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REVIEW

What Do We Really Know about ADHD in College Students?

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Abstract Research on ADHD in college students began in the 1990s and has been steadily increasing in recent years. Because young adults with ADHD who attend college have experienced greater academic success during high school than many peers with the disorder, which is likely to be associated with better overall functioning, the degree to which they experience similar patterns of adjustment difficulties was not initially known. Accumulating research suggests that college students with ADHD experience less academic success and greater psychological and emotional difficulties than other students and use alcohol and drugs at higher rates. However, conclusions to be drawn from this research are limited by the use of small samples that may not be representative of the wider population of students with ADHD, and a lack of diagnostic rigor in identifying students with ADHD to be included in such research. Studies of the effectiveness of psychosocial treatments, medication treatment, and academic accommodations are extremely limited or nonexistent. Issues particularly germane to college students include feigning ADHD and the misuse and diversion of stimulant medication. Given that at least 25 % of college students with disabilities are diagnosed with ADHD, methodologically sound investigations are clearly needed in order to better understand the impact of ADHD on college students' adjustment and to develop and implement interventions that can enhance students' success.

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Introduction

Prior to the 1970s, attention deficit hyperactivity disorder (ADHD) was widely viewed as a condition that children outgrew as they matured [1]. By the mid- to late-1990s, however, results from several longitudinal studies indicated that for roughly one half to two thirds of children with ADHD, symptoms persist into adolescence and adulthood [1]. Even though students with ADHD are less likely than their peers to graduate from high school and attend college, it is estimated that approximately 25 % of college students receiving disabilities services are diagnosed with ADHD, and this percentage is on the rise [2]. Thus, it is important to understand how ADHD impacts the adjustment to college and how to promote positive college outcomes for these students.

Because the adverse impact of ADHD on the adjustment of adults is well-documented [3], it seems likely that these college students with ADHD would also struggle in multiple areas relative to their peers. This is especially true given that success in college requires strong time management and organization skills, which are areas that students with ADHD are likely to struggle in, and parental support for meeting these challenges is likely to be less available than it was during earlier education [4]. However, students with ADHD who have experienced sufficient academic success to attend college may be better adjusted then the general population of young adults with ADHD, and therefore may not show the same pattern of difficulties.

Below, we selectively review current research addressing a number of issues pertaining to ADHD in college students: the prevalence in college populations, diagnostic considerations with students, the association between ADHD and multiple domains of college adjustment, and treatment services for students. To identify articles related to college students with ADHD, we supplemented articles included in a recent comprehensive review [2] by searching the PsychINFO and PubMed databases using the following search terms: attention deficit hyperactivity disorder + college, ADHD + college, attention deficit disorder + college, and ADD + college. Studies that examine associations between ADHD symptoms as continuous measures and the college adjustment of students are not covered. Instead, our review focuses on studies in which the students have been defined as having ADHD. Described as follows, however, the procedures used to identify such students are often problematic. Directions for future research are highlighted throughout.

Prevalence of ADHD in College Students

It has been estimated that between 2 and 8 % of college students in the United States (U.S.) have ADHD [2]. However, these estimates are largely based on studies [5–8] that obtained self-reported symptoms or diagnostic status from a convenience samples of students at individual campuses, and not on comprehensive evaluations conducted with nationally representative samples. The first study of this type was conducted by Weyandt et al. [5] who administered two self-report measures of ADHD symptoms to 770 college students at a single university. There were 7 to 8 % of students who reported ADHD symptoms that were 1.5 standard deviations greater than the sample mean, and 2.5 % reported elevated symptoms on both scales [5]. In the largest study of this type, DuPaul et al. [6] administered their Young Adult Rating Scale to 1,209 college students from the U.S., Italy, and New Zealand and found that 2.9 to 8.1 % of male students and 0 to 3.9 % of female students met the Diagnostic and Statistical Manual of Mental Disorders (DSM), Fourth Edition, Text Revision (IV-TR) [9] symptomatic criteria for ADHD. Finally, McKee [7] administered the College ADHD Response Evaluation (CARE) [10], which includes the 18 DSM-IV-TR symptoms of ADHD, to more than a 1000 students from 3 entering classes at a single school. Approximately 7.5 % of students reported at least 6 inattentive and/or hyperactive-impulsive symptoms, thus meeting symptomatic criteria for ADHD [7]. However, none of these studies assessed the additional criteria (e.g., age of onset or the presence of clinically significant impairment) required for an ADHD diagnosis, and therefore true prevalence estimates were not obtained.

