

Anxiety Symptoms and Disorders in College Students With ADHD

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O'Rourke, S.R., Bray, A.C., & Anastopoulos, A.D. (2017). Anxiety symptoms and disorders in college students with ADHD. *Journal of Attention Disorders*. DOI: 10.1177/1087054716685837

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Abstract:

Objective: This study examined anxiety symptoms and disorders in college students with ADHD. Method: Forty six college students with ADHD and a matched group of students without ADHD participated. Participants completed self-report measures of anxiety symptoms and associated features, including worry, maladaptive beliefs about worry, panic symptoms, social anxiety, obsessive-compulsive symptoms, and self-efficacy. Participants also completed a diagnostic interview to assess lifetime and current anxiety disorders. Results: Participants with ADHD endorsed more maladaptive beliefs about worry, more obsessive-compulsive symptoms, and poorer self-efficacy compared with comparison participants. There were no group differences in rates of current anxiety disorders. Participants with ADHD were over 2 times more likely than comparison participants to endorse this lifetime history. Conclusion: College students with ADHD are more likely to have a lifetime history of an anxiety disorder and are at greater risk for some anxiety symptoms and associated features. (*J. of Att. Dis.* XXXX; XX(X) XX-XX)

Keywords: ADHD | anxiety | college students | comorbidity

Article:

ADHD is a neurodevelopmental disorder characterized by symptoms of inattention, hyperactivity, and impulsivity (American Psychiatric Association [APA], 2013). Youth and adults with ADHD are at greater risk for having other psychiatric conditions, including anxiety disorders, which share common features of excessive fear, anxiety, and avoidance behavior. Anxiety disorders include generalized anxiety disorder (GAD), characterized by excessive worry; social anxiety disorder, characterized by fear and avoidance of social situations; panic disorder, characterized by recurrent panic attacks; and specific phobia, characterized by excessive fear of specific stimuli such as animals or insects, blood or injections, heights, thunderstorms, and so on (APA, 2013). Under the Diagnostic and Statistical Manual of Mental Disorders-IV-TR (DSM-IV-TR; APA, 2000), obsessive-compulsive disorder (OCD), characterized by recurrent and intrusive thoughts and repetitive behaviors, and posttraumatic

stress disorder (PTSD), characterized by significant distress associated with exposure to a traumatic event, were also recognized as anxiety disorders, though these are no longer considered anxiety disorders under the Diagnostic and Statistical Manual of Mental Disorders-5 (DSM-5; APA, 2013) diagnostic system. Dimensional approaches to the assessment of anxiety, or approaches that examine anxiety symptoms rather than disorders, are also useful in that they are sensitive to the range of severity of behaviors and may be useful for screening early signs of a problem (Dadds, James, Barrett, & Verhulst, 2004).

Approximately 15% to 35% of children and teens with ADHD have an anxiety disorder (see Schatz & Rostain, 2006, for a review), putting them at 3 times greater risk of having an anxiety disorder compared with children in the general population (Angold, Costello, & Erkanli, 1999). High rates of anxiety disorders have also been documented in clinical samples of adults with ADHD; one quarter to one half of adults with ADHD meet diagnostic criteria for GAD (Barkley, Murphy, & Kwasnik, 1996; Biederman et al., 1993; Murphy, Barkley, & Bush, 2002). Although the comorbidity between ADHD and anxiety disorders is well documented in the pediatric and adult literature, there is a developmental gap in what is known about anxiety in college students with ADHD.

Because individuals with ADHD are less likely to enter and complete college than their peers without ADHD (Weiss & Hechtman, 1993), college students with ADHD are likely to differ from the general population of individuals with ADHD in several important ways. For instance, college students with ADHD are thought to display higher intellectual abilities, greater academic achievement prior to college, and better adaptive skills compared with other individuals with ADHD (Frazier, Youngstrom, Glutting, & Watkins, 2007).

There are theoretical and empirical reasons to suggest that college students with ADHD may be more prone to anxiety and other negative outcomes compared with their peers. College entry has been conceptualized as a “perfect storm” of circumstances for young adults with ADHD (Anastopoulos & King, 2015). First, while many high school students with ADHD have substantial support from parents and teachers, formal academic accommodations, and/or treatment for ADHD, these supports and treatments are often withdrawn when students enter college. Second, success in college requires effective self-regulatory abilities: Students must learn to skillfully manage multiple demands, including class attendance and studying, extracurricular activities, interpersonal relationships, and self-care, as well as decisions about substance use and sexual activity. ADHD is characterized by deficits in self-regulation (Barkley, 2006), making the management of the multiple demands of college life especially challenging for students with ADHD. Indeed, emerging empirical evidence suggests that college students with ADHD have more academic and interpersonal problems, poorer adjustment to college life, and more symptoms of comorbid disorders such as depression compared with their peers (Anastopoulos et al., 2016; Rabiner, Anastopoulos, Costello, Hoyle, & Swartzwelder, 2008; Shaw-Zirt, PopaliLehane, Chaplin, & Bergman, 2005).

