DETECTION OF MALINGERED AD/HD IN COLLEGE STUDENTS

A Thesis

Presented to

the Faculty of the College of Science and Technology

Morehead State University

In Partial Fulfillment

of the Requirement for the Degree

Master of Science

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by

Andrea Williams

November 2012

Accepted by the faculty of the College of Science and Technology,
Morehead State University, in partial fulfillment of the requirements for the Master of Science degree.

Sean P. Reilley, PhD.
Director of Thesis

Master's Committee: _____, Chair

12/6/12
Date

DETECTION OF MALINGERED AD/HD IN COLLEGE STUDENTS

Andrea Williams, M.S.
Morehead State University, 2012

Director of Thesis: Jim Reilly, PhD

Attention Deficit/Hyperactivity Disorder (AD/HD) is a neuropsychological disorder that affects an estimated 2-5% of adults and 3-7% of children in the U.S. Many adults remain undiagnosed until their college-age years. There are several academic, personal and financial benefits to receiving an AD/HD diagnosis in college and some adults seeking the diagnosis exaggerate feign, or malingering AD/HD symptoms. To enhance clinical assessment, this study evaluated the susceptibility of eight instruments (self-report rating scales, neuropsychological measures, symptom validity measures, and psychiatric feigning inventories) to malingered AD/HD using a 2 (malinger vs. respond honestly) x 2 (AD/HD enhanced knowledge or non-AD/HD enhanced knowledge) analogue simulation research design.

Self report measures are the most common form of AD/HD screening tools used by clinicians in addition to a clinical interview. This study assessed knowledge of AD/HD using the Adult Knowledge of Attention Deficit Disorder Scale

(AKADDS; Watkins & Reilley, 2009), childhood AD/HD symptoms, using the Childhood Symptom Scale- Self Report (CSS-SF; Barkley & Murphy, 1998), and current AD/HD symptoms, using the Current Symptoms Scales (CSS; Barkley & Murphy, 1998). It was predicted and found that reading about symptom criteria enhanced participants' knowledge of AD/HD, but that knowledge of AD/HD wasn't required for successful malingering of childhood and current AD/HD symptoms on the CSS-SF and CSS, respectively.

Neuropsychological instruments are also commonly included in AD/HD evaluation as specific aspects executive functioning are thought to underlie behavioral deficits in AD/HD (Barkley, 2008). However, the impact of malingered AD/HD on such measures is often not known. The Behavior Rating Inventory of Executive Functioning- Adult Version Form (BRIEF-A; Roth, Isquith, & Gioia, 2005) is a self-reported measure of executive dysfunction. Partial support was found for hypotheses involving the BRIEF-A as malingering groups scored significantly higher the non-malingering groups, but not higher than normative data from an unmedicated clinical sample of AD/HD adults. The Delis-Kaplin Executive Functioning System Trail Making Task (D-KEFS TMT; Delis, Kaplan, Kramer, 2001a) is a paper-and-pencil measure of different aspects of executive functioning (e.g., visual scanning, sequencing, and motor speed). Partial support was found for hypotheses involving the D-KEFS as malingering groups scored significantly higher than non-malingerers except for the predicted letter-number switching task.

The utility of symptom validity measures including the WAIS-IV Digit Span Task and Reliable Digit Span Task (RDS) and the Test of Malingered Memory (TOMM) were evaluated. Partial support was found for the Digit Span task as malingerers scores significantly lower than non-malingerers on the total Digit Span score and the new Digit Sequencing Task. Full support was found for hypotheses involving the TOMM as malingerers scored significantly poorer than non-malingerers on all TOMM trials.

Individuals asked to malinger AD/HD symptoms often display deficits on measures of executive functions and portray psychiatric symptoms in excess to those reported by normal controls and those with AD/HD (Booksh, 2005; Harp, Jasinski, Shandera-Oshsner, Mason, Berry, 2011; Harrison et al, 2007). Using the Structured Inventory for Malingered Symptomatology (SIMS; Widows & Smith, 2005) the current study predicted and found that participants asked to malinger AD/HD reported an broad number of erroneous psychiatric symptoms.

The present study improves on the existing literature in the area of AD/HD assessment and suggests a carefully selected battery of instruments, including measures to aid in detection of malingering, is needed when assessing adults for AD/HD.

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Detection of Malingered AD/HD in College Students

Attention Deficit/Hyperactivity Disorder (AD/HD) is a neuropsychological disorder with symptoms and impairment thought to emerge first in childhood (Barnett, Maruff, & Vance, 2009). Approximately 50-65% of children diagnosed with AD/HD continue to experience significant clinical symptoms with impairment in psychosocial and cognitive functioning in adulthood (Barkley, 2010; Barkley, Fischer, Smallish & Fletcher, 2002; Booksh, 2005; Manos, 2010; McGough & Barkley, 2004). Thus, it is estimated that 3-7% of children and 4-6% of adults in the U.S. have AD/HD (Able, Johnston, Adler, & Swindle, 2007; Austin, Reiss, & Burgdorf, 2007; Kessler, Adler, Barkley, Conners, Demler, Faraone, Greenhill, Howes, Secnik, Spencer, Ustun, Walters, & Zaslavsky, 2006; Pastor & Reuben, 2008).

Attention Deficit /Hyperactivity Disorder is a complex disorder with differing sets of inattentive and/or hyperactive-impulsive symptoms common across individuals (Manos, 2010; Yan et al., 2010). The variability in the presentation of AD/HD is treated by classifying the symptoms into one of three subtypes of AD/HD in the current edition of the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition- Text Revision (APA, 2000): AD/HD Predominantly Inattentive type (AD/HD-PI), AD/HD Predominantly Hyperactive-Impulsive Type (AD/HD-PH), and AD/HD Combined Hyperactive/Inattentive Type (AD/HD-C). To be diagnosed with AD/HD, the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV TR; APA, 2000) requires a sufficient number of AD/HD symptoms (minimum of 6

inattentive and/or 6 hyperactive symptoms) be developmentally inappropriate and present for at least six months (DSM Criteria A). Some AD/HD symptoms with impairment must have been present before age seven (DSM Criteria B). The AD/HD symptoms must be impairing in at least two areas (or settings) of the individual's life (DSM Criteria C) with clinical impairment to a significant degree in social, academic, or occupational functioning (DSM Criteria D). Finally, the mental health practitioner needs to demonstrate that the AD/HD symptoms are not better accounted for by another disorder (DSM Criteria E).

Accurate detection of AD/HD in adults is important for initiating treatment to lessen the severity of inattentive, and/or hyperactive-impulsive symptoms, and accompanying interpersonal, occupational, academic or intrapersonal difficulties (Marchetta, Hurks, Krabbendam, & Jolles, 2008). Adults with AD/HD are at risk for relationship problems such as decreased satisfaction in their marriages, increased stress related to parenting difficulties, and higher rates of divorce and extra-marital affairs, (Goodman, 2007; Ramsay, 2010). Problems with AD/HD in the work place are common and often involve adults being late to work or meetings, being disorganized, or not completing work tasks on time (Barkley, 2010; Booksh, 2005). Difficulties with multitasking, managing large workloads, and/or getting along with coworkers can also lead adults with AD/HD to underperform at work, thus leading to increased risk for being placed on suspension or problems maintaining long-term employment (Barkley, 2010; Halmoy, Fasmer, Gillberg, & Haavik, 2009). Academically, individuals with AD/HD are at risk for underperforming compared to

their non-AD/HD counterparts in many academic areas and may need special services or tutoring (Barkley, 2010; Booksh, 2005; Corkum, McGonnell, & Schachar, 2010).

Many adults with AD/HD suffer personal difficulties such as impulsive or risky decision making leading to poor money management, or legal difficulties due to excessive speeding or increased rates of automobile accidents (Knouse, Bagwell, Barkley, & Murphy, 2005). Barkley (2010) reports adults with AD/HD have higher rates of medical conditions such as heart disease (2.4% higher), body mass index (11.4% higher), total/HDL cholesterol (20% higher), are more likely to have sleep problems (2.5% higher), and to use nonmedical drugs (2.2% higher). The occurrence of these medical conditions in individuals with AD/HD has been attributed to impulsive decision making and difficulty considering the long-term consequences of their health choices involving preventative and regular self-care (Barkley, 2010). With respect to mental health, Cumyn, French, and Hechtman (2009) found adults with AD/HD display higher rates of psychological disorders on both Axis I (46.9% vs. 27.31%) and Axis II (50.7% vs. 38.2%) of the DSM-IV-TR (APA, 2000) as compared to the general population. As corroborated and expanded by other research, AD/HD appears to have the highest co-morbidity rates with anxiety disorders (47-50% comorbidity; Biederman, 1998; Kessler et al., 2006), mood disorders (37-38% comorbidity; Downey, Stetson, Ronerleau, & Giordani, 1997; Kessler et al., 2006), substance abuse disorders (15-46% comorbidity; Biederman, 1998; 15% comorbidity; Kessler et al., 2006), and antisocial personality disorder or antisocial behaviors (1-4

times more likely; Barkley, Murphy, & Fischer, 2008; Biederman, 1998; Kessler et al., 2006).

Despite the physical and mental health risks associated with AD/HD as well as the accompanying occupational, academic, and/or interpersonal problems, a majority of adults with AD/HD remain undiagnosed. Klassen, Katzman, & Chokka (2010) suggest an adult suffering from AD/HD may never be diagnosed simply because he/she may never seek services or may be seen by a practitioner who is less familiar with AD/HD in adults. Adler & Cohen (2004) and Manos (2010) point out that many mental health providers may miss an AD/HD diagnosis because AD/HD has long been viewed as a childhood disorder, is currently assessed using diagnostic criteria that were developed on children, and some diagnostic symptoms appear to change from childhood to adulthood. Others (Fox, 2008; Reilley, 2005; Searight, Burke, & Rottneck, 2000) point out that AD/HD symptoms appear to overlap with a variety of medical and psychological problems, and thus AD/HD often goes undetected or is misdiagnosed. For example, the symptoms of inattention and distractibility are also often seen in individuals that have a medical condition such as hypothyroidism or chronic pain, or, those with learning, mood, or anxiety disorders (Fox, 2008; Reilley, 2005; Searight, Burke, & Rottneck, 2000). Individuals that have sustained head injuries, those who abuse substances, or suffer from bipolar disorder, antisocial or borderline personality disorder display symptoms of impulsivity and restlessness (Fox, 2008; Klassen, Katzman, Chokka, 2010; Searight et al., 2000). As

such, the mental health professional faces a range of diagnostic challenges in assessing adults for AD/HD.

