 demonstrates that individuals seeking psychosocial treatment were relatively underrepresented among those with extremely high responses and overrepresented among those with lower responses. That treatment is accessed by individuals with lower QoL highlights the way in which subjective perceptions of QoL may drive treatment decisions (Spitzer et al., 1995) and the uphill battle faced by providers of psychosocial services to college students. Given that a lower subjective QoL is a distinguishing feature of consumers of psychosocial treatment, providers of these services may find it beneficial to use QoL as an outcome indicator for the college-age clients they serve. Finally, contrary to hypotheses, the current study did not reveal a relationship between risk associated with use of alcohol, tobacco, and other drugs (ATOD) and QoL. Figure 4, which displays the distribution of responses, suggests that individuals behaved similarly

regardless of ATOD risk status. This finding is inconsistent with previous research examining ATOD and QoL (e.g. Murphy, Hoyme, Colby, & Borsari, 2006). There are several possible explanations for the lack of findings related to ATOD. One possible explanation for the lack of relationship in this study regards measurement limitations. The current study used a measure that assessed risk as a combination of substance use frequency and impairment, and therefore may have included individuals in the ATOD group who frequently used substances but with minimal impairment. In contrast, previous research has demonstrated that problems associated with ATOD, rather than frequency of ATOD use, predicts QoL (Murphy, McDevitt-Murphy, & Barnett, 2005; Murphy et al., 2006). A second possible explanation is that the behaviors that drive risky ATOD use are better accounted for by other variables in the current study—whereas there was originally a difference in QoL as a function of ATOD risk, this difference was no longer significant when the model controlled for the influence of the other independent variables.

Research Question 2: The Impact of ADHD Medication on QoL

The current study hypothesized that college students with ADHD who used medication to manage their ADHD symptoms would report QoL lower than that of students without ADHD but greater than students with ADHD who didn't use medication to manage their symptoms. Although the results demonstrated that both groups of students with ADHD reported a lower QoL, there was no difference between the two groups as a function of medication usage. This finding differs from those of previous research, which has generally found medication use to be associated with gains in QoL (Coghill, 2010). One possible reason for these findings is that, unlike many previous studies, this study used global subjective QoL (rather than domain-specific QoL, such as health-related or school-related QoL) as an outcome of interest. As such, it is

possible that individuals who take medication to manage their ADHD symptoms observe narrow effects, but that these effects don't generalize to broader evaluations of their life.

A second possible explanation for the findings in the current study is that the analyses did not control for the severity of ADHD symptoms or for QoL when not taking medication. As such, it's possible that the individuals who took medication in the current sample are also individuals with the most severe impairment associated with ADHD. In this case, medication usage may have obscured what would otherwise be lower subjective QoL evaluations among the individuals who used medication to manage their symptoms. That individuals with the lowest QoL would be most likely to seek medication to manage their symptoms is consistent with the idea that QoL drives help-seeking medical and psychological treatment (Spitzer et al., 1995).

Research Question 3: Moderation of the ADHD/QoL Relationship

This study operated with the hypothesis that the negative impact of ADHD on QoL would be lessened in the presence of psychosocial treatment or exacerbated in the presence of other psychiatric psychopathology or problematic use of ATOD. Based on an ANOVA, none of the three variables significantly moderated the relationship between ADHD and QoL.

Although an impact on QoL is a defining feature of most psychiatric psychopathology, relatively few studies have investigated whether psychopathology exacerbates QoL deficits found in individuals with ADHD. Previous research has found that psychopathological features, such as ADHD and depressive symptoms, contribute to reductions in QoL among college students (Gudjunsson et al., 2009). Among adults in the general population, comorbidity has been demonstrated to be associated with reductions in QoL above and beyond ADHD alone (Brod et al., 2006). The findings of the current study suggest that although psychiatric psychopathology and ADHD contribute independent significant reductions, psychiatric

comorbidity does not interact with the impact of ADHD. That is, individuals with ADHD experience impairment that is specific to ADHD, rather than as influenced by their increased likelihood to also experience other psychiatric impairment.

Although previous studies have not investigated ADHD, ATOD use, and QoL within the same model, some previous research has suggested ADHD is associated with greater problems relating to ATOD use (Glass & Flory, 2012). Contrary to these findings, the current study failed to find an association between ATOD and QoL and did not indicate that ATOD exacerbates the relationship between ADHD and QoL. These findings suggest that the impact of ADHD on QoL exists independent of the tendency of individuals with ADHD to experience more problems associated with ATOD use (Glass & Flory, 2012). Alternatively, one possible explanation is that the measure of ATOD used in the current study combined both frequency and impairment in order to generate a total score. Given that previous research (Murphy, McDevitt-Murphy, & Barnett, 2005; Murphy et al., 2006) has emphasized the importance of ATOD problems over frequency in predicting QoL, this measure may overestimate individuals who are at risk for ATOD problems for the purposes of the current study.