There have been few studies of anxiety in college students with ADHD, and the results of these studies have been mixed. Several studies have found that college students with ADHD endorsed more symptoms on narrowband measures of anxiety symptoms or anxiety-related subscales of broadband scales than students without ADHD (Anastopoulos et al., 2016; Prevatt, Dehili, Taylor, & Marshall, 2015; Richards, Rosén, & Ramirez, 1999; Weyandt et al., 2013). Other studies have not found group differences in anxiety symptoms between students with and without ADHD (Heiligenstein, Guenther, Levy, Savino, & Fulwiler, 1999; Nelson & Gregg,

2012). Only two studies have examined anxiety diagnoses in college students with ADHD. A record review of college students with ADHD found that only 5% of the sample was diagnosed with a current anxiety disorder (Heiligenstein & Keeling, 1995); in contrast, a prospective longitudinal study of first-year college students found that 28% of students with ADHD also had an anxiety disorder, a 10-fold higher rate than in the comparison group (Anastopoulos et al., 2016).

These existing studies have a number of critical limitations. First, in older studies on this topic, it is unclear how ADHD status was assessed (e.g., Heiligenstein et al., 1999; Heiligenstein & Keeling, 1995; Richards et al., 1999). Second, one of the only existing studies to examine the presence of anxiety disorders (Heiligenstein & Keeling, 1995) did not include a comparison group that would allow for comparison of rates of anxiety disorders between students with and without ADHD, nor is it clear whether all cases in the study were systematically assessed for the possibility of an anxiety disorder. Third, existing studies have tended to assess anxiety symptoms in a limited way, such as by using an anxiety subscale of a larger scale, a scale that measures only one type of anxiety, or a scale that has not been previously validated.

The present study was designed to extend previous research and clarify the relation between ADHD and anxiety in college students. This study addresses limitations of previous studies by using a rigorously defined sample of college students with ADHD, utilizing a matched comparison group, assessing anxiety systematically in all participants, assessing both anxiety symptoms and disorders, and using numerous measures of anxiety symptoms to capture the multifaceted nature of anxiety. The study also examined several constructs closely related to anxiety that have not been explored in previous studies of ADHD and anxiety in college students, including maladaptive beliefs about worry, self-efficacy, and impairment. Maladaptive beliefs about worry may include beliefs that worry helps to avoid future problems or that worry is dangerous. These beliefs about worry are associated with, and are thought to maintain, symptoms of worry (Wells, 2004). Self-efficacy, or an individual's belief that he or she can perform a certain behavior successfully, is inversely related to anxiety (Bandura, 1983). Impairment is symptom-related decrements in functioning in areas such as academic, occupational, peer, family, or romantic relationships.

Although past studies on comorbid ADHD and anxiety in college students have been limited in number and have yielded mixed results, consideration of the "perfect storm" faced by college students with ADHD would suggest that anxiety is more likely in this population and that students with both ADHD and anxiety are also likely to be more impaired. The following hypotheses were examined:

Hypothesis 1: College students with ADHD will report more severe current anxiety symptoms, more maladaptive beliefs about worry, and poorer self-efficacy compared with other students.

Hypothesis 2: College students with ADHD will be more likely to have a current anxiety disorder compared with other students.

Hypothesis 3: College students with ADHD will be more likely than other students to endorse a lifetime history of an anxiety disorder and will be more likely to develop an anxiety disorder for the first time in college.

Hypothesis 4: College students with both ADHD and an anxiety disorder will report more current impairment than students with ADHD.

Method

This study was approved by the University of North Carolina Greensboro Institutional Review Board. Data were collected between September 2012 and June 2013. Inclusion criteria for all participants were as follows: (a) undergraduate enrollment at the public university in the Southeastern United States where the research was conducted, and (b) age between 18 and 30 years. Participants in the ADHD group also met all DSM-IV-TR diagnostic criteria for ADHD, and participants in the control group did not meet criteria for ADHD (see “Participants” section for additional details). After participant eligibility was established, remaining measures were completed during a single session. The Structured Clinical Interview for DSM-IV Axis I Disorders–Clinician Version (SCID-CV) was administered by the first and second authors who, at the time that these data were collected, were doctoral students in clinical psychology and had received formal training in the administration of this interview. A demographic information form was then completed, followed by other dependent measures presented in random order.

