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The Detection Of ADHD Malingering Among College Students: A New Look At Figure Drawings

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THE DETECTION OF ADHD MALINGERING AMONG COLLEGE STUDENTS: A NEW LOOK AT FIGURE DRAWINGS

by

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This dissertation, submitted by Heather McConnell in partial fulfillment of the requirements for the Degree of Doctor of Philosophy from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done and is hereby approved.

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PERMISSION

Title	The Detection of ADHD Malingering Among College Students: A New Look at Figure Drawings
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Heather Lynn McConnell
May 5, 2019

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I wish to thank my parents for giving me a solid foundation in life and the belief that I could do anything; their never-ending support absolutely contributed and continues to contribute to my success today.

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ABSTRACT

There has been a significant increase in the number of college students feigning symptoms of ADHD. Students can receive a variety of accommodations when diagnosed with ADHD, along with the possibility of medication. These perceived benefits can make a diagnosis of ADHD desirable for college students. Research has found that college students can successfully feign ADHD with minimal detection, leading to improper diagnosis and potential misuse of accommodations and prescription medication. The research indicates a need for new approaches to the detection of ADHD malingering among college students.

The present study was exploratory in nature, seeking to identify drawing features on a modified, app-based version of the House-Tree-Person (House-Tree-Person-Modified: HTPM) that could differentiate college students feigning ADHD symptoms from honest responders. The app was created to increase the accuracy of quantifying various measures, such as line pressure, erasures, and black-to-white ratio. The Test of Memory Malingering (TOMM) and the Rey 15 Item Memorization Task (FIT) were utilized to assess for feigned performance, along with the Millon Clinical Multiaxial Inventory, Fourth Edition (MCMI-IV) to assess for profile variations between individuals feigning ADHD symptoms and honest responders. Forty-four participants were included in study. Results of the t-tests found that participants feigning ADHD drew significantly less details than those honestly responding. No other drawing variables were significant. Both the FIT and the TOMM were statistically significant, with the TOMM providing excellent sensitivity and specificity between the honest responders and the participants feigning ADHD symptoms. All but two MCMI-IV variables were statistically different between the honest responders and the participants feigning ADHD. Cut off scores are suggested for TOMM and the

MCMI-IV to maximize the potential use of these tools to aid in the assessment of feigned performance of ADHD symptoms among college students. Future research is needed to replicate the current findings for the TOMM and MCM-IV as well as assess other ways to detect feigned performance of ADHD by college students.

CHAPTER I

INTRODUCTION

During the college years, there appear to be several gains that can be acquired through a diagnosis of Attention Deficit Hyperactivity Disorder (ADHD), such as disability accommodations through the college or university (Harrison, 2006; Sullivan, May & Galbally, 2007; Young & Gross, 2011) and prescription ADHD medication that may be seen as an academic performance booster or used and or sold as a recreational drug (Harrison, 2006; Rabiner et al., 2009; Garnier-Dykstra, Caldeira, Vincent, O'Grady & Arria, 2012; White, Becker-Blease & Grace-Bishop, 2006; Young & Gross, 2011). These potential gains appear to motivate a high frequency of ADHD malingering (i.e., intentional simulation of ADHD symptoms) among college students. Indeed, in one study of 127 referrals for ADHD assessment of college students, the clinicians estimated that 20% were exaggerating or downright faking their symptoms of ADHD for external gains (Harrison, 2006). Because of the potential for misuse of ADHD medication and the costs of services provided by schools for those with a diagnosis of ADHD, it is important to research new and innovative ways to discriminate between feigned and actual symptoms of ADHD.

This dissertation aimed to identify different approaches to detect malingering and how malingering is addressed specifically with regard to ADHD assessment in college populations. The goal was to present a novel way to detect malingering of ADHD specifically since very few measures have been created for this purpose. Current research regarding malingering was addressed; ADHD as a diagnosis in adulthood along with the history and present use of figure drawings in psychology are also discussed, as they may apply to the detection of feigned ADHD.

Malingering

According to the American Psychiatric Association, "The essential feature of malingering is the intentional production of false or grossly exaggerated physical or psychological symptoms, motivated by external incentives…" (2013, p. 726). There are no specific criteria to detect malingering, however malingering can be strongly suspected with evidence of legal action-related assessment needs, significant discrepancy between assessment findings and the individual's claimed distress, dearth of cooperation in the assessment process or in the treatment phase, and the existence of Antisocial Personality Disorder (American Psychiatric Association, 2013). To make the diagnosis clearer, Slick, Sherman, and Iverson (1999, cited by Bianchini et al., 2013) have published criteria for the diagnosis of Malingered Neurocognitive Dysfunction (MND). The authors define MND as "the volitional exaggeration or fabrication of cognitive dysfunction for the purpose of obtaining a material gain, or avoiding or escaping formal duty or responsibility" (Slick, Sherman & Iverson, 1999, p. 552 as cited by Bianchini et al., 2003). To diagnose MND, Slick et al. (1999, as cited by Bianchini et al., 2013) state four criteria must be met: "(A) the presence of substantial external incentive; (B) evidence from neuropsychological testing; (C) evidence from self-report; and (D) behaviors meeting the necessary B and C criteria are not fully accounted for by psychiatric, neurological, or developmental factors" (Bianchini et al., 2003, p. 1088).

The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5; American Psychiatric Association, 2013) and Slick et al.'s (1999) descriptions of malingering follow a criminological model, theorizing that criminal background or behavior drives the motivation to malinger (Rogers, 1990). However, research does not appear to support this hypothesis. For example, research does not support the view that malingered symptomology is a product of Antisocial Personality Disorder (e.g. Poythress, Edens & Watkins, 2001; Pierson, Rosenfeld, Green & Belfi, 2011). A second model that has been proposed to describe malingering is the pathogenic model, which states that malingering behavior is still, in fact, a symptom of underlying psychopathology. In this model, "the examinee is presumed to create symptoms and portray them as genuine in an attempt to gain control over actual emerging symptoms" (McCaffrey & Webber, 1999, p. 24-25). As the disorder worsens, they begin to lose control over the feigned symptoms. However, this model has been discredited due to the fact that many individuals who malinger do not have evidence of the described deterioration; this, coupled with the fact that research by Miller (1961) shifted the understanding of malingering to economically based motivations, led to the abandonment of this theory (McCaffrey & Weber, 1999).

In light of the first two models failing to adequately describe the motivations of malingering, Rogers (1990) developed an adaptational model of malingered behavior, which includes three cognitive processes that take place prior to an individual malingering. First, the individual views the assessment or treatment as involuntary and or accusatorial. Then, the individual perceives they have something to gain from feigning impairment or something to lose from self-disclosure. Lastly, the person cannot or does not identify a more effective way to attain their preferred outcome.

To better understand malingering, Resnick, West, and Payne (2008) proposed that malingering is best described with subtypes, including pure malingering, partial malingering and false imputation. Pure malingering is described as feigning a disorder that simply does not exist. Partial malingering is seen when someone with actual symptoms deliberately exaggerates the symptoms. False imputation is seen when a person has actual symptoms but deliberately relates them to a cause unrelated to the root of their symptoms.

Malingering occurs in a variety of settings such as the military (Lande & Williams, 2013), correctional facility assessments (McDermotte & Sokolov, 2009), college populations (Sollman, Ranseen & Berry, 2010; Booksh, Pella, Singh & Gouvier, 2010; Harrison, Edwards & Parker, 2007), forensic psychiatry (Feuerstein et al., 2005) and several other contexts (e.g., Pella, Hill, Shelton, Elliott & Gouvier, 2012; Faust, Hart & Guilmette, 1988; Williams, 2011). The rising rates of college students malingering ADHD for external gains are of specific interest to the current study (e.g., Quinn, 2003; Harrison, 2006).

Although there has been extensive malingering research in several areas of psychology and criminal justice (e.g., Faust, Hart & Guilmette, 1988; Heaton, Smith, Lehman & Vogt, 1978; Jelicic, Ceunen, Peters & Merckelbach, 2011; Whitney, 2013), prevalence rates are hard to estimate, since most people who malinger refuse to admit they are falsifying data (Harrison, 2006). Mittenberg, Patton, Canyock, and Condit (2002) used surveys of practice demographics reported by practicing neuropsychologists that assess malingering to find how frequently malingering is suspected in various populations. The researchers found that base-rates of those suspected of malingering varied greatly among the different types of referral questions, however, overall, malingering was suspected among the different referral categories anywhere from 8-31% of the time. Other research has shown, however, that only half of those malingering are accurately identified when using only a standard neuropsychological battery (Faust, Hart, Guilmette & Arkes, 1988) making it increasingly difficult to assess prevalence rates of malingering. Although Mittenberg et al. (2002) studied only the frequency of suspected malingering, the differences between the times they suspected malingering and the times that Faust et al. (1988) reports individuals who are malingering are actually caught means there are, potentially, a large portion of malingering cases that go undetected. Further, in a meta-analysis of variables that may improve detection of deception, it was found that individual differences including, sex, age, education, years of experience, experience with law enforcement and confidence made no impact on the ability to detect deception (Aamondt & Custer, 2006). Lastly, it is important to note that most ADHD assessments do not include any measures of motivation, so there is no way to know how many cases of symptom exaggeration or malingering occur in these ADHD assessment settings (Harris, 2006).