Finally, the current study indicated that college students with ADHD who engage in psychosocial treatment through campus disability services or counseling do not experience differences in their QoL relative to their peers who don't seek treatment. Psychosocial treatment for ADHD in college students is generally under-investigated, and little is known about the efficacy for many psychosocial interventions within this population (Weyandt & DuPaul 2006; Weyandt & DuPaul, 2008). There are several possible explanations for the findings of the current study. One explanation is that psychosocial treatment is not associated with gains that are reflected in global QoL. Alternatively, it is possible that individuals who seek psychosocial

treatment have greater impairment associated with ADHD and that psychosocial treatment improves QoL in a way that erases a potential deficit compared to individuals with ADHD who do not seek treatment.

Research Question 4: Modeling the Impact on QoL

Finally, the current study investigated the extent to which the variables identified as being associated with QoL explain the total variability in QoL among college students. This analysis consisted of a three-step regression where the first step included ADHD status, the second step added psychiatric psychopathology and psychosocial treatment, and the final step added medication usage. The second model, which included ADHD status, psychopathology, and treatment but not medication, best accounted for the variability in QoL and accounted for approximately 15% of the variability. Within this model, psychiatric psychopathology most powerfully influences QoL, with the presence of psychopathology impacting QoL at a rate approximately two and one half times that of psychopathology and one and one half time that of ADHD (see Table 9). The finding that medication usage doesn't account for QoL above and beyond the other three variables may have practical implications for prescribers: although other studies have demonstrated that medication usage is associated with objective gains (e.g. academic outcomes; DuPaul et al., 2012), these domain-specific gains may not translate into changes in global QoL. Given that QoL may drive treatment-seeking behaviors (Spitzer et al., 1995), prescribers should prepare clients to expect narrowly-focused increases in their QoL in response to medication, rather than global changes in how they see themselves and their lives. Fostering these expectations among patients may prevent individuals with ADHD from discontinuing helpful treatments due to failing to notice global gains.

Strengths and Limitations

The current study is bolstered by a number of methodological strengths. Whereas other studies of QoL (e.g. Grenwald-Mayes, 2001; Gudjonsson et al, 2009) have used either a small clinical sample or a large sample in which ADHD was not well-assessed, the current study used a large, diverse sample that was independently assessed using multiple measures and reporters in order to determine ADHD status. Further, the current study builds on previous work by using a longitudinal design in order to strengthen the causal relationship between independent variables such as ADHD and QoL as an outcome. Finally, the current study attempted to assess moderators that may be of use for practitioners looking for entryways for intervention, such as ATOD use or prescription medication.

There are several measurement-related decisions that have both strengths and limitations. First, the AIM-A was designed for use exclusively by adults with ADHD. Although in isolation the global QoL item used in these specific analyses is similar to other global measures of QoL, the tool was not validated for adults without ADHD. Further, it is possible that the modified instructions (which point out that the measure was designed for adults with ADHD and indicate which questions participants in the comparison group should complete) may positively impact their QoL evaluations.

Second, ATOD risk (which was not found to be significantly related to QoL) was broadly defined as being at moderate risk for problems associated with any of a number of substances. Combining all substances into a single variable and selecting moderate (rather than high) risk as a cutoff may obscure findings related to greater risk, risk related to increasing numbers of substances, and/or risk related to specific substances. This is particularly likely given that the measure of ATOD in the current study generated scores based on both frequency of use and problems associated with use; research has indicated that problems associated with ATOD use,

and not frequency of ATOD use, are associated with QoL reductions (Murphy, McDevitt-Murphy, & Barnett, 2005; Murphy et al., 2006). As such it is possible that the current study overestimated membership in the ATOD risk group.

Thirdly, utilization of psychosocial services in the current study was broadly defined as being registered with campus disability services and/or seeking counseling. The study did not investigate the efficacy of individual interventions employed in either setting (e.g. coaching, CBT) or account for the extent to which services were used.

Fourthly, there is a tradeoff of plusses and minuses in using a categorical definition of ADHD rather than a continuous measurement of ADHD symptoms—the current study provides little information about people with inattention and/or hyperactivity/impulsivity symptoms that are problematic but subclinical. Further, given that symptom severity was used as an inclusion criteria for the ADHD group, it could not also be used as a control on other analyses.

Fifthly, the TRAC Project was designed specifically to study college students with ADHD. Several of the findings of the current study were made independent of ADHD status, including the impacts of psychiatric psychopathology and psychosocial services. The disproportionate number of students with ADHD in the current sample limits the generalizability of findings that do not consider this distinguishing feature of the current sample.

Sixth, the current study did not differentiate among dosage, fidelity, of modality of psychopharmacological or psychosocial treatment. As such, it is possible that a subset of either or both of these groups (e.g. people who completed therapy, people who took certain forms of medication, people receiving coaching) demonstrated significant differences that were not observed when psychosocial and psychopharmacological treatment types were considered as binary variables.

Finally, given the longitudinal nature of the current study, there was attrition between years 1 and 2 of data collection that was biased toward the ADHD group and males. As such, these two groups were slightly underrepresented in the analyses.