Participants

ADHD group. The ADHD group consisted of 46 undergraduate students diagnosed with ADHD as determined by a previous clinical or research evaluation at an ADHD specialty clinic. All undergraduate students who received a diagnosis of ADHD during a clinical or research evaluation in the ADHD specialty clinic during the recruitment period for this study were invited to participate. If participants had received a diagnosis of ADHD through the ADHD specialty clinic in the previous 6 months and met all other inclusion criteria, they were considered eligible for participation and did not undergo reevaluation of their ADHD status for the purposes of this project.

The clinical and research evaluations entailed multimethod, multi-informant assessment procedures to establish DSM-IV-TR diagnostic criteria for ADHD as evidenced by all of the following: (a) endorsement of six or more symptoms of inattention and/or six or more symptoms of hyperactivity-impulsivity on the Semi-Structured ADHD Interview and/or ADHD Rating Scale (ADHD-RS) Self-Report Version; (b) developmental deviance of symptoms, defined as at or above the 93rd percentile on a DSM-IV subscale of the Conners’ Adult ADHD Rating Scale–Self-Report: Long Version (CAARS-S:L); (c) clinically significant inattention and/or hyperactivity-impulsivity during childhood and during the previous 6 months, based on participant self-report on the Semi-Structured ADHD Interview and collateral report, typically by a parent or other relative who had known the participant since childhood, on the ADHD-RS Other Report Version; (d) presence of symptoms in two or more settings and associated clinically significant current impairment, as assessed on the Semi-Structured ADHD Interview; and (e) elimination of alternative explanations for the symptoms, based primarily on information obtained from the SCID-CV.

When the data for this project were collected, DSM-5 had not yet been published. DSM-5 generally broadened the diagnostic criteria for ADHD, particularly with regard to adults. Therefore, all participants in the ADHD group in this study would also have met diagnostic criteria for ADHD under DSM-5. Fifty percent ($n = 23$) of participants in this group were diagnosed with ADHD Predominantly Inattentive Type and 44% ($n = 20$) were diagnosed with ADHD Combined Type. Six percent ($n = 3$) received the diagnosis of ADHD Not Otherwise

Specified; these participants endorsed clinically significant but subthreshold (e.g., four or more) symptoms of inattention and/or hyperactivity-impulsivity and otherwise met all DSM-IV-TR diagnostic criteria for ADHD.

Comparison group. Comparison participants did not meet DSM-IV-TR criteria for ADHD. Comparison participants were students in introductory psychology classes who fulfilled a requirement for their class by participating in several research studies. These students first completed an online mass screening procedure in which they completed screening questionnaires for this study and several other studies being conducted in the Psychology Department. Screening measures for this study included the ADHD-RS Self-Report Version and the Infrequency Scale, which is a measure of careless and random responding. Prospective comparison participants were eligible for the study if they endorsed three or fewer current symptoms of inattention and three or fewer current symptoms of hyperactivity impulsivity on the ADHD-RS Self-Report Version and three or fewer items in the unexpected direction on the Infrequency Scale during mass screening procedures. Eighty-two out of 615 potentially eligible participants completed the remaining study measures, and 46 of these 82 participants were later selected for the final matched comparison group.

Attempts were made to create a comparison group of 46 participants that matched the ADHD group on age, gender, ethnicity, race, and class standing. Because the pool of comparison participants contained many 18-year-olds, the 82 comparison participants were rank-ordered by age and the oldest 46 participants were tentatively selected for inclusion in the final comparison group. This matching procedure yielded a final comparison group that was comparable with the ADHD group with regard to both age, $t(83.9) = -1.27$, $p = ns$, and gender, $\chi^2(1, N = 92) = 0.05$, $p = ns$. The ethnic composition of the two groups was also comparable, $\chi^2(1, N = 92) = 0.93$, $p = ns$. Because of the small number of participants whose racial identification was Asian American, Native American, Multiracial, or Other/Not reported, these classifications were collapsed into a single category for the purposes of comparing the ADHD and comparison groups. The ADHD and comparison groups did not differ with regard to race, $\chi^2(2, N = 92) = 0.18$, $p = ns$. Class standing categories were collapsed into first-year and upper-class (combining sophomores, juniors, and seniors) categories; when compared using these two categories, the groups were comparable on class standing, $\chi^2(1, N = 92) = 3.66$, $p = ns$. The demographic characteristics of the sample appear in Table 1.