Another potential challenge to the detection of malingering is the ease of finding disorder symptomology on the internet which enhances the ability to fake the disorder. For example, when searching the phrase “how to fake ADHD” on Google, over 2 million hits are found with a plethora of articles and advice on how to obtain the diagnosis and even the drug of choice to “control” it. Further, there are articles freely accessible on the internet such as *Can You Fake a Mental Illness? How Forensic*

Psychologists can tell Whether Someone is Malingering (Starr, 2012), which specifically outlines the common mistakes of individuals malingering, making it easier to avoid detection after reading the article. Indeed, several studies have found that participants, when given only minutes to look over diagnostic criteria for diagnosing ADHD, can malinger ADHD symptoms often without detection (Harrison, Edwards, & Parker, 2007; Jachimowicz & Geiselman, 2004; Quinn, 2003; Sollman, Ranseen, & Berry, 2010; Young & Gross, 2011 *cf.* Bury & Bagby, 2002). Ruiz, Drake, Glass, Marcotte and van Gorp (2002) found that in website searches, approximately 2-5% of sites create direct threats to the security of psychological assessments. With the potential of such high rates of occurrence and ease of accessing information to help one malinger, the need for accurate malingering assessment is crucial. Lastly, attorney interference is a large potential barrier in the detection of malingering. Victor and Abeles (2004) surveyed the Association of Trial Lawyers and the National Academy of Neuropsychology and found that three-fourths of the attorneys reported spending 25-60 minutes prepping clients about the psychological assessment and ways to respond to the measures. Further, nearly 50% of the attorneys indicated they want to know each specific test a clinician plans to administer, and many reported they are usually able to receive this information.

Malingering Assessment

Strategies of Malingering Detection. Strategies that have been introduced to detect malingering in neuropsychological settings include (a) symptom validity testing; (b) performance curve; (c) floor effect; (d) atypical presentation; and (e) magnitude of error. Each of the strategies will be defined.

Symptom validity testing

Symptom validity testing was originally a term to “describe a technique which assesses the validity of symptoms entailing perception and short-term memory complaints” (Liff, 2003, p. 39). To use this technique, the test is presented as a measure of a symptom or set of symptoms with which the patient claims to have difficulties (Liff, 2003). Symptom validity tests (SVT(s); see Appendix A for a list of acronyms used in this paper) utilize a forced-choice, two-alternative technique (Pankratz, 1983). Because each trial only has two response options (e.g., A or B, yes or no) by chance alone any patient should get approximately 50% of the answer correct (Strauss, Sherman & Spreen, 2006). According to Pankratz (1983) individuals who malinger will typically perceive getting half or more of the responses correct to be too successful, so they will fall far below the rate of chance. Where typical performance on trivial tasks is quite high, individuals who malinger in an unsophisticated manner might perform better than chance, but well below that of even severely impaired test-takers. Specific SVTs will be discussed later in the chapter.

Performance curve

This strategy utilizes assessments with items that progressively increase in difficulty. It is expected that as item difficulty increases, the correct response decreases in a predictable fashion, even when the test taker has bona fide deficits. It is thought that individuals who are malingering will not consider or recognize this pattern, so they are likely to get easy items wrong while passing difficult items. It is believed their "curve" will be more of a straight line, with little of the expected negative slope (Liff, 2003). This has been demonstrated as effective in detecting suboptimal effort (Wogar, von den Broek, Bradshaw & Szabadi, 1998; Frederick, Crosby & Wynkoop, 2000).

Another version of this strategy is to capitalize on the u-shaped performance curve found in list-learning tasks, known as the serial position effect. The serial position effect demonstrates that it is easier for those with normal memory to recall the items at the beginning and the end of a list than those in the middle. With repeated trials, they slowly recall more from each end and, eventually recall the entire list (Suhr, 2000). Crucially, the middle items are the hardest to recall. However, in some research, individuals who malinger show impairment on the first third of the list instead of the middle items (Bernard, 1991; Suhr, 2000).

Floor Effect

The floor is considered the lower limit in a set of scores. This strategy relies on the malingerer to fail tasks "on which even grossly impaired individuals are likely to succeed" (Liff, 2003, p. 38). Larrabee (1990) suggests the best tests to use when relying on this technique are attentional, multiple trials and verbal learning tasks. Research shows there has been some success in utilizing this strategy (Frederick, 2000; Backhaus, Fichtenberg & Hanks, 2004).

Atypical presentation

According to Liffy (2003), some researchers believe that atypical performance throughout the assessment battery, especially on tasks of similar abilities, indicates malingering. However, according to Punkratz (1988) some researchers argue this strategy is likely to misdiagnose some true responders, such as brain-injured patients, who have been known to have an atypical presentation. Some researchers caution against the use of this strategy as there is an absence of empirical data in this area (Rogers, Harrell & Liff, 1993; Liff, 2003)

Magnitude of error

Lastly, this strategy "focuses on evaluating the quantitative features of incorrect responding" (Liff, 2003, p. 39). Individuals who malinger in an unsophisticated manner appear to generate responses that are markedly deviant from the expected response and may appear bizarre. In comparison, even individuals with dementia are likely to respond with content that is close to the correct answer. Martin, Franzen, and Orey (1998) were able to utilize this strategy and correctly identify 100% of the individuals suspected of malingering, along with obtaining 100% specificity for the control group.

Neuropsychological Assessments in Malingering Detection. As early as the 1940s, the Rorschach was used to detect malingering (e.g., Benton, 1945), but provided mixed results (Perry & Kinder, 1990). More recently, a large amount of research has been done SVTs to detect feigned performance for a variety of disorders, such as Post-traumatic Stress Disorder (e.g., Rosen & Powel, 2003;, Morel & Shepherd, 2008) Traumatic Brain Injury (TBI: e.g., Russo, 2012, Jelicic et al., 2011, Armistead-Jehle, 2010), Childhood Neurological Disorders (e.g., Brooks, Sherman, & Krol, 2012) ADHD and learning disorders (e.g., Frazier, Frazier, Busch, Kerwood, & Demaree, 2008; Harrison, Green, & Flaro, 2012; Sollman, Ranseen & Berry, 2010, Suhr, Hammers, Dobbins-Buckland, Zimak, & Hughes, 2008 J. A. Suhr, Sullivan, & Rodriguez, 2011, Sullivan, May, & Galbally, 2007) and in many forensic settings (e.g., Chafetz, Prentkowski, & Rao, 2011). Another approach used to detect malingering is imbedded indices on already used neuropsychological assessments, such as MMPI scales (e.g., Rogers, Gillard, Berry & Granacher, 2011; Whitney, 2013), the Weschler Adult Intelligence Scale (WAIS) Digit Span subtest (e.g., Jasinski, Berry, Shandera & Clark, 2011) or a combination of several imbedded indices (Meyers & Volbrecht, 2003).

Van Gorp et al. (1999) indeed found that neuropsychological performance pattern was not a reliable indicator of malingered performance, however, the level of performance by the potential malingerer may be useful to detect malingering. For example, the researchers noted that individuals who were feigning TBI consistently took longer on timed and non-verbal tests than individuals with a TBI. The researchers concluded that standard clinical neuropsychological tests are not reliable indicators of malingering, indicating the need for tests that are created specifically to detect malingered performance, such as SVTs. However, more recently some researchers have found that using embedded indices, such as the Digit Span subtest of the Wechsler Adult Intelligence Scale and/or the Wechsler Memory Scale can have promising results, (e.g., Jasinski, Berry, Shandera & Clark, 2011). Miele, Gunner, Lynch and Mccaffrey (2012) compared 17 embedded validity indices with free-standing SVTs for diagnostic validity and found that of the embedded validities, Reliable Digit Span, the sum of “the longest string of digits repeated without error over two trials under both forward and backward conditions” (Greiffenstein, Baker & Gola, 1994, pp. 219-220), was the most accurate for classifying individuals who are malingering from those who are not; however, their findings do not support the use of Reliable Digit Span in place of free-standing SVTs (Miele et al, 2012).

Another approach to detection of feigned performance was that by Meyers and Volbrecht (2003). These researchers found that a specific set of 9 assessments in a neuropsychological battery helped detect litigant and non-litigating groups. They found that failing any two of the malingering tests was suggestive of feigned performance with a 0% false positive rate. However, the applicability of their method of malingering detection may be sparse in that it requires a specific set of neuropsychological assessments that may not be attainable or applicable based on the setting or situation.