Rather than obtaining ADHD symptom ratings to estimate the prevalence of ADHD in college student populations, other researchers have simply asked students whether they have a current ADHD diagnosis. In a study of nearly 3400 undergraduates from 2 universities in the southeastern U.S., 4.5 % reported a current ADHD diagnosis [10]. Rates at each university (1 public and 1 private) were 6.6 % and 2.5 %, respectively, a significant difference. Whether these students would have met diagnostic criteria for ADHD if subjected to a full clinical evaluation is unknown. This result does suggest, however, that the prevalence of ADHD on a different campus is likely to vary considerably, perhaps in relation to particular campus characteristics (e.g., competitiveness of admission) but the data required to examine such issues are not available. In addition, according to the "American Freshman: National Norms 2010," a survey of 201,818 first-time, full-time, first-year college students attending 279 full-time colleges and universities in the U.S., 5.0 % of students (6.4 % of men and 3.8 % of women) entering college in 2010 reported having a diagnosis of ADHD [11]. Participating students were selected to be representative of the 1.5 million students who entered such colleges in 2010 [11]. Rates of self-reported diagnosis appeared lower in historically black colleges and universities compared to the entire sample (i.e., 3.8 % *vs* 5.0 %) [11].

It should be emphasized that the methods used to estimate ADHD prevalence in college populations differ substantially from the guidelines suggested by McGough and Barkley [12] for diagnosing ADHD in young adults. These authors suggest that clinicians confirm that at least 4 inattentive and/or hyperactive impulsive symptoms are present and contribute to current impairment [12]. ADHD symptoms should have been evident prior to 12 years of age and contributed to impairment in multiple domains across the lifespan of these students [12]. Furthermore, clinicians should seek third party corroboration of symptoms and impairment and confirm that impairment is best accounted for ADHD rather than another disorder [12]. Such careful diagnostics have rarely been followed in studies of ADHD in college students.

Diagnostic Issues in College Students

Problems in the Use of DSM-IV-TR Diagnostic Criteria

Limitations of the DSM-IV-TR criteria in diagnosing ADHD in college students overlap with those pertaining to diagnosing young adults more generally. Barkley et al. [3] suggest that current diagnostic criteria for ADHD are better suited for school-age children, and may not capture developmental changes in the manifestation of core symptoms.

As is generally true for young adults, college students may experience much greater ADHD symptomatology than their same age peers, yet not meet DSM-IV diagnostic criteria, which require at least 6 inattentive and/or hyperactive symptoms, because this is exceedingly uncommon in this age group [8]. For example, Murphy and Barkley [8] found that only adults reporting symptoms at or greater than the 99th percentile for their age met DSM criteria for ADHD, and suggested that reducing the number of symptoms required to diagnose ADHD in adults to 4 or 5 may be warranted.

Malingering

Malingering to obtain an ADHD diagnosis may be especially pertinent to college students. Students may deliberately over-report ADHD symptoms to procure academic accommodations or feign ADHD to obtain a prescription for stimulant medication [13], which many students believe will enhance their academic performance [14].

Efforts to feign ADHD may not be uncommon, and 1 study found that that approximately 25 to 48 % of students self-referred for ADHD evaluations exaggerate symptoms [13]. In the same study, nearly 50 % of students evaluated for ADHD at a university-based psychological assessment clinic failed at least 1 index from the Word Memory Test [15], a test designed to detect lack of effort on neuropsychological assessments, and thus suggestive of malingering [13]. Similar findings were reported by Suhr et al. [16].

