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Depression and Anxiety Among Transitioning Adolescents and College Students With ADHD, Dyslexia, or Comorbid ADHD/Dyslexia

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Abstract

Objective: To investigate depressive and anxious symptomatology among transitioning adolescents and college students with ADHD, dyslexia, or comorbid ADHD/dyslexia. **Method:** Transitioning adolescents and college students with these disorders along with a non-ADHD/dyslexia college sample completed self-report measures of depression and anxiety. **Results:** Results indicated no differences between the college-level groups, although a main effect for gender was found and trended toward females with dyslexia reporting more symptoms of depression and anxiety than did males with dyslexia. Internalizing symptomatology differences were not found for subtypes of ADHD. Transitioning high school students with ADHD, dyslexia, or ADHD/dyslexia reported fewer symptoms of anxiety and depression than did college underclassmen with these disorders. **Conclusion:** The unique characteristics and experiences of the college population of individuals with ADHD and/or dyslexia are discussed relative to the general adult population with these disorders. (*J. of Att. Dis.* 2012; 16(3) 244-254)

Keywords

ADHD, dyslexia, depression, anxiety, college

Today's college students report more mental health problems while pursuing their postsecondary education than students have reported in the past. Data from the most recent National Survey of Counseling Center Directors indicated that 95% of directors of college counseling centers perceived the number of students with mental health problems to have increased in recent years (Gallagher, 2009). Depression and anxiety are two commonly co-occurring mental health problems experienced by college students, and the rates at which students report these problems have increased drastically over the past decade. In a 13-year study (1988-2001) of presenting problems to a college counseling center, depression more than doubled to approximately 41% and anxiety increased from approximately 36% to 63% (Benton, Robertson, Tseng, Newton, & Benton, 2003). The latter was found to be the most frequent presenting concern of college students.

Academic difficulties and mental health problems in college appear to be related. College students who present with depressive symptoms to college counseling centers attribute their symptoms to academic difficulties more frequently than they do to any other reason (Furr, Westefeld, McConnell, & Jenkins, 2001). Likewise, college students who report contemplating suicide frequently report academic problems as having a large effect on their suicidal ideation (Drum,

Brownson, Denmark, & Smith, 2009). Associations between mental health problems and academic difficulties suggest that college students with learning difficulties may be at particular risk for developing problems with depression and anxiety. Students with learning disabilities (LD) and ADHD are the largest populations of students with disabilities at postsecondary institutions (Gregg, 2009). They are attending college in increasing numbers (DuPaul, Weyandt, O'Dell, & Varejao, 2009) and accessing college counseling centers at an increased rate (Gallagher, Sysko, & Zhang, 2001).

Most researchers who have investigated depression and anxiety among students with LD or ADHD have done so with child samples. Recent narrative reviews and meta-analyses have indicated that children with ADHD or LD experience more depressive and anxious symptomatology relative to the general child population (Daviss, 2008; Maag & Reid, 2006; Nelson & Harwood, 2010; Schatz & Rostain, 2006). Fewer studies have been conducted with adult samples,

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although findings from these studies are generally consistent with those from studies conducted with child samples (see, for example, Kessler et al., 2006). A paucity of research has been conducted with college student samples, despite the unique characteristics of this subpopulation of adults. College students with LD or ADHD may possess specific characteristics that differ from the general population of adults with LD or ADHD, limiting the generalizability of studies with samples from the latter group.

We located only three studies in which depressive and/or anxious symptomatology among college students with ADHD was examined relative to non-ADHD college students. Rabiner, Anastopoulos, Costello, Hoyle, and Swartzwelder (2008) and Blase et al. (2009) found that students who self-reported a previous diagnosis of ADHD reported more depressive symptoms than did non-ADHD students. In contrast, Heiligstein, Guenther, Levy, Savino, and Fulwiler (1999) failed to find differences in depressive and anxious symptomatology between college students with ADHD and non-ADHD college students.

A similarly small number of studies of depression and anxiety have been conducted with samples of college students with LD. Although Hoy et al. (1997) and Carroll and Iles (2006) found that college students with LD reported more symptoms of anxiety than did non-LD college students, Riddick, Sterling, Farmer, and Morgan (1999) failed to find such differences. More consistent results have been found for depressive symptomatology among college students with LD, although we located only two studies in which this group was compared to a non-LD control group. Both Hoy et al. (1997) and Mattek and Wierzbicki (1998) found that the two groups did not significantly differ on measures of self-reported depressive symptoms.