In addition to measurement-related limitations two limitations are related to the sample. First, the data suggest that a larger sample size may have been able to detect small but significant effects that the current sample could not. This is especially true with regard to potential moderators. That is, the observed means of the potential moderators were consistent with hypotheses: the ADHD and comparison groups reported more disparate QoL in the presence of psychopathology and ATOD risk and more similar QoL in the presence of psychosocial treatment. However, none of these differences led to a statistically significant moderation. A larger sample may have detected small but significant effects that were consistent with moderation hypotheses. Second, preliminary analyses demonstrated that individuals who persisted in the study were more likely to be female. As such, it is possible that males were underrepresented in the final analyses.

Considerations for Future Research

The current study highlights the need for additional research in multiple domains relevant to college students with ADHD. First, future studies might build on some of the methodological limitations of the current study described above. For example, future studies may wish to focus more on understanding nuances of a particular potential moderator that were difficult to detect in a broader study. For example, studies might use continuous moderators or moderators that distinguish different subsets of individuals (e.g. high ATOD risk, risk related to specific forms of ATOD, engaging in different forms of psychosocial treatment). Future studies could replicate the analyses of this study but with a methodology that allows researchers to control for ADHD

symptom severity in attempting to detect the impact of psychopharmacological and psychosocial services without potentially conflating service usage with symptom severity. These studies could also look at the impact of treatment on domain-specific QoL, such as academic QoL or social QoL. Finally, future studies might consider a longitudinal design of outcomes in order to track changes in QoL over time.

The current study demonstrates that a single-item measure of global subjective QoL, which takes seconds to administer, is sensitive to differences relative to ADHD and psychiatric psychopathology. Future studies should investigate the potential utility of such a measure in treatment-related settings, including informing treatment-related decisions and monitoring the progress of intervention.

A primary purpose of the current study was to investigate not only the impact of ADHD on QoL, but also to investigate whether other variables associated with ADHD and amenable to intervention (e.g. ATOD use) might account for part of the variability in QoL among individuals with ADHD. Although the current study failed to find that ADHD is moderated by these factors as measured, future studies should continue to seek inroads to intervention for college students with ADHD.

Implications for Practice

The findings of the current study emphasize the psychosocial deficits associated with ADHD and psychopathology and refute the notion that college students with ADHD are excluded from impairment observed in other populations. As adults with disabilities comprise an increasingly large portion of college student bodies, colleges will need to provide additional supports for these students (Barkley, 2015). However, the research base investigating the efficacy of these supports is limited, and the current study found little direct evidence of their

effectiveness in aggregate. As such, practitioners should be careful to select interventions that are evidence-based.

Higher education research has emphasized the role that measuring QoL can have in shaping decisions regarding university policy (e.g. Audin, Davy, & Barkham, 2003; Frisch et al., 2005). The current study found that a brief, single-item measure of QoL can highlight meaningful differences between groups. These results are encouraging for campus officials seeking to efficiently collect information about student bodies. The study also highlighted the extent to which colleges and universities can draw conclusions about medium-term outcomes (QoL during second year) based on information they know about students during their first year. This information can help college officials identify students who are at risk, which may help them select students for targeted interventions.

Several of the findings of the current study call into question the efficacy of various treatment modalities for college students with ADHD when global QoL is considered as an outcome. Although treatment, particularly pharmacological, has been associated with gains among college students with ADHD (DuPaul et al., 2012), the current study casts doubt as to whether these gains translate into enhanced global QoL among college students with ADHD. Given the role that perceptions of QoL have in driving help-seeking behaviors (Spitzer et al., 1995), practitioners should consider working with clients to monitor more domain-specific gains in QoL, such as gains in the way students perceive their academic work. Certain models of psychosocial services, such as solution-focused therapy (O'Connell, 2005), include measurement of global QoL as part of a "check in" process. The findings of the current study suggest that these brief measurements can differentiate among clients.

Conclusions

This study adds to the limited but increasingly important body of research investigating college students with ADHD. The results of the current study provide evidence of the subjective impact of ADHD on college students. Along with treatment-seeking behaviors and psychiatric psychopathology, ADHD explains a significant portion of the QoL of college students and operates independently of other behaviors or qualities associated with ADHD. Although the current study provides preliminary information, further research is needed to determine whether and to what extent medication, ATOD, and psychosocial treatment interact with ADHD and QoL. The extent to which college students with ADHD are distinguished as a function of their QoL has implications for service providers and policy makers on college campuses who seek to best serve their students.

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Appendix A: Tables and Figures

Table 1

Demographic Characteristics of the Full TRAC Sample

	Full Sample N = 456		ADHD N = 228		Comparison N = 228	
Gender (%)						
Female	236	51.8	119	52.2	117	51.3
Male	220	48.2	109	47.8	111	48.7
Ethnicity (%)						
Hispanic/Latino	47	10.3	24	10.5	23	10.1
Non-Hispanic/Latino	409	89.7	204	89.5	205	89.9
Race (%)						
Caucasian	327	71.7	175	76.8	152	66.7
African-American	56	12.3	25	11.0	31	13.6
Asian	25	5.5	6	2.6	19	8.3
More Than 1 Race	18	3.9	10	4.4	8	3.5
Other/Not Reported	30	6.6	12	5.3	18	7.9
Year 1 Age (M, SD)	18.23, 0.52		18.27, 0.58		18.19, 0.46	

