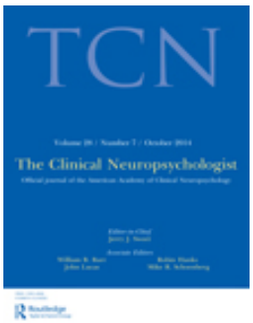

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CE Discriminating Among ADHD Alone, ADHD With a Comorbid Psychological Disorder, and Feigned ADHD in a College Sample

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Since the early 2000s concern has increased that college students might feign ADHD in pursuit of academic accommodations and stimulant medication. In response, several studies have validated tests for use in differentiating feigned from genuine ADHD. Although results have generally been positive, relatively few publications have addressed the possible impact of the presence of psychological disorders comorbid with ADHD. Because ADHD is thought to have accompanying conditions at rates of 50% and higher, it is important to determine if the additional psychological disorders might compromise the accuracy of feigning detection measures. The present study extended the findings of Jasinski et al. (2011) to examine the efficacy of various measures in the context of feigned versus genuine ADHD with comorbid psychological disorders in undergraduate students. Two clinical groups (ADHD only and ADHD + comorbid psychological disorder) were contrasted with two non-clinical groups (normal controls answering honestly and normal participants feigning ADHD). Extending previous research to individuals with ADHD and either an anxiety or learning disorder, performance validity tests such as the Test of Memory Malingering (TOMM), the Letter Memory Test (LMT), and the Nonverbal Medical Symptom Validity Test (NV-MSVT) were effective in differentiating both ADHD groups from normal participants feigning ADHD. However, the Digit Memory Test (DMT) underperformed in this study, as did embedded validity indices from the Wechsler Adult Intelligence Scale-IV (WAIS-IV) and Woodcock Johnson Tests of Achievement-III (WJ-III).

Keywords: ADHD; Malingering; Performance validity tests.

INTRODUCTION

Rates of diagnosed adult ADHD have increased dramatically over the past two decades, likely in response to the growing awareness that ADHD symptoms may persist into adulthood (Quinn, 2003). Estimates of the prevalence of adult ADHD have varied from 2.5% (APA, 2013) to 4.4% (Kessler et al., 2006) to about 5% (Barkley, Murphy, & Fischer, 2007) of the general adult population. Both accurate diagnosis and prevalence estimates have been complicated by the long-standing DSM-IV-TR requirement that symptoms must have been present before the age of 7, as adults may have trouble recalling and judging the extent of their childhood impairment.

Quinn (2003) suggested that faking might also contribute to the difficulty of diagnosing ADHD in adulthood. Malingering has been defined by the DSM-IV-TR as "the intentional production of false or grossly exaggerated physical or psychological

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symptoms, motivated by external incentives" (APA, 2000, p. 739). It is difficult to determine the base rates of feigning, in part because "real world" feigners rarely confess. However, it is reasonable to assume that the prevalence of faking would rise as associated benefits increased in magnitude. In fact, feigning of ADHD is now generally viewed as a widespread problem in cases where there is potential for secondary gain (Harrison, 2006). Consistent with this concern, Suhr, Hammers, Dobbins-Buckland, Zimak, and Hughes (2008) reported that 31% of consecutive referrals of young adults for ADHD evaluations at a U.S. university failed a well-validated test of feigned cognitive deficits, whereas Harrison and Edwards (2010) reported that about 15% of a Canadian post-secondary sample also failed widely used tests of cognitive feigning.

In a college setting there are many potential benefits an individual may receive upon successfully faking ADHD. These include significant academic accommodations, cognition- and performance-enhancing drugs, and the potential for recreational use of stimulant medication (Harrison, 2006; Kane, 2008; McCabe, Knight, Teter, & Wechsler, 2005). Advokat, Guidry, and Martino (2011) surveyed a large sample of undergraduate college students and reported that, among those who did not have a diagnosis of ADHD, 43% acknowledged using prescription stimulant medications illegally. Further, Advocat et al. found that of those surveyed who had been diagnosed with ADHD and received prescription stimulants, 84% had been asked to share their medications with a non-diagnosed student, and 19% had been asked how to fake ADHD. Thus, it has grown increasingly important to identify objective methods for detecting feigning in ADHD evaluations for college students at both the local campus and wider community levels to prevent inappropriate accommodations and the possible dangerous misuse of prescription stimulant medications.

