Psychological Assessment
2010, Vol. 22, No. 2, 325–335

1040-3590/10/$12.00 DOI: 10.1037/a0018857

Detection of Feigned ADHD in College Students

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Significant motivations and incentives exist for young-adult students to seek a diagnosis of attention-deficit/hyperactivity disorder (ADHD). With ADHD information readily accessible on the Internet, today's students are likely to be symptom educated prior to evaluation. This may result in false-positive diagnoses, particularly when students are motivated to convey symptoms. We evaluated the utility of ADHD symptom checklists, neurocognitive tests, and measures initially developed to detect feigned neurocognitive or psychiatric dysfunction (symptom validity tests [SVTs]). The performance of 31 undergraduates financially motivated and coached about ADHD via Internet-derived information was compared to that of 29 ADHD undergraduates following medication washout and 14 students not endorsing symptomatology. Results indicated malingerers readily produced ADHD-consistent profiles. Symptom checklists, including the ADHD Rating Scale and Conners's Adult ADHD Rating Scale–Self-Rating Form: Long, were particularly susceptible to faking. Conners's Continuous Performance Test—II findings appeared more related to motivation than condition. Promising results were seen with all cognitive SVTs (Test of Memory Malingering [TOMM], Digit Memory Test, Letter Memory Test, and Nonverbal–Medical Symptom Validity Test), particularly TOMM Trial 1 when scored using Trial 2 criteria. All SVTs demonstrated very high specificity for the ADHD condition and moderate sensitivity to faking, which translated into high positive predictive values at rising base rates of feigning. Combining 2 or more failures resulted in only modest declines in sensitivity but robust specificity. Results point to the need for a thorough evaluation of history, cognitive and emotional functioning, and the consideration of exaggerated symptomatology in the diagnosis of ADHD.

Keywords: ADHD, feign, malinger, symptom validity test, continuous performance test

Since awareness has grown that learning disorders can disrupt postsecondary education, young-adult students increasingly present requesting evaluation and treatment for suspected learning problems (Jachimowicz & Geiselman, 2004). Significant motivations and incentives currently exist for young adults seeking a diagnosis of a learning disorder, including attention-deficit/hyperactivity disorder (ADHD), within higher education facilities (Harrison, 2006). Laws including the Individuals With Disabilities Act, the Rehabilitation Act of 1983, and the Americans With Disabilities Act provide the legal basis guaranteeing students with disabilities, including mental disabilities, provision for academic accommodation and resources (Gordon & Keiser, 1998). Although there is much contention over legal definitions of disability (Ranseen & Parks, 2005), many universities now routinely view students identified with learning disorders as disabled and thus entitled to various accommodations including extra time for written work and tests, elimination of spelling penalties, selective seating and distraction-reduced test environments, tape recording of lectures, books on tape, reduced homework, availability of teacher notes, and additional clarification of directions and assignments (McGuire, 1998).

Young adults may also request evaluation for learning problems primarily due to poor attention, since an ADHD diagnosis typically leads to stimulant medication treatment. This can be quite effective in ameliorating deficits in attention and focus, regardless of the presence or absence of diagnosed attentional dysfunction (Rapoport, Buchsbaum, Zahn, Ludlow, & Mikkelsen, 1978). Several studies have reported a nationwide increase in stimulant prescriptions during recent years (Olfson, Gameroff, Marcus, & Jensen, 2003; Robison, Sclar, & Skaer, 2005), and multiple surveys provide evidence of misuse at the university and even professional school level (McCabe, Knight, Teter, & Wechsler, 2005; Teter, McCabe, Cranford, Boyd, & Guthrie, 2005; Tuttle, Sheurich, & Ranseen, 2007; White, Becker-Blease, & Grace-Bishop, 2006). These surveys suggest that much of the misuse is intended to facilitate studying and general academic performance, as well as to engage in recreational drug use.

Confirming a diagnosis of ADHD based on comprehensive evaluation involves conducting a detailed clinical interview to establish that symptoms are both impairing and developmental in origin and performing neuropsychological testing to provide evi-

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This manuscript is based on a dissertation submitted by Myriam J. Sollman in partial fulfillment of the requirements for a doctoral degree in clinical psychology at the University of Kentucky. We thank Amber Hall and Ashley Jo Meeks for assistance in data collection. David T. R. Berry holds the copyright to the Letter Memory Test. All proceeds from the Letter Memory Test are donated to the Harris Psychological Services Clinic.

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dence of attentional impairment while ruling out the myriad of other conditions that can mimic ADHD (Gordon & Murphy, 1998). Examples include learning disabilities and psychiatric conditions such as depression or anxiety. ADHD evaluation is often supplemented by the use of face-valid self-report symptom inventories and neuropsychological measures including continuous performance tests (CPTs) that assess sustained attention and response inhibition. Until recently, little attention has been paid to whether external incentives might motivate students to seek diagnosis of a learning disorder or ADHD by consciously or less consciously approaching the evaluation setting motivated to exaggerate self-reported problems and feign cognitive difficulty on neuropsychological measures. This problem is well known in neuropsychological evaluation such that specific cognitive measures, known as symptom validity tests (SVTs), have been developed to identify lack of effort during testing. The field of learning disability has been slow to acknowledge that issues of motivation might greatly confound interpretation of test procedures within the usual learning-disability evaluation (Harrison, 2006; Kane, 2008).

Quinn (2003) suggested that adults seeking ADHD evaluation for disability determination might malinger test results and found that rating scales typically employed to diagnose ADHD based on self-report can be easily faked by students coached to simulate ADHD. Sullivan, May, and Galbally (2007) reported that in a sample of college students evaluated for suspected learning disorder and ADHD, a significant percentage (22%) failed a commonly utilized neuropsychological SVT, the Word Memory Test (WMT; Green, 2005) designed to detect inadequate cognitive effort. In this study, of the group that sought evaluation solely for ADHD, almost half failed this measure. Suhr, Hammers, Dobbins-Buckland, Zimak, and Hughes (2008) found that of a sample of 85 university students evaluated for ADHD, 31% failed the WMT. The failing group also showed a greater degree of neuropsychological impairment than students who did not show noncredible effort on the WMT. Since SVTs were primarily developed to differentiate feigned from true neurological disorder, particularly traumatic brain injury, it cannot be assumed that these measures generalize to college students seeking ADHD evaluation. Yet these results are alarming since such a high percentage of relatively highly functioning individuals failed a measure typically passed by those with severe traumatic brain injury. At the very least, this raises the likelihood that the base rate for individuals presenting for ADHD evaluation who feign cognitive impairments is substantial.

