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Evaluating the Consistency of Scales Used in Adult Attention Deficit Hyperactivity Disorder Assessment of College-Aged Adults

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Introduction

Increased awareness of Attention Deficit Hyperactivity Disorder (ADHD) in adults may be related to gradually increasing prevalence rate in the last few decades, to reach up to 5% of the population (1). It is estimated that up to 60% of childhood ADHD cases will continue to have clinically significant ADHD symptoms as adults (2). Despite this high prevalence rate, only 10.9% of adult patients receive treatment for ADHD (3). It is estimated that ADHD results in 120 million days of annual lost work in the U.S. labor force, which is equivalent to \$19.5 billion lost human capital (2). This may be particularly important for the college population, as several studies associate untreated ADHD with lower academic success and higher psychiatric problems compared to the overall student population (4).

The diagnosis of ADHD can be challenging for several reasons. Based on recommendations in the literature, diagnostic steps should include a comprehensive evaluation reviewing current and childhood ADHD symptoms and other psychiatric comorbidities (5). Acquiring developmental history typically requires gathering information from third parties who not be easily accessible (6). Moreover, other psychiatric disorders may mask and/or imitate ADHD symptoms. The National Comorbidity Survey Replication reports that Adult ADHD has a comorbidity of 38% for mood disorders, 47% for anxiety disorders, 20% for impulse control disorders and 15% for substance use disorders (3). A recent meta-analysis reports that

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almost a quarter of patients with substance-use disorders met criteria for co-occurring ADHD(7). Despite these challenges, there is pressure on providers to reach an accurate diagnosis in a timely manner, especially in college students. A prolonged waiting period for a student to be diagnosed with ADHD and start treatment may result in significant academic losses, especially in a demanding college environment. However, an accurate diagnosis is critical to reduce the risk of stimulant medication misuse.

Neurocognitive evaluations such as Continuous Performance Tests (CPT) are traditionally viewed as objective methods to assess the cognitive abilities and attention functioning of ADHD patients. Although results of CPTs can be informative, ultimately such data are not utilized in a final diagnosis of ADHD. Such ADHD diagnoses should depend on satisfying DSM criteria, which includes both a minimum symptom count and symptom onset during childhood. In conjunction with a clinical interview, various instruments, including ADHD symptom rating scales and scales assessing other psychiatric symptoms, can aid in the diagnosis of ADHD.

We retrospectively examined records of a university-based psychological counseling center that receives approximately 130 annual requests for ADHD evaluations. The purpose of this study is to determine which measures used in a clinical evaluation of ADHD in college age adults are most strongly related to the final clinical diagnosis of ADHD. Secondarily, we sought to extend those findings to examine whether such scales could inform screening strategies.

Methods

Subjects and Procedure

We examined clinical data for students who completed an ADHD evaluation at the Vanderbilt University Psychological and Counseling Center (PCC) (N=230) between July 2013 and October 2015. Students were age 18 and older at the time of evaluation and included undergraduate, graduate and professional students, including medical, business, law, divinity and nursing students. All students completed a detailed ADHD evaluation under the supervision of the PCC psychologist (FN), who is specialized in ADHD assessment and administering neurocognitive test tools. FN provided the clinical diagnosis based on her assessment and the scales/tests reported in this study. The assessment included a complete psychiatric evaluation with medical, developmental and family history, review of childhood and current ADHD symptoms, assessment of other psychiatric comorbidities and substance use disorders, and administration of a continuous performance test.

Exclusion criteria from the study included the presence of a prior ADHD diagnosis by a child and adolescent psychiatrist, a prior diagnosis confirmed by neurocognitive evaluation outside the PCC, or the presence of a major neurological disorder affecting neurocognitive evaluation results, including prior stroke, brain tumor or multiple sclerosis.