Because ADHD is frequently diagnosed with a combination of clinical interview and self-report measures, it is relatively easy for individuals to endorse symptoms that they do not actually have. The potential ease of feigning is exacerbated by the fact that very few self-report ADHD symptom scales are equipped with validity checks to detect faking (Harrison, 2006; Quinn, 2003), and information on the disorder and feigning strategies is easily available on the internet (as well illustrated by an Internet search using the phrase "how to fake ADHD"). Therefore it has been recommended that interviews and self-report symptom measures should not be the only means of evaluation in ADHD assessment (Fisher & Watkins, 2008; Quinn, 2003).

Research into feigning from the 1980s to the mid-2000s was particularly focused on mild traumatic brain injury (mTBI), and the study of faking ADHD is still a relatively new area of inquiry. With some notable exceptions, the majority of published studies have compared ADHD groups with vs. without an incentive to feign (differential prevalence design), or contrasted normal participants asked to fake ADHD with genuine ADHD patients who are instructed to answer honestly (simulation design). Current findings suggest that individuals instructed to fake ADHD symptoms can easily feign credible symptoms on self-report tests and also typically show significantly decreased performances on neuropsychological measures as well as performance validity tests (PVTs; Booksh, Pella, Singh, & Gouvier, 2010; Harrison, Edwards, & Parker, 2007); these findings are supported in clinical samples as well (Suhr et al., 2008; Sullivan, May, & Galbally, 2007). Evidence from the neuropsychological literature suggests PVTs are well validated for detection of feigned neuropsychological disorder (Boone, 2007; Larrabee, 2007; Sollman & Berry, 2011).

Two recent simulation studies on detection of feigned ADHD used PVTs as well as detection via indices embedded in standard neuropsychological tests. These investigations compared performance on various measures between simulated ADHD malingerers and a variety of control groups in college samples (Jasinski, Harp, Berry, Shandera-Ochsner, Mason, & Ranseen, 2011; Sollman, Ranseen, & Berry, 2010). Sollman et al. (2010) compared ADHD simulators with ADHD controls and normal controls on a wide array of measures and found that feigners performed significantly worse than ADHD controls on standard neuropsychological tests as well as on PVTs and embedded validity indices. Effect sizes were robust (most *d*s ≥ 1.0), and very high specificity and moderate sensitivity were found for most of the feigning measures.

In an extension of Sollman et al.'s (2010) findings, Jasinski et al. (2011) used a modified battery to compare the test performance of normal participants and genuine ADHD patients answering under honest instruction with normal participants feigning ADHD and genuine ADHD patients asked to exaggerate their symptoms. A mood disorder control group was included as well. Broadly speaking, results were consistent with Sollman et al.'s (2010) findings with *d*s for PVTs ranging from 1.0 to 1.6.

Thus, there is growing evidence that feigned ADHD can be discriminated from genuine ADHD using PVTs and embedded validity indices. However, one potentially confounding variable that has not been widely studied is the extent to which comorbid psychological diagnoses might complicate differentiation of feigned from genuine ADHD. Most prevalence estimates suggest that half or more of the individuals who meet diagnostic criteria for ADHD also have another psychological disorder (Barkley et al., 2007; Cumyn, French, & Hechtman, 2009; Kessler et al., 2006; Sobanski, 2006; Torgersen, Gjervan, & Rasmussen, 2006). Some of the most common psychological comorbidities include anxiety and mood disorders, personality and substance use disorders, and learning disorders (Cumyn et al., 2009; Torgersen et al., 2006). Because a significant portion of individuals with ADHD are likely to have additional diagnoses, it is crucial to gain a better understanding of how comorbid disorders might affect test performance, particularly in the case of feigning detection measures.

To address the possible impact of ADHD + comorbid psychological disorders, the present study used a simulation design and was conducted similarly to that of Jasinski et al. (2011) with a few methodological changes. Comparable to the previous study, the present study examined differences between non-clinical individuals instructed to feign ADHD (NLF) and honest ADHD only (ADHD-O) individuals. An additional clinical control group was comprised of individuals with ADHD + a comorbid psychological disorder (ADHD-CO). The ADHD-CO group included two types of disorders commonly comorbid with ADHD: Anxiety Disorders and Learning Disorders. This design allowed exploration of the possible impact of ADHD with co-occurring psychological disorder on the discrimination of genuine and feigned ADHD.