There is limited empirical evidence addressing the sensitivity of typical clinical ADHD evaluation techniques for detecting students who do not provide true or valid responses. Self-report measures of current or childhood ADHD symptoms are prone to overidentify students and adults as having ADHD when they do not and do not appear able to make the distinction between true versus feigned ADHD (Harrison, 2006; McCann & Roy-Byrne, 2004). Studies examining standard ADHD assessment measures have found that ADHD symptom self-report tests generally discriminate normal honest groups from both feigning and ADHD groups (Booksh, 2005; Booksh, Pella, Singh, & Gouvier, 2010; Harrison, Edwards, & Parker, 2007; Jachimowicz & Geiselman, 2004). However, these measures do not adequately separate feigned ADHD from diagnosed ADHD, although the feigning group may tend to over-report symptoms. Additionally, it appears that little preparation is necessary to provide credible evidence of ADHD impairment on self-report measures. CPTs designed to facilitate ADHD diagnosis have demonstrated only fair sensitivity, with poor specificity to differentiate ADHD from symptomatically similar conditions, and poor convergence with other measures (Homack & Reynolds, 2005; Quinn, 2003). CPT measures should theoretically be more difficult to feign; some studies suggest that a CPT may be able to differentiate individuals feigning ADHD from true responders (Booksh et al., 2010; Quinn, 2003).

At this time, few simulation studies have evaluated the susceptibility of measures employed in the diagnosis of ADHD to the feigned symptomatology of undergraduate students (Frazier, Frazier, Busch, Kerwood, & Demaree., 2008) or have utilized a clinical comparison group of students with diagnosed ADHD (Booksh et al., 2010; Harrison et al., 2007; Quinn, 2003). As a whole, the methodologies of simulation studies examining ADHD/learning-disorder populations do not yet compare in rigor to research on feigned cognitive impairment in traumatic brain injury populations. For instance, R. Rogers (1997) advised researchers that adequate incentives are necessary in the assessment of simulated malingering to approximate real-world conditions and to assure participants' motivation to feign. Only two studies of feigned ADHD provided simulators with a modest incentive beyond course credit (Booksh et al., 2010; Fisher, 2007). Only one study (Booksh et al., 2010) utilized the variety of diagnostic tests that would approximate a real-world evaluation, including standard neuropsychological measures, although malingering measures were not given to the clinical ADHD group.

Since SVTs are commonly employed in evaluations of suspected or feigned cognitive impairment, they should be helpful in the detection of feigned ADHD. Booksh (2005) found that the WMT separated feigning and honest groups well (mean d metric = 1.60) and demonstrated superb specificity to rule out feigning in honest individuals (1.00) but demonstrated only moderate sensitivity (0.58). However, as noted above, the specificity rate here was based on college students answering honestly, not on genuine ADHD patients. Frazier, Frazier, Busch, Kerwood, and Demaree (2008) examined the use of SVTs and neuropsychological measures in a simulation paradigm asking college students to feign either a reading disorder or ADHD. SVTs including the Total Validity Indicator Profile and Victoria Symptom Validity Test were reasonably accurate in differentiating students who feigned either ADHD or a reading disorder from those who gave appropriate effort. Once again, however, no clinical control sample was included in this study. Another oversight in this line of research is that no studies to date have evaluated whether tests designed to detect feigned psychiatric symptoms might also be useful in this determination.

Additional study of ADHD evaluation measures is needed to facilitate the generalization of results to the college population. The present study investigated whether ADHD self-report inventories, neuropsychological tests, SVTs, and psychiatric malingering tests could be useful in an undergraduate ADHD-diagnostic setting where feigning may occur. This study employed methodology originally developed to investigate this problem in brain injury populations to achieve ecologically valid findings. This included use of a clinically diagnosed ADHD control group, appropriate incentives to adequately motivate simulated malingerers, and use of easily obtained information to prepare feigners for their role.

Method

Participants

Participants initially included 80 undergraduates at the University of Kentucky in Lexington, Kentucky. Two groups were recruited via psychology class screenings: normal students without any history of ADHD diagnosis and students with a previous, verifiable diagnosis of ADHD. Additional ADHD participants were also obtained through announcements posted at the university disability office. Both ADHD and control groups were screened to rule out non-ADHD disorders involving attention/concentration difficulty, including learning disabilities, diagnosed or self-perceived psychiatric conditions, and neurological disorders. Substance abuse, unfortunately, was not ruled out. To increase confidence in the validity of diagnosis, ADHD participants were interviewed regarding how they were evaluated for diagnosis (neuropsychological testing, symptom self-report, parent interview, classroom observation, teacher rating, etc.). Participants were excluded if diagnosis resulted from only a brief medical office visit or was based solely on symptom reports.

Recruited participants were divided into three groups for this study: an honest-responding ADHD group, a normal honest-responding group (HON), and a normal feigning group (FGN). Of the original 80 participants, seven were excluded for various reasons, including two nonnative English-speaking HON subjects who struggled with the protocol, one FGN participant who reported insufficient compliance with instructions on a posttest feedback sheet, and four ADHD participants whose symptom self-report questionnaires were not suggestive of a valid diagnosis of ADHD. No ADHD participants reported exaggerating symptomatology to confirm diagnosis or failed malingering measures via standard cut scores. Similarly, no HON student elevated any measure or subscale believed to be diagnostic of inattention or failed any feigning indices. Thus, 30 FGN, 29 ADHD, and 14 HON participants remained. Only a small number of normal participants were assigned to the HON group, as this condition was intended primarily as a manipulation check. Demographics are provided by group in Table 1. As can be seen, groups were comparable in terms of gender, age, number of months of college completed, ethnicity, handedness, and Wechsler Test of Adult Reading (WTAR; Wechsler, 2001) estimated full-scale IQ (administered under standard instructions to all individuals prior to group assignment). Overall, this university sample represents a younger undergraduate group with an average-range mean WTAR predicted full-scale IQ of 105.4 (SD = 8.1).