Symptom validity (distinct from “SVT”, described earlier) is “the accuracy or truthfulness of the examinee’s behavioral presentation (signs), self-reported symptoms (including their cause and course), or performance on neuropsychological measures” (Bush, Ruff, Troster, Barth, Koffler, Pliskin, Reynolds & Silver, 2005). According to Bush et al. (2005), methods for assessing symptom validity include noting the consistency between the client’s presentation, description, and history of symptoms, and their test performance and observation of their behaviors. It is also important to assess the consistency among their psychological tests results, neurocognitive functioning, and symptom-validity or forced-choice tests. The authors even suggest using multiple SVTs, indicating that, in general, the results will not be redundant. Commonly-used SVTs include the Test of Memory Malingering (TOMM:Tombaugh, 1996), the Rey Fifteen-item Memorization Task (FIT: Lezak, 1995), the Word Memory Test (WMT: Green & Astner, 1995) and the Victoria Symptom Validity Test (VSVT: Slick, Hopp, Strauss, & Thompson, 1997), among others.

Test of Memory Malingering (TOMM)

The TOMM (Tombaugh, 1996) utilizes pictorial stimuli to detect feigned memory performance. According to Strauss, Sherman, and Spreen (2006), the test uses visual stimuli because the memory of images is extraordinarily robust in nearly all populations, so subpar performance can be attributed to feigned memory performance. This test can be used with individuals age 5 and older (Kirk, Harris, Hutaff-Lee, Koelemay, Dinkins & Kirkwood, 2011. Blaskewitz, Merten & Kathmann, 2008; Donders, 2005; Gunn, Batchelor & Jones, 2010).

Administration of the TOMM involves two trials with an optional retention trial and can be given in person or by computer. Each of the first two trials involve briefly showing the subject 50 visual stimuli. They are then asked to recall them in a forced- choice recognition task that provides two images, one from the 50 visual stimuli and one distractor item. The retention trial is another round of the forced-choice recognition task of the original visual stimuli given shortly after the first two trials. The retention trial is optional and often not necessary to detect feigned effort. It has been found that the computerized and in-person administration produces an equivalent performance in college students (Vanderslice-Barr, Meile, Jardin & Mccaffrey, 2011) but it has not been shown if there is equivalence among other populations.

Demographically, there appear to be very few effects that can produce poor scores on the TOMM. Some have reported a moderately strong impact on Trial 2 and the Retention Trial in older adults (Strauss et al., 2006). Teichner and Wagner (2004) found the TOMM was useful with cognitively intact older adults, along with those with cognitive impairment. However, they found that participants with dementia have been vastly misclassified by this test. Education, gender and ethnicity or culture, (Strauss et al., 2006), along with some psychological disorders, such as depression (Rees, Tombaugh & Boulay, 2001; Ashendorf, Constantinou & Mccaffrey, 2004; O'Bryant, Finlay & O'Jile, 2007), severe depression (Yanez, Fremouw, Tennant, Strunk & Coker, 2006), anxiety (Ashendorf, Constantinou & Mccaffrey, 2004; O'Bryant, Finlay & O'Jiles, 2007) and pain (Etherton, Bianchini, Greve & Ciota, 2005) appear to have no effect on test scores (Strauss et al., 2006). However, according to Hunt, Root, and Bascetta (2014), those with psychotic disorders pass the test at a much lower rate (88%) than the norming group for the test (99% pass rate). Further, mild cognitive impairment (Simon, 2007; Love, Glassmire, Zanolini & Wolf, 2014; *cf* Shandera et al, 2010) does not appear to affect the test scores, however, higher severity of cognitive impairment can negatively affect scores. According to Merten, Bossink and Schmand (2007) the TOMM is suitable for cognitively impaired patients with a Mini-Mental State Examination score of

24 or higher. The TOMM is also useful with youth diagnosed with epilepsy (Macallister, Nakhutina, Bender, Karantzoulis & Carlson, 2009).

The TOMM's internal consistency reliability is reportedly high for all three trials (*r* = $\geq$.94 for each) (Strauss et al., 2006). The TOMM is sensitive to the deception of participants, regardless of the setting (TBI patients, hospital outpatients, university students, etc) (Rees, Tombaugh, Gansler & Moczynski, 1998) and insensitive to true memory impairment (Strauss et al., 2006). In a series of four validation studies, the TOMM was able to accurately classify 91% of all the participants, which included community members and neurologically impaired patients. Further, it correctly classified 95% of all patients with dementia as well as 100% of the individuals who were malingering (Tombaugh & Butcher, 1997). Similarly, another strength of the TOMM is that it does not appear to be affected by other effects within a battery (Ryan, Glass, Hinds & Brown, 2010).

The TOMM has mainly been used for the detection of feigned performance of TBI (e.g., Greve, Bianchini & Doane, 2006; Lange, Iverson, Brooks & Rennison, 2010; Moore & Donders, 2010). It has also been shown to be effective in forensic psychiatric populations (Weinborn, Orr, Woods, Conover & Feix, 2003), criminal court forensic assessments (Delain, Stafford & Ben-Porath, 2003) and inpatient psychiatric patients with cognitive impairment (Duncan, 2005), and is fairly sensitive to different types of coaching (e.g., Jelicic, Ceunen, Peters & Merchkelbach, 2011).

There has been research since the publication of the TOMM, finding different scoring cut-offs and ways to score the TOMM to make it more effective or efficient (e.g., Davis, Wall & Whitney, 2012). One prevalent finding is the utility of only using trial 1 from the TOMM, with results indicating the rest of the performance on the test can be predicted based on the first trial, so in many settings, it may be more efficient to only give the first trial of the TOMM (Gavett, O'Brant, Fisher & Mccaffrey, 2005; Horner,Bedwell & Duong, 2006, Greve, Bianchini & Doane, 2006; Bauer, O'Bryant, Lynch, Mccaffrey & Fisher, 2007; O'Bryant, Gavett, Mccaffrey, O'Jile, Huerkamp, Smitherman & Humphreys, 2008; Loughan, Perna, Le & Hertza, 2014). Furthermore, using only the first trial may also be sufficient in children and adolescent populations (Brooks, Sherman & Krol, 2012; Loughan, Perna, Le & Hertza, 2014).

Rey Fifteen-Item Memorization Task (FIT)

The Rey 15-Item Memorization Task (FIT), was created by Andre Rey (Rey, 1964) and later adapted by Lezak (1983). The FIT uses 15 simple visual stimuli to detect feigned memory performance and can be used with anyone 11 years of age or older. The test consists of three rows of five stimuli in each row and can be recreated by the clinician by following the description provided by Strauss et al. (2006). The test takes approximately 5 minutes to complete. Administration of the FIT begins with providing the participant with a blank sheet of paper and instructing them to write down as many of the items they can remember from the 3x5 stimuli card. The number of items to be remembered (15) is emphasized when instructing the participant to imply a higher level of difficulty in the task.

There are several ways to score the FIT, with the most basic being a simple calculation of the total number of items recalled by the participant. Typically, anyone without severe cognitive impairment can recall 9 or more of the items. Yet it has been suggested that cutoff scores anywhere from 7 or fewer correct and 11 or fewer can be used to detect feigned effort (Strauss et al., 2006, citing Lee et al., 1992; Bernad & Fowler, 1990; Schretlen et al., 1991; Greiffenstein et al., 1996; Lezak et al., 2004; Taylor et al., 2003; Hiscock et al., 1994). According to Strauss et al. (2006), “adjusting the cutoff score higher tends to increase the FIT’s sensitivity but at the expense of its specificity,” (Lee et al., 1992 cited by Schretlen et al., 1991, p. 1167).

There are some demographic effects that may hinder performance that should be considered when choosing an assessment of malingering. With children, scores on the FIT are found to correlate with age; as age increases, their scores increase. Also, education level can affect scores, with increasing scores correlating with higher education (Strauss et al., 2006). Further, among forensic inpatients with intellectual disabilities, the FIT demonstrated a false positive rate over 23%, indicating it is not a good choice for use with these patients (Love et al., 2014).

The FIT has strong interrater reliability, showing 95% agreement for correct items by independent raters. The FIT has modest correlations (.19 to .78) with other symptom validity tests, such as the TOMM and Dot Counting test. In clinical research, the FIT has been known to fall short in sensitivity and is weaker than other malingering detection assessments, although it is one of the most used measures of symptom validity testing (Slick et al., 2004). In a meta-analysis of 13 studies regarding the FIT, Reznek (2005) found the FIT has excellent specificity and low sensitivity. However, his findings indicate that the FIT is a good SVT to be used with patients with cognitive delays. The FIT has been used with criminal defendants with a correct classification of 86%, using a cut-off of 9 (Simon, 1994). The FIT has also been used with a recognition trial, which has been useful with pediatric individuals to assess for feigned performance of TBIs (Green, Kirk, Connery, Baker & Kirkwood, 2014).