Mixed results of a small number of studies suggest the need for more research on depressive and anxious symptomatology among college students with LD and/or ADHD. Along with examining potential mean differences between these groups and non-LD/ADHD college students, the addition of several other important variables would likely enhance understanding of this topic. Two demographic variables that may be particularly useful for improving understanding in this area of inquiry include gender and level of educational attainment. Rates of depression and anxiety have been found to vary by gender in the general adult population, with most studies indicating that adult females experience more depression and anxiety than do adult males (Nolen-Hoeksema, 1990). Little is known about the impact of gender on the experience of depression and anxiety by college students with LD and/or ADHD. Regarding level of educational attainment, the experiences of students who are transitioning to college but have yet to attend college may be different from those who have just begun college, and both of these groups may differ from those who have successfully completed some college and

been promoted in educational status. Like the impact of gender, little is known about the impact of level of educational attainment on the depressive and anxious symptomatology of college students with LD and/or ADHD, particularly of those students who are transitioning to college.

Two additional variables of relevance to this area of inquiry include disability subtype and comorbidity. An argument within the literature has been made that individuals with ADHD who lack hyperactive symptoms are more likely to experience internalizing problems than are those with ADHD with such symptoms (Lahey & Carlson, 1991). This possibility of differences between ADHD subtypes has yet to be investigated with college samples. In addition, because the term *LD* refers to an array of learning disorders with varying degrees of impact on academic performance, examining specific subtypes of LD may result in an enhanced understanding of associations between internalizing symptomatology and these specific learning disorders. Of the LDs, dyslexia is the most common (Shaywitz, 2003) and perhaps has the most pervasive impact on academic achievement, given the high demand for reading across college-level subject areas. Along with the relevance of examining specific subtypes of ADHD and LD, taking into account comorbidity is important because of its frequent occurrence and its often more severe impact on functioning than that of sole disorders (Angold, Costello, & Erkanli, 1999). Dyslexia co-occurs in approximately 30% of individuals with ADHD (Mayes, Calhoun, & Crowell, 2000), and, therefore, it is important to understand whether those with both these disorders experience more symptoms of depression and anxiety than do those with only one of the disorders.

Because of the wide-ranging deleterious impact of depression and anxiety on significant life course outcomes, understanding these disorders among all population subgroups is important. Although space prevents a full discussion of the importance of understanding depression and anxiety among college students with ADHD and/or dyslexia in particular, we will focus on two noteworthy issues. First, both depression and anxiety are associated with increased risk for suicide, the third leading cause of death among college-aged individuals (Garlow et al., 2008; Kisch, Leino, & Silverman, 2005). Some research has indicated that individuals with LD (McBride & Siegel, 1997) and individuals with ADHD (James, Lai, & Dahl, 2004) may be at greater risk for suicide than are their non-LD/ADHD peers. Second, both depression and anxiety disrupt the information processing system, which undoubtedly epiphenomenally encumbers academic achievement. High levels of anxiety disrupt working memory, resulting in inefficient information processing (Eysenck, Derakshan, Santos, & Calvo, 2007). Depression slows speed of information processing (Calhoun & Mayes, 2006) and decreases memory recall and recognition (Burt, Zembar, & Niederehe, 1995). Difficulties resulting from depression and anxiety in

addition to preexisting information processing weaknesses associated with ADHD (Frazier, Demaree, & Youngstrom, 2004) and LD (Swanson & Siegel, 2001) may be particularly detrimental to the academic performance of college students with these disorders.

Purpose of Study and Research Questions

The purpose of this study was to investigate symptoms of depression and anxiety among transitioning adolescents and college students formally diagnosed with ADHD, dyslexia, or comorbid ADHD/dyslexia. We sought to aid in clarifying the extant mixed results on potential differences in depressive and anxious symptomatology among students with these disorders and those without them. Furthermore, we aimed to explore areas that have yet to be investigated in the literature on college ADHD and dyslexia, including the roles of comorbidity, gender, ADHD subtyping, and level of educational attainment. To address our purpose, we sought to answer the following four research questions:

Research Question 1: Do college students with ADHD, dyslexia, and comorbid ADHD/dyslexia, and students who do not have ADHD or dyslexia differ on self-reports of depressive and anxious symptomatology?

Research Question 2: Do symptoms vary based on gender across the groups?

Research Question 3: Do college students with predominantly inattentive type ADHD and those with combined type ADHD differ on self-reported symptoms of depression and anxiety?

Research Question 4: Do transitioning high school students with ADHD and/or dyslexia and college students with these disorders differ on self-reported symptoms of depression and anxiety?

Method

Participants

Three clinical groups and one nonclinical group participated in the study. The three clinical groups included individuals diagnosed with ADHD, dyslexia, or comorbid ADHD/dyslexia. For the analyses comparing college students with these disorders to a college control group without these disorders, the sample sizes were as follows: $n = 60$ for the dyslexia group, $n = 60$ for the ADHD group, $n = 30$ for the ADHD/dyslexia group, and $n = 60$ for the non-ADHD/dyslexia control group. The groups were matched for gender; an equal number of male and female participants made up each group. For the analyses comparing college students with dyslexia and/or ADHD to transitioning adolescents with these disorders, the

above-mentioned college participants with disabilities made up one group with a sample size of 150 and the transitioning adolescent group consisted of 44 participants ($n = 22$ male; $n = 22$ female). Of the transitioning adolescent participants, 22 were participants with dyslexia, 14 were participants with ADHD, and 8 were participants with ADHD/dyslexia.