On the basis of ADHD Rating Scale (ARS; Barkley & Murphy, 2005; Murphy & Barkley, 1996) and Conners's Adult ADHD Rating Scale (CAARS; Conners, Erhardt, & Sparrow, 1999) symptom reports presented in detail below, the ADHD group was predominantly combined subtype (75%), with less inattentive subtype (>20%) and hyperactive–impulsive subtype (<5%). The majority of ADHD students (41%) reported having been diagnosed through a brief neuropsychological assessment (including psychological, IQ, and learning-disability testing), while 31% had received a full neuropsychological evaluation and 21% had received a comprehensive psychological evaluation including corroborative interviews of parents and teachers. Most students were currently prescribed medication (82.3%), typically Adderall (57.8%).

Table 1
Demographic Characteristics of Participants

Variable	HON (N = 14)	FGN (N = 30)	ADHD (N = 29)	F or χ^2	p
Male (%)	50.00	46.70	55.20	0.430	.807
Age (years)					
M	18.90	19.10	19.40	1.209	.304
SD	1.03	1.28	1.21		
Months of college					
M	12.30	13.20	16.30	0.787	.459
SD	10.25	10.56	12.89		
Race/ethnicity overall (%)				8.599	.197
Caucasian	100	83.30	86.20		
Black	0	6.70	6.90		
Asian	0	10.00	0		
Multiracial	0	0	6.90		
WTAR est. FSIQ					
M	105.80	105.80	105.60	0.036	.965
SD	8.15	8.15	8.54		

Note. HON = honest; FGN = feigning; ADHD = attention-deficit/hyperactivity disorder; WTAR est. FSIQ = Wechsler Test of Adult Reading estimated Wechsler Adult Intelligence Scale—III full-scale IQ.

Procedure

All procedures and an informed-consent document were approved by the local institutional review board. Students in the ADHD group, who came in following a 12-hr medication washout period, were asked to take a battery of counterbalanced tests and questionnaires to the best of their ability. Students with no history of ADHD were randomly assigned to the HON or FGN conditions by selecting from two envelopes with enclosed role-specific information. As previously noted, fewer HON control group participants (14) were sought because this group served only as a manipulation check to ensure that presumably normal students would not achieve clinical profiles and, by comparison, that FGN participants followed their instructions.

Research assistants administering testing were masked to participant instructions. Students in the HON condition received an explanation of the purpose and importance of a normal control group and were asked to complete measures honestly and to the best of their ability. Individuals in the ADHD group were also asked to respond honestly and accurately on the tests and questionnaire administered. FGN participants were provided with a feigning scenario (see below), followed by information about ADHD. This information was obtained from the first few listed Google hits for *ADHD* and *ADHD diagnosis* at the time of study inception.

FGN participants were given the instruction to take 5 min to read through the following scenario and Internet information (presented in a pseudowebpage format) and to take notes. Prior to reading this information, they were encouraged to think about how this information would relate to their presentation in a testing evaluation. The scenario was given as follows:

> Your roommate has been diagnosed with ADHD. He/She had trouble with classes, but then was given some medication for ADHD, and now does well. He/She even got a couple of A's recently, and has more time to socialize because studying is not as hard! During your midterms, you decided to try your roommate's medication, and ended up surprising yourself with how much easier things went. You may think that you have undiagnosed ADHD, so you "Google" the disorder to learn more about it. On the following pages are some of the things that you find.
>
> When you are done reviewing these materials, please use the colored paper to jot down symptoms that will help you remember how to fake on the tests you will be given. Tell the examiner when you are done.

After their 5-min preparation, FGN students were asked to describe symptoms of ADHD and to share how this disorder may affect testing results. They were then told to remember that they were presenting as a university student, so must do at least as well as someone who would be admitted to the university. Participants were then given the following postpreparation instructions:

> You will now be introduced to the person who will complete testing with you.
>
> Please take the following tests as if you are trying to convince someone that you have ADHD. It is not necessary for you to try to act like you have ADHD; you only need to respond to the test items as if you do. The examiner who tests you will not know your role, so please do not give it away! Remember, if you are successful at deceiving the tests and following instructions throughout, you can win $45! If you have any questions, please take time to ask me right now.

All normal participants (HON and FGN) were told they would receive two research credits at testing completion. However, those assigned to the FGN condition were told that they would also receive a $45 bonus if they were successful in their assignment to adequately feign an ADHD student. In reality, all FGN participants were given the bonus. ADHD participants from the psychology class were offered a choice of two research credits and $15 (for medication-related inconveniences) or $45 and no research credits. ADHD participants not enrolled in the psychology class were always given $45.

Tests Administered

All groups completed the following self-report inventories, a psychiatric malingering interview, neuropsychological measures, SVTs, and a posttest debriefing form requesting reproduction of instructions and ratings of compliance with instructions. As previously noted, medicated ADHD participants were asked not to take their medication during the 12 hr before testing and to complete self-report inventories with regard to how they feel when not on this medicine.

Self-report inventories. The ARS: Current and Childhood Symptom Checklists (Barkley & Murphy, 2005; Murphy & Barkley, 1996) and the CAARS, Self-Rating Form, Long (Conners et al., 1999), were administered. Both scales are frequently used by clinicians to catalogue self-report of ADHD symptoms.