Table 2

Demographic Characteristics of the Current Sample

	Combined Sample N = 372		ADHD N = 171		Comparison N = 201	
Gender (%)						
Female	201	54.0	94	55.0	107	53.2
Male	171	46.0	77	45.0	94	46.8
Ethnicity (%)						
Hispanic/Latino	41	89.0	20	11.8	21	10.4
Non-Hispanic/Latino	331	11.0	151	88.3	180	89.6
Race (%)						
Caucasian	266	71.5	133	77.8	133	66.2
African-American	46	12.4	18	10.5	28	13.9
Asian	22	5.9	5	2.9	17	8.5
More Than 1 Race	13	3.5	7	4.1	6	3.0
Other/Not Reported	25	6.7	8	4.7	17	8.5
Year 1 Age (M, SD)	18.22,	.510	18.24,	.549	18.21,	.476

Table 3

Descriptive Statistics (N = 372)

Variable		N (%)
ADHD	Present	171 (46%)
	Absent	201 (54%)
Psychopathology	Present	113 (30%)
	Absent	259 (70%)
Psychosocial Treatment	Present	125 (34%)
	Absent	247 (66%)
ATOD Risk	Present	150 (40%)
	Absent	222 (60%)
ADHD Medication Status	Comparison, No Meds	197 (53%)
	Comparison, Meds	4 (1%)
	ADHD, No Meds	77 (21%)
	ADHD, Meds	94 (25%)
QoL (M, SD)	7.54, 1.45	

Table 4

Preliminary Analyses

	α	N
ADHD Rating Scale: Childhood		
Inattention: No Meds	.938	322
Inattention: Meds	.770	47
Hyperactivity/ Impulsivity: No Meds	.903	322
Hyperactivity/Impulsivity: Meds	.858	47
ADHD Rating Scale: Current		
Inattention: No Meds	.941	369
Inattention: Meds	.819	85
Hyperactivity/ Impulsivity: No Meds	.903	369
Hyperactivity/Impulsivity: Meds	.775	85
ADHD Rating Scale: Parent		
Inattention: Childhood	.951	241
Inattention: Current	.907	242
Hyperactivity/ Impulsivity: Childhood	.941	238
Hyperactivity/Impulsivity: Current	.879	238

Table 5

Means and Standard Deviations for Independent Variables

	Variable Absent Mean (SD)	Variable Present Mean (SD)
ADHD	7.94*(1.29)	7.08* (1.50)
Psychopathology	7.86* (1.23)	6.80* (1.64)
Psychosocial Treatment	7.74* (1.62)	7.14* (1.32)
ATOD Risk	7.68 (1.43)	7.33 (1.47)

*main effect, $p<.05$

Table 6

Means and Standard Deviations for ADHD/Medication Groups

	M	*SD*	N
Comparison	7.94*	1.30	197
ADHD, No Meds	6.94	1.39	77
ADHD, Meds	7.19	1.58	94

*significantly different, $p<.05$

Table 7

Means and Standard Deviations for Moderator Variables

Potential Moderator	ADHD Status	Variable Absent (N)	Variable Present (N)	Interaction Effect *p*
Psychopathology	ADHD	7.59, 1.15 (83)	6.59, 1.62 (88)	.141
	Comparison	7.99, 1.25 (176)	7.52, 1.53 (25)	
Psychosocial Treatment	ADHD	7.20, 1.31 (89)	6.94, 1.68 (82)	.465
	Comparison	8.04, 1.23 (158)	7.51, 1.44 (43)	
ATOD Risk	ADHD	7.17, 1.47 (87)	6.98, 1.53 (84)	.881
	Comparison	8.00, 1.30 (135)	7.79, 1.27 (66)	

Table 8

Model Summaries for Regression

	R	R^2	Std. Error	ΔR^2	*p* Change
Model 1: ADHD Status	.296	.087	1.39	.087	<.001
Model 2: added Psychosocial and Psychopathology	.393	.154	1.35	.067	<.001
Model 3: added Medication	.399	.159	1.34	.005	.154

Table 9

Regression Coefficients

	Model 1		Model 2		Model 3	
	b	*β*	*b*	*β*	*b*	*β*
ADHD Status	-.863**	-.296**	-.466**	-.160**	-.929**	-.318**
Psychosocial Treatment			-.334*	-.109*	-.384*	-.125*
Psychopathology			-.795**	-.252**	-.775**	-.246**
ADHD Medication Status					3.03	.176