Concerns about college students feigning ADHD have prompted efforts to identify reliable methods for detection. Sollman et al. [17] evaluated the usefulness of ADHD symptom checklists, neurocognitive tests, and symptom validity tests (i.e., measures, such as the Word Memory Test, initially developed to detect feigned neurocognitive or psychiatric dysfunction), in discriminating between students instructed to feign ADHD and those known to have the disorder. As found in other studies [18], ADHD self-report scales did not accurately differentiate these groups [17]. Widely used neuropsychological assessments and objective measures of attention (i.e., the Conners' Continuous Performance Test [19]), also were not effective [17]. More positive findings were obtained for the symptom validity tests, as poor performance on these tests was largely restricted to students instructed to feign ADHD [17]. However, roughly half of students instructed to feign were not identified by symptom validity tests [17]. Similar findings were reported by Jasinski et al. [20].

Available research indicates that clinicians should recognize that many college students requesting an ADHD evaluation may feign symptoms to obtain a diagnosis. Self-report measures of ADHD symptoms can be readily faked and clinical interviews may or may not be more effective at identifying malingering, depending on the skill and experience of the clinician. Further studies to identify best practices for detecting malingering among college students and to better understand the magnitude of this problem are needed.

ADHD and the Adjustment of College Students

Academics

Grades

Do college students with ADHD perform as well academically as their peers? In an initial study of this issue, Heiligenstein et al. [21] reported that students with ADHD seen at a university counseling center had grade point averages (GPAs) that were a full standard deviation lower than students seen for career advice. They were also more likely to be on academic probation [19]. Whether these findings would generalize to students with ADHD who were not counseling center clients is unclear; however, 2 more recent reports [22, 23] suggest this is the case. Blase et al. [22] reported that the GPA of students with ADHD was approximately 0.5 standard deviations lower than that of other students, and freshman with ADHD had significantly lower GPAs than other students 1 year later. In related work conducted at a large public university in the southeastern U.S., Advokat et al. [23] found that students with ADHD being treated with medication had significantly lower GPAs than nondiagnosed peers.

Two published studies [24, 25] failed to find GPA differences between students with and without ADHD. However, 1 of these studies [24] restricted the ADHD sample to students who had successfully completed college, and these students may not be representative of the general population of students with ADHD. Thus, the fact that their GPA was similar to that of the typical graduating seniors does not necessarily mean that students with ADHD who enrolled at the school performed as well academically as the typical student. Although the sample of the second study was not restricted in this way [25], it was limited to 17 participants with ADHD and only 36 students in total.

Overall, available evidence suggests that even students with ADHD who experience sufficient academic success to enroll in college earn poorer grades than their peers. However, some studies (e.g., see Heiligenstein et al. for more detail [21]) have relied on clinic-based samples that may not be representative of the general population of students with ADHD. In addition, when more representative samples of students

have been used, the diagnostic status of students identified as having ADHD has been determined largely on the basis of self-reported symptoms or self-reported diagnosis [22, 23]. Studies have also generally not considered common comorbid difficulties in students with ADHD that may also undermine their academic performance (e.g., depression, learning problems, and substance use). Thus, the independent contribution of ADHD to the GPA of the students is largely unknown. The same can be said for the contribution of ADHD to graduation rates, which are perhaps the most important academic outcome measure [4].

Perception of Academic Functioning

Available evidence suggests that college students with ADHD are less confident than other students regarding their ability to academically succeed [21, 22, 26, 27, 29]. Lewandowski et al. [26] found that students with ADHD were more likely than their peers to need to read material repeatedly to understand it, to experience difficulty finishing timed tests, and to need to work harder to receive good grades. A related study [27] found that relative to students who matched their GPA, students with ADHD scored lower on the Student Adaptation to College Questionnaire (SACQ) Academic Adjustment scale [28], which includes measures of motivation, effort, performance, and satisfaction with the academic environment (e.g., variety and quality of courses). Other researchers have reported that college students with ADHD are concerned in regard to their concentration and memory, as well as their time management skills and tendency to procrastinate [29]. Finally, Blase et al. [22] found that, on average, students with self-reported ADHD were less confident about their ability to academically succeed and perform well enough to attain their goals. Nevertheless, most students in the ADHD group did not report concerns elevated relative to those of other students [22].