All participants from the clinical groups were assessed at the University of Georgia Regents' Center for Learning Disorders (UGA RCLD) over the time period of 2005 to 2009. All possible individuals assessed over this time period who met criteria for participation in the study were included until the desired sample size was met. College-student participants were attending and transitioning students were preparing to attend one of several mid- to large-sized 4-year colleges and universities in the southeastern United States. Transitioning students were high school seniors or recent high school graduates who had applied and/or been accepted to a 4-year college or university.

All individuals in the clinical and nonclinical groups were 24 years or younger (age range = 17 to 24 years). Participants in the clinical groups had full-scale IQ scores in the average range or above (i.e., greater than or equal to a standard score of 90; see Table 1 for mean IQ scores for the groups). Individuals with mood and anxiety disorders were permitted to participate; however, those with other psychological disorders were excluded from the study. Of the 150 college students from the clinical groups, 14 were diagnosed with anxiety and/or mood disorders ($n = 9$ for anxiety disorders, $n = 4$ for mood disorders, $n = 1$ for comorbid anxiety/mood disorder). One participant from the transitioning adolescent group was diagnosed with an anxiety disorder.

All participants in the clinical groups were diagnosed through use of a comprehensive psychological evaluation. The completion time for the evaluations was, on average, approximately 10 hr over the course of 2 days. All evaluations were either conducted by a licensed doctoral-level psychologist or a master's-level clinician under the supervision and with participation of a licensed doctoral-level psychologist. Evaluations included a clinical interview, behavioral observations, and administration of measures of general cognitive ability, specific cognitive abilities (e.g., working memory), specific linguistic abilities (e.g., phonological awareness), academic achievement, and social-emotional and behavioral functioning. Although all evaluations included assessments of all of these areas, they were tailored to meet the presenting concerns of each participant. That is, clinicians selected the specific instruments used to assess these areas and determined the specific skills or abilities to be assessed within each general area based on referral concerns. Interviews were developed by the clinical staff. Although the clinical interviews consisted of similar content across psychologists, the manner in which they were delivered along with the specific nature of the questions varied based

Table 1. Descriptive Characteristics of Disability Groups

	Dyslexia	ADHD	Dyslexia/ ADHD
Age			
Transitioning	17.95 (0.62)	17.20 (0.79)	17.83 (0.75)
College	19.95 (1.5)	19.72 (1.46)	19.87 (1.50)
Total	19.39 (1.62)	19.24 (1.67)	19.45 (1.59)
Full-scale IQ			
Transitioning	103.53 (6.85)	111.50 (9.24)	97.33 (6.68)
College	102.73 (6.98)	106.78 (8.38)	103.33 (8.32)
Total	102.77 (7.04)	107.70 (8.45)	102.66 (8.19)
Verbal IQ			
Transitioning	101.32 (8.55)	109.50 (9.79)	97.67 (10.50)
College	100.27 (8.21)	105.97 (8.56)	100.63 (8.68)
Total	100.51 (8.26)	106.81 (8.88)	100.18 (8.70)
Nonverbal IQ			
Transitioning	106.53 (7.91)	112.40 (7.92)	98.83 (8.57)
College	106.05 (7.84)	107.02 (10.21)	107.00 (9.80)
Total	105.87 (7.96)	107.88 (9.81)	106.18 (9.99)
Letter-word identification			
Transitioning	80.37 (10.51)	102.30 (6.55)	85.33 (9.79)
College	84.32 (9.32)	100.13 (8.66)	86.40 (6.82)
Total	83.78 (9.88)	100.68 (8.39)	86.45 (7.11)
Word attack			
Transitioning	74.68 (10.07)	98.00 (7.51)	75.00 (7.24)
College	78.08 (10.66)	98.45 (10.46)	81.37 (8.27)
Total	77.18 (10.52)	98.34 (9.90)	80.63 (8.30)
Reading fluency			
Transitioning	83.16 (10.62)	92.90 (12.00)	80.17 (8.54)
College	85.00 (9.66)	97.02 (13.19)	84.63 (9.78)
Total	84.62 (9.78)	97.27 (13.78)	83.45 (9.55)

on the approach of each psychologist. Clinicians used data obtained during the comprehensive evaluation to judge whether established diagnostic criteria (discussed below) were met. This comprehensive approach permitted the identification of comorbid disorders and the exclusion of individuals with comorbid conditions other than depressive or anxiety disorders.