METHOD

Participants

A total of 88 undergraduate students, 74 recruited through an introductory psychology participant pool and 14 recruited by fliers placed at a disability resource center on a university campus, enrolled in the study. Three groups were targeted for

inclusion in the study: individuals with a history of ADHD and no other psychological or neurological disorder (ADHD only: ADHD-O), individuals with a history of ADHD and a comorbid Anxiety or Learning Disorder (ADHD-CO), and normal participants with no history of psychological or neurological disorder. Eligible individuals in the last group were randomly assigned to either the normal feigning (NLF) group or the normal controls responding honestly (NLH) group at a ratio of approximately 2:1. The NLH group was smaller than the others because it served primarily as a manipulation check, and the large effect sizes associated with simulated malingering require less power to detect a statistically significant difference between the NLH and NLF groups. Individuals recruited through the participant pool were compensated with five of their required six research credits, while participants who were recruited via flier were compensated with $40.

All individuals underwent an initial phone interview to determine eligibility. To qualify for participation, normal control individuals (NLH and NLF) could not have a history of diagnosed or suspected ADHD, learning disorders, brain injury, neurological disorders, or psychological disorders. Individuals who were being interviewed for participation in either of the clinical groups (ADHD-O or ADHD-CO) were asked about the process they went through to obtain their diagnoses. It was required that ADHD diagnoses be received from or verified by a mental health practitioner and based on more than just self-reported symptoms and/or a brief consultation. Most individuals reported having completed self-report questionnaires on ADHD symptoms as well as undergoing cognitive and/or neuropsychological testing (e.g., intelligence testing, continuous performance testing). All participants with ADHD were required to have received their diagnoses before the age of 18, and more than half of these participants received their diagnoses by age 12. Participants with ADHD who were currently prescribed stimulant medication were asked to abstain from their medication for 12 hours prior to participating in the study.

Data from 12 participants were ultimately excluded from analysis. Six individuals were dropped because they endorsed neurological or psychological conditions on questionnaires completed at the time of the study that had not been revealed during the telephone screening. Three individuals' data were removed from analysis because they were outliers on either the age or WRAT-4 Word Reading standard score variables. One individual was excluded because he could not stay awake during testing, and another individual's data were dropped because the testing session was terminated due to inclement weather. Finally, one individual from the NLF group was excluded because he indicated on a post-test questionnaire that he did not give adequate effort in following instructions. Overall, six participants from the NLF group, five participants from the ADHD-O group, and one participant from the NLH group were excluded from analyses, resulting in the following sample sizes: NLH $n = 9$, NLF $n = 23$, ADHD-O $n = 22$, and ADHD-CO $n = 22$.

Characteristics of the participants included in the final analysis are presented in Table 1. There were no significant differences between groups on any of these variables, including gender, age, education, race, and word-reading ability (WRAT-4). A further analysis explored possible differences in the diagnostic characteristics of the ADHD-O and ADHD-CO groups. There were no statistically significant differences between these two groups for age at diagnosis, ADHD subtype, or prescription of stimulant medication. However, there was a statistically significant difference in proportion

Table 1. Demographic characteristics of participants included in final analyses

Variable	Group descriptives				Omnibus test	
	NLH $n = 9$	NLF $n = 23$	ADHD-O $n = 22$	ADHD-CO $n = 22$	F or χ^2 $N = 76$	p
Male (%)	44.44	56.52	50.00	31.82	2.96	.398
Age (years)						
M	19.44	20.04	19.05	19.50	1.89	.193
SD	1.59	1.33	1.29	1.54		
Education (years)						
M	12.67	13.26	12.73	13.09	1.16	.332
SD	1.00	0.92	1.12	1.34		
Repeat Grade (%)	0.00	4.35	0.00	9.09	2.82	.420
Ethnicity (%)					7.20	.303
White	100.00	86.96	100.00	100.00		
Black	0.00	8.70	0.00	0.00		
Hispanic	0.00	4.35	0.00	0.00		
Other	0.00	0.00	0.00	0.00		
WRAT: WR St. S						
M	99.44	106.04	98.55	99.32	2.19	.097
SD	16.08	8.21	8.18	13.47		

NLH = Normal Honest; NLF = Normal Feigning; ADHD-O = ADHD Only; ADHD-CO = Comorbid ADHD; *M* = Mean; *SD* = Standard Deviation; WRAT: WR St.S = Wide Range Achievement Test-4 (WRAT-4) Word Reading Standard Score.

receiving current academic accommodations (ADHD-O 27.3%; ADHD-CO 59.1%; $\chi^2 = 5.4$ (1), $p < .02$). Within the ADHD-CO group, of the nine individuals reportedly diagnosed with LDs, six stated that they had a Reading disability, two a Writing disability and one a Combined disability. The remaining 13 participants in the ADHD-CO group reported having been diagnosed with an Anxiety Disorder in addition to ADHD.