Consistent with the previously described findings, students with ADHD perceive themselves as struggling with their study and organizational skills (e.g., see Dupaul et al. [2] and Blase et al. [22] for more detail). Thus, even compared to students with learning disabilities, those with ADHD reported more problems using study aids, test strategies, and time management [30]. Other researchers have reported that undergraduates with ADHD are more likely than their peers to say they are worse than other students at planning for and completing assignments, taking class notes, studying ahead of time for examinations, and avoiding distractions [23]. Students with ADHD did not report spending less time studying per week, however, suggesting that their overall effort level is similar to that of other students [23].

Social Functioning and Romantic Relationships

Research on the social functioning of college students with ADHD is relatively limited, and we located only 3 studies that dealt explicitly with this issue [21, 22, 27]. In an initial study of social functioning and romantic relationships [21], students with ADHD who sought services at a university counseling center did not report more interpersonal problems than other students seen at the center. Because all participants had sought counseling center services, and the ADHD sample excluded students with comorbid diagnoses [21], these results may not be representative of the general ADHD student population.

More recent findings point toward greater social difficulties among students with ADHD. In a study using non-referred students who met full DSM-IV criteria for ADHD [27], students with ADHD reported lower levels of social adjustment, social skills, and self-esteem than a control group of nondisordered peers. Similarly, Blase et al. [22] found that students with self-reported ADHD acknowledged more concerns about their social relationships than did their peers. However, despite the significant group difference, the majority of students with ADHD did not perceive themselves to be struggling socially [22].

Research that has specifically examined heterosexual relationship outcomes in students with ADHD is extremely limited. One study [31] found that males with the inattentive subtype of ADHD experienced greater dating difficulties than males with ADHD, combined type or peers without ADHD. Specifically, these students reported a lower number of steady dating relationships and were less assertive and more uncomfortable in dating situations [31]. In a study of undergraduate males and females who had been involved in a dating or marital relationship within the past 12 months, students with self-reported ADHD were more likely to display physical and sexual aggression, but not psychological aggression, within their relationships relative to students without ADHD [32].

Psychological and Emotional Functioning

Studies examining psychological and emotional functioning in college students with ADHD have yielded somewhat inconsistent findings. Heiligenstein et al. [21] reported that students with ADHD seen at a university counseling center did not differ in their level of psychological distress from students seen for career concerns. However, comparisons with university students who had not sought services at the counseling center were not reported. Similarly, Wilmshurst et al. [25] did not find differences in the self-concept or psychological well-being of students, according to self-reported ADHD diagnostic status. Their sample was small (i.e., 17 students with ADHD and 36 students overall [25])

and this may not have been representative of the general student population.

Other findings suggest that college students with ADHD experience greater psychological and emotional difficulties than other students. As previously noted, Shaw-Zirt et al. [27] found that students with ADHD reported lower levels of social adjustment, social skills, and self-esteem. In a study by Weyandt et al. [33], students with ADHD reported more psychological difficulties than peers did on the Global Severity Index of the Brief Symptom Inventory (BSI) [34]. In 2 studies [35, 36], using the Symptom Checklist-90-Revised (SCL-90-R) [37], students with ADHD reported greater overall psychological distress. Finally, students with ADHD scored approximately half a standard deviation higher than peers did on a measure of depressive symptoms; nevertheless, depressive symptoms were elevated in only a minority of students with ADHD [22].

Overall, research suggests students with ADHD experience greater emotional distress and psychological difficulties than other students [27, 33, 35, 36]. As in the other areas reviewed, however, conclusions are limited by the use of convenience samples and reliance on student-reported ADHD symptoms or diagnostic status to identify participants with ADHD. In addition, the tendency to limit analyses to comparisons between groups obscures the fact that when psychological functioning is examined at the individual level, the majority of college students with ADHD do not report significant difficulties relative to peers [22].

Substance and Alcohol Use

Research has generally found that college students with ADHD report greater alcohol and drug use than do peers. Upadhyaya et al. [38] reported no ADHD-related differences in alcohol use of students, but found that students with ADHD were more than 2.5 times as likely to have used marijuana in the prior year and more than six times as likely to have used other drugs. Blase et al. [22] also found higher rates of marijuana and other drug use in students with ADHD, as well as more frequent drinking episodes and greater alcohol consumption. Especially noteworthy was that alcohol use increased more from freshman to sophomore year in students with ADHD than in other students [22]. Students with ADHD were also more likely to initiate tobacco use during this period [22].

