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Symptom Manifestation and Impairments in College Students With ADHD

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Abstract

To better understand the nature of impairment resulting from attention-deficit/hyperactivity disorder (ADHD) for students in a post-secondary education (PSE) setting, the authors analyzed the symptoms and associated impairment of 135 students with a diagnosis of ADHD who were recruited via Student Disability Services in Canadian post-secondary institutions. The authors (a) developed a novel semistructured telephone interview based on the 6-item *Adult ADHD Self-Report Scale Screener–Telephone Interview With Probes* (ASRS-TIPS) to elicit students' descriptions of their behavior for each symptom they endorsed, (b) administered standardized tests of executive functioning (EF) and academic fluency, and (c) obtained self-reports of grade point averages (GPAs), EF, cognitive failures, psychopathology, distress, and resilience. Qualitative analysis of the ASRS-TIPS revealed significant impairment relating to symptoms of ADHD in the PSE setting. Students reported clinically significant symptoms of ADHD, psychological distress, and impairment in EF (67%, severe range) and cognitive failure (62%, atypical range) in everyday life. By contrast, their GPAs and standardized scores of EF and academic fluency were in the average range. Standardized scores and GPAs did not capture the impairment that participants experienced in their PSE settings. The ASRS-TIPS may provide a useful tool to help document how these students' symptoms impair functioning in the PSE setting.

Keywords

college students, ADHD, academic impairment

Attention-deficit/hyperactivity disorder (ADHD) is a chronic and prevalent neurodevelopmental disorder that often persists into adulthood, with deleterious effects on academic, occupational, health, and social outcomes (Biederman, Petty, Evans, Small, & Faraone, 2010; de Graaf et al., 2008; Kessler et al., 2005). Compared to typically developing peers, most students with ADHD are at risk for lower academic achievement and are more likely to drop out of high school and to enter the workforce as unskilled or semiskilled (Currie & Stabile, 2006). However, in the past decade, a growing number of students with ADHD have graduated successfully from school and attended college or university, but they often need to register with Disability Service Offices (DSOs) to obtain accommodations or other services to help them succeed in the post-secondary environment.

One challenge faced by DSOs in accommodating these students' educational needs at university or college is that a diagnosis does not necessarily imply a disability: confirmation of a disability is required for eligibility for accommodations at the post-secondary level. That is, although one of the diagnostic criteria for ADHD in the *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition (*DSM-5;* American Psychiatric Association, 2013) requires evidence that the symptoms interfere with or reduce the quality of social, academic, or occupational functioning, the diagnosis itself is insufficient for documenting how the symptoms impair the individual's current functioning in the post-secondary context.

This newly emergent subgroup of individuals with ADHD who pursue post-secondary education (PSE) is understudied. These students may not necessarily share the characteristics of ADHD as depicted in the child and adult literature. For instance, like other "emerging adults" with ADHD, these students manifest high levels of co-occurring learning disabilities and psychiatric difficulties (Heiligenstein & Keeling, 1995; Rabiner, Anastopoulos, Costello, Hoyle, & Swartzwelder, 2008; Ramirez et al., 1997; Richards, Rosén, & Ramirez, 1999). By contrast, they manifest higher

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levels of cognitive functioning, better coping skills, and a history of relative success at school when compared to peers with ADHD who do not attend college or university (Glutting, Youngstrom, & Watkins, 2005; Green & Rabiner, 2012). The PSE setting does, however, pose new challenges for students with ADHD because in this setting they lose much of the structure and support previously provided by teachers and parents. They are also dealing with an increased demand for self-regulation, time management, and organization so they can succeed (Fleming & McMahon, 2012; Heiligenstein, Guenther, Levy, Savino, & Fulwiler, 1999; Turgay et al., 2012). In this introduction we summarize what is known about the cognitive and academic impairments in post-secondary students with ADHD.

Cognitive Functioning

Impairments in the domains of executive functioning (EF; attention, inhibition, reasoning, planning, and working memory) have been observed consistently in the adult ADHD population (e.g., Barkley, Murphy, & Fischer, 2010; Boonstra, Oosterlaan, Sergeant, & Buitelaar, 2005; Hervey, Epstein, & Curry, 2004; Willcutt, Doyle, Nigg, Faraone, & Pennington, 2005). By contrast, the limited available evidence suggests that post-secondary students with ADHD seem to manifest few difficulties on objective tests of EF compared to peers without ADHD. For instance, recent studies of students registered at DSOs with a diagnosis of ADHD indicate that they manifested only modest deficits on some—but not all—measures of auditory-verbal and visual-spatial working memory (Gropper & Tannock, 2009; Kim, Liu, Glizer, Tannock, & Woltering, 2013; Woltering, Liu, Rokeach, & Tannock, 2013). Moreover, a study by Buchsbaum et al. (1985) of 400 college students found that those who were in the highest 5% of self-reported ADHD symptoms showed slower reaction times and lower performance on serial learning and memory, but they did not display significant differences on *Wechsler Adult Intelligence Scale–Revised* (WAIS-R) IQ scores as compared to members of the control group. By contrast, post-secondary students with ADHD self-reported substantial EF impairment in everyday life (Dehili, Prevatt, & Coffman, 2013). These apparently discrepant findings may be explained by recent evidence that neuropsychological tests, which assess abilities in a highly structured, clinician-guided testing environment with minimal distractions (Toplak, West, & Stanovich, 2013), are unable to capture the type of impairment in EF and other cognitive difficulties that are self-reported by students with ADHD in the post-secondary environment. Moreover, neurophysiological research has suggested that students with ADHD exert more effort to allocate attentional resources to the task at hand to obtain similar levels of cognitive performance as that of their peers (Woltering et al., 2013). However, the nature and extent of cognitive difficulties in post-secondary students with ADHD remains unclear.

Academic Functioning

The evidence base for academic impairments in PSE students with ADHD is sparse (Frazier, Youngstrom, Glutting, & Watkins, 2007). Fewer adolescents with ADHD attend 4-year university programs compared to their peers, and of those who do, fewer graduate (e.g., Kuriyan et al., 2013). Some studies have found that university students with ADHD have lower grade point averages (GPAs) than peers and are more likely to be on academic probation, but findings are inconsistent (e.g., Gropper & Tannock, 2009; vs. Sparks, Javorsky, & Philips, 2004). However, students with ADHD report that they struggle to keep up with the academic demands of a university, stating that they work harder to achieve good grades, are concerned with their academic progress, take longer to complete assignments, and have difficulty completing tests within time limits (DuPaul, Weyandt, O'Dell, & Varejao, 2009; Lewandowski, Lovett, Codding, & Gordon, 2008; Rabiner et al., 2008). Thus, there is little evidence to date that post-secondary students with ADHD have shown deficits on standardized measures of achievement, but they self-report difficulties attaining good academic performance within the university setting.