*p <.05, **p <.001

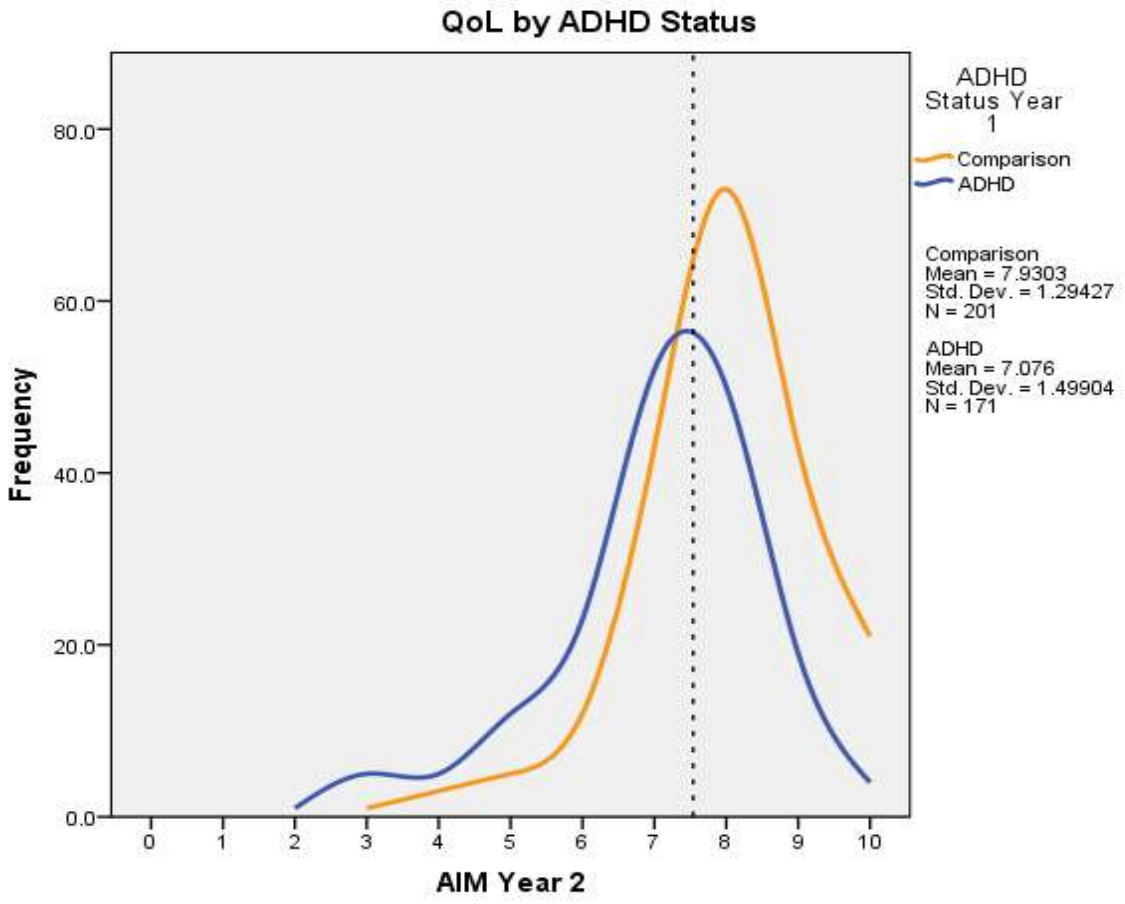

Figure 1. Distribution of responses by ADHD Status.