Measures

Diagnostic and eligibility measures

ADHD-RS-IV. Symptoms of inattention and hyperactivity-impulsivity were assessed using the ADHD-RS Self-Report Version and the ADHD-RS Other Report Version, versions of the ADHD-RS-IV (DuPaul, Anastopoulos, et al., 1998) modified for use with adults. The Other Report Version was completed, whenever possible, by the participant's parent or other relative who had known the participant since childhood. Both versions assess childhood and current symptoms. Internal consistencies for Inattention and Hyperactivity-Impulsivity subscales and Total scale are high ($\alpha = .88-.94$), and the measure discriminates significantly between youth with and without ADHD (DuPaul, Power, McGoey, Ikeda, & Anastopoulos, 1998).

Table 1. Demographic Characteristics of ADHD and Comparison Groups.

Age	20.5 (2.0)	20.0 (1.5)
	% (n)	% (n)
Gender		
Male	33 (15)	35 (16)
Female	67 (31)	65 (30)
Ethnicity		
Hispanic/Latino	15 (7)	9 (4)
Non-Hispanic/Latino	85 (39)	91 (42)
Race		
Caucasian/White	57 (26)	61 (28)
African American/ Black	17 (8)	15 (7)
Asian American	2 (1)	6 (3)
Multiracial	6 (3)	2 (1)
Other/Not reported	17 (8)	16 (7)
Class rank		
Freshman	30 (14)	50 (23)
Sophomore	22 (10)	28 (13)
Junior	24 (11)	7 (3)
Senior	24 (11)	15 (7)

Note. The ADHD and comparison groups did not differ significantly on age, gender, ethnicity, race, or class rank (first year vs. upper class).

CAARS-S:L. Developmental deviance of current symptoms of inattention and hyperactivity-impulsivity was assessed in the ADHD group using the self-report long version of the CAARS (Conners et al., 1999). Internal consistency for the CAARS subscales is good ($\alpha = .86-.92$), as is the test-retest reliability ($r = .89$) (Erhardt, Epstein, Conners, Parker, & Sitarenios, 1999).

Infrequency Scale. This 13-item measure detects careless and random response styles (Chapman & Chapman, 1983). Items are self-descriptive and are rated as true/false. Each item was designed to have a very low probability of being endorsed in a certain direction. Participants were excluded if they endorsed three or more items in the unexpected direction.

Semi-Structured ADHD Interview. This interview was developed in the ADHD specialty clinic where this research took place and includes questions about each of the 18 DSM-IV symptoms of ADHD as well as about symptom onset, duration, and related impairment. The interview also assesses academic, family, social, and psychiatric history. For a closely related version of this interview, the symptom counts are highly correlated with CAARS-S:L scores ($r_{\text{Inattention}} = .78$, $r_{\text{Hyperactivity-Inattention}} = .84$), and the coefficient alphas are excellent ($\alpha_{\text{Inattention}} = .90$, $\alpha_{\text{Hyperactivity-Impulsivity}} = .85$) (Anastopoulos et al., 2016).

SCID-CV. The clinician-administered SCID (First, Spitzer, Gibbon, & Williams, 1996) is a structured interview that assesses Axis I disorders based on DSM-IV criteria. SCID-CV modules that assess mood disorders, psychotic disorders, anxiety disorders, and substance use disorders were administered to participants in the ADHD group as part of their diagnostic

evaluations to evaluate exclusionary conditions. The Panic Disorder, Agoraphobia, Social Phobia, Specific Phobia, OCD, PTSD, and GAD portions of the Anxiety and Other Disorders module of the SCID-CV were administered to all participants in both groups to assess current and lifetime anxiety disorders (First et al., 1996). The SCID-CV has fair to good interrater reliability for current anxiety diagnoses (Lobbestael, Leurgans, & Arntz, 2011).

Dependent measures. The following measures were administered to all participants to assess anxiety symptoms, maladaptive beliefs about worry, self-efficacy, and impairment.

Beck Anxiety Inventory (BAI). The BAI (Beck, Epstein, Brown, & Steer, 1988) is a narrowband measure of anxiety with good internal consistency ($\alpha = .92$) and test-retest reliability over a 1-week period of .75 (Beck et al., 1988). BAI scores have been shown to correlate with physiological measures of anxiety (Borden, Peterson, & Jackson, 1991), and the BAI primarily measures symptoms of panic and rather than more general symptoms of anxiety (Cox, Cohen, Dorenfeld, & Swinson, 1996; Leyfer, Ruberg, & Woodruff-Borden, 2006).