Measures

Evaluation of Parent-Reported Childhood ADHD Symptoms and Self-Reported Current ADHD symptoms—Over the course of the study period, two different scales

were used at non-overlapping times to obtain parent report of childhood ADHD symptoms and self-report of current symptoms. The College ADHD Response Evaluation (CARE) evaluates early adult ADHD diagnosis according to DSM-IV criteria (8) and includes a Parent Response Inventory (PRI) of childhood symptoms and a Student Response Inventory (SRI) of current symptoms. The PRI is a 46 item questionnaire, which asks parents to endorse the presence or absence of behavioral characteristics of their child during elementary school (approximately 5-8 years old). In addition to ADHD symptoms, parents rate other childhood behaviors, including symptoms of depression, anxiety and problems with self-esteem (8). The SRI is a 59-item self-report questionnaire of current ADHD symptoms and other behaviors relevant to college students, including sitting through lectures, completing assignments, taking exams, scheduling daily activities, engaging in social activities and experiencing feelings of anxiety or depression (8). The scales were constructed to balance negatively and positively worded items to reduce response bias (8). CARE questionnaires have high levels of internal consistency (α ranging from 0.74 to 0.90) and test-retest reliability (r 's ranging from 0.77 to 0.91) (8). For both PRI and SRI, in this study we only examined the 18 questions probing ADHD criteria. Answers for each question include "Agree", "Disagree" or "Undecided" with the question counted positive only if the respondent answered "Agree".

The second symptom measure of ADHD used was the Barkley Adult ADHD Rating Scale-IV (BAARS-IV), which also includes an Other-Report of Childhood Symptoms questionnaire and Self-Report of Current Symptoms questionnaire. We used the short version of BAARS-IV, which includes only the 18 DSM5 criteria for ADHD divided into inattention, hyperactivity, and impulsivity indices. Respondents endorse behaviors as "never or rarely" present, "sometimes" present, "often" present, or "very often" present. Symptoms are considered present when endorsed as "often" or "very often" present. Studies have shown that BAARS-IV scales have a high internal consistency ($\alpha=0.92$) and high test-retest reliability ($r=0.75$) for current ADHD symptoms and childhood symptoms questionnaire, respectively (9).

To use these data in the study, we did not examine these different scales as continuous measures. Rather, we identified whether each respondent (parent or student) endorsed enough symptoms to meet DSM-5 criteria for ADHD.

Counseling Center Assessment of Psychological Symptoms (CCAPS) - 34

CCAPS-34 is a multidimensional assessment instrument, which contains 34 items covering nine domains, including Depression, Generalized Anxiety, Social Anxiety, Eating Concerns, Substance Use, Family Distress, Academic Distress, Hostility and Distress Index. Respondents rate behaviors on a scale ranging from 0 ("not at all like me") to 4 ("extremely like me") in terms of how well an item describes the individual during the past two weeks. The CCAPS-34 has good internal consistency and test-retest reliability in all scale domains ($\alpha=0.82 - 0.92$) and ($r=0.76 - 0.92$) respectively (10). Results are reported as a percentile rank, which inherently and intuitively compare an individual's subscales with the referent population (10). We compared symptomatic presentation between cohorts by using mean

percentile scores and by using cutoff scores indicating elevated symptoms reports, which range between 59 and 76 according to the scale developers (11).

Personality Assessment Inventory (PAI)

The PAI is a 344-item self-report questionnaire, organized into 22 non-overlapping scales, including 11 clinical scales, 5 treatment scales, 2 interpersonal scales and 4 validity scales. In this study we used only the 11 clinical scales (somatic concerns, anxiety, anxiety related disorders, depression, mania, paranoia, schizophrenia, borderline features, antisocial features, alcohol use and drug use). Each item is rated on a 4-point scale (1-“Not true”, 2-“Slightly true,” 3-“Mainly true,” and 4-“Very true”). Internal consistency for the full PAI scale is ($\alpha=0.80$), whereas test-retest reliability is found to be ($r=0.86$)(12). We used cutoff scores indicating elevated symptoms (score 70 and higher) and low symptoms (score 50 and lower) to compare psychiatric symptoms between ADHD and Non-ADHD groups(13).