Assessment of AD/HD by mental health professionals

Due to differences in diagnostic approaches used by mental health professionals, there is currently no gold standard assessment in the field of psychology for reliably determining a diagnosis of AD/HD (Manos, 2010; McGough & Barkley, 2004). Medical professionals utilize a variety of techniques to assess AD/HD in adults including clinical interviews, medical examinations, self-and collateral screening measures and/or external evaluations from other mental health professionals (Booksh, 2005; McGough & Barkley, 2004; Quinn, 2003; Solloman et al, 2010; Wasserstein, 2005). Similar to physical health evaluations, many adults that come in for assessment are the sole informant of their behavior. Thus, many medical professionals frequently make decisions about an AD/HD diagnosis on self-reported history and interview information provided by the client, and, when possible, data from AD/HD screening measures administered during the visit. Adler, Shaw, Sitt, Maya, and Morrill (2009) report that 75% of 400 primary care physicians surveyed believed current AD/HD screening instruments had poor to fair accuracy. As a result, 85% of the physicians surveyed indicated that until a more accurate screener was developed they would remain hesitant to take a more active role in diagnosing and treating adult AD/HD (Adler et al., 2010).

Psychologists often incorporate neuropsychological measures with data obtained from clinical interviews and self-and-collateral ratings of AD/HD behaviors

in their evaluations of adults for AD/HD (Manos, 2010; Suhr, Hammers, Dobbins-Buckland, Zimak, Hughes, 2008). Neuropsychological instruments are attractive for clinicians to include for two reasons: (1) to selectively assess aspects of executive functioning which are thought to underlie behavioral deficits in AD/HD (Lovejoy, Ball, Keats, Stutts, Spain, Janda, & Janusz, 1999; Wasserstein, 2005), and (2) to evaluate whether the examinee's effort on cognitive and behavioral measures in the assessment might be considered suspect, thus raising the possibility of malingered, feigned, or exaggerated AD/HD symptoms (Booksh, 2005; Quinn, 2003; Suhr et al., 2008).With regard to the former, executive functions are fundamental human self-directed mental processes mediated chiefly by the prefrontal lobes of the brain (Barkley, 1997, 2001). Executive functions aid individuals in self-control for performing larger, real world behaviors such as paying attention, remembering details, or managing time (Lezak, 2004; Wasserstein, 2005). Disagreement about the core components of executive functioning exists among researchers, but typically actions for shifting sets, inhibition of behavior, sequencing and planning for events, engaging in selective and sustained attention, and use of working memory are included (Lezak, 2004; Lovejoy et al., 1999; Martinussen, Hayden, Hogg-Johnson, & Tannock, 2005; Nigg, 2005). Barkley et al. (2008) argue that AD/HD chiefly disrupts inhibition leading to problems in multiple executive components. Available meta-analyses of both child and adult AD/HD executive functioning studies conducted to date (Aguiar, Eubig, & Schantz, 2010; Castellanos, Sonuga-Barke, Milham, & Tannock, 2006; Dickstein, Bannon, Castellanos & Milham, 2006; Freidman &

Miyake, 2004; Harvey, Epstein, & Curry, 2004; Lansbergen, Kenemand, & van Engeland, 2007; Schoechlin & Engel, 2005; Walshaw, Alloy, & Sabb, 2010; Willcutt, Doyle, Nigg, Faraone, & Pennington, 2005; Woods, Lovejoy, & Ball, 2002) provide partial to full support for this view with moderate overall effect sizes observed for executive components involving response inhibition, planning, sustained attention, and working memory.

As noted previously, neuropsychological tests are also becoming increasingly used as part of an assessment battery to evaluate a client's effort, especially when there are significant incentives to malinger or underperform (Inman & Berry, 2002; Quinn, 2003; Young & Gross, 2011). Malingering is defined in the DSM-IV-TR as "intentional production of false or grossly exaggerated physical or psychological symptoms, motivated by external incentives" (APA, 2000, p. 739). Incentives that may promote malingering or feigning of AD/HD, and, subsequent compromised performance on neuropsychological tests are plentiful (c.f., Young & Gross, 2011). For adults in college, successful malingering can lead to unwarranted academic accommodations such as extra time on exams and assignments, ability to take tests in a distraction free or a quiet room away from others, alternative or reduced homework loads, and ancillary resources such as recorded lectures and/or books on tape (Sollomon, Ranseen, & Berry, 2010; Young & Grossman, 2011). Adults in a non-college work environment can request occupational accommodations which if granted can lead to undue financial costs for the employer (Alfano & Boone, 2007; Sullivan, May, & Galbally, 2007). Most pharmacological treatments for AD/HD involve

stimulant medication that can also provide benefits for adults that do not have the disorder (Advokat, Guidry, & Martino, 2008; Harrison, 2006; Snider, Busch, & Arrowood, 2003). In fact, the use of stimulant medications has increased on university campuses from the undergraduate to graduate level (Advokat, Guidry, & Martino, 2008; Harrison, Edwards, Parker, 2007). College students without AD/HD can use stimulant medications recreationally, or as study aids, or can sell them (Advokat, Guidry, & Martino, 2008; Young & Gross, 2011). However, stimulant medication abuse is not just specific to college adults given as many as 12% of state prisoners used stimulant medications illicitly a month prior to their offense (Applebaum, 2008). Medications used to treat AD/HD in adults such as Ritalin and Adderall are also found in prisons where these medications can be sold and abused by inmates. In fact, financial gain or fulfillment of substance of choice can be the basis for prisoners malingering to obtain these medications (Applebaum, 2008; Burns, 2009; Mumola & Karberg, 2004). Finally, adults claiming to have ADHD can also stand to gain Social Security Disability benefits. In addition, successful malingers can avoid military service or deployment (Friedman, Blaschke, Klam, & Stein, 2010). This may be incentive for some adults in the military to either malinger or underreport AD/HD symptoms.

- **Assessment of Malingering of AD/HD**

Self-report instruments such as AD/HD rating scales are the most widely used AD/HD evaluation instruments secondary to a clinical interview (Fischer & Watkins, 2008). Currently, most of the popularly used AD/HD self-report rating scales are

based on AD/HD symptoms that share some relation to the current DSM typology for AD/HD, but often differ in the time frame for the symptom reporting (Fisher & Watkins, 2008). For instance, the ADHD Behavior Checklist (Murphy & Barkley, 1996a) was developed based on the DSM criteria for AD/HD and uses a 6-month time frame for symptom reporting whereas the Conners Adult AD/HD Rating Scale uses a "recent" time frame, albeit, without a concrete duration of months. Although AD/HD rating scales may differ in their fidelity to the DSM-IV-TR criteria or time frame for symptom reporting, most, if not all of the current AD/HD self-report measures for adults (Attention Deficit Scale for Adults; Current Symptoms Scales, CSS; Barkley & Murphy, 1998; Childhood Symptom Scale- Self Report, CSS-SRF; Barkley & Murphy, 1998; Wender-Utah ADHD scale; Ward et al., 1993) fail to reliably differentiate AD/HD individuals from those asked to malinger AD/HD in research studies (Booksh, 2005; Jachimowicz & Geiselman, 2004; Quinn, 2003; Sollomon et al., 2010). One common reason for this finding is that most AD/HD rating scales used for adults lack validity scales, thus rendering an instrument vulnerable to exaggeration of symptoms, feigning, or malingering (Young & Gross, 2011).

Because self-reports of AD/HD symptoms are often vulnerable to malingering, the current view in neuropsychological testing is to include instruments that can evaluate the suspected effort of the individual (Berry & Granacher, 2009). Self-reports of executive dysfunction such as the Behavior Rating Inventory of Executive Functioning – Adult (BRIEF-A; Roth, Isquith, & Gioia, 2005) version are

increasingly being used in AD/HD evaluation and typically involve ratings of different components of executive functions using a neuropsychological theory or model of executive dysfunction. Unfortunately, there is a paucity of research on malingering and neuropsychological rating scales, especially in the area of malingered Attention Deficit/Hyperactivity Disorder. There appears to be a larger general research base, however, regarding use of behavioral neuropsychological measures in studies of adults with AD/HD, including those asked to malinger AD/HD. These types of measures include the Test of Malingered Memory (TOMM; Tombaugh, 1996) and the Wechsler Digit Span Test (Pearson, 2009) which are discussed in subsequent sections. In addition, research has begun to examine the impact of malingered AD/HD on forensic measures, and symptom validity measures. A more thorough review of the current findings for behavioral neuropsychological measures, psychiatric feigning measures, and symptom validity measures is provided herein to provide a context for hypothesis testing in the current study using subsets of these measures.

Neuropsychological Measures

Attention Deficit/Hyperactivity Disorder is a neuropsychological disorder with executive functioning problems believed to underlie overt behavioral and cognitive problems. As such, neuropsychological measures that assess adults' ability to inhibit their behavior, to sequence and plan for events, to shift sets, to engage in selective and sustained attention, and to adequately deploy working memory are of interest. A meta-analysis conducted by Schoechlin & Engel (2005) found large effect

sizes for working memory and sustained attention when adults with AD/HD were compared to non-AD/HD controls. Prior research from other authors have noted the significant deficits in multiple executive functions (i.e., attention, memory, and inhibition) demonstrated by individuals with AD/HD (Harvey, Epstein, & Curry, 2004). A meta-analysis by Frazier, Demaree, and Youngstrom (2004) did not find the same large effect sizes reported by Schoechlin et al. (2005). The authors hypothesized that executive functioning deficits may affect estimates of the individual's overall intellectual abilities, thus resulting in lower effect sizes between groups. For other executive functions, meta-analytic reviews have found medium effect sizes for verbal fluency, inhibition, and set shifting (Boonstra, Oosterlaan, Sergant, & Buitelaar, 2005).