Liebowitz Social Anxiety Scale–Self Report (LSAS-SR). The self-report version of the LSAS was administered to assess symptoms of Social Anxiety Disorder, including fear and avoidance of social interactions and performance situations (Baker, Heinrichs, Kim, & Hofmann, 2002; Liebowitz, 1987). For the self-report version, internal consistency is high ($\alpha = .94-.95$), 12-week test-retest reliability is good ($r = .83$), and scores correlate highly with scores on the clinician-administered version (Baker et al., 2002; Fresco et al., 2001). Discriminant validity is also good (Baker et al., 2002; Fresco et al., 2001).

Meta-Cognitive Questionnaire–30 (MCQ-30). The MCQ30 (Wells & Cartwright-Hatton, 2004) is a short form of the original 65-item MCQ (Cartwright-Hatton & Wells, 1997). It assesses maladaptive beliefs about worry, which have been implicated in the maintenance of anxiety disorders, particularly GAD (Wells, 2004). The MCQ-30 has good internal consistency ($\alpha = .93$) and correlates highly with measures of state anxiety and worry (Wells & Cartwright-Hatton, 2004).

Obsessive-Compulsive Inventory–Revised (OCI-R). The OCI-R (Foa et al., 2002) is a self-report measure of obsessive-compulsive symptoms and is a shortened form of the original OCI (Foa, Kozak, Salkovskis, Coles, & Amir, 1998). The OCI-R has high internal consistency ($\alpha = .90$) and correlates highly with other measures of OCD (Foa et al., 2002).

Penn State Worry Questionnaire (PSWQ). The PSWQ (Meyer, Miller, Metzger, & Borkovec, 1990) is a self-report rating scale that assesses worry. It has high internal consistency (Meyer et al., 1990). The PSWQ distinguishes between individuals with GAD and other anxiety disorders, and correlations between the PSWQ and other measures of anxiety, depression, and emotional control support its convergent and discriminant validity (Brown, Antony, & Barlow, 1992).

Self-Efficacy Scale (SES). The SES assesses individuals' expectations of personal mastery and success (Sherer et al., 1982). Higher scores are indicative of higher self-efficacy

expectations. The SES has good internal consistency and correlates highly with measures of success in educational, vocational, and military areas, and with measures of personal effectiveness and global positive mental health (Sherer et al., 1982).

Impairment Rating Scale (IRS). The IRS collects self report information about childhood and current impairment in various life domains (Barkley & Murphy, 2006). The Current Symptoms Scale, which was used in this study, assesses current impairment in the areas of family, work, social interactions, community, education, romantic relationships, money management, driving, leisure, and daily responsibilities.

Statistical Analysis

All analyses were conducted using IBM SPSS Statistics Version 21.0. An inspection of normality for the continuous dependent measures suggested that the BAI and OCI-R were not normally distributed. These variables were log transformed, resulting in normally distributed variables. Next, the data were screened for multivariate normality and outliers; the Mahalanobis distance was not significant at the $p < .001$ level for any case. The assumption of equality of population covariances among the dependent variables was also assessed, Box's $M = 34.20$, $F(21, 27971.79) = 1.51$, $p = ns$. Thus, the assumptions for MANOVAs were met. For the purposes of evaluating Hypotheses 1, 2, and 3, participants were categorized into two groups on the basis of ADHD status (ADHD group, comparison group). For the purposes of evaluating Hypothesis 4, participants were categorized into three groups (ADHD only group, ADHD + current anxiety disorder group, comparison group).

Results

Table 2 illustrates the relationships between the continuous dependent variables.

Table 2. Correlations Among MANOVA Variables for Final Sample (N = 92).

Variable	1	2	3	4	5	6
1 BAI	–					
2 LSAS-SR	.50**	–				
3 MCQ-30	.67**	.57**	–			
4 OCI-R	.49**	.50**	.64**	–		
5 PSWQ	.68**	.57**	.72**	.56**	–	
6 SES	-.18	-.44**	-.33**	-.13	-.21*	–

Note. BAI = Beck Anxiety Inventory (log-transformation); LSAS-SR = Liebowitz Social Anxiety Scale – Self Report; MCQ-30 = MetaCognitive Questionnaire – 30; OCI-R = Obsessive-Compulsive Inventory – Revised (log-transformation); PSWQ = Penn State Worry Questionnaire; SES = Self-Efficacy Scale.

* $p < .05$.

** $p < .01$.

Table 3. Results of Follow-Up ANOVAs Comparing ADHD and Comparison Groups on Measures of Anxiety Symptoms.