Procedure

Two researchers (RA1 and RA2) were present for each testing. RA1 conducted the pre-test session which included completing a background/demographics questionnaire, confirming that individuals with ADHD had abstained from their stimulant medication, completing the IRB informed consent process, administering the pre-test measures under standard instructions, and presenting experimental instructions. All participants were told by RA1 not to reveal their instructions to RA2.

Honest participants (NLH, ADHD-O, and ADHD-CO) were instructed to give their best effort throughout the session. Feigning participants (NLF) were asked to perform on the tests in a way that would ensure that they received an ADHD diagnosis. NLF participants were cautioned not to be so obvious that they would be detected by RA2. They were offered a "conditional" $25 incentive should they successfully fake ADHD. In fact, all participants in the NLF group received this $25 in the debriefing session, per IRB protocol. NLF participants were provided a scenario to increase their motivation to feign believably:

You have a friend on campus who has just been diagnosed with ADHD. She is prescribed a stimulant drug (like Ritalin or Adderall) that makes her concentrate better

and stay awake more easily. Studying becomes so much easier for her that it takes almost no time at all. On top of that, the university gives her extra time to complete exams and other assignments because she has ADHD. Schoolwork becomes so easy for your friend that it seems like she is able to socialize and have fun whenever she wants. She tells you that all she had to do was take a few tests to receive her diagnosis. You feel you could really use some extra time on exams and assignments, and it would be great to have some medication to help you study faster, so you decide you will try to get a diagnosis, too. You search the internet for information on ADHD, and you make an appointment for testing.

NLF participants were also given a four-page packet detailing the most common ADHD symptoms and characteristics, accessible via the Internet, to review. The scenario and information were taken from the study by Jasinski et al. (2011). Following review of the materials, RA1 administered an "Instruction Check" handout which required participants to write out their instructions from memory, list three characteristics of individuals with ADHD, and provide three strategies they planned to utilize to convince the tests that they had ADHD. After participants had satisfactorily completed this worksheet and any questions had been answered, RA2 replaced RA1 and administered the test battery in counterbalanced order. Following completion of the test battery, RA2 left and RA1 returned for the debriefing process. NLF participants were required to complete a post-test questionnaire on which they were asked to write their instructions from memory. They were also required to rate their performance on various 5-point Likert scales regarding understanding of their instructions, as well as perceived effort, success, difficulty, and motivation. As previously noted, one participant in the NLF group did not meet the required minimum rating of at least 4 on the 5 point Likert scale items and was dropped from analysis.

Test Measures

Self-report inventories. All participants completed the Adult ADHD Rating Scale (ASRS; Kessler et al., 2005) as well as the Beck Anxiety Inventory (BAI: Beck & Steer, 1993) under standard instructions to characterize the groups prior to the experimental manipulation. In contrast, the Barkley Adult ADHD Rating Scale-IV, a self-report measure of ADHD symptoms in adults, (BAARS-IV; Barkley, 2011) was completed by all participants under experimental instructions and was intended to explore the effects of the experimental manipulation.

Neuropsychological measures. The Wide Range Achievement Test-4 (WRAT-4; Wilkinson & Robertson, 2006) Word Reading, Sentence Completion, and Spelling subtests were given under standard instructions to characterize the samples. In contrast, under experimental instructions (honest or feign ADHD), all participants were administered the Computerized Test of Information Processing, a continuous performance test, (CTIP; Tombaugh & Rees, 2000), the Reading Fluency subtest of the Woodcock-Johnson-III Test of Achievement (WJ-III; Mather & Woodcock, 2001), and the Coding (C), Symbol Search (SS), and Digit Span (DS) subtests from the Wechsler Adult Intelligence Scale-IV (WAIS-IV; Wechsler, 2008). These instruments were included in the test battery both to ascertain the utility of embedded indices for differentiating the NLF, ADHD-O and ADHD-CO groups and to bolster ecological validity.

In regard to the latter point, there were a total of five dedicated PVTs (see below), eight standard neuropsychological tests, and one self-report symptom inventory in the experimental battery.

Performance validity tests and embedded validity indices. Various performance validity tests (PVTs) were administered under instruction set, with the goal of replicating and extending the findings of Sollman et al. (2010) and Jasinski et al. (2011). Among those PVTs were the Test of Memory Malingering (TOMM; Tombaugh, 1996), the Digit Memory Test (DMT; Hiscock & Hiscock, 1989), the Letter Memory Test (LMT; Inman et al., 1998), the Nonverbal Medical Symptom Validity Test (NV-MSVT; Green, 2008), and the b Test (Boone et al., 2000). Embedded validity indices, which had previously been used in the Jasinski et al. (2011) paper, included Reliable Digit Span and Processing Speed Index from the WAIS-IV as well as the Reading Fluency score from the WJ-III. As the cutting score for the Reading Fluency score from the WJ-III had been described in Age Equivalent Scaled Scores by Jasinski et al. (2011), this metric was used in the present paper as well.