Current Study

Students with ADHD commencing PSE and clinicians working with these students face the challenge of providing documentation confirming not only that the student has a diagnosis of ADHD but also that his or her current symptoms cause impairments that are disabling for academic functioning and other life functions in the PSE environment. Despite this, little is known about the nature and extent of impairments resulting from ADHD in the college or university setting. Thus, the aim of the present study was to investigate qualitative reports of ADHD-related impairment in the post-secondary-level academic setting. We did so by interviewing students with ADHD who were already registered with college and university DSOs since they would have experience allowing them to describe their symptoms and impairments in these settings.

We conducted a brief, semistructured telephone interview with students, using the 6-item version of the *Adult ADHD Self-Report Scale* (ASRS), during which we asked them to provide real-life examples of behavior for each of the six symptoms (*Adult ADHD Self-Report Scale Screener–Telephone Interview With Probes;* ASRS-TIPS). We have previously reported strong test-retest reliability of the students' self-reported ADHD symptoms using this instrument, as well as moderate to good congruency between self-report and a collateral report (Gray, Woltering, Mawjee, & Tannock, 2014). To provide insight into the nature and extent of the students' academic and cognitive impairments, in this article we report qualitative interview data from the

ASRS-TIPS, as well as self-reported distress, psychopathology, and EF impairments in daily life. To compare qualitative reports of impairment with commonly used objective tests of cognitive functioning, we also provide quantitative analyses of the student's performance on standardized neuropsychological tests of IQ and working memory as well as on screening measures of academic performance.

Method

Participants

Data for this study were derived from 135 students with a previously confirmed diagnosis of ADHD who were undertaking PSE in a college or university in a large metropolitan Canadian city. Students were recruited from DSOs in three universities and six colleges via listserv announcements distributed exclusively to students registered with a diagnosis of ADHD. Their documentation of a diagnosis of ADHD causing impairment had been accepted by the DSOs, rendering them eligible for registration and accommodations. This sample had been recruited as potential participants in an externally funded randomized clinical trial of working memory training (see Note 1).

Eligible students met the following inclusion criteria: (a) previous diagnosis of ADHD, (b) current enrollment in a PSE institution, (c) registered with Student Disability Services with a diagnosis of ADHD, (d) 18 to 35 years of age, and (e) met the criterion score on a telephone-administered version of the 6-item ASRS described later. Students were deemed ineligible if they met any of the following exclusion criteria as self-reported during the telephone interview: (a) evidence of major neurological dysfunction or psychosis; (b) current use of sedating, mood-altering, or other medication (apart from that prescribed for ADHD) that could alter cognitive functioning; (c) uncorrected sensory impairments; (d) motor or perceptual disability that would preclude use of a standard desktop or laptop computer; or (e) history of concussion or traumatic brain injury requiring hospitalization.

Measures

Data for this study were derived from the following set of clinical, cognitive, and academic screening measures that were administered during the initial study-intake telephone interview and a subsequent half-day baseline assessment session conducted prior to randomization to the various treatment arms.

Telephone interview with probes. The ASRS-TIPS is a brief telephone-administered interview developed for our randomized controlled trial of working memory training. It is based on the 6-item ASRS v1.1 (Kessler et al., 2007) and requires the respondent to provide real-life examples for each of the six ADHD symptoms covered by the ASRS. The six symptoms probed in the ASRS have been found to be the most predictive of symptoms consistent with a diagnosis of ADHD and robustly discriminate cases from noncases for screening purposes (Kessler et al., 2007). In the ASRS-TIPS, the interviewer reads aloud each question verbatim to the respondent, asks the respondent to rate the severity of that symptom on a 5-point scale (0 = *never*, 1 = *rarely*, 2 = *sometimes*, 3 = *often*, 4 = *very often*), and then asks for an example of that symptom in the respondent's daily life. In this study, this telephone-based interview was conducted with each student as part of our eligibility procedure used in our clinical trial of working memory training, before he or she attended the university lab for assessment. Thus, at the time of the interview, the students had not seen a paper version of the questionnaire.

As part of the clinical trial, we also administered the 18-item ASRS-V1.1 Symptom Checklist (Adler et al., 2012) as well as the ASRS-Other, which is a version adapted for completion by a significant other (e.g., parent, adult sibling, high school teacher). We administered this via a secure online software program (www.surveymonkey.com). We removed the darkly shaded boxes as used in the printable version of the ASRS-V1.1 (http://www.hcp.med.harvard.edu/ncs/asrs.php) to minimize any possibility that the shaded areas might bias reporting or motivate symptom exaggeration. Part A of the checklist is composed of the same 6 questions that are on the ASRS. Part B contains the remaining 12 ADHD symptoms, based on *DSM-IV* criteria. The ASRS Symptom Checklist has been demonstrated to be a reliable and valid scale for evaluating ADHD in adults and adolescents: It shows a high internal consistency (.93–.94) and test-retest reliability of .58 to .77 (Adler et al., 2012; Hines, King, & Curry, 2012; Kessler et al., 2005).

In our previous study of the psychometrics of the ASRS in this same sample of college and university students with ADHD, we found that both self- and other-reported scores on the 18-item ASRS Symptom Checklist were above the clinical cutoff (i.e., greater than the 90th percentile). We also found students' ratings on the ASRS-TIPS correlated well with their ratings on Part A of the ASRS Symptom Checklist ($r = .66$). A modest correlation was found between the 18-item ASRS self-report and informant ratings on the 18-item ASRS ($r = .46$; Gray, Woltering, Mawjee, & Tannock, 2014). In this article we report the mean total scores for the ASRS-TIPS as well as the mean number of self-ratings that fall within the criterion region (grey shaded boxes in the original printable version).

Symptom Assessment–45 (SA-45). The SA-45 assesses general psychiatric symptomatology (Maruish, 1999). It provides a Global Severity Index as well as scores for six subscales for symptoms of psychiatric disorders (Depression,

Obsessive-Compulsive Tendencies, Psychoticism, Paranoid Ideation, Somatization, and Phobic Anxiety) and two additional symptom domains (interpersonal sensitivity, hostility). Respondents use a 5-point Likert-type scale (1 = *not at all* to 5 = *extremely*) to indicate the degree to which each of the 45 symptoms have bothered them in the past 7 days. *T* scores are provided, with scores greater than 60 indicating an elevated psychiatric symptom count.