Variants of the Stroop Test (Stroop, 1935) have been used to measure response inhibition and interference in individuals with AD/HD compared to controls without AD/HD. During the Stroop task, the individual is given a card in which color names (e.g., Red, Blue, Green, Black, etc) are listed in different colors (e.g., the word Blue is printed in Red ink). The examiner typically asks the examinee to read achromatic color names, and/or to identify color-congruent colored names as a priming task and then to respond to a color-incongruent word naming task to assess their response inhibition and interference. In recent research on malingered AD/HD, researchers have found that this task is insensitive to AD/HD symptoms and that often times, those with or without the disorder can score within the normal range (Sollman et al., 2010). Nevertheless, Solloman et al. (2010) demonstrated that this

task did have some ability to differentiate between malingering AD/HD participants and true AD/HD participants because those malingering AD/HD had significantly more scores in the borderline to impaired range when compare to those diagnosed with AD/HD.

Another popular neuropsychological instrument used in the evaluation of AD/HD are continuous performance measures such as Conners Continuous Performance Test (Conners, 2000), Test of Variable Attention (TOVA; Greenberg & Waldman, 1993), and the Integrated Visual and Auditory Continuous Performance Test (IVA-CPT; Sanford & Turner, 1995). These tasks gauge the selective and sustained attention of an individual as well as response inhibition. The individual is asked to respond on a computer to an infrequently presented stimulus (e.g., a target letter). Performance is assessed by correct responses, incorrect responses or errors of commission, and omission errors where the individual failed to respond to a target. Studies have shown that individuals with AD/HD do perform more poorly than normal controls (Booksh, 2005; Epstein, Conners, Sitarenios, & Erhardt, 1998; Quinn, 2003). However, those asked to malinger AD/HD in research have also performed more poorly than both normal controls and those with AD/HD, so the conclusions of the assessment alone is not always conclusive whether the person is malingering or has AD/HD (Wilding, 2005).

The Trail Making Test (TMT) Parts A & B, originally developed by the United States Army (1944), measures simple and complex planning and sequencing and alternating attention. Meta-analyses have shown a moderate effect for completion

time differences for Part A and Part B between AD/HD and control participants (Delis, Kaplan, Kramer, 2001a). On Trails A, individuals are asked to draw a line connecting a series of circles with a number displayed inside of it, similar to a connect-the-dots puzzle. On Trails B, the circles contain both numbers and letters and the individual is to connect the circles in an alternating pattern of numbers and letters (e.g., 1-A-2-B-3-C....etc). In one malingering study, there was evidence that the Trail Making Test (TMT) could differentiate between malingered and true AD/HD because malingerers performed significantly worse than the individuals with true AD/HD on the Trails A of the TMT (Booksh, 2005). Newer variations on the TMT, e.g., the Delis-Kaplan Executive Functioning System Trail Making Task (D-KEFS TMT; Delis, Kaplan, Kramer, 2001a), have not yet been used in adult AD/HD malingering studies, although there are good reasons to consider the D-KEFS in future neuropsychological and malingering research.

Benefits of the D-KEFS TMT, in comparison to the original TMT, include the ability to isolate specific performance skills (Delis, Kaplan, Kramer, 2001a). Unlike the traditional TMT which measures a group of skills (e.g., visual scanning and number sequencing in the TMT A trial), the D-KEFS separates out these skills into separate tasks in order to determine which specific deficits are present for the individual. The D-KEFS includes five tasks or conditions that measure: 1) Visual Scanning, 2) Number Sequencing, 3) Letter Sequencing, 4) Number-Letter Switching, and 5) Motor Speed. This allows the examiner to then make conclusions regarding whether difficulties on the task are related to a "higher-level deficit in

cognitive flexibility and/or to one or more fundamental component skills tapped by the task" (Delis, Kaplan, Kramer, 2001a, p.4). Wodka, Loftis, Mostofsky, Prahme, Gidley Larson, Denckla, and Mahone (2008) did not find support for the D-KEFS trail making tasks to differentiate children with and without AD/HD. However, Peden (2010) did find performance on the D-KEFS trail making task involving letter-number switching was significantly poorer in children with AD/HD relative to non-AD/HD controls. For the present study, the D-KEFS is of interest for isolating which components measured by the test are prone to malingered AD/HD in an adult sample.

Many AD/HD studies involving neuropsychological measures have included subtests of the Wechsler Adult Intelligence Scale-III (WAIS-III; Wechsler, 1997). The WAIS-III is an intellectual measure that includes a variety of tasks which measure a variety of abilities and functions of the individuals. Working memory and sequential processing which are purported deficits in AD/HD are assessed on the WAIS-III using the Digit Span Task (DS), Arithmetic (A) and Letter-Number-Sequencing (LNS) test. The Digit Span task has often been used in AD/HD malingering research due to the observed deficit in working memory common in many individuals with AD/HD. For this task, individuals are asked to repeat a string of numbers either in a forward or backward direction. In addition to working memory, attention in two forms is tested with this task; simple attention can be tested with the Digit Span Forward task, while focused attention can be measured by the Digit Span Backwards task (Schoechlin & Engel, 2005). An overall age-corrected scaled score of 5 or less on the Digit Span task is rare and could be interpreted that

the individual was not putting forth good effort on the assessment (Iverson & Tulsky, 2003). Within the context of malingering, Harrison, Rosenblum, and Currie (2005) found that none of the participants diagnosed with AD/HD received scores below this cutoff. Thus, the researchers concluded that the cutoff of a scaled score of 5 or below could potentially be used as evidence for malingering on an assessment (Harrison et al., 2005). Another variation to using the Digit Span task is the Reliable Digit Span (RDS). Although both are commonly used, a meta-analysis completed by Jasinski, Berry, Shandera, and Clark (2011), suggest that there is no significant differences in diagnostic accuracy between the two variations when the suggested cut-off scores are applied.

Symptom Validity Measures

Digit memory tasks such as the Digit Span Task on version of the Wechsler Adult Intelligence Scale or the Digit Memory Test (DMT; Hiscock and Hiscock, 1989) have been shown to have moderate sensitivity and strong specificity for detecting malingered vs. true AD/HD. In general, individuals malingering AD/HD typically perform significantly poorer on the theses tasks as compared to adults with AD/HD. The Digit Span Task has also been adapted in the Advanced Clinical Solutions for the Wechsler Adult Intelligence Scale-Fourth Edition (WAIS-IV; Wechsler, Coalson, Raiford, 2008) with the Reliable Digit Span Task (Pearson, 2009) to evaluate the examinee's effort on the neuropsychological testing. For this task, the examiner calculates a score based on the last trial in which the individual received full points. The scores from both Forward and Backward are combined to determine an

overall raw store. The score is compared to normative samples to ultimately result in a performance summary that can be used when determining the individual's effort on the task. Both the Digit Span and Reliable Digit Span Task along with another popular measure, the Test of Malingered Memory (TOMM; Tombaugh, 1996), were used in the current study.

The TOMM is a memory-based recognition task that has been successfully used in batteries administered during malingering research for both adults (Solloman et al., 2010) and children (Constantinou & McCaffery, 2010). Solloman et al. (2010) found significant differences in TOMM performance between adults attempting to malinger AD/HD and true AD/HD individuals. During the task, the participant is shown a series of 50 line drawings. The individual is later asked to recall the images, by selecting a presented image on 50 two-choice response panels. Conclusions about why the test is a strong predictor of malingering are credited to the test's design. Tombaugh (1996) indicates the TOMM's multiple stimuli give examinees the impression that the task is very difficult. Additionally, the task does not give any signs to the examinee about what the examiner may be measuring. Lastly, the examinee receives feedback during the task, so those who are exhibiting full effort, will learn from the feedback, where those who are not trying or malingering, will not demonstrate any learning. On the basis of these benefits of the TOMM and its ability to discriminate between adults with AD/HD and those attempting to malinger AD/HD, it was included for the current study.

Psychiatric Feigning Measures

In past research, individuals asked to malinger AD/HD symptoms have not only showed deficits on measures of executive functions, but also have portrayed psychiatric symptoms in excess to those reported by normal controls and those with AD/HD (Booksh, 2005; Harp, Jasinski, Shandera-Oshsner, Mason, Berry, 2011; Harrison et al., 2007). One popular psychiatric feigning measure used in prior research on malingered AD/HD is the Miller Forensic Assessment of Symptoms Test (M-FAST; Miller, 2001). Similar to malingering research with other clinical groups, M-FAST items were positively endorsed more often by the malingering AD/HD group in comparison to the true AD/HD group and produced a moderate effect size (Solloman et al., 2010). Dearth (2007) used the Structured Inventory for Malingered Symptomatology (SIMS; Widows & Smith, 2005), a psychiatric feigning measure, in AD/HD malingering research involving adolescents. The researcher found that those who were asked to malinger AD/HD symptoms demonstrated elevated SIMS scores indicative of feigning of symptoms. Since the current study will be asking some participants to purposefully malinger AD/HD symptoms with and without enhanced AD/HD knowledge, a more comprehensive psychiatric feigning measure like the SIMS would be of benefit for detecting gross symptom reporting, and was included.

Current Study

The current study was primarily focused on evaluating the ability of self-report, neuropsychological, and symptom validity instruments to detect malingered AD/HD in a college population. To accomplish this main goal, a 2 (malinger vs.

respond honestly) x 2 (AD/HD enhanced knowledge or non-AD/HD enhanced knowledge) analogue simulation research design was used with selected self-report, neuropsychological, psychiatric feigning scales, and symptom validity measures. A pre-plan-ned power analysis using PASS 11.0 suggested the estimated power in the study was expected to exceed .90 for a 2x2 factorial design with sixteen participants per cell (N=64), a moderate effect size (.50), and alpha set at .05.

The study tested the following hypotheses in an attempt to replicate and extend prior malingering work for AD/HD self-report scales, rating scales for executive functioning, neuropsychological measures, psychiatric feigning scales, and symptom validity measures.

Hypothesis 1: As an internal validity check for the methodology employed, experimentally enhancing participants' knowledge of AD/HD symptoms was expected to be associated with elevated scores on a measure of AD/HD knowledge. Thus, consistent with previous findings regarding the Adult Knowledge of Attention Deficit Disorder Scale (AKADDS; Watkins & Reilley, 2009), participants in conditions of enhanced AD/HD knowledge are expected to show a significant increase in AD/HD symptom knowledge as measured by AKADDS relative to those in the non-AD/HD knowledge enhancement condition.