Alcohol Use Disorders Identification Test (AUDIT)

The AUDIT is a 10-item self-report measure used to identify problematic use of alcohol(14). It has been found to be a valid tool to identify severity of alcohol use in college students (15). The scale contains three domains, including alcohol consumption, alcohol dependence and alcohol-related problems. Each question varies in response but can be scored on a 0-4 point scale. A total score is generated by summing the scores for all questions. We used a cutoff score of 8 or more in men (7 in women) recommended by several studies as a strong indicator of harmful alcohol consumption. A score of 20 or more in men (13 in women) as suggestive of alcohol dependence (15). The AUDIT has an excellent sensitivity of 0.89 for an alcohol-related diagnosis(16).

Integrated Visual and Auditory Continuous Performance Test – Advanced Edition (IVA-AE)

IVA-AE is a CPT designed to assess aspects of response control (i.e., inhibition) and attention to aid ADHD diagnosis according to DSM-IV criteria. It provides information to differentiate between the four subtypes of ADHD, including Predominantly Inattentive type, Predominantly Hyperactive-Impulsive type, Combined type and Not Otherwise Specified. The task requires the subject to respond to auditory and visual targets or inhibit a response to auditory and visual non-targets for a total of 500 trials during the Basic Test and up to 1000 Trials during the Extended Test. Each trial lasts for only one second. We used IVA-AE researcher kit to obtain scores for 28 different scales divided into four main groups: The Full Scale Response Control Quotient (FRCQ), which is a combination score for Prudence, Consistency and Stamina; The Full Scale Attention Quotient (FAQ), which is a combination score for Vigilance, Focus and Speed; The Sustained Full scale Attention Quotient (SFAQ), which is a global measure of ability to respond to stimuli under low demand conditions that is a combined score for Acuity, Dependability, Elasticity, Reliability, Steadiness and Swiftiness; and finally the Symptomatic scales. The prior three scales assess characteristics of executive functioning relevant to ADHD diagnosis and so are used in the current study. The Symptomatic scale provides information about the validity of the evaluation, which is divided into Stillness, Comprehension and Sensory/Motor scales, and was not examined. IVA-AE is highly stable across time for test-retest reliability, with correlation coefficients of 0.60 higher (17).

Statistical Analyses

All analyses were conducted using SAS 9.4 . We tested for univariate differences between diagnostic groups in demographic and clinical variables using chi-square tests for categorical variables and two-tailed t-tests for continuous variables. Initial tests for differences between ADHD and Non-ADHD cohorts were conducted using chi-square tests.

Variables that differed between diagnostic groups in univariate tests were incorporated into general linear regression model to analyze the measures most strongly related to clinical ADHD diagnosis, while controlling for age, sex, education level. Retaining these demographic variables, we conducted backward regression to develop a parsimonious model, removing each non-significant variable based on its statistical significance level of $p=0.05$. The remaining variables were identified as most strongly related to clinical ADHD diagnosis. Based on these results, we conducted exploratory analyses examining whether such measures could be used as screening instruments and estimating the number of false positive and false negative cases that would be identified using this method.

Results

We evaluated the records of 230 students presenting for ADHD evaluation. We excluded 17 records due to lack of final diagnosis, resulting in final sample of 213 students: 93 with an ADHD diagnosis and 120 without an ADHD diagnosis. There were no statistically significant differences between diagnostic cohorts in demographic characteristics, current alcohol use, presence of ADHD family history, or past psychotropic medication use. The exception was that students receiving an ADHD diagnosis were more likely to report past use of stimulant medication (Table 1).

Self-Report of ADHD symptoms

Students who received an ADHD diagnosis scored significantly higher on the CARE self-report, but we did not observe significant differences between those with and without a final ADHD diagnosis on the BAARS-IV self-report scale (Table 1). Students with a final ADHD diagnosis also exhibited significantly higher scores on both the CARE and BAARS-IV parent report scales.