Word Memory Test (WMT)

The WMT differs from the TOMM and the FIT by utilizing 20 semantically linked word pairs presented orally by an examiner or visually on a computer screen. The list is presented twice and is followed with an Immediate Recognition Trial (IR) that requires the participant to select the original words from 40 new word pairs. Feedback is given for each answer regarding correctness to motivate patients to learn for the subsequent subtests. Without giving advanced warning, a Delayed Recognition Trial (DR) is administered after a half-hour delay and again the participants are asked to select the original words from 40 new word-association pairs. The DR and IR are each considered effort trials (Strauss et al., 2006).

After giving the effort trials, one or more memory trials are given. A Multiple Choice (MC) task is given which requires the participant to match an original word with its original associated word while it is among seven distractors. Another memory trial, Paired Associates (PA), can be given next, which involves providing one-half of the originally associated pairs and asking the participant to recall the word originally associated with it. Then a measure of Free Recall (FR) of any of the pairs can be administered, followed by another trial of Delayed Free Recall (LDFR) 20 minutes later, if desired. According to the scoring guidelines, a clear pass is 90% or more correct for the effort trials, while a clear fail is 82.5% or less correct on any one of the effort trials. For the memory trials, 70% or less correct for MC or 60% or less on PA are suspicious, unless the participant has dementia or amnesia (Strauss, et al., 2006).

The WMT requires a 3rd grade reading level, so it cannot be given to participants under the age of 7. However, it has been shown to work with six-year-olds as well (Gunner, Batchelor & Jones, 2010). Reading level is positively correlated with WMT effort scores. Age, education level, IQ and gender do not appear to have an effect on the effort trials. For the memory trials, age has a significant impact, with scores improving as children age into adulthood. For ages 15 to 68, age appears to significantly affect Paired Associate performance. Reading level is correlated with memory scores, and memory scores increase with higher levels of verbal IQ. Women tend to score higher than men on Free Recall and Delayed Free Recall.

The WMT has been found to be reliable and valid. It has internal consistency between the IR and DR ($r = .86$), MC and PA ($r = .90$) and FR and LDFR ($r = .86$). Further, test-retest reliability, effort measures correlated highly with each other (IR and DR $r = .87$ on the initial test date and .94 after retest). Effort reliability was more modest since effort can vary from one occasion to the next ($r = .43$ for IR and $r = .33$ for DR). The WMT is sensitive to motivation defects while being insensitive to cognitive impairment. The WMT shows moderate correlations with other measures of feigned performance such as .68 with TOMM Trial 2 (Strauss et al., 2006). In a mixed out-patient sample, the computer version of the test was found to be equivalent to the oral version of the test (Hoskins, Binder, Chaytor, Williamson & Drane, 2010). The WMT has been found to work with mild, moderate and severe brain injuries (Green, Iverson & Allen, 1999).

Since the publication of the WMT, researchers have sought to improve scoring accuracy and/or efficiency. Bauer et al. (2007) found that using the WMT Immediate Recognition (IR) trial alone is an effective screening tool for malingering.

Victoria Symptom Validity Test (VSVT)

The VSVT utilizes a two-alternative forced-choice recognition task of five-digit numbers. After a brief delay, another card is presented with the choice of the correct answer and a distracter. In the easier items, the correct answer can always be distinguished by remembering the first or last digit of the five-digit sequence. In the harder items, the first and last numbers are the same and one or more of the middle numbers are transposed so the participant must know the number more thoroughly. The test includes 48 items, presented in 3 different blocks, and can be administered using a computer or a clinician-administered flip-card version. For the first block, there is a five-second retention interval, then a 10 and then 15-second interval in the next two blocks (Strauss et al., 2006).

Any score that is less than 50% correct, the odds of random chance, are indicative of feigning memory difficulties. However, the test score classification includes three categories: Valid (above chance), Questionable (At Chance) and Invalid/Malingering (Below Chance). The Questionable classification includes correct scores ranging from 18-29, while Valid is any score $\geq$30 and Invalid is any score $\leq$17. The computer scoring provides additional information, such as Z-scores, a measure of response bias based on the tendency to utilize one hand over the other while responding and mean response latency. Age has no effect on this test, however, it can only be used with adults ages 18 and older. Education and gender have been found to influence VSVT scores (Strauss et al., 2006).

The VSVT has high reliability and validity. Internal Consistency alphas for the 24 easy items, 24 hard items, and the entire set of 48 items are all $\geq$.82, indicating adequate reliability. Further, test-retest reliability has been measured, and correlations among the control sample ranged from .53 to .54. The correlations for the compensation group included ranged from .56 to .84. All control participants were classified the same each time, and 86% of the compensation-seeking participants were given the same classification the second time. “The VSVT exhibits adequate reliability and suggests that changes in classification across test-retest intervals most likely reflects the VSVT’s sensitivity to changes in effort or performance exhibited by patients and not error variance” (Thompson, 2002, as cited by Strauss et al., 2006, pg. 1181).

The test appears to be sensitive to motivation deficiencies. In one study of healthy individuals, simulated post-concussion individuals, compensation-seeking individuals and non-compensation seeking individuals, the three-classification scoring system showed great specificity (zero false-positives) and adequate sensitivity. Further, 25% of participants perceived the VSVT to be a legitimate measure of memory (Strauss et al., 2006).

The VSVT has the potential to assess non-compliance in the assessments of pediatric patients (Brooks, 2012) and patients with Borderline Personality Disorder (Ruocco, 2015). However, depending on the population, some suggestions have been made regarding scoring and/or cutoffs. Silk-Eglit, Lynch, and McCaffrey (2016) suggest a cutoff of <18 for patients with mild TBI.

Strauss et al. (2006) discuss some of the pros and cons of each of the aforementioned SVTs, citing studies that have compared two or more of the SVTs to help clinicians choose the assessment most appropriate. According to Macciocchi, Steel, Alderson, and Godsall (2006, as cited by Strauss et al., 2006), the VSVT has been critiqued for having too many false negatives and they found the manual interpretation criteria to be too conservative for patients with severe TBI. Tan, Slick, Strauss and, Hultsch (2002, as cited by Strauss et al., 2006) used a simulation task to compare the TOMM, WMT and VSVT and found the TOMM to be least effective at differentiating groups. The WMT and VSVT accurately classified all controls into the correct groups, while the TOMM misclassified 4% of the control subjects. Further, the TOMM misclassified 20% of the individuals simulating malingering, while the VSVT misclassified 12% and the WMT did not misclassify any individuals simulating malingering. However, according to Tan et al. (2002, as cited by Strauss et al., 2006), the TOMM is more efficient in malingering detection than the FIT.

Another disadvantage of each of the SVT's is the frequency in which people detect the measures that are being used for that feigned performance detection. According to Tombaugh (1997), people perceive the TOMM to be a measure of memory malingering more frequently than with other SVTs. The TOMM is perceived as a valid measure of memory less than 10% of the time, while approximately 1/3 of those given the WMT believing it to be a measure of memory. Approximately 1/4 of those taking the VSVT believe it to be a valid measure of memory. (Strauss et al., 2006).

Sollman and Berry (2011) conducted a meta-analysis of SVTs as an extension of earlier meta-analyses research by Vickery et al. (2001). They compared the effect sizes of the SVTs used in non-embedded studies with adult subjects. They specifically looked for studies that involved the VSVT, the TOMM and the WMT, among others. Based on their findings, they created a hierarchy of the tests' effect sizes, even though they were all large effects. The authors report that the best test, or the test that had the highest effect sizes, is the VSVT. The TOMM and the WMT were equally useful after the VSVT (Sollman & Berry, 2011).

Psychometrics

"The diagnostic validity of a test concerns the ability of that test to detect the presence or absence of a defined characteristic in the person assessed" (Assessment of effort in clinical testing of cognitive functioning for adults, 2009). In the discussion of symptom validity testing, diagnostic validity refers to the test's ability to categorize whether or not someone is being truthful. Diagnostic validity is measured through *sensitivity* and *specificity*. These are characteristics specific to each individual test and do not change based on the population (10.3 Sensitivity, Specificity, 2016). To illustrate sensitivity and specificity, please refer to table 1. Cells in table 1 contain the number of prediction outcomes from some malingering-detection procedures, where the procedure predicts either malingering or no malingering, and it can be determined in which cases malingering actually did or did not occur.