Hypothesis 2: Replicating prior findings for AD/HD self-report scales, malingering groups should score significantly higher than non-malingering groups on the Current Symptom Scale, CSS, and the Childhood Symptom Scale, CSS-SRF. Additionally, participants in both malingering conditions should yield CSS and CSS-

SRF scores that are at least comparable to the published means for AD/HD groups found in the administration manual. Because extensive AD/HD knowledge is not needed to malinger on the CSS and CSS-SRF, a significant difference is not expected on the CSS and CSS-SRF when malingered groups are compared to one another.

Hypothesis 3: The BRIEF-A has yet to be administered in a study of malingered AD/HD in adults. However, it is expected that the malingering groups will score significantly higher than non-malingering groups when their BRIEF-A change scores (post-pre) are evaluated. This is expected given the pattern of excessive symptom reporting observed for AD/HD self-report measures. Additionally, participants in the malingering conditions should yield BRIEF-A scores that exceed the published means for AD/HD groups found in the administration manual. Knowledge of AD/HD is expected to produce a significant difference between the malingering groups wherein a higher BRIEF-A score is expected for the AD/HD knowledge enhanced malingering group relative to other groups.

Hypothesis 4: The D-KEFS has yet to be administered in adult AD/HD malingering studies. However, the pattern of prior TMT findings for malingered AD/HD was expected to generalize to the newer D-KEFS tasks. As such, the malingering groups were expected to score significantly poorer on the D-KEFS tasks compared to non-malingering groups when standardized scores associated with completion times were statistically evaluated. An a priori prediction for the D-KEFS letter-number switching tasks was made based on prior research by Peden (2010). Specifically, the letter-number switching task is expected to produce a significant

difference between the malingering groups and non-malingering controls due to its perceived complexity and difficulty.

Hypothesis 5a: The current study attempted to extend prior research on the Digit Span test of the Wechsler Adult Intelligence Scale-III by using the Digit Span test from the Wechsler Adult Intelligence Scale-IV and advanced test analysis using the Adult Clinical Solutions norms. The pattern of malingering findings for the WAIS-III Forward and Backward Digit Span task were expected to replicate and be extended using the WAIS-IV Forward and Backward Digit Span tasks. That is, the malingering groups were expected to yield lower scaled scores relative to non-malingering counterparts on those tasks. In addition, malingering groups were expected to score significantly lower than published means for the AD/HD group included in the WAIS-IV standardization sample. Finally, performance on the last trials receiving full credit for the Digit Forward and Backward tasks were combined to create the Reliable Digit Span test according to the manual for the Advanced Clinical Solutions for the WAIS-IV. It was expected that the malingering groups would demonstrate significantly poorer performance on the Reliable Digit Span relative to non-malingering groups and will be similar to or exceed published norms for suspected effort as found in the administration manual for the Advanced Clinical Solutions for the WAIS-IV.

Hypothesis 5b: The Digit Span Sequencing subtest which is new to the WAIS-IV has not yet been used in AD/HD malingering research. Nevertheless, a similar pattern of findings observed on the Digit Forward and Backward tasks was

expected for the Digit Span Sequencing task given the perceived difficulty of the task (e.g., multiple complex trials with more working memory demands) and the continued use of an underperforming malingering strategy. Thus, it was expected that malingering groups would produce lower scaled scores suggestive of poorer performance relative to non-malingering groups.

Hypothesis 6: The present study expected to replicate the malingered AD/HD findings for the TOMM from Soloman et al. (2010). Specifically, it was expected that the malingering groups would score significantly lower than non-malingering groups when their TOMM learning trials and recognition trial scores were evaluated. Additionally, participants in the malingering conditions should yield TOMM scores that exceed the published means for groups containing individuals with AD/HD as found in Soloman et al. (2010).

Hypothesis 7: The present study expected to extend the malingered AD/HD adolescent findings for the SIMS reported by Dearth (2007) in the current adult malingering AD/HD sample. Specifically, it was expected that malingering groups would score significantly higher than non-malingering groups when their SIMS total scores were evaluated. Additionally, participants in the malingering conditions should yield SIMS scores that meet or exceed the published means for suspected effort as found in SIMS administration manual.

Methods

Participants

The sample included 107 undergraduate students who were recruited to participate through the SONA-Online Research Sign-Up System as one means for fulfilling the research/research alternative requirement of Introductory Psychology and other participating psychology courses. Participants were 25 males (23%) and 82 females (77%) ranging in age from ages 18 to 45 years. Self-reported class standing was as follows: freshman (51%), sophomore (24%), junior (10%), and senior (15%). The ethnic background of the participants as self reported were as follows: Native American or Alaskan Native (1%), African American (6%), Asian/Pacific Islander (3%), Hispanic (1%), and Caucasian (89%). Students without a prior AD/HD diagnosis and who have not received or are currently receiving treatment for AD/HD were included in the study. Recruited participants were randomly assigned to one of four groups: Informed AD/HD Malingers, Informed Control Malingers, AD/HD Informed Non-Malingers, and AD/HD Control Non-Malingers.

Procedures

All protocol and informed consent documents were approved by the Morehead State University Institutional Review Board. Each individual in the research study completed a research session of approximately 2-hours. See Figure 1 for a schematic for the research protocol. As part of the pre-test battery, each participant completed a personal history form, and was administered the symptoms/diagnosis subscale of the Adult Knowledge of Attention Deficit Disorder

Scale (AKADDS; Watkins & Reilley, 2009) to assess the participant's current knowledge of AD/HD. The Childhood Symptom Scale- Self Report (CSS-SRF; Barkley & Murphy, 1998) and the Current Symptoms Scale (Murphy & Barkley, 1996a, 1996b) were administered to determine if the participant was free from clinical levels of AD/HD symptoms and to establish a baseline level of reported AD/HD symptoms. Finally, the BRIEF-A was administered to obtain a baseline of self-reported executive functioning problems. After this assessment, participants received a brief reading. The AD/HD knowledge enhanced groups received the Center for Disease Control (CDC) AD/HD Symptom Criteria (CDC & National Center on Birth Defects and Developmental Disabilities, 2001) to read and the non-AD/HD knowledge enhancement groups received an excerpt from the MTVu College Mental Health Summary (The Jed Foundation and MtvU, 2006) that addressed mental health issues generally on college campuses, but did not address AD/HD specifically. Similar to other research studies (e.g., Solloman et al., 2010), participants were given 5 minutes to read the assigned reading, and then were asked to complete a short quiz to ensure they read and comprehended the content of the reading. A quiz score of 70% was used as the criterion for further inclusion of participants' data for statistical analysis. Following the administration of the quizzes on the reading, participants were asked to again complete the AKADDS to reassess their AD/HD knowledge.

Following completion of the AKADDS, non-malingering participants were given instructions to complete all post-study measures to the best of their ability and to respond honestly. Malingering Participants were given a scenario (provided below)

and asked to use the information they received from the articles, and fill out the following measures as the person in the scenario who has AD/HD (Quinn, 2003).

> "Imaging yourself having trouble in school. Things aren't working out as you planned, but your counselor's only advice is to buckle down. You want to get some help. You hear about adult AD/HD on a television show. When talking to a friend about it, your friend tells you that you could get special accommodations from the university, like untimed tests and rescheduling of exams if two are given on the same day. Your friend adds that the stimulant medications that are generally prescribed have minimal side effects and that you can take the medication only when you need it, just for school. You decide to read a book on ADHD. You find that some ADHD adults even collect social security benefits. You conclude that you have enough of the symptoms. You convince yourself that you have ADHD. You go to the doctor and you really want to get help. In order to get these benefits, you need to convincingly act like a person who has ADHD."

After being presented with the scenario, malingering participants were asked to give the researcher an oral summary (See Appendix A) regarding what s/he understands they are to do for this part of the study as a manipulation check. Control subjects were asked to verbally explain the task as well, but were not provided a scenario (See Appendix B). In addition to participants' explanation of what the task involved, the researcher included a Likert-type scale ranging from 1 (No Understanding of Task) to 5 (Perfect Understanding of Task) to evaluate the level at

which the participant appeared to have understood the task. Additionally there was a note section for the researcher to record qualitative information regarding the rating assigned to the participant. For example, any problems or issues that arose during the test administration were noted such as interruptions or distractions (i.e. voices outside the room), temperature issues (i.e., was the room too hot or too cold for the participant), significant observations about participant behavior, and any information regarding why the researcher suspected the participant of not displaying acceptable effort.

All participants received research credit for completing the testing in whole or in part. The researcher provided 8 door prizes in a raffle for those who completed the assessment. Malingering groups were told that the door prize will only be offered to those who successfully malingered ADHD, however, consistent with the approved IRB protocol, the researcher randomly chose 8 individuals to receive door prizes (2 from each of the 4 groups) from the pool of individuals that completed the research session. The door prize was a $10.00 gift certificate to the campus bookstore.

Tests Administered

All study participants were asked to complete the following self-report measures, symptom validity measures, psychiatric feigning measure, and neuropsychological measures.

A *Personal History Questionnaire* was administered as part of the pre-test battery of testing to all participants. This questionnaire included demographic information (e.g.,. age, sex, ethnicity, grade level, etc), in addition to questions

regarding past history of learning disorders, AD/HD status, medical and mental health history, substance use, and current academics.

The *Current Symptoms Scales* (CSS; Barkley & Murphy, 1998) was administered as part of the pre and post-test battery to assess self-reported current AD/HD symptoms. Previous studies have shown the CSS has acceptable internal consistency of $\alpha > .80$; Barkley & Murphy (1998). The CSS has 18 items (10 social functioning and 8 Oppositional Defiance Disorder (ODD) items) that are rated on 0-3 point scale using the responses 'Never or Rarely, Sometimes, Often, and Very Often.' Total scores for AD/HD Inattentive, AD/HD Hyperactivity, and AD/HD Combined symptom scales were calculated. These scores were additionally compared to established clinical AD/HD cutoffs and impairment ratings to determine non-AD/HD status (pre-test) and to determine the severity of the self-reported AD/HD symptoms in the post-test battery.

The *Childhood Symptom Scale- Self Report* (CSS-SRF; Barkley & Murphy, 1998) was included in the pre and post-test battery to establish a low probability of AD/HD (pre-test) and to evaluate self-reported AD/HD symptoms in the post-test battery. Similar to the CSS, the CSS-SRF has 18 items covering DSM-IV criteria for AD/HD. Using the same 0-3 point scale as the CSS, participants respond to CSS-SRF items according to how well the statement describes them as a child between the ages of 5-12 years. Again, this instrument includes a section that asks the participant how these problems they endorsed affected their other activities when they were between 5-12 years of age. Similar to the CSS, total scores for AD/HD Inattentive,

AD/HD Hyperactivity, and AD/HD Combined scales were calculated. These scores were additionally compared to established clinical AD/HD cutoffs and impairment ratings to determine non-AD/HD status (pre-test) and to determine the severity of the self-reported AD/HD symptoms in the post-test battery. Previous studies have shown the CSS-SRF has an internal consistency of $\alpha > .80$; Barkley & Murphy (1998).