Another recent study also points toward greater problems with alcohol and drug use among college students with ADHD. In a study that compared 104 undergraduates diagnosed with ADHD to 75 control students from the same university [39], students with ADHD reported feeling less control of their drinking. Specifically, roughly 40 % of students with ADHD felt unable to stop drinking when they wanted, as compared to only 12 % of control participants [39]. The authors interpreted this as suggesting that college students with ADHD are more prone to binge drinking, although this was not directly examined [39]. Of particular interest, students with ADHD who were treated with stimulant medication were more likely than students with ADHD not treated with medication to endorse behaviors associated with problematic drinking [39]. Students taking medication were more likely to report drinking-induced blackouts (78 % *vs* 32 %), hospitalization due to drinking (25 % *vs* 0 %), and losing friends or romantic partners because of drinking (22 % *vs* 0 %) [39]; the reasons for these findings were not clear.

An important limitation of the previously described studies is that none controlled for conduct disorder (CD) symptoms, which are associated with greater substance use [40] and tend to be more prevalent among individuals with ADHD [41]. Thus, as previously been reported [42], higher rates of alcohol and drug use among college students with ADHD may be explained by CD symptoms, and not by ADHD per se. A recent study [43] addressed this concern by examining alcohol and illicit drug use in students with and without ADHD, taking the CD symptoms of students into account and did not find this to be the case. Results indicated that ADHD, independent of CD, was associated with higher overall scores on the alcohol use disorders identification test (AUDIT) [44], and its hazardous drinking scale, as well as greater likelihood of endorsing an item indicative of alcohol dependence or emerging dependence (odds ratio, 3.70) [43]. Students with ADHD, independent of CD symptoms, were also more than 3 times as likely to have used marijuana or tobacco and more than 4 times as likely to have used other illicit drugs [43]. This study had the additional strength of requiring a thorough diagnostic evaluation to document that participants in the ADHD group met criteria for the disorder [43].

Treatment

Medication Treatment

Research on the efficacy of ADHD medication treatment in college students is extremely limited. This is problematic because there are several reasons why medication treatment may be less helpful in this group than in children or adolescents. First, college students may require symptom management that extends from morning classes through study sessions lasting into the early morning hours, a time period longer than what even long-acting stimulants can cover [45]. The extent to which physicians consider the unique

demands of college life, when prescribing ADHD medication for students, is unknown [45]. Second, students generally assume greater responsibility for taking their medication as scheduled, as parents are less able to monitor this [46]. There is evidence, however, that a substantial percentage of college students with ADHD do not take their medications as prescribed [14].

We identified several studies that compared college adjustment in students with ADHD according to their medication treatment status [22, 23, 39, 46]. Rabiner et al. [46] examined the association between medication treatment and college adjustment among 68 first-semester college students attending a public and a private university. Students' academic concerns, depressive symptoms, social satisfaction, and alcohol/drug use were unrelated to their treatment status [46]. In a follow-up study that included a larger sample of students recruited from all 4 classes [22], student adjustment was again unrelated to treatment status, and Advokat et al. [23] reported no medication treatment-related difference in the GPAs of college students with ADHD. Although more than 90 % of students on medication indicated that it helped them academically, the average GPAs of the groups were nearly identical [23]. Finally, as noted in the prior section, students with ADHD who were receiving medication treatment were found more likely to engage in behaviors associated with problematic drinking [39].