Table 1: Sensitivity/Specificity Example

Prediction:	Respondent is:	
	Malingering	Not Malingering
Malingering	Cell A (TP)	Cell B (FP)
Not Malingering	Cell C (FN)	Cell D (TN)

Cell A (referred to as true positives; TP) represents those that were accurately categorized as belonging to the diagnosed group; in this instance, they are categorized as malingering when they were indeed malingering. Cell B is called the false positive (FP) group and it includes those who were incorrectly categorized as belonging to the diagnosed group when they do not actually belong to that group (i.e., this includes people who were categorized as malingering when they were not malingering). Cell C, the false negative (FN) group, includes anyone who was inaccurately categorized as belonging to the non-diagnosed group when they actually fit in the diagnosed group; in this instance, this includes those who were categorized as not malingering, but actually were malingering. Cell D includes the true negatives (TN) which are those who were classified as not malingering and were indeed not malingering (Parikh et al., 2008).

Sensitivity is the tests proportion of individuals who have malingering identified, by the test, as individuals who have malingered. The equation for sensitivity is Cell A/(Cell A + Cell C) x 100. Specificity is the proportion of individuals not malingering identified, by the test, as not malingering. The equation for specificity is Cell D/(Cell D + Cell B) x 100. Both sensitivity and specificity are expressed as a probability. For example, a test with 75% specificity means it is able to accurately classify 75 out of 100 respondents with sub-optimal performance as truly malingering (Parikh et al., 2008). Usually, a specificity of .90 (or 90%) is preferred (Assessment of Effort, 2009).

Two other important assessment statistics are Positive Predictive Power (PPP) and Negative Predictive Power (NPP). Positive Predictive Power is the percentage of people identified by the test as individuals who have malingered who are, in fact, individuals who have malingered. The operational definition of PPP is Cell A/(Cell A + Cell B) x 100. Negative Predictive Power is the percentage of people identified, by the test, as individuals who have not malingered who are, in fact, individuals who have not malingered. The arithmetic definition NPP is Cell D/(Cell D + Cell C) x 100. The higher the NPP value, the better the test is at accurately categorizing those assessed by the test when the test makes a *negative prediction*, e.g., *not* malingering (Parikh et al., 2008). These statistics are directly affected by the prevalence, or base rate, of the target trait, disorder, etc. The base rate is simply the frequency in which a phenomenon occurs within a population (Finn, 2009). For example, if the base rate of a phenomenon such as malingering is low, the number of people inaccurately classified as malingering when in actuality are honest (i.e., FP) is much higher than the amount of those accurately classified as malingering when they truly are malingering (i.e., TP) (Parikh et al., 2008). In such cases, the importance of correctly classifying TNs become more critical to overall classification accuracy, because there are many more “negative” cases than “positive” ones (Meehl & Rosen, 1955). While clinicians are frequently cautioned to account for base rates in their diagnostic predictions (Meehl & Rosen, 1955; Finn, 2009), and it is generally assumed that the base rate of malingering is less than 50% in most contexts, there are no definitive base rates for malingering, making accurate detection that much more challenging (Drob, Meehan & Waxman, 2009).

Efficient Detection Assessments. Another assessment approach that clinicians can take is efficient detection, which is the use of embedded indices within measurements already used in the psychological battery. Several measures include efficient detection indices, such as the Personality Assessment Inventory (PAI; Morey, 1991), the Minnesota Multiphasic Personality Inventory-Second Edition (MMPI-2; Butcher, Dahlstrom, Grahm, Tellegen & Kaemmer, 1989), the Wechsler Memory Scale, Third Edition (WMS-III: Wechsler, 1997), the Wechsler Memory Scale, Fourth Edition (WMS-IV: Wechsler, 2009) and the Wechsler Adult Intelligence Scale, Third Edition (WAIS-III: Wechsler, 1997) and the Wechsler Adult Intelligence Scale, Fourth Edition (WAIS-IV; Wechsler, 2008).

Personality Assessment Inventory (PAI)

The PAI has several scales to aid in the detection of exaggerated or feigned performance. There are two specific supplemental validity indices that assess for deception in the positive direction (i.e., “faking good” or intentionally hiding a problem) which are the Defensiveness Index and the Cashel Discriminant Function (CDF). There is also a validity scale called the Positive Impression Management (PIM) scale that identifies a positive response set due to naïveté or feigned performance (Morey, 2014); this scale is used in conjunction with the supplemental scales to differentiate feigned performance from lack of insight or defensiveness (Hopwood, Blais & Baity, 2010).

The PAI also includes four supplemental validity indices that assess for malingering, which are the Malingering Index (MAL), Rogers Discriminant Function (RDF), Negative Distortion Scale (NDS) and Malingered Pain-Related Disability scale (MPRD). The MAL includes eight features that are frequently observed samples of individuals who malinger, while the RDF is a function that discerns between patients and individuals who are malingering. The NDS was also created to differentiate feigning patients from true respondents (Mogge, Lepage, Bell & Ragatz, 2010). Lastly, the MPRD is a function that identifies over-reported pain-related disability. There is also a validity scale called the Negative Impression Management (NIM) scale that identifies a negative response set with a pessimistic world view or feigned performance; this scale is used in conjunction with the supplemental scales to distinguish over-exaggeration due to sincere distress from feigned performance (Morey, 2014). However, the NIM alone is not a pure measurement of feigned performance; it assesses for a negative response style that can be magnified unintentionally due to characteristics of true psychological disorders, perceptions of the world, current situation, etc. (Cheng, Frank & Hopwood, 2010).

The PIM, NIM, Malingering and Defensiveness Indexes, CDF, and RDF have been found to detect feigned responding (Morey & Lanier, 1998), with the RDF being the most effective in identifying malingering (Morey & Lanier, 1998; Sullivan & King, 2010). Another study found the PAI is resistant to coaching effects, but only the RDF was able to detect those feigning a mental disorder (Bagby, Nicholson, Bacciochi, Ryder & Bury, 2002). The PAI is able to identify individuals feigning PTSD (Liljequist, Kinder & Schinka, 1998; Wooley & Rogers, 2015), with and without coaching (Guriel-Tennant & Fremouw, 2006), although Lange, Sullivan, and Scott (2010) found the best validity indicator for detecting feigned PTSD and depression was the MAL index, but the detection rate was moderate at best. The PAI was useful in detecting combat-related PTSD, however, it misclassified a large number of true PTSD cases as feigned performances (Calhoun, Earnst, Tucker, Kirby & Beckham, 2000). The PAI is also able to distinguish patients with mild TBI seeking compensation from those individuals with mild TBI non-seeking compensation (Whiteside, Galbreath, Brown & Turnbull, 2012). The NIM and RDF have been found to be the most sensitive to faking bad scenarios by those feigning psychiatric symptoms (Baity, Siefert, Chambers & Blais, 2007).

Among a prison population, one study identified the RDF and the MAL as the only indicators able to distinguish individuals who were malingering from bona fide patients in a psychiatric unit (Edens, Poythress & Watkins-Clay, 2007), however, in other research, it was found that only the NIM scale successfully discriminated between feigning and honest responders (Kucharski, Toomey, Fila & Duncan, 2007). Boccaccini, Murrie, and Duncan (2006) also found the NIM was the most effective screening index on the PAI. The PAI has been found to be generally ineffective in detecting malingered generalized anxiety disorder, with coaching (Veltri & Williams, 2012) and without coaching (Rogers, Orneduff & Sewell, 1993) as well as malingered depression, with and without coaching (Rogers et al., 1993).

Minnesota Multiphasic Personality Inventory, Second Edition

The MMPI-2 has 8 scales designed for the detection of feigned performance. The MMPI-2 "feigned indices use the following strategies: (a) rare symptoms, (b) symptom severity, (c) obvious versus subtle symptoms, and (d) symptom selectivity" (Rogers, Sewell, Martin & Vatacco, 2003, p. 160). The rare symptom scales are Infrequency (F), Back Infrequency (Fb) and Infrequency-Psychopathology (Fp). There is one symptom severity scale, Lachar and Wrobel critical items scale (LW) and one obvious vs. subtle (O-S), though these are not routinely scored for clinical use (Graham, 2012). Another detection strategy utilizing the MMPI-2 that has been introduced is that of erroneous stereotypes, in which there are three scales: Gough's Dissimulation Scale (Ds), an abbreviated version of this scale (Dsr), and Fake-Bad Scale (FBS) (Rogers et al., 2003). In a meta-analysis of MMPI-2 research regarding detection of feigned performance, the F scale was found to have a large effect size (mean d=2.21), however, conceptually the Fp (mean effect size d=1.90) might be a better choice due to the scale's design to reflect infrequent endorsement among inpatient (presumably, more impaired) respondents, whereas the F scale simply measures low probability endorsement in the norming sample. The Ds scale was also found to be useful in the detection of feigned performance (mean effect size d=1.62). According to the authors, the applicability of O-S or LW is minimal (Rogers et al., 2003). Other scales of malingering have been suggested, such as the Infrequency Posttraumatic Stress Disorder scale (Fptsd). However, the Fptsd has not been shown to add any incremental predictive utility in the detection of malingered PTSD when considering the rest of the F scale family (Marshall & Bagby, 2006; Elhai et al., 2004). Although, according to Elhai et al. (2004), the scale is more useful with combat-exposed PTSD patients.