Participants with dyslexia. All participants diagnosed with dyslexia met the diagnostic criteria established by the University Systems of Georgia (USG) for determining LD (see <http://rcld.uga.edu> for a detailed description of these criteria). From the pool of individuals diagnosed with LD, we further refined the sample by selecting only those with dyslexia (and not other LD subtypes). Consistent with the International Dyslexia Association's definition of dyslexia (Lyon, Shaywitz, & Shaywitz, 2003), we defined dyslexia as significant difficulties with accurate and/or fluent word recognition, decoding, and spelling. Participants diagnosed with dyslexia were required to perform below the 25th percentile on two measures of real-word reading, nonsense-word reading, or reading fluency,

or on one of these measures and one measure of real-word spelling or nonsense-word spelling. These measures included the letter-word identification, word attack, reading fluency, spelling, and spelling of sounds subtests of the Woodcock–Johnson III tests of achievement (Woodcock, McGrew, & Mather, 2001). The 25th percentile has been proposed as a cutoff for diagnosing dyslexia (Dykman & Ackerman, 1992; Siegel, 1999). In addition, documentation of poor performance on at least two measures has been proposed as a way to increase the validity of LD diagnoses (Brueggemann, Kamphaus, & Dombrowski, 2008).

Participants with ADHD. All participants with ADHD met both the USG and the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev.; *DSM-IV-TR*; American Psychiatric Association, 2000) diagnostic criteria for attention disorders. During the ADHD section of the clinical interviews, participants were asked about their experience of *DSM-IV-TR* ADHD symptoms. In addition, other areas (e.g., developmental history of symptoms, generalization of symptoms across settings, and functional impairment) necessary to meet *DSM-IV-TR* criteria for ADHD were investigated during the clinical interview. Consistent with the criteria of the *DSM-IV-TR*, participants with ADHD were required to report or have a caretaker report that symptoms were present during childhood and that symptoms were and continued to be experienced across at least two settings. An additional criterion of the USG not included in the *DSM-IV-TR* but required of our participants was corroboration of self-reported current symptoms by an outside observer, usually a parent. To aid in determining the severity of symptoms, norm-referenced ADHD self-report (e.g., Conners' Adult ADHD Ratings Scales [CAARS] self-report [Conners, Erhardt, & Sparrow, 1999b] and College ADHD Response Evaluation [CARE] Student Response Inventory [Glutting, Sheslow, & Adams, 2002b]) and observer-report (e.g., CAARS observer-report [Conners, Erhardt, & Sparrow, 1999a] and CARE Parent Response Inventory [Glutting, Sheslow, & Adams, 2002a]) rating scales were used. The specific scales used for each participant were based on the preference of the psychologist. Specific cutoff scores on the rating scales were not used to make diagnoses; rather, each psychologist utilized clinical judgment in weighing the data from each method of assessment and each informant to determine whether *DSM-IV-TR* and USG criteria were met. Of those diagnosed with ADHD, only participants meeting the *DSM-IV-TR* criteria for predominantly inattentive type ADHD ($n = 30$) or combined type ADHD ($n = 30$) were included in the study.

Participants with comorbid ADHD/dyslexia. This group consisted of participants who met the criteria for both dyslexia and ADHD as discussed above.

Participants without ADHD and dyslexia. The nonclinical group included undergraduate students enrolled at a large state university. They were enrolled in sections of an introductory

psychology course in which participation in research experiments allowed them to meet one of the course requirements. All participants from this group completed a demographic questionnaire in which they denied current and past diagnoses of dyslexia and ADHD.

Instruments

Depressive symptomatology was assessed with the 21-item Beck Depression Inventory–Second Edition (BDI-II) self-report rating scale (Beck, Steer, & Brown, 1996). The test authors reported a coefficient alpha of .92 for samples of outpatients and college students. In addition, a test–retest correlation of .93 was found for an outpatient sample over a 1-week interval. Evidence supportive of test validity included a correlation of .93 with the first edition of the instrument and correlations of .68 and .71 with the Beck Hopelessness Scale (Beck & Steer, 1988) and the Hamilton Psychiatric Rating Scale for Depression (Hamilton, 1960), respectively.

Symptoms of anxiety were assessed with the 21-item Beck Anxiety Inventory (BAI; Beck & Steer, 1993). Evidence supportive of reliability reported in the test manual included coefficient alphas greater than .90 for samples of individuals diagnosed with panic disorder, social phobia, and obsessive-compulsive disorder; the test authors found a coefficient alpha of .85 for a sample of individuals diagnosed with generalized anxiety disorder. A test–retest correlation of .75 was found for an outpatient sample over a 1-week interval. Validity evidence included correlations of .51 with the Hamilton Anxiety Rating Scale–Revised (Hamilton, 1959) and .58 and .47 with the Trait and State subscales, respectively, of the State-Trait Anxiety Inventory (Spielberger, 1983).