Variable	df	F	p	Partial η^2	Group	M	SD
BAI	1	0.803	.37	0.01	ADHD	2.21	0.88
					Comparison	2.04	0.91
LSAS-SR	1	0.642	.42	0.01	ADHD	37.28	23.8
					Comparison	33.30	23.8
MCQ-30	1	6.55 ^a	.01*	0.07	ADHD	31.91	13.5
					Comparison	23.46	17.9
OCI-R	1	4.61	.03*	0.05	ADHD	2.43	0.98
					Comparison	2.00	0.91
PSWQ	1	0.81	.37	0.01	ADHD	47.13	14.1
					Comparison	44.26	16.4
SES	1	25.43	<.001*	0.22	ADHD	70.37	12.5
					Comparison	82.15	9.7

Note. BAI = Beck Anxiety Inventory (log transformation); LSAS-SR = Liebowitz Social Anxiety Scale–Self-Report; MCQ-30 = Meta-Cognitive Questionnaire–30; OCI-R = Obsessive-Compulsive Inventory–Revised (log transformation); PSWQ = Penn State Worry Questionnaire; SES = Self-Efficacy Scale. ^a The assumption of equality of population variances was violated for the MCQ-30 variable, suggesting that that overall F statistic may be unreliable. The Welch’s t statistic, which does not assume equality of population variances, was calculated, $t(1, 83.587) = 6.55, p = .01$, and was also significant.

* $p < .05$.

Hypothesis 1: College students with ADHD will report more severe current anxiety symptoms, more maladaptive beliefs about worry, and poorer self-efficacy compared with other students.

The one-way MANOVA yielded significant differences between the ADHD and comparison groups on the dependent measures, Wilks’s $\Lambda = 0.68, F(6, 85) = 6.64, p < .001$, partial $\eta^2 = 0.32$. Follow-up ANOVAs on the six dependent variables (Table 3) were significant for the MCQ-30, $F(1, 90) = 6.55, p = .01$; OCI-R, $F(1, 90) = 4.61, p = .03$; and SES, $F(1, 90) = 25.43, p < .001$. The ANOVA assumption of equality of variances was violated in the case of the MCQ30, and the Welch statistic, which does not assume equality of population variances, was also calculated. This test was also significant, $t(1, 83.587) = 6.55, p = .01$. The ADHD group had significantly higher scores on the MCQ-30 (partial $\eta^2 = 0.07$) and OCI-R (partial $\eta^2 = 0.05$) than the comparison group. The ADHD group had significantly lower scores on the SES (partial $\eta^2 = 0.22$) than the comparison group. The ADHD and comparison groups did not differ significantly on the BAI, LSAS, or PSWQ.

Hypothesis 2: College students with ADHD will be more likely to have a current anxiety disorder compared with other students.

Twenty-six percent ($n = 12$) of participants in the ADHD group and 17% ($n = 8$) of

participants in the comparison group endorsed current criteria for any SCID-CV anxiety disorder (Table 4). Participants in the two groups were equally likely to endorse criteria for any current anxiety disorder, $\chi^2(1, N = 92) = 1.02, p = ns$, Cramér's $V = .11$.

Hypothesis 3: College students with ADHD will be more likely than other students to endorse a lifetime history of an anxiety disorder and will be more likely to develop an anxiety disorder for the first time in college.

Forty-one percent ($n = 19$) of participants in the ADHD group endorsed a lifetime history of any anxiety disorder on the SCID-CV, a rate that was significantly higher than the 17% ($n = 8$) of participants in the comparison group who endorsed such a history (Table 4), $\chi^2(1, N = 92) = 6.34, p = .01$, Cramér's $V = .26$. The relative risk was 2.38, $p = .02$, 95% confidence interval [CI] = [1.17, 4.81] for the ADHD group compared with the comparison group.

Two percent ($n = 1$) of participants in the ADHD group and 4% ($n = 2$) of participants in the comparison group reported the onset of a new SCID-CV anxiety diagnosis as a college student. Due to the small numbers of participants endorsing the onset of a new anxiety disorder in college, the planned chi-square analysis could not be carried out.

Hypothesis 4: College students with both ADHD and an anxiety disorder will report more current impairment than students with ADHD.

Total scores for current impairment on the IRS were examined. Variables were normally distributed, and assumptions for ANOVA were met. A one-way ANOVA evaluating the relation between group status and self-reported current impairment was significant, $F(2, 89) = 22.43, p < .001$, partial $\eta^2 = 0.34$. Follow-up Tukey's honestly significant difference (HSD) tests revealed that the ADHD + current anxiety disorder group had higher IRS current impairment scores ($M = 17.50, SD = 5.76$) than either the ADHD only ($M = 10.82, SD = 5.64$) or comparison ($M = 6.65, SD = 4.63$) group. In addition, the ADHD only group had significantly higher IRS current impairment scores than the comparison group.