The MMPI-2 was found to be resistant to coaching effects, with the F scale being the best at detecting feigned performance, even though the rest of the F scales (i.e., Fs and Fb) were also effective in detecting those feigning a mental disorder (Bagby et al., 2002). The MMPI-2 can detect feigned PTSD (Lees-Haley, 1992; Elhai, Gold, Sellers & Dorfman, 2001; Lange et al.,2010; Mason et al., 2013), even in combat veterans (Arbisi, Ben-Porath & Mcnulty, 2006; Elhai, Gold, Frueh & Gold, 2000; Tolin, Steenkamp, Marx & Litz, 2010), schizophrenia (Rogers, Bagby & Chakraborty, 1993; Bagby et al., 1997; Veltri & Williams, 2012), brain injury (Larrabee, 2003; Ross, Millis, Krukowski, Putnam & Adams, 2004), even when respondents were warned about tests' abilities to detect feigned performance (Wong, Lerner-Poppen & Durham, 1998), chronic pain (Bianchini, Etherton, Greve, Heinly & Meyers, 2008) and depression (Bagby, Marshall & Bacchiochi, 2005; Lange et al., 2010; Bagby et al., 1997), even when feigned by experts in the field (Bagby, Nicholson, Buis & Bacchiochi, 2000). However, when coached, participants were more successful in malingering depression (Walters & Clopton, 2000). The MMPI-2 RF is able to distinguish feigned performance from true responses from psychiatric inpatients (Sellbom & Bagby, 2010; Chmielewski, Zhu, Barchett, Bury & Bagby, 2016). The MMPI-2 was able to distinguish feigned Dissociative Identity Disorder (DID) from genuine cases, even when respondents were coached (Brand & Chasson, 2015). Among criminal defendants, the F and Fp scales, when used together, successfully differentiated between individuals who malingered and true responders (Sellbom, Toomey, Wygant, Kucharski & Duncan, 2010; Steffan, Morgan, Lee & Sellbom, 2010).

The MMPI-2 appears to be significantly affected by intelligence and knowledge of the test. Those with higher intelligence (Pelfrey, 2004) and test knowledge are much more likely to escape detection of feigned performance (Viglione et al., 2001; Pelfrey, 2004). Further, knowledge of the test appears to help respondents elude detection more than knowledge of the disease, at least in the case of feigning schizophrenic symptoms (Rogers et al., 1993). Knowledge of the test also helped respondents feigning closed-head injury elude detection (Lamb, Berry, Wetter & Baer, 1994).

One major concern using the FBS scale was highlighted by Williams, Butcher, Gass, Cumella, and Kally (2009). They indicate that women respond in the deviant direction more frequently than men.

The cut score is equal for both men and women, meaning the threshold for identifying women as malingering is lower (less conservative) than that of men.

An area of research still under dispute is which measure, the MMPI-2 or the PAI, is better for malingering detection. In the area of detecting feigned PTSD, some research shows that the MMPI-2 is better in detecting feigned performance (Lange et al., 2010; Eakin, Weathers, Benson, Anderson & Funderburk, 2006). However, Eakin et al. (2006) caution that both the PAI and MMPI-2 are vulnerable to those feigning PTSD, as many avoided elevations on one or more malingering scales or indices on either test. This is especially true when the participants have been coached (Veltri & Williams, 2012). Veltri and Williams (2012) also note that with coaching, participants can avoid detection of feigned generalized anxiety disorder as well. Among prison populations, Boccaccini et al. (2006) suggest the PAI and MMPI-2 are on par, as both are useful in detecting feigned performance among this population. Blanchard, McGrath, Pogge, and Khadivi (2003) found the MMPI-2 to be slightly more effective in detecting feigned serious mental illness than the PAI.

Wechsler Scales

It has been shown that on the Wechsler Memory Scales, Revised (WMS-R), individuals who were malingering typically scored far lower on the Attention/Concentration Index in comparison to the General Memory Index, so the difference between the two scores became the Malingering Index. This score originally resulted in an 83% accurate classification rate (Mittenberg, Azrin, Millsaps & Heilbronner, 1993) and has been supported since with non-litigating samples (Iverson, Slick & Franzen, 2000; Hilsbeck et al., 2003). However, among the non-litigation studies, 5-8% of participants were misclassified as malingering, so it was suggested that other cutoff scores may be necessary for non-litigating samples (Iverson et al., 2000). For the WMS-III, the Rarely Missed Index (RMI) was created from 6 items on the Logical Memory Delayed Recognition (LMDR) subtest to detect feigned performance. In the validation study, the scale had high sensitivity (97%) and specificity (100%) and accurately classified over 98% of the participants feigning head injury (Killgore & DellaPietra, 2000).

However, Lange, Sullivan & Anderson (2005) found the scale to have very low sensitivity (.25) and high specificity (.91 to .95) in a population of litigants and non-litigant patients and Swihart, Harris and Hatcher (2008) reportedly failed to replicate the diagnostic utility of the RMI. These results do not support the use of the RMI as a measure of malingering.

The WMS-III Auditory Recognition Delayed of the Verbal Paired Associates subtest discriminated individuals who were malingering from honest responders when used with participants feigning cognitive impairment (Laneluddecke & Lucas, 2003; Sánchez, Jiménez, Ampudia & Merino, 2012). The scale was even found to detect feigned performance as reliably and accurately as the TOMM (Sánchez et al., 2012). Also, the WAIS-III Processing Speed Index has been found to detect feigned chronic pain (Etherton, Bianchini, Heinly & Greve, 2006).

One of the most common subtests for malingering detection on both the WMS and WAIS is Digit Span (Jasinki, Berry, Shandera & Clark, 2011). Two malingering measures have been derived from this subtest: Reliable Digit Span (RDS) and the Age-Corrected Scaled Score (DS-ACSS). In a meta-analysis of both the RDS and DS-ACSS used from both the WMS and the WAIS in mainly forensic populations, it was found that both measures, regardless of which test they were used on, are reliable measures of malingering (RDS mean effect size $d = 1.34$; DS-ACSS mean effect size $d = 1.08$) and overall they had a hit rate of 76.3% (Jasinki et al., 2011; also see Mathias, Greve, Bianchini, Houston & Crouch, 2002; Heinly, Greve, Bianchini, Love & Brennan, 2005; Duncan & Ausborn, 2002). The Digit Span subtest and the RDS scale specifically have been used to detect feigned toxic exposure as well (Greve et al., 2007). Through the use of a computerized analysis of Digit Span recall error patterns, a Digit Span Malingering Index has also been created (Woods et al., 2011). The use of the RDS has been retained in the WAIS-IV, even with the changes made to the Digit Span subtest (Reese, Suhr & Riddle, 2012). Digit Span has also been found to detect feigned performance in children on the Wechsler Intelligence Scale for Children-Fourth Edition (Kirkwood, Hargrave & Kirk, 2011; Loughlan, Perna & Hertza, 2012).

Drawing Assessments

Figure Drawing Assessments

The first projective test, the Rorschach (1921), was introduced in the 1920s, but the first true interpretation of projective assessment, in general, did not emerge until the late 1930s. The projective hypothesis (Frank, 1939) states people interpret the world differently based on their own experiences, especially when interpreting ambiguous, unstructured stimuli. The technique that emerged from the projective hypothesis asks the subject to give meaning to a relatively ambiguous stimulus (Reynolds & Kamphaus, 2003). The concept of projection originates in psychodynamic theory in which metaphorical or representational material tends to generate less intrapsychic conflict or tension than explicit material. Thus, individuals are likely to be less defensive about material expressed in testing. Another projective measure introduced around the same time as Frank's projective hypothesis is the Thematic Apperception Test (Morgan & Murray, 1935 as cited by Tompkins, 1947), which also had the assumption built in that when confronted with a social situation that is ambiguous in nature, individuals are likely to respond differently based on their personality and personal experiences.

Drawing tests represent another tradition in projective testing, though not all tests that rely on the drawing are projective per se. Overall, there are two broad types of drawing tests: human figure drawing tests (HFDs) and figure drawing tests (FDs). Human Figure Drawings typically involve the production of a human figure from the respondent's imagination, based on open-ended instructions from a clinician. These tests involve at least one human figure and sometimes also require the drawing of non-human objects. Most HFDs identify a projective hypothesis as their basis (Naglieri, 1988). Some examples of these tests include House-Tree-Person (Buck, 1948), Draw-A-Person test (Machover, 1949), Draw-A-Person Screening Procedure for Emotional Disturbance (Naglieri, McNeish & Bardos, 1991) and Kinetic Family Drawing (Burns & Kaufman, (1987). Human Figure Drawings have had a varied history in usage; however, today, they are typically associated with the assessment of personality and behavioral disturbance.