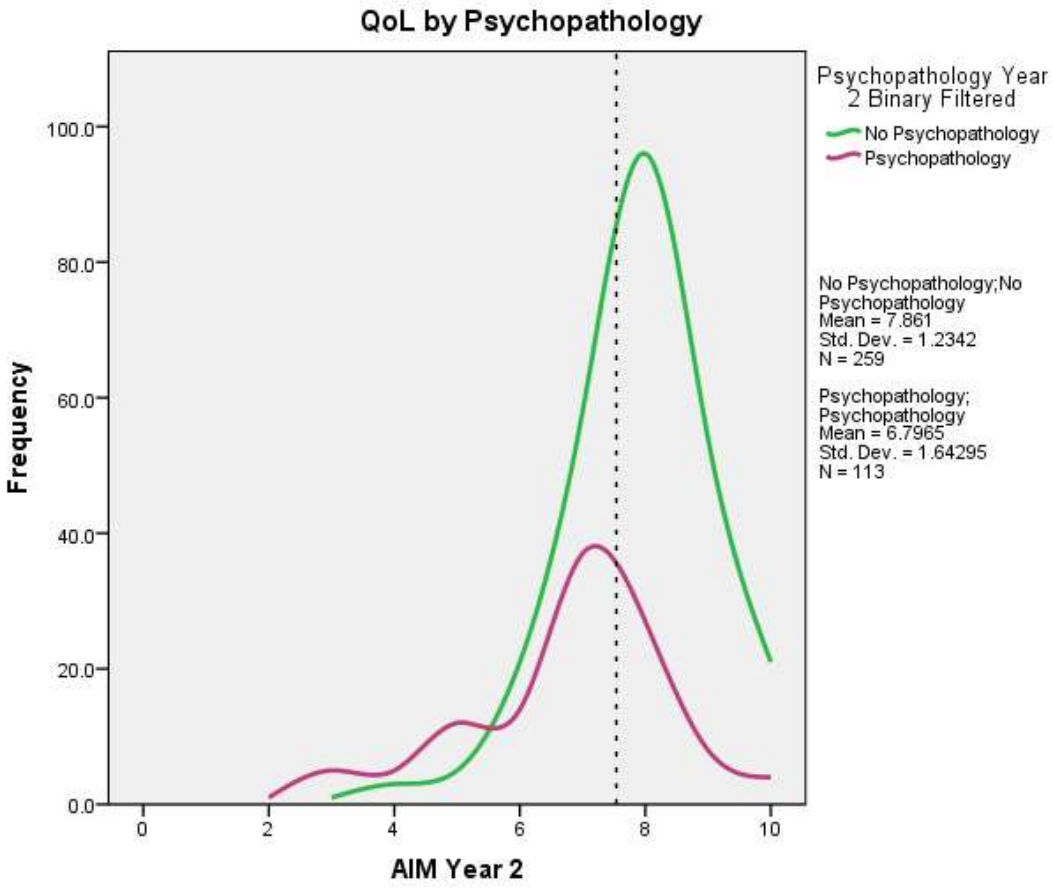

Figure 2. Distribution of responses by psychopathology status.

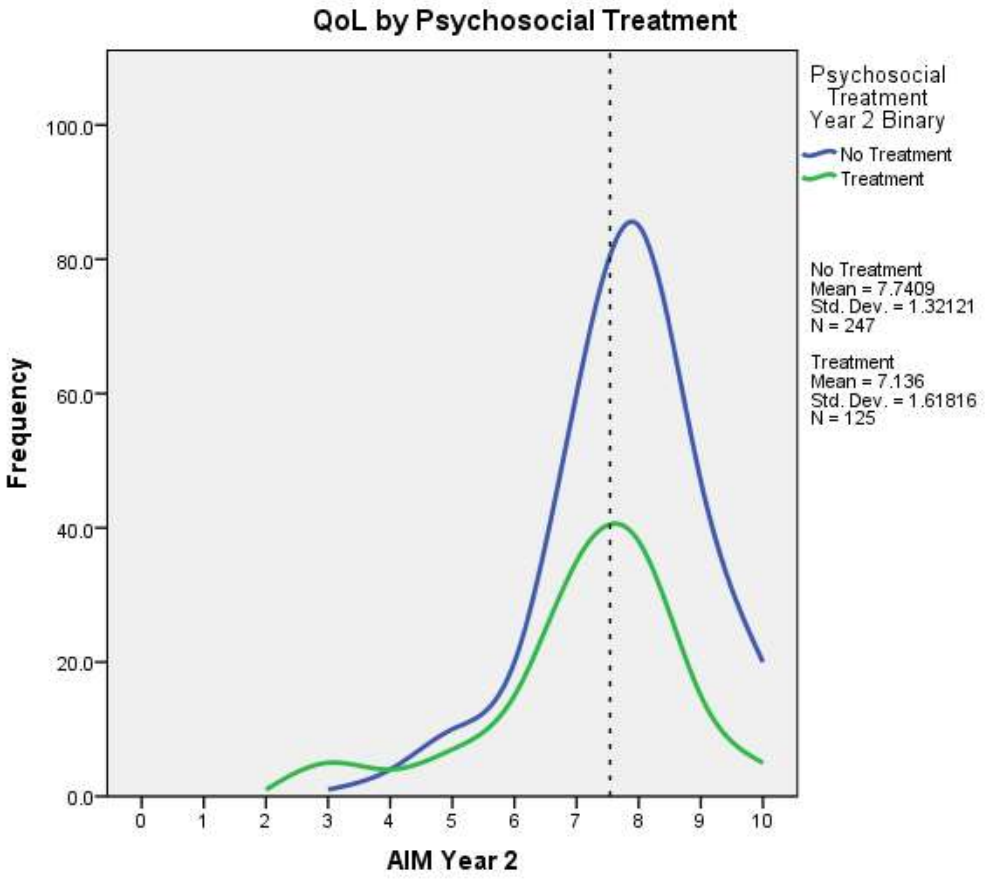

Figure 3. Distribution of responses by psychosocial treatment use.