Procedures

The clinical groups were administered the BDI-II and BAI as part of a comprehensive psychological evaluation at the UGA RCLD. These instruments were used to screen for potential emotional problems for *all* individuals seeking evaluations at the UGA RCLD; therefore, participants from the clinical groups were not selectively screened for depression and anxiety, preventing the possibility of selection bias. Participants from the nonclinical group were administered the instruments in a group setting during the 2007–2008 school year. All participants gave informed consent to participate in the study.

Preliminary Analyses Comparing Groups on Demographic and Diagnostic Variables

Comparison between college clinical and nonclinical groups. The college groups did not differ in age, $F(3, 206) = 0.85$, $p = .47$. Table 1 displays the mean ages for the clinical groups. The mean age (standard deviation) for the nonclinical group

was 19.57 (1.10). Furthermore, chi-square analysis indicated that the groups did not differ in level of educational attainment (i.e., freshman, sophomore, junior, senior), $\chi^2(9) = 1.54$, $p = .99$. Both the clinical and nonclinical groups consisted mainly of underclassmen (i.e., freshmen and sophomores). Of the participants in the clinical and nonclinical groups, 74% and 75%, respectively, were underclassmen. Results indicated no significant ethnicity differences between the groups, $\chi^2(12) = 13.85$, $p = .31$. Breakdowns for ethnicity included 90.59% White, 5.98% African American, 1.71% Hispanic, 0.09% Asian American, and 0.09% Other for the clinical college groups, and 88.33% White, 6.66% African American, 1.66% Hispanic, 1.66% Asian American, and 1.66% Other for the nonclinical college group.

Comparisons between clinical groups. MANOVA with full-scale IQ, verbal IQ, nonverbal IQ, letter-word identification, word Attack, and reading fluency scores as dependent variables was conducted (see Table 1 for mean scores by group for each of these variables). Main effects of disability status were tested using the multivariate criterion of Wilks's lambda (Λ). Statistically significant differences were found between the groups, Wilks's $\Lambda = .44$, $F(12, 372) = 15.79$, $p < .01$, $\eta^2 = .34$. Follow-up ANOVAs were conducted in which alpha was set at .008 (.05/6) by using the Bonferroni method to control for the increased chance of Type I error resulting from multiple comparisons. These analyses indicated differences between the groups on full-scale IQ, verbal IQ, and all reading skills assessed. As expected, Tukey's honestly significant difference (HSD) post hoc tests indicated that the dyslexia and ADHD/dyslexia groups had significantly lower reading skills than did the ADHD group. The groups did not differ in nonverbal intellectual ability, but the ADHD group possessed significantly higher verbal IQs and full-scale IQs than did the dyslexia and ADHD/dyslexia groups. These differences are not surprising given the impact of reading on vocabulary and other verbal intellectual abilities (Stanovich, 1986).

Comparisons of the transitioning adolescent participants with disabilities and the college participants with disabilities indicated no differences between these groups on the IQ and reading variables (see Table 1 for mean scores by group for these variables), Wilks's $\Lambda = .97$, $F(6, 187) = 1.11$, $p = .36$, $\eta^2 = .03$. Likewise, the groups did not significantly differ on the ethnicity variable, $\chi^2(4) = 1.24$, $p = .87$. Predictably, the transitioning adolescent participants were significantly younger than the college student participants, $t(192) = 9.45$, $p < .01$.

Results

Comparison of College Clinical and Nonclinical Groups

A 4×2 MANOVA was conducted to evaluate the effect of disability status and gender on self-reported symptoms of

Table 2. Means and Standard Deviations by Group

Group	BDI-II	BAI
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)
Dyslexia		
Male (<i>n</i> = 30)	5.87 (7.70)	5.37 (6.67)
Female (<i>n</i> = 30)	10.30 (10.04)	10.30 (9.16)
Total (<i>N</i> = 60)	8.08 (9.15)	7.83 (8.32)
ADHD		
Male (<i>n</i> = 30)	10.33 (8.98)	8.93 (7.23)
Female (<i>n</i> = 30)	9.47 (7.07)	10.40 (8.14)
Total (<i>N</i> = 60)	9.90 (8.02)	9.67 (7.66)
ADHD/dyslexia		
Male (<i>n</i> = 15)	7.40 (6.45)	6.27 (6.55)
Female (<i>n</i> = 15)	9.20 (6.53)	9.20 (6.09)
Total (<i>N</i> = 30)	8.30 (6.44)	7.73 (6.39)
No dyslexia or ADHD		
Male (<i>n</i> = 30)	9.43 (7.65)	5.67 (4.48)
Female (<i>n</i> = 30)	8.27 (5.89)	8.37 (6.03)
Total (<i>N</i> = 60)	8.85 (6.79)	7.02 (5.44)

Note: BAI = Beck Anxiety Inventory; BDI-II = Beck Depression Inventory—Second Edition.