Neuropsychological measures. The WTAR (Wechsler, 2001) was included as a screening measure to assess intellectual equivalence between HON, FGN, and ADHD groups and was administered under standard instructions. Conners's Continuous Performance Test—II for Windows (C-CPT; Conners & MHS Staff, 2004) is one of several computerized tests frequently used in the clinical context to evaluate impulsivity and inattention related to ADHD. Its susceptibility to feigned dysfunction requires further evaluation. To approximate a clinical evaluation, standard neuropsychological measures included the Wechsler Memory Scale—Third Edition, Word Lists subtest (WMS–WL; Wechsler, 1997); the Stroop Color–Word Test (Golden, 1978; Golden & Freshwater, 2002); and the Nelson-Denney Word Reading Test, Reading Speed subtest (NDWR; Brown, Fishco, & Hanna, 1993).

Psychiatric feigning measure. The Miller Forensic Assessment of Symptoms Test (M-FAST; Miller, 2001) was included as a self-report inventory designed to quickly screen for psychiatric symptoms. Although primarily created to detect feigned mental illness such as hallucinations and unusual complaints, content of some items, such as difficulty sitting still, may appear to correspond to ADHD.

Symptom validity measures. The Digit Memory Test (DMT; Hiscock & Hiscock, 1989) is considered by many to be the gold standard of neurocognitive feigning tools when evaluating neurological patients. Meta-analytic reviews have suggested that the DMT exhibits the strongest sensitivity of all measures reviewed, as well as very high specificity (Vickery, Berry, Inman, Harris, & Orey; 2001). Similarly, the Letter Memory Test, Card Version (LMT; Inman et al., 1998; Schipper, Berry, Coen, & Clark, 2008), has also shown a strong ability to separate groups of known or probable feigning and honest individuals in neurological samples, according to a Hedges's *g* (a *d*-approximate effect size) of 1.79 (Sollman & Berry, 2008). The Test of Memory Malingering (TOMM; Tombaugh, 1997) is another forced-choice measure that has demonstrated good ability to differentiate feigning from nonfeigning and is perhaps the most commonly used SVT within the clinical context (Slick, Tan, Strauss, & Hultsch, 2004). Finally, Green's Nonverbal–Medical Symptom Validity Test (NV-MSVT; Green, 2006) was included partly since it is a newer and slightly different type of computer-administered nonverbal symptom validity measure that might have potential to separate honest and feigning evaluees in an ADHD population.

Scoring, Data Entry, and Analysis

All measures were scored according to standardized instructions. Scoring and data entry were independently cross-checked for accuracy by two individuals at the conclusion of data collection. Review of 20% of files resulted in an interrater agreement greater than 99% (due to seven errors), so no additional files were checked.

Manipulation Checks

Two manipulation checks were employed. In the first, individuals' posttest questionnaires were examined to determine if they accurately summarized instructions (e.g., "to fake ADHD" or "to take these tests honestly and with my best effort") and reported providing adequate effort according to a Likert-type rating of at least 3 out of 5 points (range: 1–5). The second manipulation check involved assessing group accuracy. HON and ADHD results were examined to determine if they diverged, that is, to support the diagnostic nature of that experimental group.

Data Analysis

A statement is warranted regarding the statistical comparison of groups. Because of the small sample sizes, groups were compared primarily in terms of effect size differentials using Hedges's *g*. This statistic is similar to Cohen's *d,* but it provides an additional correction for small sample size.

Results

Self-Report ADHD Measures

Table 2 provides CAARS and ARS results collapsed across scales since all of the subscale scores closely approximate these results. No HON-group individual achieved a clinical elevation on any index of the CAARS (> 65*T*) or ARS (Current or Childhood scales). While high sensitivity for the detection of ADHD was found by at least two CAARS indices (Scale 5: *DSM–IV* Inattentive Symptoms, 93%; Scale 7: *DSM–IV* Total ADHD Symptoms, 86%) and the ARS Childhood (90%) and Current Symptoms (86%) scales, all of these indices were successfully faked. The FGN- and ADHD-group means, though significantly greater than the HON-group means in all cases ($p < .000$), were statistically equivalent to one another across the board (median CAARS scale $g = .25$, median ARS $g = .31$). Malingerers' symptom endorsements resulted in frequencies of combined, inattentive, and hyperactive–impulsive subtype specifications that were virtually identical to those of the ADHD group. These results suggest that a sizable proportion of university students avoided the blanket-endorsement strategy for Current Symptoms. Of note, the CAARS Inconsistency index did not differentiate the ADHD and FGN groups ($p = .951$, $g = .00$), suggesting that it is not effective in detecting feigned symptom reports.

Neuropsychological Measures

Results of the neuropsychological tests other than the C-CPT indicate that the Stroop, NDWR, and WMS–WL were largely insensitive to cognitive impairment associated with ADHD in this population (see Table 3). Mean performance for both the HON and ADHD groups was generally within the average range. No statistically significant differences were observed between those groups, although, as expected, a general trend for the ADHD group to perform at a lower level than the HON group is noted.

Neuropsychological test results were somewhat more useful in identifying differences between genuine and feigned ADHD. With the Stroop, the proportion of borderline or impaired-range scores ($T < 37$, or Scaled Score ≤ 6) was significantly greater for the FGN than the ADHD group on all three trials (mean $p = .019$), with about half to two thirds of feigners and one fifth of ADHD participants performing in that range. This is translated into mean score differences for the FGN and ADHD groups on the Word ($p = .000$) and Color ($p = .046$) subtests. The same was not replicated in the mean number of words read on the NDWR ($p = .393$). Likewise, the WMS–WL did not differ between real and feigned ADHD as well as the Stroop, with few FGN or ADHD participants scoring in the impaired range (mean $p = .352$). The FGN group displayed significantly lower performance on Contrast 2 compared to the ADHD group ($p = .002$), however.

Conners's Continuous Performance Test

The results for the C-CPT (see Table 4) generally parallel those of the other neuropsychological measures that suggest limited utility for distinguishing ADHD from normal students. Consistent with some previous findings (Homack & Reynolds, 2005), the HON and ADHD groups were statistically similar across the majority of C-CPT indices. Indeed, mean sensitivity to ADHD across indices with group differences was 24.1%. Further complicating the utility of the C-CPT is that this test appears to have been successfully faked. The FGN group achieved more consistent clinical elevations than the ADHD group.