Figure Drawing tests (FDs) usually originate in cognitive-developmental theory. These types of tests are typically used to evaluate neurocognitive functioning, memory, visual-spatial organization and coordination of motor production. Some examples of FDs include Rey Osterrith Complex Figure drawing (Rey, 1941; Osterrieth, 1944), Bicycle Drawing test (Taylor, 1959), Bender-Gestalt test (Bender, 1938) and the Visual Reproduction I and II subtests of the Wechsler Memory Scale 3rd and 4th edition (Wechsler, 1997; Wechsler, 2009). Figure Drawings usually begin with a presentation of a basic line drawing or image with no meaning. The drawer then reproduces the non-meaningful image that was presented to them. However, less formal drawing tests given in neuropsychological assessments are drawn from memory or imagination (e.g., bicycle drawings, Clock Drawing, etc.).

Human Figure Drawings. The first structured drawing assessment measure was the Draw-A-Man test. It was developed in 1926 by Florence Goodenough as a non-verbal assessment of intellectual ability in children. Goodenough (1926) hypothesized that the number of accurate details included in a child's drawing could provide information about their intellectual abilities. Goodenough (1926) also hypothesized that drawings may contain more information than she was currently measuring, such as characteristics within drawings that may indicate personality disturbances (Goodenough, 1926). Goodenough's original assessment has been revised more than once, including larger standardization samples and expanded scoring criteria. Harris (1963) did just this when adapting the original test to the Goodenough-Harris test, which included drawings of a man, a woman and self, and revised standardization to keep the test current. Harris (1963) also attempted to adapt the test to use with adolescents but was unsuccessful. The most current scoring system for a figure drawing intellectual assessment is that of Naglieri, developed in 1988 (Naglieri, 1988).

According to Weiner and Greene (2008), Machover developed a similar test in 1949, the Draw-A-Person test using figure drawings to assess personality characteristics through the structural and thematic data provided by the drawer. Some examples of structural details include placement of the image on the page, size of the image, and amount of detail in the drawing. Thematic data was elicited by asking the person being evaluated to make up a story about the person in the drawing. Weiner and Greene (2008) noted that Machover chose a qualitative approach to interpreting individual details independently within each drawing. Weiner and Greene (2008) indicated that in 1968, Koppitz expanded this idea to create a list of “emotional indicators” that are tallied from features of the drawing and calculated to determine the level of a child’s emotional disturbance (Weiner & Greene, 2008).

Naglieri and colleagues also created a quantitative scoring system of figure drawings for personality features call the Draw-A-Person Screening Procedure for Emotional Disturbance (DAP:SPED). Naglieri standardized the scoring system, identifying 55 features that are rarely drawn by normal children and adolescents (Naglieri et al., 1991). The authors of the DAP:SPED proposed it could be used as a screening tool for adjustment difficulties warranting further evaluation (Weiner & Greene, 2008).

In 1948, Buck expanded the number and type of drawn objects to create the House-Tree-Person test (HTP), requiring the test-taker to draw a house, a tree, and a person. The test was intended to “tap the concerns, interpersonal attitudes, and self-perceptions of children and adolescents more fully than is usually possible with human figure drawings alone” (Weiner & Greene, 2008, p. 485). A few years after the introduction of the HTP, Emanuel Hammer (1958) elaborated on the test. Buck and Hammer believed the tree drawing would arouse feelings about the self and prompt less defensiveness than when drawing a person, as it could be less obvious as a form of self-portrait. The person drawing was then used to tap additional aspects of a child’s self-image and how they would like to view themselves. The house was used to elicit feelings regarding the child’s home life and relationships (Weiner & Greene, 2008).

Similar to the HTP, Robert Burns and S. Harvard Kaufman (1987) developed the Kinetic Family Drawing (KFD) in 1970, which they believed helped to obtain valuable information by asking children to draw their family members and themselves in action. A KFD drawing is examined for structural features and the relationships among the members. The test is said to indicate attitudes of family members towards one another and salient patterns of interaction. A variation of the KFD was introduced soon after, by Prout and Phillips (1974), called the Kinetic School Drawing (KSD). The KSD requires the child to draw a school picture of their teacher, friend(s), and themselves, in action. It again is said to provide information about relationships, this time with peers, and attitudes regarding school. When using the KFD and KSD together it is called the Kinetic Drawing System, and together they are intended to identify adjustment difficulties in both home and school settings. Lastly, in 1987, Burns introduced a kinetic twist on the HTP, requiring a drawing of a house, a tree and a person in a single drawing, with the person in action (Weiner & Greene, 2008).

More recently, the Synthetic-House-Tree-Person (S-HTP) has emerged (Mikami, 1995) but much of the research is only available in Japanese (e.g.,Mikami, 1995, Kohketsu & Morita, 2011; Naoko, 2009; Doi, Oochou, Yamanaka, Inoue & Seino, 2001). In a recent study, Fujii et al. (2016) compared those with no synthetic sign (i.e., patients that are unable to draw all three figures in one drawing) with those able to complete the S-HTP. The study found those with no synthetic sign consisted of patients with a mental age of 5 years 11 months and under, along with patients with Autism Spectrum Disorder (ASD). They argue these results indicate that using the S-HTP “may help in early identification of children with developmental problems and facilitate earlier initiation of interventions” (Fujii et al., 2016, pg. 8). Further, Kato and Suzuki (2016) were able to associate specific drawing details to personality traits of Japanese adolescents, such as larger house and trees associated with traits of high conscientiousness, and smaller human figures associated with neuroticism. They believe these findings could help develop useful criteria for assessing the S-HTP in the future.

Variables that are commonly evaluated in any human figure drawing test include structural, thematic and behavioral variables. Structural variables include, but are not limited to, line quality, placement and size of figures and emphasis or omission of parts. Thematic variables include, but are not limited to, figure description by the drawer, affective tone, story plot and manner of expression. Behavioral variables can include a commitment to the task and unsolicited comments (Weiner & Greene, 2008).

Many psychological assessments that started as paper and pencil have been updated to computer administration but very few attempts have been made to computerize projective tests. Recently, Kim, Han, Kim, and Oh (2011) created a computerized version of the Kinetic Family Drawing, called the

Computer Art Therapy System for Kinetic Family Drawing (CATS_KFD) with the goal of higher reliability and validity and less interpretation time for the clinician. They theorize that it will be an ever-growing knowledge base, essentially prompting the program become “smarter” and create more accurate and in-depth interpretations of the image created in the program. Although it is not free-drawing like HFDs of old, the program provides images that can be manipulated by the test-taker. However, this is only a prototype and currently, there is no evidence that the program will be a useful clinical tool (Kim, Han, Kim, & Oh, 2011).

Figure Drawings. As stated previously, some common FDs include the Rey-Osterrieth Complex Figure (ROCF) (Osterrieth, 1944), the Bender-Gestalt test (Bender, 1938), the Bicycle Drawing Test (Taylor, 1959) and Visual Reproduction I and II (Wechsler, 1997; Wechsler, 2009). Arguably, one of the most popular figure tests is the ROCF, developed in 1941 (Rey, 1941). The test consists of a complex, abstract drawing consisting of 18 details, such as triangles, circles, crosses, and squares surrounding a central rectangle (Mitrushina, 2005). The test typically includes a copy trial, immediate recall trial, delayed recall trial, and in more recent years, a delayed recognition trial (Meyers & Meyers, 1995). The original scoring procedure assigns points (0-2) based on the presence of distortion and placement of each drawing element, however, several scoring systems have been proposed since 1941 (e.g., Bennett-Levy, 1984; Loring, Lee & Meador, 1988; Meyers & Meyers, 1995; Taylor, 1998; Deckersbach et al., 2000; Lu, Boone, Cozolino & Mitchell, 2003).

Another widely used FD assessment is the Bender Visual Motor Gestalt test (Bender Gestalt; Bender, 1938). The Bender-Gestalt requires the examinee to reproduce simple line drawings. The newest version, the Bender-Gestalt II also includes a recall procedure along with simple, additional tests to identify specific motor and perceptual deficits (Brannigan & Decker, 2003). The Bender-Gestalt was originally created to detect deviations in normally developing motor functions that are associated with pathological conditions such as schizophrenia, TBI, and cognitive impairment (Reichenberg & Raphael, 1992). Several scoring systems have been introduced throughout the years (e.g., Pascal & Suttell, 1951; Hutt & Briskin, 1960; Paulker, 1976; Aucone et al., 1999), including a personality scoring system made up of “emotional indicators” specifically for assessment of children (Koppitz, 1963, 1975).