The *Adult Knowledge of Attention Deficit Disorder Scale* (AKADDS; Watkins & Reilley, 2009), inquires about knowledge of adult AD/HD and is a modified version of the child AD/HD knowledge scale (Sciutto, Trejersen, and Bender Frank, 2000). The AKADDS includes 34 'True, False, or I don't know' formatted questions that cover symptoms, treatment, and associated features of adult AD/HD. Previous studies have shown that this study has acceptable internal consistency (α= .62-.82) and has good convergence with the KADDS (correlations .82-.92) (Dahmane & Reilley, 2009; Watkins & Reilley, 2009). A 9-item subscale from the AKADDS pertaining to AD/HD symptoms/diagnosis was administered to participants to evaluate the participants' knowledge about ADHD before and after the AD/HD knowledge intervention. Change scores across the pre-post administration of the 9-item AKADDSA subscale was calculated by subtracting the pre-test scores to those from the post-test battery.

The *Behavior Rating Inventory of Executive Functioning- Adult Version* (BRIEF-A; Roth, Isquith, & Gioia, 2005) was administered in the pre and post-test battery to evaluate self-reported executive functioning problems. The Self-Report

form of the BRIEF-A was used and contained 75-multiple choice questions. These items were distributed across nine clinical scales [Inhibit, Shift, Self-Monitor, Working Memory, Plan/Organize, Task Monitor, Organization of Materials] and three validity scales [Negativity, Infrequency, Inconsistency]. The BRIEF-A has acceptable internal consistency (Roth, Isquith, and Gioia, 2005) ranging 0.73-0.90 for normal samples and 0.80-0.94 for mixed samples of clinical and healthy adults. Additionally, researchers have found significant difference between medicated and unmedicated adults with AD/HD on the clinical scales of Inhibit, Self-Monitor, Initiate, Working Memory, Plan/Organize, and Task Monitor. The measure has been successfully used in AD/HD research regarding stimulant research (Biederman, Mick, Fried, Wilner, Spencer, & Faraone, 2011), but has not been used in AD/HD malingering studies to date. For this study, scores for the BRIEF-A composite scores, and clinical scales were calculated and inspected akin to Reid, Karim, McCrory, & Carpenter (2010) and were compared to the normative AD/HD sample reported by Roth, Isquith, and Gioia (2005).

The *Test of Memory Malingering* (TOMM; Tombaugh, 1996) is a symptom validity test commonly used in clinical practice. Participants completing the TOMM were asked to complete the two separate learning trials comprised of 50 line drawing target items and 50 line drawing recognition items and a retention trial comprised of 50 recognition items. The first two trials were administered to the participants consecutively. Another counterbalanced task was administered before utilizing the

TOMM retention trial to fulfill the needed time gap as outlined in the administrative manual. Scores on the learning trials and the recognition trial were subjected to statistical analysis to evaluate the research hypothesis involving the TOMM.

The Structured Inventory for Malingered Symptomatology (SIMS; Widows & Smith, 2005) is a 75 item inventory designed to gauge malingered psychopathology and cognitive functioning. The items on the SIMS were distributed across five scales (Psychosis, Neurologic Impairment, Amnestic Disorders, Low Intelligence, and Affective Disorder) contained 15 statements to which participants responded either True or False. Content assessed by the different scales ranged from bizarre symptoms (i.e. "I have noticed that my shadow dances wildly even though I remain still") to symptoms that are uncommonly endorsed by the clinical population (i.e. "I believe that the government has installed cameras in stop lights to spy on me"). Additionally, Amnestic Disorder items measured general knowledge using items such as "The capital of Italy is Hungary." Each SIMS response was associated with a value of 0 or 1 and was subsequently assigned to one of the individual SIMS scales, and then ultimately summed into a total SIMS score. The SIMS Total Score has adequate reported reliability with Cronbach's alpha = 0.88.

The *Wechsler Adult Intelligence Scale- Fourth edition (WAIS-IV; Wechsler, 2008) Digit Span subtest* was administered to assess auditory short-term memory. The Digit Span forward and backward tasks have been traditionally used in AD/HD malingering studies with success in detection of possible malingering due to exaggerated poor performance (Inman & Berry, 2002). To standardize the

administration of this orally administered task, participants listened to a string of digits that were pre-recorded by a female voice with a rate of about one digit every two seconds in order to increase standardization. When the recorded string of numbers was completed, the participant was asked to repeat the numbers in a set order. For the first condition (Digits Forward), individuals were asked to repeat the numbers exactly as the recording presented them. In the second condition (Digits Backwards), individuals were asked to repeat the string of numbers in the reverse order in which they were presented. In the last condition (Sequencing), the individual arranged the number in numerical order including any repeated digits (i.e. item is 1-5-6-4-1, the correct response would be 1-1-4-5-6) as directed. The raw Digit Span scores (Forward, Backward, and Sequencing) were calculated and converted to Standard Scores based on standardized methods outlined in the WAIS-IV Administration Manual. The Reliable Digit Span score was also calculated using the procedure outlined in the Advanced Clinical Solutions for the WAIS-IV Administration Manual.

The Delis-Kaplan Executive Functioning System Trail Making Task (D-KEFS TMT; Delis, Kaplan, Kramer, 2001a) is a modification of the original trail making task and involved five conditions. This modification removed the need for 'clinical hunches' to hypothesize about an individual's performance by assessing visual scanning, number sequencing, letter sequencing, and motor speed abilities; both in isolation and in combination (i.e., Condition Four - Letter-Number Switching Task). Raw scores were comprised of the completion time (in seconds) and were converted

to raw scores based on standardized practices as stated in the examiner's manual. The D-KEFS TMT has acceptable internal consistency across conditions ($\alpha > .70$) and has good test-retest reliability (r_{12}= 0.61, 0.55, 0.59, 0.60, 0.59 respectively).

Results

Statistical Analysis Plan

All scoring of standardized measures were completed according to the standardized instructions included in the manuals for each assessment instrument. To ensure accuracy of scoring and data-entry from psychological measures and self-report inventories, cross-checking of scoring of psychological measures was conducted by research staff and a random subset of the data-entry was inspected to ensure accuracy of data entry.

Both Multivariate Analysis of Variance (MANOVA) and univariate Analysis of Variance (ANOVA) procedures were conducted to initially test the research hypotheses. Planned and post-hoc t-tests were used as a follow-up to the MANOVA/ANOVA analyses to test research hypotheses. The underlying assumptions for each analysis to be performed were evaluated to determine acceptability of the analyses and non-parametric analyses were considered for any serious violations of the assumptions for a specific statistical test. An adjusted alpha of 0.01 was used to reduce the likelihood of a Type I error given the number of statistical tests that were conducted.

Analyses for Hypotheses Involving AD/HD Self-Report Measures

As can be observed in Table 2, there were no pre-existing differences between groups' prior knowledge of ADHD symptoms assessed by the AKADDS (F (3,79) = .86, p = .468). Similarly, no pre-existing differences emerged for groups' childhood AD/HD symptoms, as measured by the Barkly Murphy Childhood Symptom Scale-Self Report Form (F (3,79) = .25, p = .863)., and current AD/HD symptoms, as reported on the Barkley Murphy Current Symptom Scale (F (3,79) = .36, p = .784).

Adult Knowledge of Attention-Deficit Disorder Scale (AKADDS).

Hypothesis 1 predicted that participants in conditions of enhanced AD/HD knowledge would display a significant increase in AD/HD symptom knowledge on the AKADDS symptom subscale scores relative to those in the non-AD/HD knowledge enhancement conditions. An ANOVA conducted on the residualized AKADDS change scores (post - pre test scores) indicated a significant main effect between groups, F (3,79)=15.26, p = 0.001. Consistent with Hypothesis 1, the mean AKADDS change score for the collapsed ADHD knowledge enhanced (CDC) groups (M=3.59) was statistically higher than average AKADDS change score for the non-ADHD knowledge enhanced (MTVu) groups (M=0.47) according to planned t-test analysis, t (81) = 7.12, p = 0.001. There were no significant differences between the knowledge enhanced groups (t (46) = 0.45, p = 0.64) or between non-knowledge enhanced groups (t (33) = 0.78, p = 0.44). Thus, Hypothesis 1 was fully supported.

Barkley & Murphy Current Symptom Scale and Childhood Symptoms Scale.

Hypothesis 2 was supported as malingering groups scored significantly higher than

non-malingering groups on the Current Symptom Scale, (CSS) and the Childhood Symptom Scale, (CSS-SRF). Specifically, the mean CSS change score of the collapsed malingering groups (M=30.29) was significantly higher than the mean CSS score for the collapsed non-malingering groups (M = -1.31) according to planned t-test analysis, $t(81)$=7.29, p=0.001. Similarly, the mean CSS-SRF change score for the collapsed malingering groups (M=29.42) was significantly higher than the mean CSS-SRF change score for the collapsed non-malingering groups (M = -1.26) according to planned t-test analysis, t (81) = 7.74, p=0.001. As can be seen in Table 3, the mean post-test CSS-SRF score for the collapsed malingering group (M = 45.67) exceeds the highest reported cut score based on age and gender (M = 38.80) for a positive screening for childhood AD/HD symptoms as listed in the manual, whereas the mean post-test score for the collapsed non-malingering group (M = 15.55) did not. Similarly, Table 4 shows the mean post-test CSS score for the collapsed malingering group (M = 44.24) exceeds the highest reported cut score based on age and gender (M = 27.80) for a positive AD/HD screening as listed in the manual, whereas the mean post-test score for the collapsed non-malingering group (M = 11.79) did not.

Behavior Rating Inventory for Executive Functioning- Adult Version (BRIEF-A).