Although the studies previously reviewed do not indicate any clear benefit of medication treatment, they are limited by the fact that students were not randomly assigned to treatment. For example, it is possible that students on medication would have been doing worse if it were not for their treatment. Recently, results were published from the first randomized, placebo-controlled trial of medication treatment in a carefully diagnosed sample of college students with ADHD [47]. The medication tested was the long-acting stimulant Lisdexamfetamine dimesylate ([LDX] brand name Vyvanse, Shire Pharmaceuticals, Dublin, Ireland), which was administered to students for 5 weeks [47]. Medication treatment was associated with large reductions in ADHD symptoms and corresponding improvements in aspects of executive functioning related to task management, planning, organization, study skills, and working memory [47]. Smaller, but statistically significant improvements in psychosocial functioning were also found [47]. Despite these improvements, however, treated students exhibited much greater ADHD symptomatology and executive functioning deficits than did controls [47]. Although this was a much needed and well-conducted study, the relatively short duration of the trial precluded assessment of the possible longer-term impact of medication treatment, and direct assessments of the academic/educational functioning of the students were not included. Thus, the impact of medication treatment on longer-term social and academic outcomes in college students with ADHD remains unknown.

Misuse and Diversion of ADHD Medications

Clinicians should be aware that the diversion and misuse of ADHD medication are common problems on many campuses [45]. The prevalence of stimulant medication diversion by students with ADHD was found to be 26 % in the previous 6 months [45], 35 % in the previous 12 months [48], and 62 % during their lifetime [49]. In addition to diverting their medication, college students with ADHD frequently deviate from taking their medication as prescribed by taking it more frequently and/or at higher doses, using it in conjunction with drugs and/or alcohol, or intentionally misusing to get high [50]. Given the significant risk of stimulant medication misuse and diversion, clinicians prescribing these drugs to students should consider establishing contracts requiring students to use their medications appropriately. Clinicians should also clearly explain the potential medical and legal consequences of misuse and diversion [51]. Additional suggestions for addressing these issues are provided by Wilens et al. [51].

Psychosocial Treatment

To date, no empirical studies testing the efficacy of psychosocial treatments for college students with ADHD have been published. Until relevant empirical work becomes available, it has been recommended that cognitive-behavioral treatments, perhaps in conjunction with medication, should be used to treat ADHD in college students, as cognitive-behavioral therapy (CBT) seems to be the most effective psychosocial treatment for adults with ADHD [52]. CBT addresses maladaptive and self-critical thoughts of self, the world, and the future that may stem from the difficulties students with ADHD experience in the college environment [52]. CBT may prevent negative attitudes from demoralizing students and hampering their progress [52].

Although CBT trials have not been conducted specifically with college students, several recent trials with adults have clear relevance for college student populations. Safren et al. [53] randomized 86 adults with ADHD who were being treated with medication into continued medication treatment alone or medication treatment plus CBT. The CBT program entailed 12 to 15 individual sessions that targeted: 1) organizing and planning, 2) reducing distractibility, and 3) cognitive restructuring (adaptive thinking) [53]. After treatment, adults in the medication plus CBT condition received significantly lower scores on the ADHD Rating Scale [54] and the Clinical Global Impressions Scale [55] from assessors blind to the

condition of the participants [53]. Self-report ratings were consistent with these findings [53].

In related work, Solanto, Marks, Mitchell, Wasserstein, and Kofman [56] reported positive results for a small group cognitive behavioral treatment program for 88 adults with ADHD that they call Meta Cognitive Therapy. The focus of Meta Cognitive Therapy is to impart skills and strategies in time management, organization, and planning, and to target depressogenic and anxiogenic cognitions that undermine effective self-management [56]. Compared to adults randomized to receive supportive therapy, those receiving Meta Cognitive Therapy had significantly fewer inattentive symptoms after treatment according to self-report, condition-blind clinician ratings, and collateral informants [56].

Each of these CBT approaches targets skills that seem particularly relevant for the academic performance of college students with ADHD (e.g., time management, organization and planning) and may help the students attain greater academic success. Clearly, trials of these approaches with college student populations should be conducted.

Coaching is another approach to helping adults with ADHD and may be particularly suited to use with college students. Coaches work with clients to identify important goals, develop plans and strategies for achieving them, and monitor progress toward attaining them [57]. Coaches may be able to help students with ADHD develop effective self-regulatory behaviors and can act as important external sources of regulation as the abilities of students are developing [57]. In a case study of ADHD coaching with a female college senior [57], her time management, academic organization, studying, and ability to pay attention in class and take good notes improved after an 8-week coaching intervention. Parker et al. [58] interviewed 19 college students who had received ADHD coaching and found that it increased their self-discipline, time management skills, organization, and feelings of self-efficacy. Students also reported that coaching helped them to formulate realistic and specific goals, think about their goals more frequently, and maintain a desire to achieve them [58]. Students were less clear, however, on whether they believed coaching improved their grades [58]. Coaching college students with ADHD, therefore, appears to be a promising approach, although additional research is clearly needed.