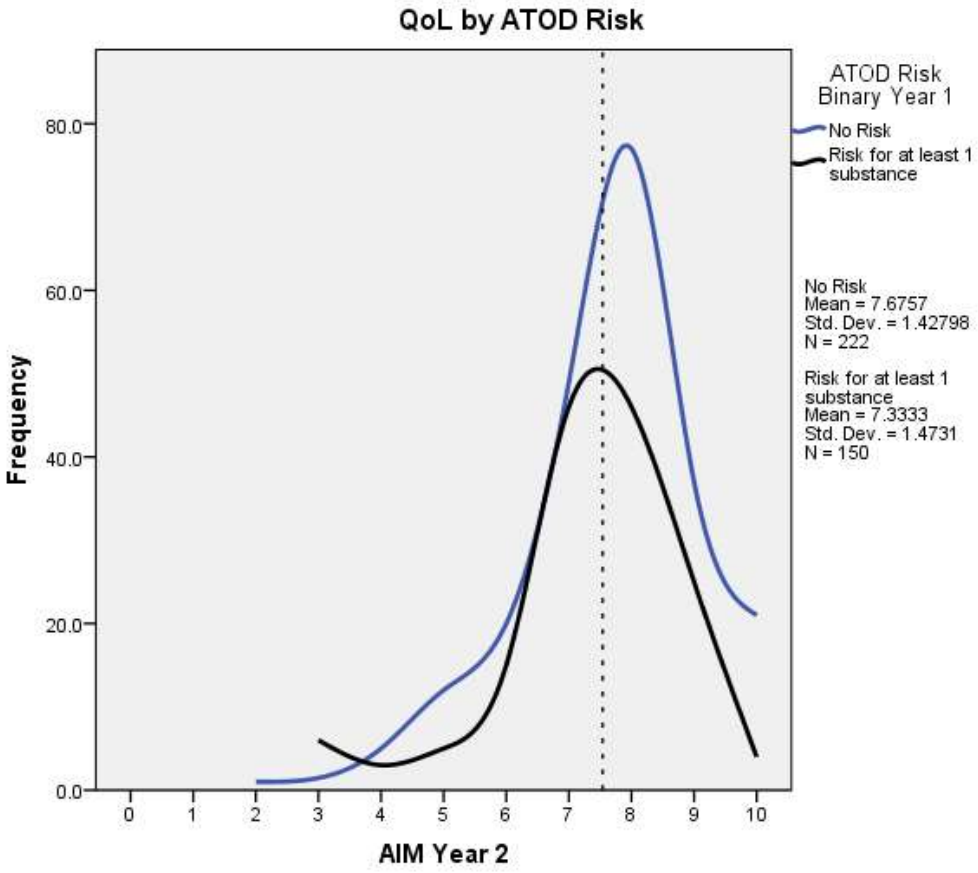

Figure 4. Distribution of responses by ATOD risk.

Trevor Pinho

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EDUCATION

LEHIGH UNIVERSITY COLLEGE OF EDUCATION Bethlehem, PA 2011-Present
Masters of Education, Human Development (2013)
Doctoral of Philosophy—School Psychology Program (expected 2016)

AMHERST COLLEGE Amherst, MA 2007-2011
Bachelor of Arts, Psychology (Honors; *Magna cum Laude*)
Bachelor of Arts, Sociology

AWARDS AND HONORS

Lehigh University Graduate Student Research Grant 2012-2013
Lehigh University Graduate University Fellowship 2011-2012
Amherst College Memorial Fellowship for the Study of School Psychology 2011-2014
Haskell R. Coplin Memorial Award for Psychology 2011
Amherst College Center for Community Engagement Fellowship 2009-2010

AFFILIATIONS

Pennsylvania Certified School Psychologist 2015-Present
National Association of School Psychologists 2011-Present
American Psychological Association , Division 16 2012-Present
Students for the Advancement of School Psychology, Lehigh University 2011-2015
Sigma Xi 2011-2013

VOLUNTEER & WORK EXPERIENCE

Carbon Lehigh IU 21 Schnecksville, PA 2015-Present
School Psychology Predoctoral Intern

- Facilitated group interventions for adolescent partial hospitalization program.
- Completed evaluations of school and transition-age students.
- Managed individual counseling caseload at center-based emotional support program**.**
- Provided consultation to parents and teachers regarding special education students.

Lindsey Meyer Teen Institute Rutherford, NJ 2009-Present
Coordinator, Youth Advisory Council

- Planned curriculum and co-led trainings for high school-age counselors-in-training ahead of roles in adolescent prevention program.
- Supervised adolescents and CIT's during prevention summit.
- Moderated small group discussions/process groups
- Designed and implemented educational workshops related to community planning model of prevention

Lehigh University Bethlehem, PA 2015
Teaching Assistant

- Coordinated practicum placement for graduate students enrolled in Assessment and Intervention in Education Consultation.
- Supervised students individually and in small groups.

Starfish, Inc Rindge, NH 2009-2011
Program Administrator

- Designed and taught educational and social emotional curriculum for EBD children in camp setting
- Managed and responded to extreme behavioral management situations
- Implemented social skills and self-management interventions.
- Trained, supervised, and evaluated programming staff, including reviewing lesson plans and conducting exit interviews.

Bethlehem YMCA Bethlehem, PA 2013-Present
Counselor

- Co-led a group of 10-20 diverse adolescents and preadolescents in predominantly low-income childcare setting.
- Created curriculum and classwide behavior planning

Holyoke High School Holyoke, MA 2008-2009
Classroom Aid

- Aided a diverse group of high school students in class, including instruction, small group, and individual help.

RESEARCH EXPERIENCE

T.R.A.C. Project Bethlehem, PA 2012-2015
Research Assistant

- Worked with staff at various colleges and universities to recruit college students with and without ADHD.
- Conducted interviews and assessments to diagnose ADHD and other DSM disorders.
- Assisted in systematic collection, entry, and maintenance of project data.
- Collaborated with Principle Investigators and other research assistants and managers to generate and implement relevant research ideas.

C.A.R.S Project Bethlehem, PA 2011-2012
Mental Health Facilitator

- Consulted with school staff to implement mental health interventions and dropout prevention strategies.
- Assessed integrity of various intervention implementation
- Conducted assessments used to determine emotional and behavioral statuses of high school students.