Kessler Psychological Distress Scale (K10). This 10-item scale, widely used to screen for poor mental health, measures nonspecific psychological distress. It has strong psychometric properties and discriminates psychiatric cases from noncases (Kessler et al., 2003). Respondents indicate the amount of time they have experienced each problem using a 5-point Likert-type scale (5 = *none of the time*, 4 = *a little of the time*, 3 = *some of the time*, 2 = *most of the time*, 1 = *all of the time*). Scores of 31 to 38 indicate that the respondent is experiencing "high levels of distress," scores of 10 to 30 indicate the person is experiencing "very high levels of distress," scores of 39 to 44 indicate "moderate levels of distress," and scores of 45 to 50 indicate "low levels of distress."

Barkley Deficits in Executive Functioning Scale–Short Form (BDEFS). The 20-item short form of the BDEFS assays various dimensions of adult EF in daily life, such as time management, organization and problem solving, self-restraint, self-motivation, and self-regulation of emotions. Respondents use a 4-point Likert-type scale to indicate the frequency of occurrence of each problem (1 = *never or rarely*, 2 = *sometimes*, 3 = *often*, 4 = *very often*). It has demonstrated high internal consistency and test-retest reliability, good interobserver agreement, and validity in clinical and college samples of adolescents and adults with ADHD (Barkley, 2014; Dehili et al., 2013). Normative percentile scores are available based on sex and age group (e.g., for ages 18–34 years). Scores greater than the 85th percentile are considered of clinical significance (85th–92nd percentile = borderline, 93rd–95th = mild deficits, 96th–98th = moderate deficits, 99th = severe deficits).

Cognitive Failures Questionnaire (CFQ). This 25-item scale quantifies self-reported slips of attention and memory in everyday life. Respondents rate the frequency of occurrence of these mistakes (0 = *never*, 1 = *very rarely*, 2 = *occasionally*, 3 = *quite often*, 4 = *very often*). Scores for each item are added to calculate a total score. It has excellent psychometric properties and is suitable as a trait measure of cognitive control problems in everyday life (Bridger, Johnsen, & Brasher, 2013; Broadbent, Cooper, FitzGerald, & Parkes, 1982). Norms are not available, so we based our interpretation on data from a published study of college students, which indicated that the mean score for typically developing university students was about 44, with a standard deviation of 10 to 15 (Matthews, Coyle, & Craig, 1990; Wallace, Kass, & Stanny, 2002).

GRIT. This 17-item self-report scale, composed of a Short-Grit (Grit-S) and an Ambition subscale, was designed to measure perseverance and passion for long-term goals (Duckworth, Peterson, Matthews, & Kelly, 2007). Its name is not an acronym but rather indicates its colloquial use, referring to determination and resolve in pursuing a goal. Respondents use a 5-point Likert-type scale with items ranging from *not like me at all* to *very much like me.* Scores are averaged, with higher scores representing more determination and resolve, and they can therefore be interpreted on a 1 (*very low grit*) to 5 (*very high grit*) scale. For this study we used the 8-item Grit-S, which has been shown to have good internal consistency and test-retest reliability. We found that the GRIT total scale has good internal consistency ($\alpha = .88$). All items appear to be worthy of retention: No increase in alpha would come from deleting any item. All items correlated with the total scale to an acceptable degree (lower $r = .33$). Although formally tested norms are not yet present, data are available from a sample of 300 participants ages 25 to 35 years (79% female). Grit-S scores averaged 3.2 ($SD = 0.7$), suggesting that a Grit-S rating of less than 2.5 would fall 1 standard deviation below the mean for adults ages 25 to 35 years (Duckworth & Quinn, 2009).

Cognitive measures. Standardized scores for the Vocabulary and Matrix Reasoning subtests from the second edition of the *Wechsler Abbreviated Scale of Intelligence* (Wechsler, 1999) were used to obtain an estimate of general intellectual ability. The remaining measures focused on working memory, which is known to be impaired in adults with ADHD (Alderson, Kasper, Hudec, & Patros, 2013). Measures used included the Digit Span Forwards, Digit Span Backwards, and Digit Span Sequencing from the fourth edition of the *Wechsler Adult Intelligence Scale* (Wechsler, 2008) for auditory-verbal working memory. Also we administered the Spatial Span Task and Spatial Working Memory Task from the *Cambridge Neuropsychological Testing Automated Battery* (CANTAB; Fray, Robbins, & Sahakian, 1996) to assess visual-spatial working memory capacity and updating of spatial working memory, respectively. We included a measure of strategy use during cognitive performance, the CANTAB Spatial Working Memory Task Strategy Score, which indexes the number of times the participant started a search with a different box—an inefficient strategy (i.e., high strategy scores denote poorer performance). Standardized scores are provided for all of these tests.

Academic screening measures. The Math Fluency subtest from the third edition of the *Woodcock-Johnson Tests of*

Achievement (Woodcock, McGrew, Mather, & Schrank, 2001) and the second edition of the *Test of Word Reading Efficiency* (Torgesen, Wagner, & Rashotte, 1999) were used to screen basic math and reading skills. Also, we used self-reported GPAs based on all post-secondary-level courses taken to date to index current academic performance in college or university. In North America, GPAs are derived from marks from individual courses, which in turn are based on performance on assignments, tests, or quizzes throughout the course as well as a final examination mark. We used a grade conversion table to convert all GPAs to a number based on a standardized 4-point scale. The use of self-reported GPAs has been found to be reliable insofar as findings are interpreted with caution (Cassady, 2001; Kuncel, Credé, & Thomas, 2005).

Procedures

The randomized controlled trial, including the methods and measures reported herein, was approved by the Institutional Research Ethics Boards of the participating universities and colleges. Written informed consent was obtained from all participants prior to entering the study. All ASRS-TIPS interviews were conducted by one of the authors (Karizma Mawjee). This interview was administered prior to the half-day baseline assessment during which participants were tested individually and completed the clinical, cognitive, and academic screening measures. After the baseline assessment, participants provided contact information for a designated significant other with their permission (e.g., partner, parent, sibling, or friend), who then completed the ASRS-Other.

Analytic Approach

Quantitative analysis. IBM SPSS Version 21 was used to perform the statistical tests. Independent sample *t* tests and chi-square tests were used to look for differences in means and expected frequencies, respectively. The following four measures had missing values exceeding 5% of the sample: self-reported GPA (40% missing; data were collected retroactively by phone), ASRS-Other (56% missing; no response from contact information provided), CFQ (16% missing second page of double-sided form), and designation for learning disability (LD) (15% self-report missing; unable to confirm with disability services). Thus, analyses of these variables were based on a reduced sample size.