depression and anxiety. The independent variables were disability status with four levels (dyslexia, ADHD, ADHD/dyslexia, and no disabilities) and gender with two levels (male and female). The dependent variables were total scores on the BDI-II and BAI. The interaction effect was nonsignificant, Wilks's $\Lambda = .97$, $F(6, 402) = 0.93$, $p = .47$, $\eta^2 = .01$. The main effect for disability status was also nonsignificant, Wilks's $\Lambda = .96$, $F(6, 402) = 1.08$, $p = .38$, $\eta^2 = .02$. The main effect for gender was statistically significant, Wilks's $\Lambda = .95$, $F(2, 201) = 5.01$, $p = .008$, $\eta^2 = .05$. Table 2 displays the mean BDI-II and BAI raw scores by disability group as well as by gender within each of these groups.

ANOVAs on each dependent variable with gender as the independent variable were conducted. Each ANOVA was tested at the .025 level (.05/2) to control for the increased chance of Type I error resulting from multiple comparisons. The ANOVA on the BAI scores was significant, $F(1, 202) = 8.66$, $p = .004$, $\eta^2 = .04$, whereas the ANOVA on BDI scores was nonsignificant, $F(1, 202) = 0.99$, $p = .32$, $\eta^2 = .01$. Independent samples *t* tests were conducted to further test the impact of gender on the BAI and BDI-II scores of each of the four disability status groups. These were tested at the .006 (.05/8) level to correct inflated Type I error rate. All of these tests were nonsignificant. The trend was in the direction of higher scores on the BAI for females with dyslexia compared to males with dyslexia, $t(58) = 2.23$, $p = .02$, $d = .62$, and a similar trend was found within the nonclinical group, $t(58) = 1.97$, $p = .05$, $d = .51$. In addition, the trend was in the direction of higher scores on the BDI-II for females with dyslexia in comparison to males with dyslexia, $t(58) = 1.92$, $p = .06$, $d = .50$.

Comparison of ADHD Subtypes

A one-way MANOVA was conducted to determine the effect of ADHD subtype (predominantly inattentive type vs. combined type) on total BDI-II and BAI scores. The MANOVA was nonsignificant, Wilks's $\Lambda = .99$, $F(2, 57) = .18$, $p = .84$, $\eta^2 = .01$. The mean scores of the predominantly inattentive type group (BDI-II = 10.37 [8.31]; BAI = 9.93 [8.19]) did not differ from those of the combined type group (BDI-II = 9.17 [7.49]; BAI = 9.50 [7.36]).

Comparison of Transitioning Adolescents and College Students With Disabilities

A $3 \times 3 \times 2$ MANOVA was conducted to determine the effect of level of educational attainment (transitioning adolescents and college underclassmen—that is, freshmen and sophomores—and college upperclassmen—that is, juniors and seniors), disability status (dyslexia, ADHD, and ADHD/dyslexia), and gender on BDI-II and BAI scores. The four interaction effects were nonsignificant. Main effects were nonsignificant for disability status, Wilks's $\Lambda = .98$, $F(4, 350) = 0.86$, $p = .49$, $\eta^2 = .01$, and gender, Wilks's $\Lambda = .98$, $F(2, 175) = 1.84$, $p = .16$, $\eta^2 = .02$. The main effect for level of educational attainment was statistically significant, Wilks's $\Lambda = .93$, $F(4, 350) = 3.16$, $p = .01$, $\eta^2 = .04$.

ANOVAs with level of educational attainment as the independent variables and total BDI-II and BAI scores as the dependent variables were conducted as follow-up tests to the MANOVA. These were tested at the .008 level (.05/6). The ANOVAs on both the BDI-II, $F(2, 176) = 5.41$, $p = .01$, $\eta^2 = .06$, and BAI, $F(2, 176) = 4.33$, $p = .02$, $\eta^2 = .05$, scores approached statistical significance. Tukey's HSD post hoc tests indicated college underclassmen with disabilities had higher BAI ($M = 9.10$, $SD = 8.37$) and BDI-II scores ($M = 9.30$, $SD = 8.92$) than did transitioning adolescents with disabilities (BAI: $M = 5.18$, $SD = 6.18$; BDI-II: $M = 4.50$, $SD = 5.40$). The effect sizes for these group differences on the BAI ($d = .50$) and BDI-II ($d = .59$) were medium in magnitude.