The lack of clinical sensitivity to the HON–ADHD distinction is reflected in several findings. First, the percent clinical agreement variable, purporting to estimate how well the test-taker's results match those of the ADHD normative sample, was statistically equivalent for the HON ($x = 42.4\%$, $SD = 17.76$) and ADHD ($x = 60.3\%$, $SD = 24.04$) groups according to Tukey post hoc testing ($p = .090$). Both values approximate

Table 2
ADHD Symptom Self-Report Results

Test	Group			FGN–ADHD *g*
	HON ($n = 14$)	FGN ($n = 30$)	ADHD ($n = 29$)	
CAARS				
M scale *T* score	46.00 (0.45)$_a$	69.50 (8.84)$_b$	66.90 (8.27)$_b$	.30
Number of elevated scales	0.10 (0.27)$_a$	5.10 (2.33)$_b$	4.60 (2.23)$_b$	.22
Inconsistency index	4.00 (2.04)	5.20 (2.25)	5.20 (2.43)	.00
ARS				
Total symptoms: current	0.80 (1.48)$_a$	12.10 (4.88)$_b$	10.80 (4.19)$_b$	.29
Total symptoms: childhood	2.20 (3.02)$_a$	14.70 (4.10)$_b$	13.60 (3.60)$_b$	.28

Note. CAARS cutoff > 65*T*; ARS cutoffs vary by gender and scale. For each variable, groups with the same subscript are statistically equivalent ($p > .05$) according to Tukey post hoc testing. Under the heading Group, values provided are means, with standard deviations in parentheses. HON = honest; FGN = feigning; ADHD = attention-deficit/hyperactivity disorder; FGN–ADHD = comparisons involving those groups only; *g* = Hedges's *g* effect size; CAARS = Conners's Adult ADHD Rating Scale; ARS = ADHD Rating Scale.

Table 3
Neuropsychological Test Results

Test	Group			FGN–ADHD *g*
	HON (*n* = 14)	FGN (*n* = 30)	ADHD (*n* = 29)	
NDWR (words read)	188.0 (40.8)	189.0 (55.5)	174.0 (58.6)[a]	0.26
Stroop (*T*)				
Word	48.30 (13.96)$_a$	30.90 (12.18)$_b$	43.00 (10.65)$_a$	−1.06
Color	47.10 (10.23)$_a$	37.50 (11.51)$_b$	43.20 (9.92)$_a$	−0.53
Color–word	52.80 (9.52)$_a$	43.20 (12.16)$_b$	47.70 (8.49)	−0.43
Interference	55.40 (5.88)	54.00 (8.67)	53.20 (7.14)	0.10
WMS–WL (ScS)				
First recall	11.10 (3.08)	9.40 (2.16)	9.40 (3.03)	0.00
Recall total	11.40 (2.47)$_a$	7.80 (2.86)$_b$	9.00 (2.73)$_b$	−0.43
Contrast 1	9.60 (2.13)	9.70 (2.13)	10.40 (2.81)	−0.28
Contrast 2	10.10 (3.23)$_a$	7.70 (3.49)$_b$	10.50 (2.36)$_a$	−0.94

Note. Within each row, columns with different subscripts are statistically different from one another ($p < .05$) according to Tukey post hoc testing. Under the heading Group, values provided are means, with standard deviations in parentheses. HON = honest; FGN = feigning; ADHD = attention-deficit/hyperactivity disorder; FGN–ADHD = comparisons involving those groups only; *g* = Hedges's *g* effect size; NDWR = Nelson-Denney Word Reading Test, Reading Speed subtest; WMS–WL = Wechsler Memory Scale—Third Edition, Word List.; ScS = Scaled Score.
[a] Removed one outlier more than 3 *SD*s above mean.

chance level, suggestive of both weak specificity and sensitivity. Additionally, the HON and ADHD group means were statistically different on only two (of 12 total) indices (Commission Errors [as in Booksh, 2005], $p = .000$, and Detectability, $p = .001$). However, on these, only 31% and 17% of ADHD participants achieved clinically elevated scores (> 65*T*). Overall, the ADHD participants show relatively few clinical elevations (above the 65*T* cut score). On average, the ADHD participants displayed 2.3 ($SD = 2.44$) of seven indices elevated, a value not significantly greater than the HON participants' mean (1.1, $SD = 1.56$; M $p = .238$).

As for the fakability of the C-CPT, it was the FGN group that tended to demonstrate clinical elevations on the C-CPT, rendering the group significantly different from the HON and ADHD groups on a handful of scales. Approximately half of feigners produced clinical elevations on each index except Detectability and Hit Rate, with 3.9 ($SD = 2.58$) scale elevations on average. Their mean percent clinical agreement was 71.4% ($SD = 26.4$). Modest effect sizes were noted to separate feigners from ADHD participants across the board (median $g = .35$). While the C-CPT appears to have been successfully faked, and without egregious elevations, the C-CPT's limited sensitivity to ADHD suggests that the measure is unlikely to be successful in distinguishing between genuine and faked ADHD.

Psychiatric Feigning and Symptom Validity Testing

Table 5 presents data from the M-FAST, as well as the four SVTs used in the study, with means, standard deviations, effect

Table 4
Conners's Continuous Performance Test—II Performance Means (With Standard Deviations in Parentheses) and Test Parameters for Indices of Interest

Variable or index	Group			Test parameters	
	HON (*n* = 14)	FGN (*n* = 30)	ADHD (*n* = 29)	Sensitivity to ADHD	Specificity for FGN
Percentage clinical agreement	42.40 (17.76)$_a$	71.40 (26.40)$_b$	60.30 (24.0)$_{a,b}$		
Index					
Omissions	46.40 (4.24)$_a$	85.40 (46.01)$_b$	61.20 (24.15)$_a$	.241	.533
Commissions	48.20 (14.67)$_a$	63.50 (10.02)$_b$	59.50 (9.93)$_b$	.310	.621
Hit Rate[a]				.241	.724
Hit Rate *SE*	50.50 (9.56)$_a$	70.40 (17.48)$_b$	60.00 (15.81)$_a$	.241	.400
Variability	49.80 (8.62)$_a$	67.50 (13.09)$_b$	58.20 (13.77)$_a$	.241	.483
Detectibility	50.60 (8.63)$_a$	59.40 (5.43)$_b$	57.40 (6.90)$_b$	.172	.897