Qualitative analysis. Each student's responses to the interviewer's probes on the ASRS-TIPS were transcribed verbatim by the interviewer during the telephone interview. This was feasible because the students provided fairly brief descriptions of the behavioral symptoms in everyday life in the PSE setting. Analysis of the transcripts were carried out by two of the study researchers (Sarah A. Gray and Rosemary Tannock) using thematic analysis and following the process outlined by Braun and Clarke (2006). Because reviewers undertook an inductive approach, analysis was data driven and did not aim to fit into either a preexisting coding frame or analytic preconceptions of the reviewers. Inductive approaches are ideal for exploratory analysis, which was one of the primary goals of this study: understanding how the student's symptoms of ADHD manifested and impaired functioning in the PSE setting. The reviewers independently read through the transcribed responses of each student several times before any coding or analysis began. We sought to understand the experiences of the students through their own words, placing less emphasis on the reviewers' co-creating meaning (Swift et al., 2013). Overall, themes were largely consistent between coders, and the few inconsistencies were resolved via discussion to achieve concensus. The number of responses that fit into each identified theme was counted. The content of a student's response to one of the questions often reflected more than one theme. In such cases all themes were counted.

Results

Characterization of the Sample

The sample included more females (58%) than males, and the students' mean age was 23.7 years (SD = 3.6), with no significant age difference between males (M = 23.8, SD = 3.7) and females (M = 23.8, SD = 3.5). Most were attending university (77%, n = 104; with 23%, n = 31 attending college), and our study recruited a more equal female-male ratio of students in university (53% female, 47% male) compared to students in college (73% female, 29% male). About 18% (n = 24) of the sample (19% of females; 16% of males) reported that they were also registered at DSO with a comorbid diagnosis of specific learning disabilities as well as ADHD, but the nature of the LD was not specified. Also, 51% of the participants (n = 69) were receiving medication treatment for their ADHD (52% of females, 49% of males). Among these, 4 (3%) were being treated with nonstimulant medication (atomoxetine) and the rest with psychostimulants/amphetamines (10% Adderall; 4% Dexedrine; 11% Vyvanse) or methylphenidate (6% Ritalin; 16% Concerta; 1% Biphentin). Students were not required to stop or make changes to their medication treatment for this study or during the clinical trial.

The majority of the students (90%) had completed at least 1 year of college or university (range = 0–6 completed years) and therefore could base their responses to the ASRS questions upon their lived experiences in PSE settings. About one third of the sample was enrolled in humanities, with the next highest enrollment being in psychology and social sciences (15% and 16%, respectively), life sciences

Table 1. Clinical Profile for Male and Female College Students With Attention-Deficit/Hyperactivity Disorder.

Measure	Female[a] *M* (*SD*)	Male[b] *M* (*SD*)	Total[c] *M* (*SD*)
ASRS-TIPS total	17.5 (2.3)	17.5 (2.7)	17.5 (2.5)
ASRS-TIPS criterion range	4.82 (.90)	4.82 (0.74)	4.82 (0.84)
K10 total	36.22 (5.37)	38.16 (6.04)	37.04 (5.72)
SA-45			
Anxiety	63.23 (7.84)	60.46 (9.33)	62.09 (8.56)
Depression	60.05 (6.77)	60.84 (7.86)	60.39 (7.23)
Obsessive compulsive**	72.25 (8.48)	67.25 (7.26)	70.17 (8.34)
Somatization*	57.32 (9.06)	53.68 (7.66)	55.78 (8.65)
Phobia	63.67 (6.02)	61.77 (5.15)	62.86 (5.72)
Paranoia**	58.61 (8.45)	53.96 (7.45)	56.62 (8.33)
Psychoticism***	62.92 (5.02)	59.20 (4.21)	61.34 (5.02)
Global Severity Index**	63.13 (7.84)	58.9 (8.02)	61.38 (8.14)
Short-Grit	2.46 (0.59)	2.61 (0.57)	2.52 (0.59)

Note. ASRS-TIPS = *Adult ADHD Self-Report Scale Screener–Telephone Interview With Probes;* K10 = *Kessler Psychological Distress Scale;* SA-45 = *Symptom Assessment-45*. ASRS-TIPS, K10, GRIT: raw scores; SA-45: *t* score. ASRS-TIPS criterion range = mean number of symptoms that fell in the clinical criterion range (or darkly shaded boxes in the original scale). Four or more scores in criterion range = symptoms highly consistent with ADHD.
[a]$n = 78$. [b]$n = 57$. [c]$N = 135$.
Significant difference between males and females: *$p < .05$. **$p < .01$. ***$p < .001$.

(11%), and business management (10%), with very low enrollment in programs that encompass fundamental and applied sciences, such as engineering (5%), computer/information science (0.7%), mathematics (0.7%), and physical sciences (3%).

Clinical Profile

As shown in Table 1, most students had at least four ratings on the ASRS-TIPS falling into the criterion range (or darkly shaded boxes in the original scale; mean rating = 4.82), which indicates that these students manifest a symptom profile that is highly predictive of an ADHD diagnosis in adults (Kessler et al., 2007). Moreover, as we have reported elsewhere (see Gray et al., 2014, for details), both the self- and other-reported scores on the 18-item ASRS Symptom Checklist were greater than the 90th percentile (ASRS-Self, $M = 49.14$, $SD = 9.25$; ASRS-Other, $M = 45.80$, $SD = 10.9$), with females self-reporting more symptoms than males (females: $M = 51.38$, $SD = 9.11$; males: $M = 46.12$, $SD = 8.62$), $t(133) = 3.37$ $p < .01$. Also, the mean K10 score for both male and female students with ADHD was at least 1 standard deviation below the mean for adults (Andrew & Slade, 2001), indicating high levels of psychological distress and the likelihood of severe mental disorder. For instance, almost 60% of the sample had scores signifying high to very high distress, predominantly in females (64% of females and 46% of males reported high levels of distress). Similarly, the mean *T* scores on many of the subscales of the SA-45 were greater than the clinical cut-off (score > 54.7, which is 1 *SD* above the mean for college students; Matthew et al., 1990), indicating high levels of psychopathology. Females reported significantly higher scores than males for the OCD, Somatization, Paranoia, and Psychoticism subscales and the Global Severity Index (see Table 1). As can be seen in Table 1, the mean Grit-S score for this sample (2.52) was about 1 standard deviation below the mean for age, with females reporting lower GRIT scores than males.

Cognitive Profile

Scores on indexes of cognitive performance are presented in Table 2, separately for male and female students with ADHD. Mean IQ scores were within the average range, as were the scores for the standardized auditory-verbal and visual-spatial working memory and strategy tests, with females outperforming males on simple span memory (spatial span) but males outperforming females on spatial working memory and working memory strategy. Mean IQ scores were higher for males, although it should be noted that these data may have been skewed by the higher female-to-male ratio in college students compared to university students in our study.