Data analysis

Due to widespread skewness, kurtosis, and heterogeneity of variance in the data, non-parametric statistics were used for the main analyses, including omnibus tests using Kruskal-Wallis one-way ANOVA, with Mann-Whitney *U* follow-up contrasts. In order to limit type I error, alpha was held at .01 for all omnibus tests. Effect sizes were reported using Cohen's *d*.

RESULTS

The NLH group was compared to the NLF group on the self-report BAARS-IV and the performance-based CTIP to evaluate whether the experimental manipulation was effective. A subset of the findings from the BAARS-IV and CTIP results is presented in Table 2. Considering the BAARS-IV, raw scores represent self-reported frequency of symptoms and the symptom count variable represents severity of symptoms. The NLF group exhibited significantly higher symptom endorsement than the NLH group on all BAARS-IV variables. Further, the NLF group results were not significantly different from the clinical groups on all but one of these variables, suggesting fairly effective feigning. It is also worth noting that the NLF groups tended to have more extreme scores than genuine ADHD groups on these variables. Finally, the BAARS-IV scales were significantly higher for the two ADHD groups than for the NLH group, supporting the validity of the self-reported ADHD diagnoses. Turning to the CTIP data, it can be seen that the NLF group scored significantly worse on all three variables, with no significant differences between the two ADHD groups. Overall, these results suggest that the malingering instructions induced the intended response set and did so in an apparently realistic way. Having established the integrity of the experimental manipulation, NLH data were not included in further analyses to avoid inflating the apparent effectiveness of the validity indices.

Table 2. BAARS-IV and CTIP: Mean group differences

	Group descriptives				Omnibus test (N = 76)	
	NLH n = 9 M (SD)	NLF n = 23 M (SD)	ADHD-O n = 22 M (SD)	ADHD-CO n = 22 M (SD)	K	p
Barkley's Adult ADHD Rating Scale-IV						
Inattention Raw Score	14.11 (4.28)[a]	23.39 (4.74)[b]	21.50 (4.73)[b]	21.19 (6.23)[b]	19.13	.001**
Hyperactivity Raw Score	7.44 (2.40)[a]	13.78 (2.75)[b]	11.05 (3.54) [c]	11.71 (2.47)[bc]	21.90	.001**
Impulsivity Raw Score	5.67 (1.94)[a]	10.48 (2.31)[b]	10.00 (3.92)[b]	9.29 (3.15)[b]	15.03	.002*
Total ADHD Raw Score	27.22 (7.68)[a]	46.04 (12.79)[b]	42.55 (9.51)[b]	42.19 (9.91)[b]	18.02	.001**
Inattention Symptom Count	0.67 (1.32)[a]	5.30 (2.30)[b]	3.77 (2.45)[b]	3.57 (2.91)[b]	20.37	.001**
Hyperactivity/ Impulsivity Symptom Count	0.89 (1.36)[a]	5.17 (2.23)[b]	3.86 (2.80)[b]	3.67 (2.11)[b]	18.15	.001**
Total ADHD Symptom Count	1.44 (2.55)[a]	10.48 (4.28)[b]	7.64 (4.18)[b]	7.24 (4.27)[b]	21.88	.001**
Computerized Test of Information Processing						
Simple RT Median RT	.29 (.03)[a]	.50 (.22)[b]	.30 (.004)[ac]	.32 (.05)[ac]	21.33	.001**
Choice RT Median RT	.51 (.07)[a]	.90 (.28)[b]	.56 (.14)[ac]	.60 (.22)[ac]	29.86	.001**
Semantic Choice RT Median RT	.78 (.15)[a]	7.36 (28.9)[b]	.83 (.25)[ac]	.90 (.22)[ac]	24.05	.001**

These values reflect the performance of participants under experimental manipulation. NLH = Normal Honest; NLF = Normal Feigning; ADHD-O = ADHD Only; ADHD-CO = Comorbid ADHD; K = Kruskal-Wallis Chi-Square value; M = Mean; SD = Standard Deviation; RT = Reaction Time.

[abc]Within each row, columns with different letters are statistically significantly ($p < .01$) different from each other using Mann-Whitney U follow-up contrasts.

* = significant at $p < .01$ level; ** = significant at $p < .001$ level.