Note. Within each row, columns with different subscripts are statistically different ($p < .05$) from one another according to Tukey post hoc testing. Subscales indicative of inattention include Omissions, Hit Rate Block Change, and Hit Rate *SE* Block Change. Subscales indicative of hyperactivity–impulsivity include Commissions, Perseverations, and Hit Rate (using values < 35*T* for the latter). HON = honest; FGN = feigning; ADHD = attention-deficit/hyperactivity disorder.
[a] Clinical elevation is observed at > 65*T*, except Hit Rate (< 35*T* and > 65*T*), for which mean score is irrelevant.

sizes for the critical FGN versus ADHD contrast, sensitivity for the FGN group, specificity for the ADHD group, and hit rate for the combination of these two groups. Considering first the M-FAST, few participants in any of the groups endorsed many of the questions, and the effect size was moderate. Although the FGN group scored statistically significantly higher than the ADHD group, sensitivity was quite low at .10, whereas specificity was excellent at 1.00. The TOMM trials appeared much more promising, with significant differences between the FGN and ADHD groups and robust effect sizes ranging from −1.19 to −1.60. Sensitivity was greatest for Trial 1, with moderate specificity. Sensitivity was moderate for both Trial 2 and the retention trial, with excellent specificity for both. The DMT, LMT, and NV-MSVT Scales A and B all had moderate sensitivity and strong specificity. These results tend to support the use of all of the SVTs for detecting feigned ADHD, but not the M-FAST, which of course, was not originally intended to detect feigned cognitive symptoms.

Classification Using Combined SVT Results

As noted, above, the SVT measures tended to have excellent specificity for ADHD but only moderate sensitivity to feigning. This raises the possibility that combining results across SVTs might increase sensitivity with only modest cost in specificity, as suggested by Vickery et al. (2004). To explore this possibility, results from each of the SVT indices (total = 7) were considered as passing or failing. Table 6 presents classification parameters when increasingly stringent rules were applied for classifying participants as FGN or ADHD, with predictive powers worked out for various hypothetical base rates of feigning. Data presented here suggest that classifying a participant as feigning when one or more indices were failed did not achieve adequate positive predictive power (PPP) in any of the three base-rate environments considered. Using a criterion of two or more failures on indices was in the mid to upper .80s for PPP for the higher base rates. By the threshold of three or more failures, PPP was 100% for feigning classifications. Of course, results would vary in different base-rate settings, as well as if different combinations of tests, with varying classification parameters, were used.

Discussion

Sufficient data now exist to show that adult ADHD clinical evaluations include significant numbers of individuals motivated to provide inaccurate test performance (Suhr et al., 2008; Sullivan et al., 2007). Thus, ADHD evaluations are not immune to the interpretive problems associated with false presentation due to symptom overreporting and inadequate effort on cognitive tests. The desire for medication and extra help within the college environment provides external incentives potentially motivating inaccurate presentation by some college students presenting for evaluation. A body of research is developing to facilitate an understanding of this problem as it relates to the use of specific tests employed in clinical ADHD evaluation. The current study involved a simulation methodology based on recommended practices to study feigning in neuropsychological evaluation. This study used a design whereby students were provided information on ADHD from the top Internet hits and were not even admonished to avoid overfaking; results of the study support and extend findings to date regarding ADHD self-report inventories, cognitive tests commonly used in the diagnostic assessment of ADHD in college students, and the use of SVTs with this population.

This study confirms that self-report ADHD checklists, such as the CAARS and the ARS, are probably of no value in differentiating individuals with ADHD from those faking this disorder. Previous research has shown that both current and retrospective self-report inventories are easily feigned (Booksh et al., 2010; Jachimowicz & Geiselman, 2004; Suhr et al., 2008; Tucha, Sontag, Walitza, & Lange, 2009). Although some studies have suggested that individuals malingering ADHD will tend to overreport problems on checklists (Harrison et al., 2007), findings from the present study suggest that when Internet-derived information about ADHD is read and incentive is provided, different results are

Table 5
Feigning Test Results: Mean (SD)

Measure/index (cut score)	Group: HON (n = 14)	FGN (n = 30)	ADHD (n = 29)	FGN–ADHD g	Sensitivity to FGN	Specificity for ADHD	Hit rate
M-FAST total (≥6)	0.21 (0.58)$_a$	2.63 (3.03)$_b$	1.07 (1.22)$_a$	0.67	.100	1.000	.542
TOMM subscales (<90)							
Trial 1 percentage correct	98.60 (2.98)$_a$	76.70 (13.58)$_b$	93.70 (6.30)$_a$	−1.60	.867	.828	.877
Trial 2 percentage correct	100.00 (0.00)$_a$	84.50 (17.07)$_b$	99.20 (2.65)$_a$	−1.19	.467	.966	.767
Retention trial percentage correct	99.90 (0.54)$_a$	84.90 (16.08)$_b$	99.20 (2.65)$_a$	−1.23	.467	.966	.767
DMT percentage correct (<90)	100.00 (0.00)$_a$	90.20 (11.83)$_b$	99.50 (1.30)$_a$	−1.10	.433	1.000	.767
LMT percentage correct (<93)[a]	100.00 (0.00)$_a$	85.50 (15.97)$_b$	97.70 (3.35)$_a$	−1.06	.517	.931	.778
NV-MSVT							
Scale A (≤90)	97.50 (3.25)$_a$	90.50 (9.21)$_b$	97.20 (3.54)$_a$	−0.96	.467	.931	.740
Scale B (<88)	96.30 (4.66)$_a$	87.00 (12.31)$_b$	96.10 (4.73)$_a$	−0.97	.433	.931	.712

Note. Within each row, columns with different subscripts are significantly different according to Tukey post hoc testing ($p < .05$). HON = honest; FGN = feigning; ADHD = attention-deficit/hyperactivity disorder; M-FAST = Miller Forensic Assessment of Symptoms Test; TOMM = Test of Memory Malingering; DMT = Digit Memory Test; LMT = Letter Memory Test; NV-MST = Nonverbal–Medical Symptom Validity Test; g = Hedges's g effect size.
[a] FGN N = 29 for LMT due to one student not finishing protocol before leaving.