Discussion

This study provides evidence that college students with ADHD are at risk for poorer self-efficacy, more maladaptive beliefs about worry, and more obsessive-compulsive symptoms than their peers without ADHD. Furthermore, participants with ADHD were over 2 times more likely to report a lifetime history of an anxiety disorder than participants without ADHD. In this study, more than 40% of participants with ADHD endorsed a lifetime history of an anxiety disorder, compared with 17% of the comparison participants. GAD was the most common lifetime anxiety diagnosis in the ADHD group. Taken together, these findings highlight the particular anxiety-related risks that college students with ADHD are likely to face.

Hypothesis 1 was partially supported. Expected between group differences in self-efficacy, maladaptive beliefs about worry, and obsessive-compulsive symptoms were observed. Poor self-efficacy and maladaptive beliefs about worry, while not anxiety symptoms in and of themselves, are closely related to anxiety and may increase vulnerability to clinically significant anxiety. Predicted group differences in physical symptoms of anxiety, social anxiety,

and worry were not observed.

Table 4. Lifetime and Current SCID-CV Anxiety Diagnoses by Group.

Diagnostic Category	ADHD	Comparison	χ^2 (1 df)
	(n = 46)	(n = 46)	
Any lifetime anxiety diagnosis	41 (19)	17 (8)	6.34*
Agoraphobia	4 (2)	0 (0)	
Generalized anxiety disorder	22 (10)	9 (4)	
Obsessive-compulsive disorder	7 (3)	7 (3)	
Panic disorder	4 (2)	4 (2)	
Posttraumatic stress disorder	15 (7)	2 (1)	
Social phobia	9 (4)	11 (5)	
Specific phobia	0 (0)	2 (1)	
Any current anxiety diagnosis	26 (12)	17 (8)	1.02
Agoraphobia	0 (0)	0 (0)	
Generalized anxiety disorder	15 (7)	9 (4)	
Obsessive-compulsive disorder	4 (2)	7 (3)	
Panic disorder	0 (0)	2 (1)	
Posttraumatic stress disorder	6 (3)	2 (1)	
Social phobia	9 (4)	9 (4)	
Specific phobia	0 (0)	2 (1)	

Note. The numbers of participants meeting criteria for individual anxiety diagnoses sum to greater than the number of participants endorsing any diagnosis, as several participants met diagnostic criteria for more than one anxiety disorder. SCID-CV = Structured Clinical Interview for DSMIV Axis I Disorders–Clinician Version.

* $p < .05$.

Unexpectedly, Hypothesis 2 was not supported, as the ADHD and comparison groups were equally likely to meet diagnostic criteria for a current anxiety disorder. Rates of current anxiety disorders in both groups were high, with 26% of participants in the ADHD group and 17% of participants in the comparison group endorsing current criteria for any SCID-CV anxiety diagnosis. The most frequent anxiety diagnosis, GAD, was observed in 15% of participants in the ADHD group. The proportions of participants in the ADHD group who currently met diagnostic criteria for disorders including GAD, PTSD, and OCD were comparable with the rates of these disorders documented in Anastopoulos and colleagues' (2016) sample. In the comparison group, however, rates of current anxiety disorders were generally greater than was observed in Anastopoulos and colleagues' comparison group. The comparison group participants in the present study were recruited from introductory psychology courses, and while students in introductory psychology courses are generally thought to be representative of undergraduate

student populations (King, Bailly, & Moe, 2004), the comparison group in Anastopoulos and colleagues' study was recruited from multiple sources and may be a more heterogeneous group.

Hypothesis 3 was also partially supported. While participants in the ADHD were indeed more likely to endorse a lifetime history of any anxiety disorder, few participants in either group endorsed the onset of an anxiety disorder in college. This finding was unexpected given that college had been conceptualized as a time of great risk for the onset of anxiety disorders in students with ADHD due to the introduction of new stressors. One possible explanation for this finding is that the cross-sectional design of this study may not have captured college students who experienced the new onset of an anxiety disorder if their anxiety interfered with their ability to remain enrolled in college.

Hypothesis 4 was supported. An examination of functional impairment associated with ADHD revealed that participants with both ADHD and an anxiety disorder reported greater current impairment in comparison with participants with ADHD only or participants in the comparison group. This finding is consistent with past research demonstrating that children with ADHD plus another disorder exhibit more impairment than children with ADHD only (Booster, DuPaul, Eiraldi, & Power, 2012; Crawford, Kaplan, & Dewey, 2006). While this study does not establish a directional relationship between comorbidity and increased impairment, it does underscore the clinical importance of identifying and treating ADHD with co-occurring anxiety in college students.