Table 3 displays the results from the omnibus test and follow-up contrasts for the PVTs and embedded validity indices. The NLF group demonstrated significantly worse performances than ADHD-O and ADHD-CO on all of the PVTs, with the exception of the Efficiency score from the b-test, where the NLFs were only significantly different from the ADHD-O group. Turning to the embedded validity indices, Reliable Digit Span did not show a significant difference across the groups. For both the WAIS-IV PSI variable and the WJ-III Reading Fluency variable, the NLF group performed significantly worse than the ADHD-O group but not significantly different from the ADHD-CO group. Additionally, the ADHD-O and ADHD-CO group were significantly different on the WJ-III Reading Fluency variable, with the latter group producing lower scores. These results raise questions about the effectiveness of the three embedded indices.

The effect size data in the rightmost three columns in Table 3 show the typical robust values on PVTs when the NLF group is compared to the ADHD-O and

Table 3. Neurocognitive feigning test results by group on dedicated and embedded effort tests

	Group descriptives				Cohen's *d*		
	NLF *n*=23 *M* (*SD*)	ADHD-O *n*=22 *M* (*SD*)	ADHD-CO *n*=22 *M* (*SD*)	*K* *N* = 67	NLF vs. ADHD-O	NLF vs. ADHD-CO	ADHD-O vs. ADHD-CO
Test of Memory Malingering							
Trial 1% Correct	80.17 (12.04)	94.55 (8.38)	92.27 (7.81)	20.81**	–1.41	–1.21	0.29
Trial 2% Correct	89.48 (11.76)	99.64 (1.00)	99.82 (0.85)	32.02**	–1.23	–1.25	–0.20
Retention Trial % Correct	88.96 (11.33)	99.45 (1.41)	99.36 (0.95)	30.31**	–1.31	–1.31	0.08
Digit Memory Test % Correct	95.28 (6.83)	99.37 (1.90)	99.50 (1.85)	18.82**	–0.83	–0.85	–0.07
Letter Memory Test % Correct	93.05 (8.04)	98.89 (1.78)	99.30 (1.43)	13.14*	–1.02	–1.10	–0.26
b Test							
E-Score	180.03 (179.27)	45.06 (17.98)	84.22 (107.00)[b]	12.53*	1.07	0.66	–0.52
Nonverbal Medical Symptom Validity Test							
Criterion A1	90.18 (6.70)	96.82 (3.20)	96.82 (3.26)	17.10**	–1.28	–1.28	0.00
Criterion A2	85.65 (9.45)	95.23 (4.80)	95.51 (4.72)	17.92**	–1.30	–1.34	–0.06
Wechsler Adult Intelligence Scale-IV							
Reliable Digit Span	8.87 (1.42)	9.32 (1.62)	9.27 (1.58)	1.05	–0.30	–0.27	0.03
Processing Speed Index	91.00 (15.48)	106.82 (16.37)	98.23 (9.45)	11.09*	–0.99	–0.58	0.67
Woodcock-Johnson-III Tests of Achievement							
Reading Fluency – Age-Equivalent Scaled Score	15.25 (4.53)	20.42 (3.28)	17.17 (3.84)	14.83*	–1.33	–0.46	0.91

These values reflect the performance of participants under experimental manipulation. Kruskal-Wallis non-parametric test (*df* = 2) was used due to violations of the assumptions of normality. Within each row, moving from left to right, columns with different letters are statistically significantly ($p < .01$) different from each other using Mann-Whitney *U* follow-up contrasts. NLF = Normal Feigning; ADHD-O = ADHD Only; ADHD-CO = Comorbid ADHD. *K* = Kruskal-Wallis Chi-Square value; *M* = Mean; *SD* = Standard Deviation; Med RT = Median Reaction Time.

* = significant at $p < .01$ level; ** = significant at $p < .001$ level.

ADHD-CO groups. In fact, the median absolute values of the effect sizes for these comparisons are 1.25 and 1.23 for the ADHD-O and ADHD-CO groups, respectively. Of further interest for present purposes are the effect sizes for the ADHD-O vs. ADHD-CO contrast, which had a median absolute value of .14. These results

suggest that the feigning response set is a much more powerful determinant of PVT performance than the comorbid disorders studied here.

Effect sizes from the embedded validity indices are more complex. First, Reliable Digit Span from the WAIS-IV showed no statistically significant effect. The WAIS-IV Processing Speed Index and the W-J-III Reading Fluency Test both showed strong effect sizes for the NLF vs. ADHD-O contrast, but were substantially attenuated for the NLF vs. ADHD-CO contrasts. The moderate to strong effect sizes in the contrast of ADHD-O and ADHD-CO, in favor of the former, once again raise questions about the performance of the embedded indices in this study.