Academic Accommodations for Students with ADHD

Colleges and universities typically offer academic accommodations, such as additional time for assignments and tests, and distraction-reduced test settings, to students with ADHD [4]. However, in a study including 30 students with ADHD [59], only 40 % indicated that they had been offered adequate accommodations, and just 45 % of students with access to accommodations reported using the aid. Similarly, 1 study [24] found that less than one third of students with ADHD who were enrolled in foreign language courses utilized available instructional accommodations, such as extended time or distraction-free environments for tests. Commonly cited reasons for not using accommodations included not wanting aid beyond that provided to nondisordered students, viewing the aid as unnecessary, or not being unaware of its existence [59].

Although the findings previously discussed are limited to several small studies conducted at single institutions, they suggest that many students with ADHD are not offered adequate accommodations and/or fail to use them. Given the greater likelihood of students with ADHD to encounter academic struggles, the current situation seems problematic, and additional studies on this issue that use larger and more representative samples are needed. In addition, the extent to which these accommodations are actually helpful to students with ADHD is a particularly important question that we were unable to identify within any published studies.

Summary and Future Directions

Since research on college students with ADHD began to appear in the mid- to late-1990s, there has been a surge of interest in this population, which is reflected in the increasing number of published studies. However, despite this growing body of research on ADHD in college students, the research remains extremely limited relative to work conducted on children, adolescents, and even adults with ADHD. Thus, although important progress in our knowledge of ADHD in college populations has been made, data on a number of key issues remain sparse.

A particularly important issue is that most studies of college students with ADHD have relied on relatively small convenience samples of students at a single institution [2]. Furthermore, those students may not have actually met diagnostic criteria for ADHD, as researchers have typically relied on students' self-reported diagnostic status, or self-reported symptoms above a certain cutoff, to identify samples. Few studies have confirmed that students identified in these ways actually qualify for an ADHD diagnosis. When diagnostic status has been more carefully evaluated, samples have typically been limited to students with ADHD seeking counseling center services [21]; these students are not necessarily representative of the general population of students with ADHD. In fact, we did not locate a single study where a representative sample of students at one institution—let alone multiple institutions that reflect the diversity of colleges and universities in the US—was evaluated such that an accurate

estimate of ADHD prevalence on that campus could be attained.

This issue limits our understanding of ADHD in college students in ways beyond the obfuscation of basic prevalence estimates. Because consistent methods have not been used to identify students with ADHD, and full diagnostic criteria are generally not applied, samples recruited for different studies are likely to considerably vary. A recently completed study highlights this issue [60]. The participants were 200 college students who completed an anonymous web-based survey in which they rated themselves on the DSM-IV-TR symptoms of ADHD and also provided their self-reported diagnostic status [60]. Students with 6 or more self-reported inattentive and/or hyperactive-impulsive symptoms were considered "cases," as were those who reported a diagnosis [60]. These methods are consistent with the case identification procedures used in many of the studies previously cited as reviewed (e.g., for more detail see Weyandt et al. [5], DuPaul et al. [6], McKee [7], and Murphy and Barkley [8]). Unfortunately, the overlap of participants identified as having ADHD by these methods was limited: of the 21 students who reported an ADHD diagnosis, only 6 even met the DSM symptomatic criteria for ADHD [60]. In addition, of the 19 participants meeting DSM symptomatic criteria, only 6 endorsed the other, nonsymptomatic essential criteria, thereby attaining a response-based diagnosis [60]. Thus, depending on the identification method used, very different samples were identified. This result highlights the difficulty of comparing results across studies of ADHD in college students and may contribute to some of the inconsistent findings that have been reported concerning the adjustments of students. It is also likely that many participants in studies of college students with ADHD would not actually qualify for the disorder if they had been more rigorously evaluated. Our knowledge of how college students with ADHD fare academically, socially, and psychologically is thus likely to be significantly undermined by the methodological shortcomings in how students with ADHD have been identified in many studies.