Table 6
Classification Rate Data for Failure of Increasing Numbers of Cognitive Feigning Test Indices

Number of tests failed	Sensitivity	Specificity	Hit rate	Base rate = 15%		Base rate = 40%		Base rate = 50%	
				PPP	NPP	PPP	NPP	PPP	NPP
≥1	.633	.828	.729	.394	.928	.710	.772	.786	.693
≥2	.500	.931	.712	.561	.913	.829	.737	.879	.651
≥3	.467	1.000	.729	1.000	.914	1.000	.738	1.000	.652
≥4	.345	1.000	.667	1.000	.896	1.000	.696	1.000	.604

Note. Indices considered for classification at recommended cutting scores: Test of Memory Malingering Trial 1, Trial 2, and retention trial; Digital Memory Test; Letter Memory Test; and Nonverbal–Medical Symptom Validity Test Scales A and B. Hit rate at ≥3 reflects one participant with missing data on the Letter Memory Test. PPP = positive predictive power; NPP = negative predictive power.

produced. In particular, students feigning ADHD did not necessarily overreport problems, and they provided a profile of inattention similar to other college students diagnosed with ADHD. This study also confirms findings reported by Suhr et al. (2008) that the CAARS validity scale (Inconsistency) is not helpful in making a determination of feigning. Realistically, there is no reason to suspect that ADHD symptom report within the context of a verbal interview would not also suffer from all of the inherent problems differentiating true from feigned ADHD found in these studies of feigning self-report inventories. Given that recent research also suggests weakness in ADHD self-report inventories secondary to readability and linguistic problems (E. S. Rogers, Spalding, Eckard, & Wallace, 2009) and item position effects (Mitchell, Knouse, Nelson-Gray, & Kwopil, 2009), they should generally be used cautiously as an adjunct to a clinical interview.

Similar to previous research, this study has also found that students asked to feign ADHD tended to exhibit a higher level of cognitive deficits on neuropsychological tests yet not at a sufficient level to confidently differentiate those feigning ADHD from those with ADHD. As discussed by Booksh et al. (2010), there tends to be a continuum of impairment from normal controls to a clinical sample to feigners. Further complicating interpretation of cognitive tests, the ADHD sample in this study did not exhibit a significant degree of cognitive impairment when compared to normal controls. Although numerous studies have found group differences on select neuropsychological measures between adults with ADHD and normal controls (Boonstra, Oosterlaan, Sergeant, & Buitelaar, 2005; Lovejoy et al., 1999; Siedman et al., 2004), this is not necessarily the case when comparing relatively highly functioning ADHD adults with controls (Riccio et al., 2005). Presumably, the college student sample is a less cognitively impaired group than a general adult population such that these differences do not clearly emerge. Thus, it is questionable whether many neuropsychological measures provide much diagnostic information in this population and frank impairments or whether several deficits on such measures may be more apt to indicate feigning than true ADHD.

Continuous performance measures, such as the C-CPT, are probably the most frequently employed cognitive test used to assess ADHD. The present study tends to confirm that individuals feigning ADHD are more apt to show impairment than an ADHD sample on the C-CPT. However, the ADHD sample in this study showed relatively little impairment in general, rendering the test insensitive to ADHD, as has been found in some other studies (Riccio et al., 2005). Those faking ADHD did tend to exhibit a greater degree of impairment, seemingly at a level that would be considered clinically indicative of a true ADHD sample. Of note, those feigning ADHD tended to exhibit impairment on indices (Omissions, Variability) that are often considered of importance in diagnosing ADHD. In short, their pattern of performance was not grossly impaired and fit a profile likely to be interpreted as clinically consistent with ADHD. Additionally, it should be noted that the C-CPT scale provided in the computer scoring as the percentage clinical agreement seems to be of limited value and may even be confusing. The C-CPT manual (Conners & MHS Staff, 2004) does not describe exactly how this discriminant function analysis is derived or indicate how much weight a clinician should place on the variable. While one might assert that a lack of clinical elevations by the ADHD group in the present study points to limited attentional or neuropsychological dysfunction, the fact that the HON group displayed more than a 40% correspondence to the clinical profile is difficult to understand.

Some prior studies have suggested that a CPT may show some value in differentiating actual from feigned ADHD, although these studies did not involve as tight a methodology as recommended by R. Rogers (1997). For instance, Leark, Dixon, Hoffman, and Huynh (2002), using a normal sample with some asked to feign impairment on a CPT measure (Test of Variable Attention), found that the faking group tended to exhibit a greater degree of impairment across most variables including omissions and commissions. They noted that excessive impairment should be a sign of an abnormal response set, but there were no clinical controls. Quinn (2003), utilizing the Integrated Visual and Auditory CPT, found that it achieved good sensitivity in differentiating a feigning group when compared to a clinical ADHD sample since this group exhibited notably more impairment on all indices. This study involved a relatively brief instructional set with no incentive for role performance. Booksh (2005), employing the C-CPT in a simulation paradigm with a clinical control sample, found that the simulated ADHD group exhibited a greater degree of impairment on the C-CPT indices of overall elevation. The specificity of C-CPT measures for detecting feigning was modest.

The M-FAST was administered in this study as a commonly used, brief measure of psychiatric symptom malingering. None of the groups exhibited much tendency to endorse these symptoms, suggesting it is of limited value for identifying malingered ADHD. It seems unlikely that typical psychiatric inventories designed to assess dramatization or malingering of psychiatric disorders have sufficient relevance to the ADHD student population to be useful in making this distinction. Realistically, the M-FAST and other feigning measures such as the Minnesota Multiphasic Personality Inventory—2 F scales (Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989) or the Structured Inventory of Malingered Symptomatology (Smith & Burger, 1997) are focused on exaggeration of severe psychiatric and somatic complaints, not symptoms of ADHD. A measure would likely need to be designed specifically with this population in mind.