We next dichotomized parent-report and student-report scales according to a symptomatic diagnostic threshold (five or more positive ADHD symptoms of inattention or hyperactivity/impulsivity questions per DSM 5). Combining data across CARE and BAARS-IV, we found that students with clinical ADHD diagnoses were more likely to meet ADHD criteria per parent and student report (Table 1).

Self-Reported Psychiatric Symptoms

When assessing psychiatric symptom severity using the CCAPS-34, the ADHD diagnosis group generally reported lower levels of co-morbid symptoms and distress than did those who did not receive an ADHD diagnosis (Table 2). These group differences were statistically significant for depressive symptoms, academic distress and distress index scores (Table 2).

We found similar results whether we examined mean CCAPS-34 scores or dichotomized results based on CCAPS-34 severity thresholds.

On the PAI, students who received ADHD diagnosis showed significantly lower PAI scores on scales of anxiety, anxiety-related disorders, schizophrenia, borderline and paranoia (Table 3). However, group mean differences were often small across these domains, ranging from 4 to 6 points. When we dichotomized scores according to a high symptomatic cutoff point (score 70 or above), fewer students with ADHD diagnosis reported this level of severity in the schizophrenia subscale (8.4% (N=7) compared to students without ADHD (25.6% (N=30), $X^2=9.54$, $p=0.0020$). On examining a low symptomatic cutoff point (score 50 and lower) students with ADHD diagnosis were less likely to endorse this level of severity in anxiety-related distress (50.6% (N=42) to 30.8% (N=36), $X^2=8.03$, $p=0.0046$) and schizophrenia (24.1% (N=20) to 9.4% (N=11), $X^2=8.01$, $p=0.0047$) compared to students without ADHD.

Objective Attentional Performance

We did not observe any significant difference in performance on the IVA-AE test between students with and without ADHD diagnoses. This was true both for the final IVA-AE diagnosis for presence or absence of ADHD and also for specific IVA-AE subscales (Table 4).

Measures Most Strongly Related to ADHD diagnosis

To analyze the factors that were most strongly associated with clinical ADHD diagnosis, we developed statistical regression models that examined categorical and continuous variables that exhibited statistically significant group differences in the above analyses. In these analyses, we were primarily interested in categorical variables due to their potential clinical utility, however we also examined continuous measures to capture the full power and range of the measures. The categorical model included dichotomized results of parent and student ADHD symptom report; prior stimulant use; CCAPS depression, social anxiety, academic distress and distress index subscales; and PAI schizophrenia subscales. The continuous model included the dichotomized results of parent and student ADHD symptom report and prior stimulant use; CCAPS-34 scores for depression, academic distress and distress index subscales; and scores for PAI anxiety and anxiety-related disorders subscales. The models showed that clinical diagnosis is highly associated with parent report of increased ADHD childhood symptoms, student report of increased ADHD current symptoms, history of prior stimulant use, low scores/negative symptoms on CCAPS-34 academic distress and distress index subscales, and negative symptoms on the PAI anxiety subscale (Table 5).

Exploratory Analyses Examining Potential Utility of Assessments for Screening Purposes

In exploratory analyses, we examined whether these instruments could potentially have value as a screening method for adult ADHD diagnosis. Given the strength of the association between parent and student self-report with clinician ADHD diagnosis, we examined whether a combination of these instruments could be used as a screening tool. We dichotomized the sample into those who did not meet criteria for a DSM5 diagnosis by either self- or parent-report and those who met a DSM5 diagnosis on either the parent-report

or self-report questionnaire. In the analysis of 172 students who had results for both parent and student self-reports scales, 22.6% (23 of 102) of students who did not receive a clinical ADHD diagnosis had negative reports, while only 2.9% (2 of 70) of students with a clinical ADHD diagnosis had negative parent and self-report questionnaire results. This suggests that if self- and parental-report of symptoms was used as a screening tool to identify students without ADHD, there would be a false negative rate of approximately 3%.