Partial support was found for the three predictions associated with Hypothesis 3. First, malingering groups scored significantly higher than non-malingering groups when BRIEF-A change scores (post-pre BRIEF-A) were statistically compared using separate sets of MANOVA and ANOVA analyses with planned t-tests for BRIEF-A

scales associated with the Behavioral Regulation Index (BRI) and the Metacognition Index (MI), respectively. The MANOVA for the set of residualized (post-pre) BRIEF-A Behavioral Regulation Index (BRI) and subscales assessing difficulties Inhibiting, Task Shifting, Emotional Control, and Self-Monitoring was significant with Wilks' Λ (.54), $F = 3.49$, $p < .001$, partial eta squared = .19. Univariate ANOVA analyses yielded significant results for the total BRI score and all associated subscales (all F's > 8.04, $p < .001$) between groups. Table 5 lists the residualized means for the BRI Total score and associated subscales for each of the malingering and non-malingering groups. To simplify presentation of findings, malingering groups and non-malingering groups were collapsed as statistical differences did not emerge when mean scores were tested within malingering and non-malingering groups, respectively. As predicted, t-test analyses indicated that malingering groups BRIEF-A scores increased significantly from baseline in contrast to non-malingering groups (all $ps < .001$) for the BRI total score (malingering $M = 13.12$; non-malingering $M = -0.50$), and associated subscales measuring difficulties Inhibiting (malingering $M = 15.07$; non-malingering $M = -0.26$), Task Shifting (malingering $M = 12.98$; non-malingering $M = 1.19$), Emotional Control (malingering $M = 6.63$; non-malingering $M = -1.19$), and Self-Monitoring (malingering $M = 13.34$; non-malingering $M = -0.19$).

A similar pattern of results in the predicted direction emerged from the MANOVA for the set of residualized (post-pre) BRIEF-A Metacognition Index (MI) and associated subscales assessing difficulties Initiating, Working Memory,

Planning/Organizing, Task Monitoring, and Organization of Materials with Wilks' Λ (.43), $F = 4.02$, $p < .001$, partial eta squared = .24. Univariate ANOVA analyses yielded significant results for the total MI score and all associated subscales (all F's > 12.55, $p < .001$) between groups. Table 6 lists the means for each of the malingering and non-malingering groups for the MI Total score and the means scores for the associated subscales. As before, t-test analyses indicated that malingering groups' BRIEF-A scores significantly increased from baseline in contrast to non-malingering groups (all $ps < .001$) for the MI total score (malingering $M = 18.37$; non-malingering $M = -0.62$), and associated subscales measuring difficulties Initiating (malingering $M = 13.12$; non-malingering $M = -0.26$), Working Memory (malingering $M = 20.71$; non-malingering $M = -0.50$), Planning/Organizing (malingering $M = 17.34$; non-malingering $M = 0.10$), Task Monitoring (malingering $M = 19.07$; non-malingering $M = -0.48$), and Organization of Materials (malingering $M = 12.37$; non-malingering $M = -0.98$).

Finally, contrary to predictions, malingerers with or without AD/HD knowledge did not yield BRIEF-A scores that were significantly higher (all $ps > .05$) than the published BRIEF-A means from a sample of 27 non-medicated adults with AD/HD reported in the administration manual. This finding was consistent for both BRI and MI as well as for all associated subscales as can be seen in Table 5 and 6.

Analyses for Hypotheses Involving Neuropsychological Measures

Delis-Kaplan Executive Functioning System Trail Making Task (D-KEFS).

Partial support was found for the predictions associated with Hypothesis 4. First, support was found for the prediction that malingering groups would score significantly higher than non-malingering groups on the D-KEFS. When the set of D-KEFS tasks (1: Visual Scanning, 2: Number Sequencing, 3: Letter Sequencing, 4: Number-Letter Switching, and 5: Motor Speed) were considered jointly using their scaled scores, the initial MANOVA procedure was significant, Wilks' Λ (.55), F = 3.28, p = .001, partial eta squared = .18. Univariate ANOVA analyses using D-KEFS scaled scores yielded significant (all F's > 5.53, p < .01) differences between groups for all D-KEFS Trials except Trial 4: Number-Letter Switching (F (3, 79) = 2.44, p = .07). As can be seen in Table 7, malingerers[1] performed significantly worse than non-malingerers as evidenced by lower D-KEFS scaled scores on tasks involving Visual Scanning (malingering M = 6.56; non-malingering M = 10.64), Number-Sequencing malingering (M = 7.66; non-malingering M = 10.69), Letter Sequencing (malingering M = 7.80; non-malingering M = 11.14), and Motor Speed (malingering M = 9.80; non-malingering M =11.33). The difference between malingerers (M = 7.95) and non-malingerers (M = 9.74) on the fourth D-KEFS task that involved number-letter switching approached significance (t (81) = 2.56, p = .013).

[1] To simplify presentation of findings, malingering groups and non-malingering groups were collapsed as statistical differences did not emerge when mean scaled scores were tested within malingering and non-malingering groups, respectively.

Analyses for Hypotheses Involving Symptom Validity Measures

Digit Span Test from Wechsler Adult Intelligence Scale – Fourth Edition.

Partial support was found for the predictions associated with Hypothesis 5. A significant group level multivariate effect did not emerge (Wilks' Λ (.79), $F = 1.22$, $p = .249$, partial eta squared = .08.) for performance indicators associated with the Digit Span Tasks (Digits Forward, Digits Backward, Digit Span Sequencing, Reliable Digit Span). Univariate ANOVA analyses indicated group level differences approaching significance for the Digit Span Total Score, (F (3, 79) = 3.44, $p = .021$), Digit Span Sequencing Task (F (3, 79) = 3.54, $p = .018$), and Reliable Digit Span Score (F (3, 79) = 3.54, $p = .018$). Subsequent t-test analyses comparing the collapsed mean score of malingerers vs. non-malingerers supported predictions that malingers would have worse overall performance on the Digit Span Task as evidenced by significantly lower Digit Span Total Scores (t (81) = -2.79, $p = .006$). Similarly, predictions regarding the Digit Span Sequencing were supported as malingerers scored significantly lower on this new task relative to non-malingerers, (t (81) = -2.82, $p = .006$). Finally, although the difference between malingerers and non-malingerers approached significance (t (81) = -2.52, $p = .014$), malingerers with enhanced AD/HD knowledge ($M = 7.65$) did score significantly lower than their non-malingering ($M = 9.68$) counterparts. Individual participant analysis of the Reliable Digit Span scores identified a total of 9 participants (11%) as potentially malingering after scoring below the minimum cut-off for scores with questionable effort according to the ACS

Manual. The CDC Malingering AD/HD group included 6 participants (26%) and the MtvU Malingering AD/HD group included 2 participants (11%) that were labeled as potentially malingering based on the RDS score. There was one participant that was incorrectly identified at potentially malingering in the CDC Honest Responding group due to scoring below the cut-off score.

Test of Memory Malingering.

Hypothesis 6 was supported. A significant group level multivariate effect was found (Wilks' Λ (.65), $F = 4.06$, $p = .001$, partial eta squared = .13.) when performance indicators associated with the TOMM tasks (Learning Trial 1, Learning Trial 2, Retention) were considered jointly. Univariate ANOVA analyses yielded significant (all F's > 5.85, $p < .001$) group differences for both TOMM Learning Trials as well as the Retention trial. As can be found in Table 9, subsequent t-test analyses indicated that malingerers[2] performed significantly worse (all ts > 4.24, with ps < .001) than non-malingerers on TOMM Learning Trial 1 (malingering $M = 78.3$; non-malingering $M = 98.3$), Trial 2 ($M = 85.3$; non-malingering $M = 99.9$), and the Retention trial (malingering $M = 81.2$; non-malingering $M = 99.9$). Finally, consistent with predictions, malingerers yielded TOMM scores that were significantly lower (all ts > 2.68, ps < .01) than published TOMM means for an AD/HD group from Solloman et

[2] To simplify presentation of findings, malingering groups and non-malingering groups were collapsed as statistical differences did not emerge when mean scaled scores were tested within malingering and non-malingering groups, respectively.

al. (2010). This finding was consistent for Trial 1, Trial 2, and the Retention Trial for malingerers with and without enhanced AD/HD knowledge as can be seen in Table 9.

Structured Inventory of Malingered Symptomatology (SIMS).

Hypothesis 6 was partially supported. Although a significant group level multivariate effect approached significance (Wilks' Λ (.66), $F = 1.74$, $p = .036$, partial eta squared = .86.), univariate ANOVA analyses yielded significant (all F's > 4.26, $p < .01$) group differences for all SIMS subcales except the Affective Disorder subscale where $F(3, 74) = 1.18$, $p = .322$. As can be found in Table 10, subsequent t-test analyses indicated that consistent with expectations malingerers scored significantly higher than non-malingerers on the SIMS Total Score ($t(76) = 4.45$, p = .001), Psychotic symptoms ($t(76) = 3.50$, p = .001), neuropsychological symptoms ($t(76) = 4.25$, p = .001), amnestic symptoms ($t(76) = 3.83$, p = .001), low intellectual functioning ($t(76) = 3.26$, p = .002), but not for affective disorder symptoms ($t(76) = 1.95$, p = .054). Individual participant analysis of the SIMS Total Score indicated that ten CDC Malingering participants (45%), two CDC Control participants (9%), five MTVu Mlaingering participants (28%), and zero MTVu Control participants (0%) were classified as potentially malingering with a Total Score exceeding 14.

Discussion

The current study used a lab-based simulation research design to evaluate the susceptibility of commonly used AD/HD rating scales, as well popular neuropsychological, and symptom validity tests to malingered AD/HD in a college

population. The results of the present inquiry further the science of clinical psychology by adding to the research base of commonly used measures for screening and assessing adults with suspected AD/HD. In addition, it is one of the first studies to experimentally evaluate malingered AD/HD with respect to new, promising instruments, including a self-report (BRIEF-A) and a paper-and-pencil (D-KEFS) measure of executive dysfunction, and symptom validity measures (WAIS-IV Digit Span and Reliable Digit Span task, and the SIMS).