The primary finding in this study extends prior research indicating that existing cognitive SVTs can be quite valuable in identifying students who are feigning ADHD on this type of evaluation. As single measures, each is able to do so with a moderate degree of sensitivity. Prior research with a simulation design (Frazier et al., 2008) found that both the Victoria Symptom Validity Test and the Validity Indicator Profile show good ability to discriminate both simulated ADHD and reading disorder groups while having a low rate of inaccurate identification of controls as simulators. Booksh et al. (2010) found good discrimination with the WMT, which, not surprisingly, was much better than masked researchers or independent clinicians at determining faking, although a clinical ADHD group was not included. Of note, both studies found that the found the 15-item test was less able to discriminate simulated ADHD from controls, a finding that has been found with other populations (Vickery et al., 2001).

All of the cognitive SVTs employed in this simulation design (TOMM, DMT, LMT, and NV-MSVT) exhibited a moderate level of sensitivity in the identification of feigned ADHD. With increasing base rates of feigning, this translates into higher positive predictive values for each measure. The TOMM, DMT, and LMT were employed in this study since they have previously been found to have high levels of predictive ability when studying this issue in other patient populations (Sollman & Berry, 2008). Using previously established cut scores for the determination of inadequate effort, these measures displayed adequate sensitivity and hit rates for the identification of the feigning group while identifying few honest individuals with ADHD as faking. However, with the exception of the DMT, which did not classify any ADHD subject as feigning, the others did misidentify two ADHD participants as feigning. Similar findings were noted for the NV-MSVT, which is a newer, innovative type of SVT. Of interest, Trial 1 on the TOMM, which is not routinely employed in malingering identification, showed a very high sensitivity to feigning when using a cut score employed for the second and retention trials. Thus, it may be quite valuable in making this determination, provided this finding is cross-validated. Its value may relate to the most typical strategy voiced by those in the feigning group when asked how they approached their role. A significant number of subjects (58%) indicated that they actively tried not to concentrate or pay attention during the tests—a strategy seemingly apt to impact the first trial as much as later ones. This finding warrants replication.

Finally, combining the SVT indices resulted in only modest declines in overall sensitivity but robust specificity beginning at a criterion of predicting feigning when two or more of the indices were failed. Given the common use of multiple SVT measures in clinical evaluations, further work on the optimal methods for combining these results is warranted. In particular, it will be important to cross-validate the specificity rates found here in additional genuine ADHD patients.

Two major limitations exist in this study. By their nature, simulation designs may limit the generalizability of the data. Cross-validation in additional geographic and university settings with differing student body compositions is necessary. Since no gold standard exists to identify either genuine ADHD or feigned ADHD in this population, however, researchers must rely on the analogue methodology at this time. The lack of a diagnostic gold standard also impacts the designation of a clinical ADHD group as employed in this study. There is little reason to assume that the clinical sample would necessarily be a pure group of true ADHD subjects. While it is a sample consistent with current clinical practice, the diagnostic accuracy of the ADHD group is undoubtedly imperfect. Clinicians vary greatly in their approach to diagnosing the disorder, as well as the base rate at which they conclude with an ADHD diagnosis. While every effort was made to only include those ADHD cases who met full diagnostic criteria and had pursued treatment for the disorder, some of these participants may have had limited impairment associated with their condition, perhaps accounting for the general lack of cognitive differences between groups. Additionally some may have, in fact, feigned impairment to receive treatment or some other benefit. The ADHD group included young adults without comorbid diagnoses to facilitate diagnostic accuracy. Given that adult ADHD is known to be frequently associated with other conditions, this may also have reduced the overall pathology of the clinical group, perhaps further contributing to the lack of pronounced neuropsychological differences with the controls.

The identification of students who feign impairment on ADHD evaluations within the university setting will likely remain a vexing problem. Sufficient research exists to indicate that some tentative guidance for clinical practice can be made at this time. Evaluations should not rely on unsubstantiated self-report even if augmented by standard ADHD checklists. College students with no documented history of ADHD who report numerous symptoms of ADHD and exhibit gross elevations on face-valid ADHD self-report inventories such as the CAARS should arouse suspicion of feigning the disorder. Similarly, gross impairment on multiple neuropsychological measures, including CPT measures, at a level more consistent with severe head trauma than normal functioning should also arouse suspicion of feigning. Adequate evidence exists to state that college students presenting for ADHD evaluation are unlikely to fail cognitive SVTs using standard cutoff scores, but some individuals who are feigning the disorder may perform suboptimally on such tests. Realistically, it is better to miss some who are feigning than to mislabel true clinical cases as feigning. Sufficient data exist to recommend that available SVTs that have demonstrated good predictive power in other populations (e.g., neurological, pain) be routinely used with this population. The Rey 15-item test, which has not generally held up well in previous research, should not be used. Further research should examine recalibration of existing measures for maximum prediction within this population as well as designing other types of cognitive tests that might better serve this purpose. For instance, Osmon, Plambeck, and Mano (2006), in a simulation design, found that a memory-based SVT (the WMT) showed good sensitivity to feigning a reading disorder but that a reading-based SVT (the Word Reading Test) was superior in terms of its sensitivity to feigning, presumably since it more directly measures the skill that someone feigning the disorder would presume to identify as requiring an impaired response set. In particular, designing SVTs that appear to directly examine sustained attention or speed of cognitive processing, as opposed to short-term memory skill, would seem warranted. Until then, careful neuropsychological examination of symptom history and cognitive performance to identify actual impairment and to rule out motivational issues, psychiatric contributors, and non-ADHD cognitive difficulties seems necessary to accurately diagnose the condition in undergraduate students.

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Received September 16, 2009
Revision received December 23, 2009
Accepted December 24, 2009 ■