We next examined whether other questionnaires could serve as further screening tools. In these analyses, we removed students who did not meet DSM5 criteria on either parent or self-report. Given the strength of the association in multivariate models, we examined students meeting the threshold for severe symptoms of academic distress and the distress index from the CCAPS-34. Analyses dichotomized the sample into those who met the severity threshold on both scales and those who did not. In these analyses, 25.7% (19 of 74) of students who did not receive an ADHD diagnosis exhibited high severity on both scales, while only 8.9% (5 of 56) of those with an ADHD diagnosis exhibited the same level of severity. If used as a second screening tool following parent report and student self-report, there would be a false negative rate of approximately 9%.

Of note, we also examined whether past history of stimulant use would be informative. After excluding students who did not meet DSM criteria by either parent or self-report, we found that 18.9% (14 of 74) of students who did not receive an ADHD diagnosis had previously used stimulant medication. This is in comparison with 44.6% (25 of 56) of students who did receive an ADHD diagnosis. We included this significant finding as one of the informative markers.

Discussion

Our study supports past literature by emphasizing the importance of current and childhood symptom self-reports in diagnosing adult ADHD (18). Family ADHD history was not different between groups, however, students with ADHD reported higher family history and would probably reach a statistical significance with a bigger sample size. As expected, we found a strong relationship between both student and parent positive reports of ADHD symptoms and clinical diagnosis of ADHD in the college population, which is consistent with DSM5 ADHD diagnostic criteria. We also found lower reports of other psychiatric symptoms in those diagnosed with ADHD using the self-report CCAPS-34 and PAI scales. Interestingly, students with ADHD diagnosis also reported lower scores in CCAPS-34 academic distress and distress index subscales, compared with students who did not have an ADHD diagnosis. In our final regression analyses, we found that predictors for adult ADHD diagnosis included student report of current symptoms, parent reports of childhood symptoms, prior stimulant medication use, lower scores in the CCAPS-34 academic distress and distress index subscales; and lower anxiety on the PAI.

We did not find any differences in IVA performance scales based on final ADHD diagnosis. Neurocognitive tests can highlight executive function deficits commonly observed in ADHD. Executive function includes cognitive skills that enable a person to successfully engage in a goal-directed, independent, autonomous, efficient and socially adaptive

behaviors (19). Although some studies report a benefit of using CPT as a tool for clinical evaluation and measure of medication effectiveness (20), other studies highlight the inability of a neurocognitive test to provide a final ADHD diagnosis (19). It is well documented that CPT cannot differentiate between neurological or psychiatric disorders that may result in executive dysfunction (6), nor can it identify false negative or false positive results (21). Moreover, reliance on neurocognitive tests as a primary method to diagnose ADHD in college students may result in insufficient availability of care due to the limited number of providers who are able to provide this testing and the high cost of neurocognitive testing. Our study did not identify any benefit or utility from using IVA-AE test as part of ADHD diagnosis in college-age adults. These data support that, at least for college-aged adults, clinical assessment emphasizing current symptoms and developmental history can provide an accurate, cost-effective and efficient diagnosis for ADHD without the necessity of a CPT (22, 23).

In some clinical settings it is desirable to screen adults for ADHD before conducting a full clinical evaluation, which can facilitate exploring psychiatric symptoms in a timely and efficient manner (6). One commonly used screening method is The World Health Organization Adult ADHD Self-Report Scale, which is a six item questionnaire reported to have 69% sensitivity and 99% specificity (24). Extending the screening method by adding ADHD current and childhood symptomatic reports, other psychiatric self-report symptomatic scales and malingering scales, such as the Test of Memory Malingering, can assist with an accurate and more efficient diagnosis (21, 25, 26).

Limitations

Despite the strength of including a large sample size, the current study also has weaknesses. This includes use of retrospective parent-report scales, which is subject to memory bias. Moreover, our study has limitations inherent to retrospective studies, such as missing data and changing use of assessment instruments (specifically the CARE and the BAARS-IV) over the study period. Our sample is limited to graduate and undergraduate students at Vanderbilt University, which has resulted in a demographically limited population in terms of age, educational level and socioeconomic level.