For those measures exhibiting significant between group differences as indicated in Table 3, effort test utility indicators were examined to provide information about usefulness in a clinical setting. These test-operating characteristics are displayed for recommended cut scores in Table 4. Published cut scores were not available for the WAIS-IV PSI, and WJ-III RF A-E variables for detecting feigning; therefore, the high specificity optimal cut scores derived in Jasinski et al. (2011) were used for the purpose of comparison. Considering the PVT data, these operating characteristics are fairly typical for

Table 4. Effort test operating characteristics for dedicated and embedded effort tests

	Sensitivity to NLF	Specificity for ADHD-O	Specificity for ADHD-CO	BR (.25)	
				PPP	NPP
TOMM					
Trial 2% Correct	.391	1.00	1.00	1.00	.831
Retention Trial % Correct	.391	1.00	1.00	1.00	.831
TOMM Overall	.522	1.00	1.00	1.00	.863
DMT (%TOT < 90)	.174	1.00	1.00	1.00	.784
LMT (%TOT < 93)	.391	1.00	1.00	1.00	.831
b test (E-Score ≥ 120)	.364	1.00	.857	.561	.815
NV-MSVT					
Criterion A1 (≤ 90)	.435	.955	.955	.718	.834
Criterion A2 (< 88)	.478	.909	.909	.626	.839
NV-MSVT Overall	.478	.909	.909	.626	.839
WAIS-IV					
PSI (< 97)[a]	.652	.727	.591	.404	.854
WJ III RF					
A-E (< 16)[a]	.478	.909	.500	.394	.813

PPP = Positive Predictive Power; NPP = Negative Predictive Power; NLF = Normal Feigning; ADHD-O = ADHD Only; ADHD-CO = Comorbid ADHD; TOMM = Test of Memory Malingering; TOMM Overall = raw score <45 on either or both Trial 2 and Retention Trial; DMT %TOT = Digit Memory Test Total percent correct; LMT %TOT = Letter Memory Test Total percent correct; NV-MSVT = Non-Verbal Medical Symptom Validity Test; NV-MSVT Overall = failure on either or both Criterion A1 and Criterion A2; CTIP = Computerized Test of Information Processing; SRT Med RT = Simple Reaction Time median reaction time; CRT Med RT = Choice Reaction Time median reaction time; SCRT Med RT = Semantic Choice Reaction Time median reaction time; WAIS-IV = Wechsler Adult Intelligence Scale – Fourth Edition; PSI = Processing Speed Index; WJ III RF= Woodcock-Johnson III Tests of Achievement Reading Fluency; A-E = Age-Equivalent Scale Score.

[a] = cut score derived from Jasinski et al. (2011) high-specificity optimal cut scores.

Table 5. Utility indicators for failure on multiple effort tests

Number of PVTs failed	Sensitivity to NLF	Specificity for ADHD-O	Specificity for ADHD-CO	Hit rate (.25)
≥ 1	.870	.909	.864	.885
≥ 2	.478	1.00	.909	.836
≥ 3	.348	1.00	1.00	.835
≥ 4	.174	1.00	1.00	.795
≥ 5	.130	1.00	1.00	.783

Measures in the analysis for overall tests failed included TOMM Overall, LMT total percent correct, DMT total percent correct, NV-MSVT Overall, b Test E-Score. SN = Sensitivity; SP = Specificity; HR(50) = Overall Hit Rate based on estimated BR = .50; NLF = Normal Feigning; ADHD = ADHD Only; ADHD-CO = Comorbid ADHD.

results from feigning studies, in that high to very high specificity values at recommended cutting scores are found, accompanied by moderate sensitivity rates. An exception to the PVT pattern is seen for the DMT, which had low sensitivity in this study. Additionally, the two remaining embedded validity indices had unacceptably low specificity rates in the ADHD-CO group (Reliable Digit Span did not produce statistically significant differences between groups and was excluded from classification analyses).

Positive and negative predictive powers are also displayed in Table 4, calculated using a hypothetical base rate of .25. The TOMM, LMT, and DMT displayed excellent PPP (1.00). More modest PPP values were seen for the remaining variables, with the two embedded indices particularly weak. NPP values were generally moderately high for all of these indices.