In contrast to their average performance scores obtained on the neuropsychological tests, both male and female students with ADHD reported marked impairments in EF in daily life (e.g., time management, organization, problem solving, self-restraint, self-motivation, and self-regulation of emotions), as indicated by the mean BDEFS scores that were greater than the clinical threshold of the 85th percentile (Barkley, 2014). A review of individual scores revealed that 67% of the sample had scores greater than the 95th

Table 2. Cognitive and Academic Profile of Post-Secondary Students With Attention-Deficit/Hyperactivity Disorder.

Measure	Female[a] *M* (*SD*)	Male[b] *M* (*SD*)	Total[c] *M* (*SD*)
Cognitive			
WASI IQ*	109.45 (11.72)	114.51 (14.40)	111.59 (13.11)
Digit Span total	8.47 (2.75)	9.20 (3.02)	8.78 (2.88)
CANTAB span*	0.118 (1.12)	−0.002 (1.19)	0.067 (1.15)
CANTAB spatial working memory*	−0.38 (1.24)	0.06 (1.09)	−0.20 (1.19)
CANTAB strategy score	0.02 (1.12)	0.11 (1.18)	0.06 (1.15)
BDEFS summary score % rank	95.28 (8.6)	90.16 (12.10)	93.13 (10.28)
CFQ total***	62.34 (12.38)	52.50 (12.44)	58.16 (13.28)
Academic			
TOWRE total word reading efficiency	102.28 (12.49)	105.51 (14.60)	103.64 (13.46)
WJ math fluency	91.55 (12.17)	95.00 (13.36)	93.01 (12.76)
GPA	2.79 (0.62)	3.07 (0.67)	2.91 (0.65)

Note. WASI = *Wechsler Abbreviated Scale of Intelligence*; CANTAB = *Cambridge Neuropsychological Testing Automated Battery*; BDEFS = *Barkley Deficits in Executive Functioning Scale–Short Form;* CFQ = *Cognitive Failures Questionnaire;* TOWRE = *Test of Word Reading Efficiency*; WJ = *Woodcock-Johnson Tests of Achievement;* GPA = grade point average. WASI IQ, Digit Span total, TOWRE, WJ: standard score; CANTAB: z-score; CFQ: raw score; GPA: self-reported.

[a]n = 78. [b]n= 57. [c]N = 135.

Significantly different between males and females: *p < .05. ***p < .001.

percentile, indicating moderate to severe deficits in EF; of the remainder, 21% had scores indicating borderline to mild deficits, and only 11% reported no EF deficits.

The students also reported high scores on the CFQ, with females reporting more problems in everyday cognitive failures than males; the mean CFQ scores were about 1 standard deviation higher than the mean found for normative samples of college students (Matthews et al., 1990; Wallace et al., 2002). A review of individual scores revealed that 62% of the sample scored in the "atypical" range (≥ 1 *SD* above the mean for college students), with more females (74%) than males (46%) reporting atypical levels of cognitive failures in everyday life.

Academic Profile

Self-reported GPA scores are presented in Table 2 along with standard scores for reading and math fluency. Average-range scores on tests of academic fluency indicate that these students did not manifest deficits in fluent application of basic academic skills in arithmetic calculation and word decoding. Moreover, the mean GPA scores for this sample reflect letter scores between a B– and a B, indicating acceptable to good academic progress. Only 9% of these students with ADHD reported a GPA of 2 or less, reflecting performance below expectations at the post-secondary level.

Subgroup Comparisons

Comparisons for all measures were run between the following subgroups: LD+ADHD/ADHD only, medication/no medication, and college/university. There were no significant differences on any measures between participants diagnosed with ADHD only and those with LD and ADHD. Similarly, no differences were found between participants who were taking medication or not and participants attending college versus university, after applying a Bonferroni familywise correction for each of the subcomparisons separately, with the threshold for significance at an alpha level of .0071.

Correlations

Significant moderate correlations between the ASRS and the BDEFS and CFQ have previously been reported, along with a strong correlation between the BDEFS and the CFQ (Gray et al., 2014). There was no significant correlation between ASRS total scores and any cognitive measures of working memory, working memory strategy, or achievement measures (see Table 3). There was only a small correlation between the BDEFS EF summary score and Digit Span (DS) and no relationship between the BDEFS and any other measures of working memory or achievement. Similarly, the CFQ was not correlated with DS or CANTAB measures, although there was a small correlation between CFQ and word-reading efficiency. The significant correlations between ADHD scales and self-report of EF and cognitive functioning are contrasted with these results; scales measuring ADHD symptoms and EF and cognitive impairment as manifested in everyday life were not related to scores on objective measures of working memory in this sample. These results add to the literature that indicates no

Table 3. Pearson Correlation Coefficients for Cognitive, Clinical, and Academic Profiles.

Measure	ASRS	BDEFS	CFQ	Digit Span	CANTAB Span	CANTAB SWM	CANTAB SS	K10	Short-Grit	SA-45 GSI	TOWRE
Cognitive profile											
Digit Span	−.018	−.208*	−.110								
CANTAB span	−.158	−.020	−.061	.035							
CANTAB SWM	.076	.051	.110	−.391**	−.241**						
CANTAB SS	.128	.131	.097	−.276**	−.428**	.714**					
Clinical profile											
K10	−.408**	−.494**	−.380**	.175*	.090	−.041	−.103				
Short-Grit	−.350**	−.456**	−.462**	−.012	.045	−.051	−.055	.184*			
SA-45 GSI	.520**	.599**	.589**	−.144	−.022	−.018	−.008	−.607**	−.198*		
Academic profile											
TOWRE	−.098	−.042	−.212*	.376**	.014	−.182*	−.155	.000	.063	−.068	
WJ	.060	.058	−.024	.311**	.065	−.206*	−.168	−.045	−.005	.079	.316**

Note. ASRS = *Adult ADHD Self-Report Scale Screener;* BDEFS = *Barkley Deficits in Executive Functioning Scale–Short Form;* CFQ = *Cognitive Failures Questionnaire;* CANTAB = *Cambridge Neuropsychological Testing Automated Battery;* SWM = Spatial Working Memory; SS = Strategy Score; K10 = *Kessler Psychological Distress Scale;* SA-45 = *Symptom Assessment–45;* GSI = Global Severity Index; TOWRE = *Test of Word Reading Efficiency;* WJ = *Woodcock-Johnson Tests of Achievement.* ASRS, BDEFS, CFQ, K10, CANTAB, GRIT: raw scores; SA-45: *t* score; Digit Span, WJ: scaled scores.
Significant correlation: *$p < .05$. **$p < .01$.

consistent relationship between reported impairments relating to EF in everyday life and objective measures of EF (e.g., Toplak et al., 2013), within the scope of our measures.