In addition, most studies have not considered whether adjustment difficulties thought to be the result of ADHD may be at least partially explained by other psychiatric disorders, such as depression and anxiety, that are likely to be more common in young adults with ADHD. Furthermore, most studies have limited analyses to the examination of group differences between students with and without ADHD and have not supplemented this approach by considering the percentage of individual students with ADHD who show impairment relative to their normative peers in various domains of functioning (such as academic, social, and emotional functioning). When this has been done [22], the clear majority of students with ADHD were found to be adjusting well in multiple domains of college life, even though as a group they were making less satisfactory adjustments than their peers. We believe this is important to note, as it may lead to somewhat different conclusions about the relationship between ADHD and college adjustment.

Given these concerns, examining many of the issues previously reviewed in a nationally representative sample of college students with ADHD whose diagnostic status (including comorbidities) has been well-established would be an important advance for the field. Such a study could entail conducting structured psychiatric interviews with representative samples of students from a nationally representative sample of U.S. colleges and universities. Best practice guidelines to diagnose ADHD in young adults [12] should be followed and careful attention should be paid to the assessment of comorbid conditions. Although this would be an expensive and time consuming undertaking, examining many of the issues reviewed above in such a rigorously identified sample would lead to substantially greater confidence in the conclusions that are drawn.

Beyond this basic descriptive work, other important gaps remain. For instance, the issue of college students feigning ADHD to obtain academic accommodations and/or prescriptions for stimulants may help to explain why as many as half of campuses do not handle diagnosing ADHD in their students [61]. Obtaining a better understanding of the scope of this problem, and developing best practice guidelines for addressing it, are important practical issues for the field to address because this may increase the number of colleges and universities that choose to provide evaluation and treatment services for ADHD. We see this to be critically important because requiring students to seek off-campus providers for ADHD evaluation and treatment services is likely to reduce the percentage of students who obtain appropriate professional services. Given recent evidence that many students who use ADHD medication without a prescription may be engaging in "self-treatment" [62], the lack of treatment options on campus may also contribute to the misuse and diversion of ADHD medications [50].

As previously discussed, studies that evaluate the impact of treatment on college students with ADHD are extremely limited. Other than a recent study on coaching students with ADHD [58], no controlled studies of psychosocial interventions have been published. Also, as previously discussed, recent trials of CBT for adults with ADHD [53, 56] have yielded very promising findings, and specifically evaluating the impact of these programs in college students should be a priority. Studies on the effectiveness of academic accommodations that students with ADHD may receive (e.g., additional time for assignments and tests, and distraction-reduced test settings) are also lacking.

There has been only 1 controlled study of medication treatment [47], and although a clear reduction of core ADHD symptoms was observed, this study was a short

duration trial in which no assessment of academic outcomes was obtained. Thus, the degree to which medication treatment may improve academic and educational outcomes in college students with ADHD is unknown. In fact, the limited evidence to date suggests this is not the case [22, 23], and it highlights the need for additional research on this important issue. Basic information on whether prescribing practices for students reflect the fact that symptom coverage may be required from morning classes through late night study sessions is also unavailable. This gap in the literature could start being addressed by surveying students with prescriptions for ADHD medication as to the specifics of their prescription; gathering information from physicians who treat college students as to whether and how their prescribing practices address this need would also be informative.

This review began by noting that because students with ADHD who attend college have experienced greater academic success than many of their peers with the disorder, they may be a better adjusted subgroup of the young adult ADHD population, thus, not showing the same pattern of difficulties. However, despite important limitations in the rapidly developing research base on ADHD in college students, it does seem clear that many students with ADHD struggle in important ways relative to their college classmates. Therefore, as was concluded in another recent review of this issue (for more detail see page 246 to 247 of Dupaul et al. [2]), "… it behooves us as researchers and clinicians to better understand the nature of ADHD in the college student population and to develop effective treatment interventions to increase the likelihood of these students succeeding in higher education."

Required Author Forms Disclosure forms provided by the authors are available with the online version of this article.

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