Data Collection Bethlehem, PA 2012-2014

- Collected dissertation for Ph.D. students, including
  - Small groups discussing transitioning a child from Head Start to Kindergarten
  - Small groups discussing impact of cystic fibrosis on child's education
  - Assessing oral reading fluency in elementary school-aged children
  - Conducted individual interviews related to diets of middle-school students
  - Observed students with autism before and during peer-led intervention
- Assessed elementary and middle-school aged children's reading ability for Project RAMP-UP.

Amherst College Dept. of Psych. Amherst, MA 2009-2011

- Conducted various literature searches for professor.
- Helped design and implement pilot study for morality experiment
- Worked with two honors students on their thesis projects.

PRACTICUM EXPERIENCE

Valley Youth House Bethlehem, PA 2014-Present

Youth Education Program Intern

- Facilitated weekly small groups of middle school students as part of prevention program.
- Designed and implemented program evaluation tool for grant-funded prevention program.
- Completed supervised psychological evaluations as part of referral processes.

Shoemaker Elementary School Emmaus, PA 2014-Present

School Psychology Practicum Student

- Conducted evaluations of students with suspected academic, emotional, and behavioral concerns.
- Worked with children displaying behavioral problems both via consultation and through direct services.
- Assisted with district-wide implementation of RTI

Emmaus High School Emmaus, PA 2013-2014

School Psychology Practicum Student

- Conducted multidisciplinary evaluations of students with academic, emotional, and behavioral concerns.
- Administered various direct assessments and rating scales.
- Conducted crisis assessments with adolescents who had indicated or who it was suspected may be in danger of self-harm.
- Provided individual ongoing direct counseling sessions
- Implemented individualized academic interventions.

Pediatric Specialists at LVH Allentown, PA 2013-2014
Pediatric School Psychology Practicum Student

- ❖ Collaborated with multidisciplinary team of doctors, nurses, nurse practitioner, social worker, and others to provide services to patients
- ❖ Communicated with school staff in order to provide accommodations for students whose medical diagnoses interfered with their academic placement
- ❖ Provided interventions to promote treatment adherence

PUBLICATIONS AND PRESENTATIONS

DuPaul., G.J., Gormley, M., Laracy, S., **Pinho, T.,** Pollack, B. (2014). *Adolescents with ADHD transitioning to college: Self-concept and school preparation.* Poster session presented at the meeting of the American Psychological Association, Washington, DC.

DuPaul, G.J., **Pinho, T.,** Pollack, B., Gormley, M., & Laracy, S. (2015). First-year college students with ADHD and/or LD: Differences in engagement, positive core self-evaluation, school preparation, and college expectations. *Journal of learning disabilities.*

Eisenberg, R., Gernhart, A., Manz, P.,Laracy, S., Faison, J., **Pinho, T.**, & Ridgard, T. (February, 2013). *Culturally relevant book talk: Dialogic reading feasibility and acceptability.* Poster session presented at the meeting of the National Association of School Psychology, Seattle, WA.

Gormley, M. J., DuPaul, G. J., Pollack, B., **Pinho, T**., Franklin, M., Busch, C., Weyandt, L., Anastopoulos, A. D. (2015, November). Psychosocial and psychopharmacological treatment of ADHD in college students: Longitudinal associations with psychological and behavioral outcomes. Poster presented at the annual convention of the Association for Behavioral and Cognitive Therapies, Chicago, Il.

Gormley, M., **Pinho, T.,** Pollack, B., Laracy, S., Busch, C., Franklin, M., Puzino, K., Hollingsworth, K., & DuPaul, G.J. (2014). *First-year GPA for college students with and without ADHD: A moderated mediation model.* In A. D. Anastopoulos (Chair), *Longitudinal outcome of college students with ADHD: Initial findings from two studies.* Symposium at the meeting of the American Psychological Association, Washington, DC.

Gormley, M. J., **Pinho, T.**, Pollack, B., Puzino, K., Franklin, M. K., Busch, C.,… &

Anastopoulos, A. D. (2015). Impact of Study Skills and Parent Education on First-Year GPA Among College Students With and Without ADHD A Moderated Mediation Model. *Journal of attention disorders*.

Manz, P., Eisenberg, R., Gernhart, A., Faison, J., Laracy, S., Ridgard, T., & **Pinho**, **T.** (In Press). Engaging Early Head Start parents in collaborative inquiry: The co-construction of Little Talks. *Early Child Development and Care.*

Pollack, B., Gormley, M., **Pinho, T**., DuPaul, G., Weyandt, L., Anastopoulos, A., Puzino, K., & Oster, D. (2015) *Service utilization among college students with ADHD and learning disorders.* Presentation for National Association of School Psychologists 2015 Convention in Orlando, FL.

IN PROGRESS/PRESS PUBLICATIONS AND PRESENTATIONS

DuPaul, G.J., Pollack, B., **Pinho, T.** (In Press). Attention-deficit/hyperactivity disorder. In Goldstein, S. & DeVries, M. (Eds.) *Handbook of DSM-V Disorders in Children*

DuPaul, G.J., Dahlstrom-Hakki, I., Gormley, M.J., Fu, J., **Pinho**, **T.**, Banerjee, M. (Submitted) College students with ADHD and LD: Effects of support services on academic performance. *Journal of Learning Disabilities.*