As expected, scores of psychopathology were significantly correlated with ASRS scores, indicating higher levels of distress and psychopathology and lower levels of perseverance and passion for goals (GRIT), for participants with high levels of ADHD symptomatology. There was a very small significant correlation between psychological distress and DS; however, none of the objective working memory measures were significantly related to the GRIT or general psychiatric symptomatology as measured by the SA-45. Psychiatric symptoms (SA-45) correlated moderately with the ASRS and CFQ and most strongly with the BDEFS.

Qualitative Analysis of ASRS-TIPS

First, we ascertained the frequency with which students endorsed each symptom in the 6-item ASRS interview (see Table 4, in which the dotted line identifies the clinical cutoff scores identified by shaded boxes in the original questionnaire). Notably, the students used the full range of the scale, with variation across all levels of endorsement on different items, suggesting that they were not simply endorsing all symptoms as occurring "very often." As can be seen in Table 4, the most frequently endorsed symptom was one of hyperactivity, particularly fidgeting (Question 5: 55% rated its occurrence as "very often," 26% as "often"). Another commonly endorsed symptom was that of procrastination (Question 4), with 50% of the students with ADHD reporting that they procrastinated "very often." Also, many students reported problems "wrapping up the final details of a project, once the challenging parts have been done" (35% reported this problem occurred "very often," 38% as "often").

For presentation of the themes extracted from our qualitative analysis, along with the frequency of report by these college/university students with ADHD (including the number who did not endorse that symptom as occurring "often" or "very often" and so did not provide an example), see the appendix table. Table 5 presents exemplars of the students' responses for the two most common themes extracted for each of the 6 questions; additional examples are included below.

The most commonly reported theme for each question was consistent with that of the intended meaning of that *DSM* symptom, as worded in the ASRS (see Table 5 and the appendix). For instance, 95% of students described relevant behavior of procrastination, 86% gave relevant examples of fidgeting, and 61% described forgetting appointments, in response to Questions 4, 5, and 3, respectively. For Question 1 trouble with details was the most frequently referenced theme, for Question 2 it was action/inaction in organizing things, and for Question 6 the most frequently referenced theme was compulsion, an inner drive to move or act. Moreover, the respondents' examples clearly reflected the contexts of their symptom manifestation in the post-secondary environment. For instance, in their responses to Question 4 (avoiding or delaying getting started on a task requiring a lot of thought), most students referred to putting off starting assignments (e.g., "Had a film essay that was worth 60% of mark and didn't start until 3 days before it was due"; "I leave assignments and studying for tests until late, will start homework at 12 at night"). Others provided

Table 4. Frequency of Endorsement per Item on the *Adult ADHD Self-Report Scale* (ASRS) 6-Item Self-Report Scale.

	Valid percentage (frequency of endorsing)				
ASRS question	Never	Rarely	Sometimes	Often	Very often
1. Wrapping up details	1.5 (2)	8.3 (11)	17.4 (23)	37.9 (50)	34.8 (46)
2. Getting things in order	1.5 (2)	14.4 (19)	28.0 (37)	28.8 (38)	27.3 (36)
3. Remembering appointments/obligations	2.3 (3)	14.4 (19)	36.4 (48)	20.5 (27)	26.5 (35)
4. Delay getting started	0.0 (0)	3.0 (4)	12.1 (16)	31.8 (42)	50.3 (70)
5. Fidget or squirm	0.8 (1)	5.3 (7)	12.9 (17)	25.8 (34)	55.3 (73)
6. Compelled to do things, overactive	0.8 (1)	12.9 (17)	28 (37)	34.1 (45)	24.2 (32)

examples of procrastination in other required activities (e.g., "I procrastinate for school and for life—for example, I haven't filed taxes in two years"; "Cannot get anything started, even the smallest of projects like sorting mail or cleaning, let alone school work"). Similarly, in response to Question 5 (fidgeting), students described fidgeting in lectures, as well as when studying (e.g., "Tapping feet and squirming all the time sitting in lectures," "Will fiddle with hair when studying, will bounce leg"). Further discussion about the insights provided by the qualitative example given for each ASRS-TIPS question is presented below.

As can be seen from the exemplars of themes in Table 5, the students' responses also offered nuances to the meaning of some ADHD symptoms. For instance, in response to Queston 2 (trouble getting things in order), students described not only problems organizing things or actions (e.g., "When trying to study for an exam, I waste time flipping through pages or notes, I don't keep a binder, and have a messy pile"; "When doing a long physics problem, I will break it down into small tasks but will still get lost") but also problems organizing their thoughts (e.g., "When writing an essay, getting my ideas into specific paragraphs and organizing it into a cohesive piece of work is difficult"). In response to Question 6, students described problems with mental overactivity ("a creative side that doesn't shut off … can't write as fast as I think"; "feels like my mind is racing and can't stop thinking"), as well as very high levels of motoric activity. Also, in response to Question 3 (difficulty remembering appointments and obligations) they reported forgetting infrequent but very important appointments (e.g., "I've missed many appointments with the counselor because I forgot to check my agenda," "I missed two appointments that I had to pay late fees for") as well as frequent obligations (e.g., "Yesterday I forgot class started, even though it's the same time every week"; "I forgot about a lecture yesterday that I have every week"). Participants described forgetting to use coping strategies they had developed to help overcome their difficulties (e.g., "I always put things in my iPhone, but every so often I will forget and without the reminder I won't show up for things, even weekly classes").

The table in the appendix reveals that some themes occurred in response to more than one question, namely, time management problems and psychological distress. For example, the theme of poor time management occurred in responses to Question 1 (trouble with details: "I have trouble with time management—will always wait until the last minute to do things, so little details just don't get done"), Question 3 (difficulty remembering appointments: "I always get dates and time wrong and am always early or late"; "I always put reminders in phone so will get to appointments, but showing up on time never happens"), and Question 4 (procrastination: "I have trouble with this [procrastination] all the time, when drafting and drawing in technical program I won't have time for little details"). Also, students reported anxiety and stress associated with procrastination (Question 4): "Will leave essays until the last minute, and experience anxiety and frustration," "Had a huge research study for sociology but left it until the last minute and was so anxious and couldn't wrap my head around it"); with fidgeting when required to sit for a long time, as in lectures and examinations (Question 5: "Always picking at hair, clothes, nails"; "Will crack hands all the time"); and in association with feeling compelled to move constantly (Question 6: "Have to keep active, I get anxious if I'm not engaging in some kind of physical activity"; "If I don't go to the gym I feel anxious"). Notably, none of these cross-cutting themes are reflected in the current *DSM* criteria for ADHD, but these behavioral examples of ADHD symptoms are consistent with the problems the students endorsed in the BDEFS, CFQ, K10, and SA-45.