An important limitation to highlight is that the scales/tests examined were also utilized by clinician to make the final clinical diagnosis of ADHD. This emphasizes the need for replication to determine how generalizable our results are. Moreover, it requires future prospective studies to determine whether such scales continue to be associated with clinical ADHD diagnosis in the presence of blinding. Future studies can study the use of other screening approaches as a method for providing timely care for discrete college students while reducing false negative evaluations.

Conclusions

Our results suggest that in college populations, a combination of self-report and parent report questionnaires may help identify students without ADHD diagnoses with only a small percentage of students with ADHD being false negatives. Although there will still be a

sizable number of students who are false positives (who screen positive for ADHD, but are later determined not to have that diagnosis), it will reduce the number of students who need the full evaluation. The use of these scales for this purpose requires further study before it can be recommended.

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Table 1

Comparison of Demographic Information between cohorts

Variable	Without ADHD (n = 120)	With ADHD (n = 93)	Test statistic	P
Age (years)	22.4 (4.4)	23.0 (4.4)	t=-0.84	0.4012
Sex, female	53.3% (n=65)	47.9% (n=45)	X ² =0.62	0.4307
Race, white	59.4% (n=73)	67.0% (n=63)	X ² =1.18	0.2783
Level of education (Undergraduate)	59.0% (n=72)	48.9% (n=46)	X ² =2.18	0.1401
International student	9.0% (n=11)	11.7% (n=11)	X ² =0.42	0.5176
Any Prior Psychotropic Use	48.4% (n=59)	60.9% (n=56)	X ² =3.30	0.692
Prior Stimulant medication use	17.2% (n=21)	40.4% (n=38)	X ² =14.41	0.0001
Alcohol use AUDIT	5.2 (4.2)	5.1 (4.0)	t=0.17	0.8619
ADHD Family History	32.5% (n=26)	41.1% (n=23)	X ² =1.05	0.3055
CARE Student Total Score (n = 127)	n=77 9.2 (3.4)	n=50 11.5 (3.4)	t=-3.74	0.0003
CARE Parent Total Score (n = 121)	n=68 4.4 (4.0)	n=53 9.5 (4.4)	t=-6.68	<0.0001
BAARS-IV Student Total Score (n = 66)	n=40 8.6 (4.6)	n=26 10.0(3.8)	t=-1.28	0.2043
BAARS-IV ParentTotal Score (n = 61)	n=37 3.1 (3.7)	n=24 9.1 (5.1)	t=-5.35	<0.0001
Met DSM criteria for ADHD by Student Report (Total n = 191)	n=83 72.2% (n=83)	n=71 93.4% (n=71)	X ² =13.22	0.0003
Met DSM criteria for ADHD by Parent Report (Total n = 182)	n=23 21.9%	n=55 71.4%	X ² =44.49	<0.0001

Table 1 presents data from students who did and did not receive a final clinical diagnosis of ADHD. Determination of DSM5 Criteria for ADHD as assessed by CARE and BAARS-IV made by determining whether enough items were endorsed for a diagnosis on either student or parent self-report questionnaires.