Discussion

Examination of our primary research question indicated that college students with ADHD, dyslexia, or ADHD/dyslexia did not significantly differ on self-reported symptoms of depression and anxiety when these groups were compared to each other and when compared to a group of college students without ADHD or dyslexia. Our results contrast with those from studies of the general adult population, particularly of the general adult population with ADHD. Results from the largest epidemiological study of adult ADHD to date, the National Comorbidity Survey Replication, indicated that the 12-month prevalence of mood and anxiety disorders was 38.3% and 47.1%, respectively, for adults with ADHD,

whereas the rates of mood and anxiety disorders for non-ADHD adults were 11.1% and 19.5%, respectively (Kessler et al., 2006). Other studies of adults with ADHD have resulted in similar findings (e.g., Biederman, Faraone, Monuteaux, Bober, & Cadogen, 2004). Methodological differences between these studies and our study prevent direct comparison of results; however, the difference in findings may suggest that college students with ADHD and/or dyslexia are a unique subpopulation within the larger population of adults with these disorders. It has been suggested that college students with ADHD possess better coping skills and higher cognitive abilities than does the general population of adults with ADHD (Glutting, Youngstrom, & Watkins, 2005). They likely have experienced more academic success than have those adults with ADHD who do not attend college, and their pursuit of postsecondary education may suggest a belief in their abilities to overcome obstacles resulting from their disorder and a high degree of resiliency. In addition, college students with ADHD and/or dyslexia may have less severe forms of the disorders than do those with these disorders who do not attend college.

Our findings are different from Rabiner et al.'s (2008) and Blase et al.'s (2009) findings that college students with ADHD reported more depressive symptoms than did non-ADHD college students. A difference between these studies that may have contributed to the mixed results is the use of self-reported ADHD in the latter two studies and diagnoses of ADHD determined by clinical evaluation in this study. Both research groups using the self-report diagnostic methodology acknowledged the shortcomings of this approach and called for future research in which ADHD diagnoses are confirmed with clinical evaluations. Our results are consistent with Heiligstein et al.'s (1999) findings. These researchers used clinical evaluations to diagnose ADHD and found no significant differences in depressive or anxious symptomatology between this group and a non-ADHD college sample. Clinical evaluation aids in ensuring better differential diagnosis than does reliance on a self-report methodology. Because ADHD shares symptoms with other disorders (e.g., depression), a comprehensive clinical evaluation is often necessary to understand presenting symptomatology and to rule out other possible explanations for ADHD-like symptoms. It is possible that increased internalizing symptomatology reported by college students with self-reported ADHD may be partially attributable to other disorders with similar symptoms as ADHD.

Gender Differences

Although our results indicated a main effect for gender, follow-up analyses indicated no gender differences in self-reported symptoms of anxiety and depression for college students with ADHD, a finding that is consistent with the results of Biederman et al.'s (2004) investigation of anxiety and depression among adults with ADHD. Follow-up analyses indicated a gender difference approaching statistical significance in

symptoms of anxiety and depression for college students with dyslexia in the direction of females with dyslexia reporting more of these symptoms than did males with dyslexia. The magnitude of the effect sizes representing these differences was medium. Hoy et al.'s (1997) findings were partially consistent with ours in that they found that female college students with LD reported more symptoms of anxiety than did male college students with LD; however, no such gender differences were found for symptoms of depression.

Comparison of ADHD Subtypes

Research on attention disorders several decades ago indicated the possibility of two distinct subtypes of attention deficit disorder, referred to as attention deficit disorder with hyperactivity (ADD/H) and attention deficit disorder without hyperactivity (ADD/WO). Results of this research indicated not only different symptom structures for these subgroups but also different behavioral and emotional correlates. Those with ADD/H were found to demonstrate more behavioral conduct problems than were individuals with ADD/WO, whereas the ADD/WO subgroup was found to more likely experience symptoms of anxiety and depression than was the ADD/H subgroup (see Lahey & Carlson, 1991, for a review of this literature).

More recent research findings have been contrastive. Several researchers have either failed to find differences in internalizing symptoms among these subtypes or found a trend for those with hyperactive-impulsive symptoms in addition to inattentive symptoms to experience more internalizing symptoms than do those with predominantly inattentive symptoms (Crystal, Ostrander, Chen, & August, 2001; Faraone, Biederman, Weber, & Russell, 1998; Power, Costigan, Eiraldi, & Leff, 2004). Our findings of no differences in symptoms of depression and anxiety between subtypes of ADHD are consistent with the results of these studies but unique in that they are derived from a college sample, whereas extant findings were derived from school-aged samples.

The Impact of Comorbidity of ADHD and Dyslexia

Our findings on the impact of comorbidity are generally consistent with McGillivray and Baker's (2009) findings that adults with comorbid ADHD/LD did not experience more overall symptoms of anxiety and depression than did those with ADHD alone. We replicated these findings and also found that college students with comorbid ADHD/dyslexia did not report more symptoms of anxiety or depression than did college students with dyslexia alone and those without these disorders. Both sets of results are also consistent with Livingston, Dykman, and Ackerman's (1990) findings that school-aged students with comorbid ADHD/dyslexia were no more likely to meet criteria for mood or anxiety disorders than were those with ADHD alone. Therefore, although the assumption that those with comorbid

ADHD/dyslexia experience more internalizing symptomatology than do those with either disorder alone is intuitively appealing, results from several studies incorporating both school-aged and adult samples have indicated otherwise.