The present study found support for Hypothesis 1as increases in AD/HD symptom knowledge measured by the AKADDS were associated with a brief review of a widely available and free version of the AD/HD symptom criteria from the DSM-IV-TR. This finding was consistent with previous research work involving the AKADDS (Watkins & Reilley, 2009) as well as broader psychoeducational attempts to improve mental health practitioners' knowledge about the disorder (Sollomon et al., 2010; Watkins & Reilley, 2009) Evidence in support of Hypothesis 2 was garnered and illustrates the high susceptibility of self-report AD/HD rating scales to malingered AD/HD when response distortion indicators are not included. Specifically, both retrospective reporting of childhood AD/HD symptoms (Barkley & Murphy CSS-SRF) and complaints of current AD/HD symptoms (Barkley & Murphy CSS) were able to be easily manipulated and falsified as reflective of AD/HD by college students with and without experimentally enhanced knowledge of AD/HD. These findings support prior work by Booksh (2005), Jachimowicz & Geiselman (2004), Quinn (2003), and Sollomon et al. (2010). When students attempting to

malinger AD/HD were asked to consider the wider domain of executive dysfunction, their malingering attempts only partially met with success as evident by partial support of Hypothesis 3. While malingering groups scored significantly higher than non-malingerers on the BRIEF-A scales, including the BRI, MI, as well as corresponding subscales, they did not score significantly higher than published AD/HD norms. In fact, malingered AD/HD groups scored well below published normative data from a group of unmedicated adults with AD/HD. Thus, additional research on the BRIEF-A is needed before determining its potential utility in discriminating between clinical AD/HD and malingered AD/HD samples.

Hypothesis 4 involved predictions for a paper-and-pencil neuropsychological measure of executive dysfunction, an expected area of cognitive weakness in adults with AD/HD. Previous studies have focused on a traditional trail making test (D-KEFS TMT; Delis, Kaplan, Kramer, 2001a) as one means of assessing executive dysfunction. However, the traditional Trail Making Test (Parts A and B) confounds visual scanning, motor control, letter-number and number-number sequencing whereas modern versions of the task like the D-KEFS (Delis, Kaplan, Kramer, 2001a) allow for separate performance assessments of the task components. Partial support was found for Hypothesis 4 as malingerers of AD/HD performed significantly worse on visual scanning, number sequencing, letter sequencing, and motor speed components, and approached statistical significance for number-letter switching. Thus, the present study found support for malingerers to score significantly more poorly on 4 of 5 D-KEFS tasks, but did not support the findings of Peden (2010)

findings regarding letter-number switching being significantly poorer in AD/HD populations relative to non-AD/HD controls. The lack of a significant finding for number-letter sequencing from the D-KEFS could be due to reduced statistical power due to a reduced alpha level to control Type 1 error rather than lack of a true difference between malingerers and non-malingers. Additional research will be needed to evaluate this speculation.

Partial support was also found for Hypothesis 5 which involved attempts to malinger auditory working memory as measured by the new WAIS-IV Digit Span task, including the new Digit Span Sequencing task. The results of the present study did not overwhelmingly support prior malingering research (e.g., Booksh, 2005; Inman and Berry, 2002; Solloman et al., 2010) involving individual Digits Forward and Digit Span tasks; however, analyses of the Total Digit Span score as well as Digit Span Sequencing tasks did show significant differences in the predicted difference. The current study did not provide support regarding group level differences for the Reliable Digit Span Task nor did many differences emerge between the AD/HD normative group and the malingered AD/HD groups. The latter could be a comparison issue as the clinical AD/HD group reported in the manual was a combined sample of medicated and unmedicated adults with AD/HD. Additional research will be needed with adequate clinical samples of unmedicated and medicated adults with AD/HD to evaluate this speculation.

With respect to symptom validity measures, support was found for Hypothesis 6 involving the Test of Memory Malingering (TOMM). The results from the current

study support the findings of the Solloman et al. (2010) study. Specifically, participants who attempted to malinger AD/HD in the present study performed significantly worse on learning and retention trials in comparison to the clinical AD/HD group means from the Solloman et al. (2000) study. Thus, future malingering studies should consider inclusion of the TOMM to determine if it continues to demonstrate promise as a symptom validity measure that may be helpful in determining clinically valid vs. malingered AD/HD. Similarly, malingerers also scored significantly higher on the Structured Inventory of Malingered Symptomatology (SIMS) in contrast to the non-malingerers and 28% to 45% of malingerers without and with enhanced AD/HD knowledge were identified as malingerers compared to 0-9% of control participants, respectively. Assuming these results are replicable, future research may wish to consider the comparative efficacy of including specific symptom validity measures whether self-report like the SIMS or performance based like the TOMM as part of AD/HD assessment battery.

The current study was not without limitations. Unlike some prior studies (Kibby & Cohen, 2008; Quinn, 2003; Solloman et al, 2010), the present inquiry did not use a clinical AD/HD group which limits clinical generalizability of findings. Although new AD/HD malingering were generated for the D-KEFS and the SIMS, a limitation is the lack of direct comparability of malingering groups to adults with clinical AD/HD on these measures. The current study chose to include the DKEFS TMT instead of the original Trail Making Task due to the advantage of isolating the specific functional behaviors associated of each task. That is, inclusion of the

measures like the D-KEFS allows the clinician to isolate specific performance difficulties on a multifaceted task which is advantageous for enhancing our neuropsychological understanding of the specific cognitive and motor difficulties associated with the disorder. Similarly, the SIMS was successful in the correct study by correctly classifying malingers as malingering 28-45% of the time, but it is unclear and remains as open question as to how often an individual will be incorrectly classified on the SIMS. Finally, a larger sample size (N>29) and increased power for statistical tests would have be preferred to provide maximum comparison ability. Unfortunately, a reduction in the alpha to correct for multiple comparisons may have led to several unclear outcomes that approached statistical significance rather than a clearer set of findings in a few cases. Identification of individuals that are malingering AD/HD in university settings may remain a complex process due to the variability in the methods in which clinicians assess for the disorder. As found in numerous studies, including the current study, self-reports alone are not sufficient for diagnostic clarity due to the instruments general susceptibility to malingering. The present study provides data on a number of additional inventories and modern assessment measures (D-KEFS, TOMM, SIMS) that should be considered both in research as well in clinical work for empirically informing our clinical decision making regarding feigning or malingering AD/HD.

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Appendix A

Instructions Prior to Filling Out Post-Tests for Malingering Participants

Task:

Imagine yourself having trouble in school. Things aren't working out as you planned, but your counselor's only advice is to buckle down. You want to get some help. You hear about adult AD/HD on a television show. When talking to a friend about it, your friend tells you that you could get special accommodations from the university, like untimed tests and rescheduling of exams if two are given on the same day. Your friend adds that the stimulant medications that are generally prescribed have minimal side effects and that you can take the medication only when you need it, just for school. You decide to read a book on ADHD. You find that some ADHD adults even collect social security benefits. You conclude that you have enough of the symptoms. You convince yourself that you have ADHD. You go to the doctor and you really want to get help. In order to get these benefits, you need to convincingly act like a person who has ADHD

Directions:

Using the Information Reading you were presented Previously, and imagining yourself as the person in the above scenario, try to fill out the following questionnaires and complete the following task convincingly acting like someone who has ADHD.

Tell your researcher a summary of what you understand you are supposed to do for this part of the study.

Appendix B

Instructions Prior to Filling Out Post-Tests for Control Participants

Task:

Fill out the following questionnaires and complete the following tasks honestly using the knowledge you gained from the article.

Tell your researcher a summary of what you understand you are supposed to do for this part of the study.

Appendix C

Researcher Evaluation of Participant's Performance

Rate the Participants Motivation to complete the study (please circle) and provide notes about the study (problems, mistakes, temperature issues, etc.)

Low 1 2 3 4 5 6 7 8 9 10 High

Notes:

_____

_____

_____

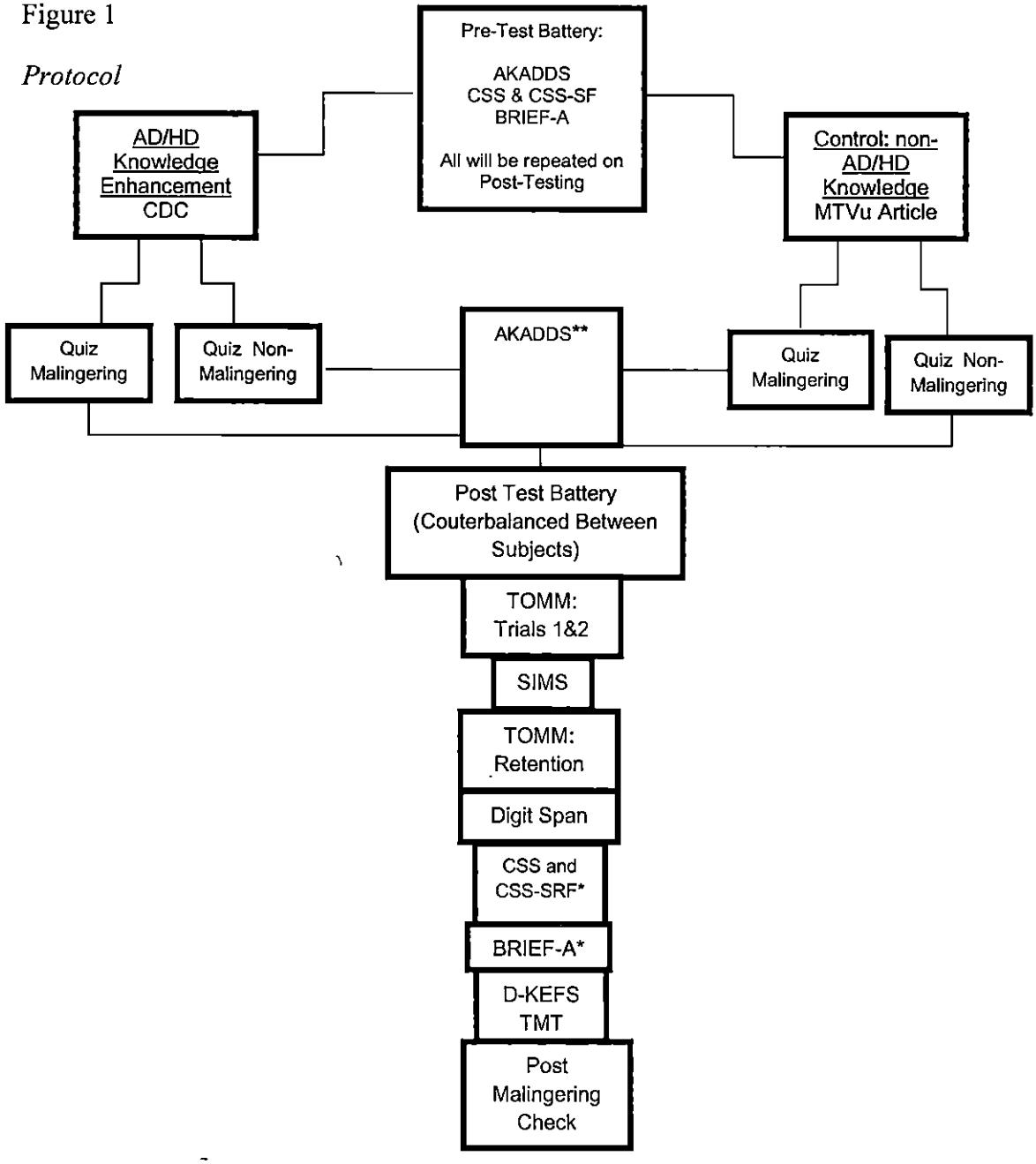
_____

_____

_____

Appendix D
Figure 1

Protocol



Appendix E

Table 1

Participant Demographic Information by Condition

Participant Group	n	Age		MSU GPA	
		Mean	S.D.	Mean	S.D.
Malingering Collapsed	42	20.61	5.43	3.20	0.52
CDC Malingering	23	20.52	4.91	3.21	0.54
MTVU Malingering	19	20.58	6.02	3.17	0.48
Control Collapsed	41	20.29	4.15	3.17	0.57
CDC Control	25	21.04	5.13	3.15	0.61
MTVU Control	16	19.25	1.57	3.20	0.54