Because most authorities on detection of feigning recommend use of multiple PVTs in high-stakes evaluations (Boone, 2007; Larrabee, 2007), the performance of combinations of these tests was explored. Given the relatively poor performance of the embedded validity indicators in analyses to this point, they were excluded from these calculations. Table 5 shows sensitivity and specificity values for requiring that various numbers of PVTs be failed to classify a participant as feigning. As can be seen, requiring that two or more tests be failed to detect feigning had robust specificities of 1.00 and .909 for the ADHD-O and ADHD-CO groups, respectively. However, at this cut-score, sensitivity was a more modest .478.

DISCUSSION

Concern that college students might feign ADHD in order to obtain academic accommodations and access to prescription stimulants has grown since the early 2000s (Quinn, 2003). This has spurred exploration and validation of procedures to detect this phenomenon. In general, performance validity tests (PVTs), originally developed to detect feigned neuropsychological impairment in other populations, have proved fairly effective at detecting malingered ADHD. One question in this area that has not yet been extensively addressed is the potential impact of comorbid disorders, common in those with ADHD diagnoses, on the accuracy of PVTs and related procedures for identifying feigned ADHD.

The present study began to address this issue by evaluating the effect of psychological disorders comorbid with ADHD on detection of feigned ADHD using PVTs. Results suggested that several well-validated PVTs are fairly effective in discriminating simulated ADHD from genuine ADHD alone as well as from ADHD with selected comorbid psychological disorders. Consistent with other reports in the feigning detection literature, failure of two or more of the best performing PVTs in this study had a near 100% accuracy rate in predicting presence of malingered ADHD. In contrast, the validity indices embedded in standard neuropsychological tests did not perform very well in this investigation.

In light of the heavy reliance on self-reported diagnoses in forming the groups, additional analyses were conducted to evaluate the integrity of the Anxiety (ANX; n = 13) and LD (LD; n = 9) subgroups of the ADHD-CO sample. Under standard instructions, the NLF group scored 5.8 (SD = 7.3) on the BAI whereas the ANX subgroup scored 16.8 (SD = 15.0), which was a statistically significant difference, $t(34) = –2.4)$, $p < .05$. Also under standard instructions, on the WRAT-4 Word Reading Subtest, the NLF group scored 106.0 (SD = 8.2) whereas the LD subgroups scored 96.4 (SD = 12.0), which was also a statistically significant difference, $t(30) = 2.6$; $p < .01$. Similar results were found for the WRAT-4 Sentence Completion and Spelling subtests. Finally, as noted earlier, the two ADHD groups scored significantly higher than the NLH group under standard instructions on all indices from the BAARS. Although these analyses do not provide gold standard verification of the diagnoses included here, they are consistent with expected differences across the groups.

The relatively poor performance of the embedded indices studied here (WAIS-IV Reliable Digit Span and Processing Speed Index as well as WJ-III Reading Fluency) was surprising. Indices derived from Digit Span have typically performed well in other populations (Jasinski et al., 2011), and the Digit Span results are possibly idiosyncratic to the present samples. In the case of the PSI and WJ-III- RF, sensitivity values were comparable to those of the dedicated PVTs. However, specificity values were poor. Broadly similar findings for decreased psychomotor speed and lower reading scores have been reported for individuals with ADHD and comorbid Reading Disorder (Katz, Brown, Roth, & Beers, 2011) and depression (Larochette, Harrison, Rosenblum & Bowie, 2011), which might explain the findings here.

Taken together with other reports in the literature to date, these results suggest that clinicians evaluating college-aged individuals claiming ADHD in order to seek academic accommodations and stimulant medications have several useful tools for discriminating feigned from genuine ADHD, even in the presence of comorbid anxiety or LD diagnoses. It is recommended that clinicians conducting assessments in these circumstances include two or more well-validated PVTs in such evaluations. Most dedicated (not embedded) PVTs included in the present study performed fairly well and could be considered for clinical practice. It is also interesting to note that the problem of potentially feigned ADHD in pursuit of academic accommodations has now reached into professional education. Jasinski and Ranseen (2011) review this area and note that is not unusual for law students to first request an ADHD evaluation following failure of initial law school exams or when confronting the bar examination. In particularly high-stakes evaluations such as accommodations for professional school students, it appears to be imperative to utilize PVTs.

Limitations of the present study include small groups, relatively narrow demographic variability, the inherent nature of simulation studies, failure to assess for substance abuse, lack of data on IQ equivalence across groups, the absence of independent confirmation of ADHD diagnoses, and the inclusion of only two of many possible conditions comorbid with ADHD. Despite these caveats, the finding that the NLF group produced realistic ADHD patterns on both a self-report symptom checklist and a continuous performance test emphasizes the ease with which ADHD may be feigned as well as the need to use PVTs to address the validity of claimed ADHD symptoms.

AUTHOR NOTES

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