Differences Between Transitioning High School and College Students

Our cross-sectional comparison of transitioning high school students with dyslexia and/or ADHD to college students with these disorders indicates that college underclassmen reported more symptoms of depression and anxiety than did transitioning high school students. College upperclassmen with dyslexia and/or ADHD did not report more of these symptoms than did college underclassmen or transitioning high school students with these disorders. Because a non-ADHD/dyslexia transitioning high school sample was not included in this study, we were unable to determine whether this pattern was different from that occurring in the typical population of students. Cross-sectional studies in which community samples were investigated, however, have resulted in different findings. For example, Gladstone and Koenig (1994) found that depressive symptomatology *decreased* for females and remained stable for males over the high school to college transition.

The transition from high school to college typically brings about several life changes for all students. For most students, this transition includes physical separation from established social support networks and the demand to develop new social relationships. Furthermore, relative to the typical high school setting, most college settings include less direct contact with teachers, larger class sizes, more long-range projects, and less frequent evaluative feedback (Janiga & Costenbader, 2002). These academic changes may be particularly stark for students with learning and/or attention disorders because they, via individualized education planning in high school, likely receive more direct contact with teachers and more frequent evaluative feedback than does the typical high school student. Because students with learning and/or attention disorders often need increased support and structure in high school to be successful, they may have less developed skills associated with personal responsibility than do their typical classmates when they enter college (Parker & Benedict, 2002). Unfortunately, the transition services received by high school students with learning and/or attention disorders are often inadequate in preparing them to meet the demands for increased personal responsibility and self-advocacy of the postsecondary environment (Gregg, 2009; Janiga & Costenbader, 2002). Our results, therefore, may reflect increases in symptoms of anxiety and depression over the high school to college transition for students with ADHD and/or dyslexia as a result of the changes associated with this transition along with potentially poor preparedness for coping with these changes. These results should be interpreted cautiously, however, because of the

limitations of the study's design. Future research in which the same samples of students with ADHD and/or dyslexia and those without these disorders are investigated longitudinally over the high school to college transition would aid in understanding trajectories of internalizing symptomatology of these groups and would permit much stronger inferences than is permitted by the design of the current study.

Limitations

Our results should be interpreted in light of the following limitations. Two limitations associated with the use of self-report rating scales are important to highlight. First, results of this study were derived solely from self-reports rather than via a more thorough multi-informant assessment approach. Obtaining ratings of internalizing symptoms from other informants (e.g., parents or peers) would have resulted in a more complete clinical picture. Symptomatology often varies by informant source (Achenbach, McConaughy, & Howell, 1987), and, therefore, the amount of internalizing symptomatology experienced by our participants may have differed had we included the viewpoints of others. Second, participants were asked to report their symptoms of anxiety and depression over a brief period of time (i.e., over the past week on the BAI and over the past 2 weeks on the BDI-II), permitting only snapshots of their symptomatology. Assessment of symptoms over a longer period of time may have produced different results and would have controlled for the possibility of transient experience of symptoms.

Issues related to sample size and multiple statistical comparisons should be kept in mind when interpreting our results. The relatively small size of the participant groups limited the statistical power to detect group differences. The need to set a more conservative alpha level to reduce the possibility of Type I error associated with multiple statistical comparisons further reduced the statistical power to detect group differences.

In addition, although participants in the clinical groups participated in comprehensive psychological evaluations, two shortcomings of the evaluation approach should be underscored. First, clinical interviews with established psychometric properties were not used, which may leave questions about the veracity of diagnoses. Because a multimethod assessment approach was used, however, this threat to diagnostic veracity may have been attenuated. Nonetheless, inclusion of an empirically validated structured or semistructured interview would have further minimized questions related to diagnostic veracity. Second, interrater reliability procedures for diagnoses were not incorporated in the present study. This too would have aided in assuring the veracity of diagnoses.

The generalizability of our findings is limited by our inclusion of select groups of participants. The clinical samples consisted of individuals who sought a comprehensive

psychological evaluation, often to determine their eligibility for postsecondary academic accommodations. These individuals may differ from college students with dyslexia and/or ADHD who do not seek psychological evaluations or eligibility for postsecondary academic accommodations. In addition, participants were drawn from only one geographic location of the country. Some caution should be heeded when generalizing these results to individuals from other areas of the country. Furthermore, our findings are unlikely generalizable to adults with dyslexia and/or ADHD who do not attend college. Students with dyslexia and/or ADHD represent a select group of individuals who have beaten the odds by attending college; they, therefore, may possess characteristics that make them less prone to internalizing psychopathology than are their counterparts who do not attend college.

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