Taken together, these findings suggest that college students with ADHD are at increased risk for anxiety, based on greater lifetime history of anxiety disorder, poorer self-efficacy, greater maladaptive beliefs about worry, and more obsessive-compulsive symptoms. The results of this study are generally consistent with past findings that college students with ADHD are at greater risk for anxiety symptoms and disorders compared with their peers (Anastopoulos et al., 2016; Prevatt et al., 2015; Richards et al., 1999; Weyandt et al., 2013). This study advances these previous findings by utilizing a rigorous diagnostic approach to ADHD, identifying the particular types of anxiety symptoms for which students with ADHD are at risk, and by examining for the first time rates of lifetime anxiety disorders in comparison with college students without ADHD. Finally, the results of this study highlight the significance of the problem of anxiety in college students with ADHD by showing that students with both ADHD and anxiety are also more impaired.

Limitations and Future Directions

Although promising, the results must be interpreted within the context of the cross-sectional design, sampling procedure and unique characteristics of the study sample, and the reliance on self-reporting of anxiety symptoms.

The cross-sectional design of the study is important for two reasons. First, the participants with ADHD in this study likely represented an especially resilient subpopulation of students with ADHD who not only entered college but remained enrolled in college. Thus, the findings of this study may therefore underestimate the degree to which anxiety is an important problem in college students with ADHD. Second, while the SCID-CV retrospectively assesses lifetime history of anxiety disorders, there are no known measures that allow for retrospective assessment of anxiety symptoms. Thus, only current anxiety symptoms could be assessed in this study. Future longitudinal research that examines comorbidity and other impairment in college

students with ADHD will be essential for addressing these limitations and beginning to establish directional relationships among ADHD, college entry, impairment, and anxiety.

Some characteristics of the sample may limit the generalizability of the findings. Because college students with ADHD are not thought to be representative of the general population of young adults with ADHD, these findings may be unique to college students with ADHD. The sample for this study was roughly two thirds female. While this ratio was representative of the undergraduate population of the university where recruitment took place, adult males with ADHD still tend to outnumber adult females with the disorder, and thus results should be replicated in samples containing more males. As women are more likely than men to meet diagnostic criteria for anxiety disorders such as GAD (Vesga-López et al., 2008), a replication of this study with a sample containing more males may find lower rates of anxiety disorders. Furthermore, because most participants for the ADHD group were recruited from an ADHD specialty clinic, many of these participants had been identified as having ADHD during childhood; this clinical attention in childhood may have increased these participants' likelihood of recalling a history of clinically significant anxiety on the SCID-CV interview.

This study relied on participant self-report of anxiety. While the clinical assessment of anxiety in adults typically relies on interviews and questionnaires as in this study, other techniques, such as the dot-probe paradigm, have been used in research to detect anxiety-related information processing biases and may be less sensitive to socially desirable responding or attempts to minimize symptoms (MacLeod, Mathews, & Tata, 1986).

Finally, it is acknowledged that the psychometric properties of the Semi-Structured ADHD Interview, which was used as part of the ADHD assessment battery, have not yet been fully established. To our knowledge, there is not an existing valid and reliable structured or semistructured interview for assessing ADHD in adults. The field would benefit from the development of a structured interview for use in the clinical and research assessment of ADHD in adults.

Clinical Implications

These findings underscore the likelihood that college students presenting for evaluation of ADHD may also present with clinically significant anxiety or factors that increase their vulnerability to anxiety such as poor self-efficacy or maladaptive beliefs about worry. It is imperative that clinicians conducting ADHD evaluations with high school and college students thoroughly assess for anxiety and self-efficacy concerns. As in the assessment of ADHD, the clinical assessment of anxiety should be comprehensive and thorough, and may include interviews and self-report behavior rating scales.

When college students with comorbid ADHD and anxiety are identified, clinicians should guide these students to evidence-based treatments. While no expert or consensus guidelines exist for the treatment of ADHD in college students, the results of several recent trials of cognitive-behavioral group-based treatments for college students with ADHD have been promising (Anastopoulos & King, 2015; Fleming, McMahon, Moran, Peterson, & Dreessen, 2015; LaCount, Hartung, Shelton, Clapp, & Clapp, 2015). It is possible that some elements of cognitive-behavioral therapy for ADHD, such as cognitive restructuring and behavioral management of avoidance, may target anxiety and self-efficacy concerns as well. In these trials, however, decreases in anxiety symptoms were either modest or nonsignificant. As development

of treatments for college students with ADHD continues, attention must be given to how to address students' symptoms of anxiety, either within the context of these interventions or through connections with other campus services that are equipped to provide adjunctive services for students with anxiety-related concerns.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research was supported by a UNCG Psychology Department dissertation research award to Sarah R. O'Rourke.

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