The students' responses to our probes for examples of symptom manifestations in the PSE setting provided not only support for their current symptoms but also important insights into how their symptoms impair functioning in that academic setting.

Discussion

Our major goal in this study was to gain further insight into the way in which ADHD symptoms manifest and impair functioning in the post-secondary setting. To do so, we used

Table 5. Representative Examples for Extracted Themes on the *Adult ADHD Self-Report Scale* (ASRS) Telephone Interview Probes for Symptoms.

ASRS question	Representative examples
1	Trouble with details • "Every time I write an essay it is difficult to do last minute details like going through the bibliography, checking sources and citations, even handing it in." • "I have trouble with every assignment, the whole ordeal takes forever. … I can eventually get it going, but at the end I will get distracted, and forget to double check grammar and references." Fails to finish • "I've got many incomplete courses because I couldn't finish assignments—some were 90% done and couldn't do the last 10 percent."
2	Action/inaction organizing things • "I have difficulty setting up different stages of a research project, creating an outline, just trying to make a schedule to finish." • "Getting things together for school, just organizing for a day the night before is tiring, and difficult and often doesn't get done." Organizing thoughts • "For essay assignments with multiple parts I have to go over the paragraph with instructions, over and over, to understand things, and even then I can't organize in my mind what needs to get done."
3	Problems with missing appointments • "I always gets days mixed up in my head—will think it's Wednesday when it's Friday, which results in many missed appointments and classes." • "I miss all appointments—only one thing seems to take priority at a time. For example, doctor's appointment—I missed twice in a row this month." Total reliance on strategy and technology • "I use an agenda, timer, and phone, otherwise I would forget absolutely everything." • "I have to rely on iPhone, but often forget to record appointments."
4	Putting off getting started/procrastination • "With almost every assignment I have problems with procrastination—just can't get started and articulate ideas on to paper that are in my head." • "Getting started in general is difficult, I always feel overwhelmed and can't seem to figure out what to do first." Affective response to procrastination • "Last semester I had three courses, had a lot of labs and procrastinated for all of them and had so much anxiety and stress, because I was never prepared."
5	Fidgeting with objects, tapping/jiggling feet/legs • "Always when writing exams at school and sitting for four hours—I have to move and shift in my chair and it gets worse near the end." • "During an exam I fidget constantly to the point of distracting other people. Even while watching TV, I need to fold laundry or do something with my hands." Pacing, getting out of seat • "In class, there is no room to fidget, so often I leave to just walk around."
6	Compulsion, inner drive to move or act • "I have a creative side that doesn't shut off and so I'm constantly writing notes or recording voice notes because I can't write as fast as I think." • "If I'm sitting at a computer trying to get work done, I will get urge to go eat or go to the kitchen, and will get up and get distracted." Burst of energy • "If a task gets too boring I will get a burst of energy and need to move around."

Note. See Table 4 for question descriptions.

a novel semistructured telephone-based version of the 6-item ASRS with probes for real-life examples of behavior for each symptom (ASRS-TIPS). We also gathered self-reports of distress, psychopathology, and EF impairments in everyday life, and we administered standardized measures of neuropsychological performance as well as screening measures of academic performance. The major finding was a marked discrepancy in evidence of impairment as measured by standardized cognitive and academic tests versus self-report measures. Specifically, the students' performance

on standardized tests of EF and academic achievement provided no evidence of impairment, but impairment in PSE settings was well described by students in their examples of symptom manifestation in responses to probes on the ASRS-TIPS.

In this sample of college and university students, the reported frequency of occurrence of ADHD symptoms (i.e., often or very often) suggest that they were quite severe and above the clinical cutoff. Similarly, self-reported psychopathology scores and levels of psychological distress were clinically significant. ASRS scores were significantly correlated with measures of psychopathology and psychological distress, indicating that these post-secondary-level students with ADHD were dealing with significant mental health difficulties combined with problematic ADHD symptoms. This high level of co-occuring ADHD and reported other psychiatric symptomology is consistant with findings for children and adults (Barkley et al., 2010; Biederman, Newcorn, & Sprich, 1991). This is an important issue for implementation of accommodations at the post-secondary level in that accomodations for ADHD should be paired with appropriate intervention and treatment for other co-occuring disorders that could interact with symptoms of ADHD. The study participants also manifested lower levels of determination and resolve ("grit") toward goals, indicating less resilience to mitigate impairment related to ADHD symptoms. Sex differences included higher levels of obsessive-compulsive, somatization, paranoia, psychoticism, and overall levels of psychological distress symptoms reported by females, but no sex differences were found for ASRS-TIPS totals, anxiety, depression, and phobia symptoms.

Consistent with the established links between ADHD, self-reported impairment in EF, and major life activities found in the adult ADHD literature (Barkley & Fischer, 2011), these post-secondary students self-reported significant impairment related to EF difficulties in daily life. Participants, particularly females, reported high levels of difficulty with lapses in attention, listening, and forgetfulness. This is supported by detailed examples of impairment on each of the ADHD symptoms on the ASRS-TIPS. By contrast, their performance on the standardized tests of intelligence and working memory did not reveal impairments. For instance, their average Digit Span score fell between the 25th and 34th percentiles, which is considered to be at the lower end of average. Spatial working memory and spatial span scores fell between the 42nd and 50th percentiles, solidly in the average range. Thus, when compared to the "average person," these students are generally performing in the expected range on these tests. However, if they were to be compared to non-ADHD peers in higher education, they might be found to be underperforming. For example, in our previous research we found that typically developing college and university students performed at the 50th percentile on the WAIS Digit Span task, the 68th percentile on tests of spatial working memory, and the 73rd percentile on spatial span tests (Kim et al., 2013). However, the current recommendation for DSOs is to compare the cognitive functioning of post-secondary students with ADHD to that of the "average" person rather than to college and university peers, who would have the same level of education (Harrison & Rosenblum, 2010). Results from correlation analyses also provided evidence for a limited relationship between ADHD symptoms, self-reported EF difficulties, and objective measures of working memory.

Students' self-reported GPAs fell in the acceptable-to-good range, as has been reported in other studies (e.g., Sparks et al., 2004), and they did not display impairment in fluent performance of basic academic skills (word reading, math fluency). Of note, moderate correlations were found between DS and word reading and math fluency, indicating a relationship between working memory and these basic academic skills. Half of the sample were being treated with medications, and some students reported receiving accommodations that might have helped them maintain reasonable GPAs, but we were unable to confirm this information systematically for all participants. Further research is warranted to investigate the impact of medication and specific accommodations on students' GPAs, given that the limited available evidence of beneficial effects on the academic outcomes is equivocal (Lovett & Leja, 2015; Miller, Lewandowski, & Antshel, 2013).