Appendix F

Table 2

AKADDS Scores by Condition

Participant Group	n	Pre-AKADDS		Post-AKADDS	
		Mean	S.D.	Mean	S.D.
Malingering Collapsed	42	3.71	1.69	5.70	1.91
CDC Malingering	23	3.57	1.83	7.00*	0.95
MTVU Malingering	19	3.79	1.55	4.15	1.54
Control Collapsed	41	3.02	1.91	5.64	2.23
CDC Control	25	3.00	1.85	6.72*	1.24
MTVU Control	16	3.13	2.10	3.94	2.46

* indicating sig. t-test difference from pre-test mean at $p < .01$

Appendix G

Table 3

CSS-SF Scores by Condition

Participant Group	n	Pre-CSS-SF		Post-CSS-SF	
		Mean	S.D.	Mean	S.D.
Malingering Collapsed	42	16.24	15.78	45.66	24.52
CDC Malingering	23	16.35	14.18	45.96*	25.12
MTVU Malingering	19	15.63	17.35	43.37*	24.80
Control Collapsed	41	16.81	12.40	15.55	12.10
CDC Control	25	18.44	11.51	17.16*	11.60
MTVU Control	16	14.88	13.91	13.44*	13.15

* indicating sig. t-test difference from pre-test mean at $p < .01$

Appendix H

Table 4

CSS Scores by Condition

Participant Group	n	Pre-CSS		Post-CSS	
		Mean	S.D.	Mean	S.D.
Malingering Collapsed	42	13.95	11.07	44.24	25.86
CDC Malingering	23	14.17	12.33	45.74*	26.81
MTVU Malingering	19	13.63	9.29	40.79*	25.13
Control Collapsed	41	13.10	7.32	11.79	7.06
CDC Control	25	14.20	7.16	12.92*	7.60
MTVU Control	16	11.38	7.71	9.94*	6.16

* indicating sig. t-test difference from pre-test mean at $p < .01$

Appendix I

Table 5

BRIEF-A BRI Change Scores (Post-Pre) by Condition

		Inhibiting	Task Shifting	Emotional Control	Self-Monitoring	Total BRI
Participant Group	n	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)
Malingering Collapsed	42	15.07* (14.24)	12.98* (14.28)	6.63* (10.64)	13.34* (15.43)	13.12* (13.32)
CDC Malingering	23	15.87* (12.55)	12.74* (11.90)	4.09* (8.75)	12.39* (15.70)	12.22* (11.19)
MTVU Malingering	19	13.47* (16.21)	12.58* (17.01)	9.37* (12.01)	13.95* (15.26)	13.63* (15.72)
Control Collapsed	41	0.26* (4.56)	1.19* (7.07)	1.19 (3.75)	0.19 (8.07)	0.50 (3.00)
CDC Control	25	0.64* (5.20)	0.96* (5.93)	1.56 (3.97)	0.16 (10.10)	0.84 (3.08)
MTVU Control	16	0.13* (3.56)	1.63* (8.94)	0.69 (3.55)	0.94 (3.62)	0.13 (2.94)

* indicating sig. t-test difference at $p < .01$

Appendix J

Table 6

BRIEF-A MI Change Scores (Post-Pre) by Condition

	n	Initiating	Working Memory	Planning/ Organize	Task Monitor	Organize Materials	Total MI
Group		Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)
Total Malingering	42	13.12* (11.71)	20.71* (15.20)	17.34* (14.09)	19.07* (15.77)	12.37 (12.67)	18.37* (13.91)
CDC Malinger	23	13.22* (10.21)	20.26* (14.22)	19.22* (13.05)	21.35* (16.03)	11.91* (12.63)	19.35* (12.78)
MTVu Malinger	19	12.32* (13.65)	19.79* (17.54)	14.16* (15.31)	15.53* (15.21)	12.00* (13.33)	16.11* (15.71)
Total Control	41	0.26* (5.71)	0.50* (8.10)	0.10* (4.15)	0.48* (5.14)	0.98* (3.39)	0.62* (3.62)
CDC Control	25	0.40* (5.29)	1.00* (6.06)	0.28* (2.25)	1.80* (5.93)	0.92* (3.19)	0.40* (4.37)
MTVu Control	16	1.31* (6.51)	0.69* (10.76)	0.69* (6.19)	1.31* (2.89)	0.81* (3.75)	0.88* (2.25)

* indicating sig. t-test difference from pre-post test mean at $p < .01$

Appendix K

Table 7

DKEFS Scores by Condition

Participant Group	n	1 Mean (S.D)	2 Mean (S.D.)	3 Mean (S.D)	4 Mean (S.D.)	5 Mean (S.D)
Malingering Collapsed	42	6.56*	7.66*	7.80*	7.95	9.80*
		(4.71)	(3.87)	(4.04)	(3.69)	(2.51)
CDC Malingering	23	5.39*	7.48*	7.39*	7.74	10.26
		(4.73)	(3.89)	(4.19)	(3.31)	(1.91)
MtvU Malingering	19	8.11*	8.05*	8.42*	8.21	9.16
		(4.25)	(3.89)	(3.82)	(4.10)	(3.00)
Control Collapsed	41	10.64*	10.69*	11.14*	9.74	11.33*
		(2.39)	(2.25)	(2.34)	(2.56)	(1.57)
CDC Control	25	10.44*	10.28*	10.60*	9.56	11.32
		(2.69)	(2.25)	(2.57)	(2.62)	(1.52)
MtvU Control	16	11.06*	11.31	12.06*	10.13	11.56
		(1.88)	(2.24)	(1.73)	(2.55)	(1.50)

* indicating sig. t-test difference from controls at $p < .01$

Appendix L

Table 8

Digit Span and Reliable Digit Span Scores by Condition

Participant Group		Forward		Backward		Sequencing		Reliable	
	N	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Malingering Collapsed	42	7.88[t]	3.99	8.22	3.00	8.83*	3.62	8.15*	2.56
CDC Malingering	23	7.13*[t]	3.23	7.96	2.99	8.22*	3.61	7.65*	2.67
MTVu Malingering	19	8.84	3.86	8.47	3.01	9.58	3.49	8.79	2.27
Control Collapsed	41	9.62	3.19	9.31	1.91	10.64*	2.03	9.36*	1.75
CDC Control	25	10.32*	3.52	9.28	1.97	10.68	2.27	9.68*	1.89
MTVu Control	16	8.56	2.45	9.50	1.83	10.69	1.70	8.88	1.50

* indicating sig. t-test difference from controls at $p < 0.01$,
t indicating sig. t-test difference from published AD/HD norms at $p<0.01$

Appendix M

Table 9

TOMM Scores by Condition

Participant Group		Learning 1		Learning 2		Retention	
	n	Mean	S.D.	Mean	S.D.	Mean	S.D.
Malingering Collapsed	42	78.34*[t]	21.07	85.32*[t]	22.33	81.22*[t]	25.36
CDC Malingering	23	76.61*[t]	19.30	83.83*[t]	22.79	81.39*[t]	23.32
MTVu Malingering	19	81.47*[t]	23.21	87.79[t]	21.74	82.00[t]	27.98
Control Collapsed	41	98.33*	3.12	99.90*	0.43	99.95*	0.31
CDC Control	25	98.72*	2.64	100.00*	0.00	100.00*	0.00
MTVu Control	16	97.75*	3.86	99.88	0.50	99.88	0.50

* indicating sig. t-test difference from controls at $p < 0.01$,
t indicating sig. t-test difference from published AD/HD norms at $p<0.01$

Appendix N

Table 10

SIM Scores by Condition

Participant Group	n	Total Mean (S.D)	Psych Mean. (S.D.)	Neuro Mean (S.D.)	Amnestic Mean (S.D.)	Low IQ Mean (S.D.)	Affect Mean (S.D.)
Total Malingering	42	17.13*	1.38*	2.69*	4.03*	3.38*	5.23
		(11.71)	(1.80)	(2.47)	(4.33)	(2.87)	(2.22)
CDC Malinger	23	19.09*	1.59*	2.82*	4.91*	3.95	5.09
		(11.70)	(1.97)	(2.30)	(4.60)	(3.29)	(1.82)
MTVu Malinger	19	14.28	1.06	2.50	2.78	2.72	5.22
		(11.31)	(1.55)	(2.66)	(3.70)	(2.05)	(2.73)
Total Control	41	8.51*	0.33*	0.90*	1.23*	1.74*	4.31
		(2.95)	(0.53)	(0.91)	(1.40)	(1.27)	(1.94)
CDC Control	25	9.05*	0.41*	0.73*	1.50*	1.77	4.64
		(3.04)	(0.59)	(0.63)	(1.47)	(1.19)	(1.84)
MTVu Control	16	7.75*	0.25	1.06	0.88*	1.56*	4.00
		(2.82)	(0.44)	(1.18)	(1.31)	(1.31)	(2.03)

* indicating sig. t-test difference at $p < .01$