Table 2

Comparisons between Cohorts According to CCAPS Scores and Cutoff Points

CCAPS	Without ADHD (n = 110)	With ADHD (n = 76)	Test statistic	P
Depression				
• Score	50.5 (28.9)	38.9 (24.5)	t=2.84	0.0051
• Cutoff	40.9% (n=45)	22.4% (n=17)	X ² =6.95	0.0084
Generalized Anxiety				
• Score	49.2 (25.9)	44.0 (24.7)	t=1.37	0.1701
• Cutoff	39.6% (n=38)	24.1% (n=14)	X ² =1.48	0.2242
Social Anxiety				
• Score	56.3(30.0)	51.3 (24.8)	t=1.20	0.2327
• Cutoff	32.7% (n=36)	17.1% (n=13)	X ² =5.65	0.0174
Hostility				
• Score	46.7 (23.2)	48.6 (23.0)	t=0.98	0.3262
• Cutoff	20% (n=22)	13.2% (n=10)	X ² =1.48	0.2242
Eating Concerns				
• Score	59.9 (19.4)	57.1 (19.5)	t=0.98	0.3306
• Cutoff	26.4% (n=29)	23.4% (n=17)	X ² =0.39	0.5347
Academic Distress				
• Score	74.2 (21.8)	65.0 (21.9)	t=2.83	0.0051
• Cutoff	71.8% (n=79)	52.6% (n=40)	X ² =7.18	0.0074
Distress Index				
• Score	52.2 (26.5)	43.1 (23.7)	t=2.14	0.0340
• Cutoff	30.0% (n=33)	14.5% (n=11)	X ² =6.00	0.0143
Substance Use				
• Score	60.7 (17.6)	61.7 (16.7)	t=-0.38	0.7017
• Cutoff	30.0% (n=33)	27.6% (n=21)	X ² =0.12	0.7265

ADHD students reported lower symptoms in depression, academic distress and distress index.

Table 3

Comparing PAI Score Means between Cohorts

PAI	Without ADHD (n = 117)	With ADHD (n = 83)	Test statistic	P
Somatic Concerns	53.9(51.6)	53.3 (50.6)	t=0.38	0.7041
Anxiety	65.0 (62.1)	60.5 (57.6)	t=2.19	0.0300
Anxiety Related Distress	58.2 (55.3)	52.6 (49.4)	t=2.57	0.0112
Depression	64.5 (61.4)	60.4 (57.5)	t=1.91	0.0578
Mania	58.9 (56.2)	64.9 (47.7)	t=-0.73	0.4677
Schizophrenia	64.1 (61.5)	58.6(56.0)	t=2.99	0.0033
Borderline Features	62.7 (60.1)	58.7 (56.1)	t=2.17	0.0319
Antisocial	59.0 (56.1)	58.0 (54.8)	t=0.49	0.6264
Paranoia	54.1 (51.7)	49.9 (47.3)	t=2.32	0.0218
Alcohol	56.0 (60.7)	51.7 (10.8)	t=0.65	0.5179
Drug Use	49.9 (9.7)	48.5 (8.0)	t=1.10	0.2718

ADHD students reported lower psychiatric symptomatic report compared to non-ADHD

Table 4

Comparing IVA-AE Results and Diagnosis between Cohorts

IVA-AE	Without ADHD (n = 120)	With ADHD (n = 93)	Test statistic	P
ADHD diagnosis by IVA %(n)	68.75% (N=77)	72.1% (N=62)	$X^2=0.26$	0.6102
Full scale Response Control Quotient (FRCQ)	81.7 (39.3)	74.5 (37.4)	$t=1.10$	0.2723
Full Scale Attention Quotient (FAQ)	68.9 (60.8)	63.0 (54.8)	$t=1.01$	0.3123
Sustained Full scale Attention Quotient (SFAQ)	72.3 (63.5)	64.8 (55.8)	$t=1.17$	0.2444

IVA-AE suggested diagnosis and IVA-AE subscales do not influence clinical diagnosis.

Table 5

Integration of scales to identify Predictors for ADHD Clinical Diagnosis

Variable	Categorical		Continuous	
	F Value	P	F Value	P
Student Report of Current ADHD	5.80	0.0172	7.59	0.0066
Parental Report of Childhood ADHD	44.07	<.0001	53.69	<0.0001
Prior Stimulant Medication Use	5.56	0.0197	6.18	0.0140
CCAPS: - Academic Distress Subscale	9.30	0.0027	10.18	0.0017
- Distress Index Subscale	4.25	0.0409	-	-
PAI: - Anxiety Subscale	-	-	9.39	0.0026

Both Categorical and Continuous (scale mean score) measures show a positive association of ADHD diagnosis with student and parent reports of ADHD symptoms, and prior stimulant use; and negative association with other self-reported psychiatric symptoms on CCAPS-34 and PAI scales.