A unique feature of this study was the telephone-based administration of the ASRS-TIPS, which allowed us to elicit and analyze qualitatively the students' descriptions of behavior provided in their response to the 6 questions that probed some key symptoms of ADHD. Our analysis of the frequency with which each item on the ASRS was endorsed revealed that students were not simply endorsing all symptoms at the "very often" level but rather were using the full scale with a varied pattern of endorsement.

Our qualitative analysis yielded several major findings. First, we found that the most common theme emerging from students' responses to each question was consistent with that of the intended meaning of the corresponding *DSM* symptom. Second, the analysis provided insights that expand outside of standardized testing, to further explore the type of impairments associated with these six ADHD symptoms, as manifested in the post-secondary environment, which we discuss in the following section. Third, our analysis also revealed themes that were common across several symptoms but are not represented in the current diagnostic criteria for ADHD: problems with time management, problems with thinking, and psychological distress related to symptoms.

One unexpected finding from our qualitative analysis was that the symptom most frequently endorsed by these students was a symptom of hyperactivity, namely, overt fidgeting. For instance, these students described frequently tapping or swinging their feet, or "leg-bouncing" while having to try to sit still through lectures, exams, and essay writing or other long assignments. This finding is counter to the widely held belief that overt motor hyperactivity declines with age or is transformed to a subjective feeling of "inner restlessness," leaving symptoms of inattention and impulsivity as the prevailing features of adult ADHD (e.g., Biederman, Mick, & Faraone, 2000). Recent objective measurements of hyperactivity, however, have revealed that activity measures of head and shin movements while seated doing computerized attention tasks were superior to attention measures in discriminating adults with ADHD from healthy controls (Teicher, Polcari, Fourligas, Vitaliano, & Navalta, 2012). Moreover, although the *DSM-5* lists "feeling restless" as an example of the adult manifestation of the symptom "often runs about or climbs," these college and university students with ADHD reported inner restlessness in response to ASRS Question 6 (feel overly active and compelled to do things, like you were driven like a motor). Their need to move was often associated with psychological stress and was not necessarily restricted to academic environments. Collectively, these findings afford confidence that the students' frequent endorsement of fidgeting was valid and not simply a strategy for feigning ADHD symptoms, as has been claimed (see review by Musso & Gouvier, 2012).

These insights into the manifestation of ADHD symptoms in post-secondary settings have implications for developing accomodations. The ASRS-TIPS may allow researchers and clinicians to link various symptoms and associated impairments described by students with types of accommodations to enable them to function as well as their peers. For example, recurrent forgetfulness, which resulted in missing classes and appointments, may be accommodated with use of assistive technology, such as smart phones, to provide auditory and visual reminders of deadlines and appointments and permit automatic scheduling.

Limitations

There are some limitations that are important to consider in conjunction with the findings of this study. First, findings might not be generalizable to all college and university students with ADHD; data were derived from a Canadian sample of college and university students who were already registered with the DSOs, indicating that their disabilities had been reviewed and accepted. Moreover this sample had been recruited as potential participants for a clinical trial on working memory training for students in PSE who had a diagnosis of ADHD, but we did not confirm the diagnosis or comorbid disorders. Furthermore, we were unable to obtain collateral reports for about 50% of the sample or confirm the type of collateral informant (e.g., parent, adult sibling, partner). On the other hand, all students had documentation of a diagnosis and impairment that was acceptable for registration with the DSOs, and the majority were in their 2nd year or more. This meant that they could readily provide valid examples of symptom manifestation and associated impairment in the PSE environment. Second, about one fifth of our sample was registered with a comorbid diagnosis of LD, but we were unable to confirm either the diagnosis or type of LD. Third, we did not have systematic information about the students' academic accommodations, which might account for the average-to-good GPAs reported by the students. Fourth, this was a cross-sectional study, so we were unable to ascertain changes in course load or withdrawals, time to graduation, or drop-out/graduation rates. Last, although representative of important cognitive functions associated with ADHD, our neuropsychological tests were restricted to tests of IQ, working memory, and working memory strategy, and they were not representative of a full neuropsychological test battery that may be conducted in a clinical or educational assessment.

Conclusions

College and university students with ADHD are likely to manifest severe and impairing symptoms that interfere with functioning and success in the PSE environment. Standardized public-domain tools, such as the ASRS, completed by the student and a collateral informant, provide reliable and cost-effective ways of confirming current symptomatology. When supplemented by probes to elicit the student's description of behavioral examples of each symptom in daily life, such tools may provide insights into the nature of impairment associated with the symptoms. Impairment from current symptoms is readily documented by self-report using standardized rating scales that probe for slips of attention and memory, or of EF in everyday life, and may be further supported by contextually based examples of symptoms, as elicited in the ASRS-TIPS. Collectively, findings from this study, together with previous research, suggest that the common current practice of requiring evidence of impairment, as compared to the "average person," on standardized neuropsychological and academic achievement tests may inadvertently render these students ineligible for registration and access to needed accommodations.

Appendix

Major Themes Extracted From Participant Responses on the Adult ADHD Self-Report Scale (ASRS) Telephone Interview Probes for Symptoms.

ASRS question	Major themes extracted	Frequency
1 (*DSM-5* symptom category A1 d)	Trouble with details[a]	68
	Fails to finish	30
	Time management	32
	Procrastination	12
	No example	16
2 (*DSM-5* symptom category A1 e)	Action/inaction with organizing things[a]	49
	Trouble organizing thoughts	29
	Time management	28
	No example	15
3 (*DSM-5* symptom category A1 i)	Problems with missing appointments[a]	82
	Total reliance on strategy and technology	60
	Strategy ineffective or misused	15
	Lateness (time management)	11
	No example	9
4 (*DSM-5* symptom category A1 f)	Putting off getting started/procrastination[a]	128
	Affective response (anxiety) to procrastination	25
	Doing something else instead of task to start	13
	No example	5
5 (*DSM-5* symptom category A2 a)	Fidgeting with objects, tapping/jiggling feet/legs[a]	116
	Pacing, getting out of seat	18
	Anxiety: nail biting, knuckle cracking	14
	People noticing/complaining about fidgeting	10
	No example	8
6 (*DSM-5* symptom category A2 e)	Compulsion, inner drive to move or act[a]	78
	Burst of energy	18
	High speed of thoughts/actions	18
	No example	17
	Anxiety, discomfort if not physically active	9

Note. DSM-5 = Diagnostic and Statistical Manual of Mental Disorders, fifth edition. See Table 4 for question descriptions.
[a]Extracted theme is consistent with that of the meaning of the parallel *DSM-5* symptoms.

Declaration of Conflicting Interests

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