The Bicycle Drawing Test (BDT) was created in 1959 (Taylor, 1959) to assess higher conceptual reasoning in children. Since then the research has expanded to include adults and has been described as a measure of mechanical reasoning and visuographic functioning (Lezak, 1995, cited by Hubley & Hamilton, 2002; Cf. Cannoni, Norcia, Bombi & Giunta, 2015). The test requires the respondent to draw a bicycle without a rider aboard, and in some cases, they are also asked to copy a drawing of a bicycle afterward (Hubley & Hamilton, 2002).

Human Figure Drawings Research

The research on HFDs spans several decades and the results are very mixed. Research suggests HFDs can predict a variety of important variables, such as emotional disturbance of those with conduct and oppositional defiant disorders (Maloney & Glasser, 1982; Naglieri & Pfeiffer, 1992) and students in need of special education services (McNeish & Naglieri, 1993).

Further, HFDs have been found to identify suicidal ideation or self-harm wishes (Zalsman et al., 2000; Kumar, Nizamie, Abhishek & Prasanna, 2014), aggression in adults (Goldstein & Rawn, 1957), impulsivity (Oas, 1984), and organicity (Mclachlan & Head, 1974). Research suggests HFDs can distinguish children who have been abused from children who have not been abused (Blain, Bergner, Lewis, & Goldstein, 1981), and differentiate between children with anxiety and mood disturbance from those without (Tharlinger & Stark, 1990), and children with ADHD from those with LD (Perets-Dubrovsky, Kaveh, Deutsch-Castel, Cohen & Tirosh, 2010). Recently, it has been suggested that an HFD can be used to differentiate individuals with Alzheimer’s Disease from those with mild cognitive impairment (Maserati, D’Onofrio, Matacena, Sambati, Oppi, Poda, De Matteis, Naldi, Liguori & Capellari, 2018).

In a study comparing drawings made by children with ADHD with drawings made by children with no diagnoses, Haghigh, Khaterizadeh, Chalbianloo, Toobaei and Ghanizadeh (2014), found several significant differences. Several features of the drawings distinguished the two groups of children, including simplified body parts and weak quality of drawings. Further, they differed significantly on scales of impulsivity and non-impulsivity, with children diagnosed with ADHD scoring higher than children without a diagnosis for impulsivity and lower than children without a diagnosis for non-impulsivity.

Research indicates HFDs have negligible results detecting trauma (Devore & Fryrear, 1976), self-esteem difficulties in adults (Groth-Marnat & Roberts, 1998), differences in body image (Maloney & Payne, 1969), and individuals with a disability (Johnson & Greenberg, 1978).

As a projective measure of intelligence (e.g., the DAP:IQ), even when the scores on HFDs have correlated with standardized cognitive assessments, the correlations are only moderate in strength. Further, the HFDs have too many false negatives and false positives, often underestimating or overestimating individuals' abilities and misclassifying their abilities. For example, the test may place someone in the low functioning category, allowing them to receive services when they are actually much higher functioning and would not be offered services if a more accurate cognitive ability score was attained. These difficulties with HFDs render them unusable in the assessment of IQ (Willcock, Imuta & Hayne, 2011; Imuta, Scarf, Pharo & Hayne, 2013).

Research regarding specific drawing elements used as indicators of distress or symptoms of a disorder has been mostly unsubstantiated; for example, Golstein and Rawn (1957) did not find any evidence of line pressure or figure size to predict aggression. In a review of 18 years' worth of research, there was very little to support any of Machover's (1949) hypotheses regarding specific elements (Roback, 1968; also see Lilienfeld, Wood & Garb, 2000). McPhee and Wegner (1976) failed to find differences in defensive styles of drawings, with features such as edging and compartmentalization (using lines to isolate a family member) as the elements being measured. Holtz, Branigan, and Schofield (1980) did not find evidence of placement of self in relation to other family members as a reliable measure of interpersonal distance. Holms and Stephens (1984) could not find consistent evidence of edging as a diagnostic indicator. However, amongst children with ADHD, a shorter HFD has been associated with low self-esteem and anxiety (Saneei, Bahrami & Haghegh, 2011). And, it has been found that as children grow older, the likelihood of them drawing a phallic-like tree becomes much less, so when a phallic-like tree is drawn by older children, it can be deemed significant (Jolles, 1952).

Lastly, research in the area of sexual abuse remains unsettled. Palmer, Farrar, Valle, Ghahary, Panella, and Degraw (2000) found negligible results in detecting sexual abuse, along with the meta-analysis of Lilenfeld, Wood and Garb (2000). However, in other research, indicators of sexual abuse have been identified (Rachel, 1999; Jacobs-Kayam, Lev-Wiesel & Zohar, 2013).

Human Figure Drawings have been found to be easy to administer (Weiner & Greene, 2008) and are largely unaffected by racial and cultural differences (Matto & Naglieri, 2005). Both an attractive quality and a caution to the user, Thomas and Jolley's (1998) meta-analysis concluded drawings can be highly influenced by children's emotional attitudes towards the depicted topics or people.

Meta-analyses have been used to evaluate the usefulness of HFDs overall. These have found high interrater reliability among HFDs, with results typically over .80 (Kahill, 1984, Groth-Marnat & Roberts, 1998). However, negligible results have been found regarding the use of structural (e.g., head size, detailing, line characteristics) and content (e.g., facial expression, eyebrows, hair) variables (Kahill, 1984). According to Kahill (1984), global measures also have mixed results in the literature (see also, Swenson, 1968; Lilienfeld, Wood, and Garb, 2000). Motta, Little, and Tobin (1993) reviewed the literature on HFD's and found there is very little support for the validity of HFD's regardless of their use (e.g., Behavior, personality, emotional or cognitive assessment). Further, Gresham (1993) suggests that use of HFDs continues due to the false belief in incremental validity, illusory correlations— "the relationship between test responses and symptoms/behavior that are based on verbal associations rather than valid observations" (Gresham, 1993, p 183)—and the impossibility of disconfirming interpretations. Kahill (1984) offers, "While it is obvious that figure drawings are not meaningless, establishing what it is they mean with any precision or predictability is difficult. It may well be impossible if the meaning is inconsistent and idiosyncratic (Kahill, 1984, p 288).

Knoff (1993) highlights some major issues with HFDs in general; Knoff reviewed 104 empirical studies from 1980-1988 and reported nearly 75% percent neglected to use a control group, over half did not use a random or matched sample, over 80% did not report interrater reliability data and over 60% used non-parametric statistical analyses. According to Knoff (1993), less than 30% of the studies had good generalization potential; much of the research focused on very specific details of HFDs or targets, such a specific population, that the generalizability is negligible. Knoff (1993) concludes that given the characteristics of the research, “it seems clear that much of the HFD research is of such poor quality that any positive results must be methodologically and/or statistically questioned” (Knoff, 1993, p 192). Further, Lilienfeld, Wood and Garb (2000) noted in their review of the literature that research has repeatedly shown that artistic ability accounts for a large portion of variance instead of psychopathology.

Figure Drawings Research

Figure Drawings are sensitive to ADHD in adults (Antshel et al., 2010) and children (Raggio, 1999; Mahone et al., 2002; Kim, Cho & Kim, 2003; Sami, Carte, Hinshaw & Zupan, 2004; Allen & Decker, 2008; Borkowska et al., 2011 cf. Alpanda, 2015; Mccarthy, Rabinowitz, Habib & Goldman, 2002), major depressive disorder (Behnken et al., 2010, Abbate-Daga et al., 2015), schizophrenia (Silverstein, Osborn & Palumbo, 1998; Zanello, Perrig, & Huguelet, 2006; Kim, Namgoong & Youn, 2008; Javanmard, 2011), anorexia nervosa (Sherman et al., 2006; Favaro et al., 2012; Lang et al., 2015), bulimia nervosa (Darcy et al., 2015), binge eating disorder (Aloi et al., 2015) obsessive compulsive disorder (Pinto et al., 1999; Savage et al., 2000; Kim, Park, Shin & Kwon, 2002; Lacerda et al., 2003; Penadés, Catalán, Andrés, Salamero & Gastó, 2005), compulsive hoarding (Hartl et al., 2004), Parkinson’s disease (Sandyk, 1996; Kawabata, Tachibana & Kasama, 2002), TBI (Messerli, Seron & Tissot, 1979; Quemada et al., 2003; Ashton, Donders & Hoffman, 2005; Serra-Grabulosa, 2005) and impulsivity (Oas, 1984). Some FD tests appear to be sensitive to age differences, such as the BDT (Hubley & Hamilton, 2002) while other FDs are not, such as the Bender Gestalt (Keppeke, Cintra & Schoen, 2013, cf., McCarthy et al., 2002). The RCFT is not sensitive to Autism Spectrum Disorders (Chan et al., 2009; Chan et al., 2011), however, the BDT is useful within this population (Volker et al., 2010; Cannoni et al., 2015).

As an emotional indicator, the research regarding the Bender-Gestalt is very mixed, with some research suggesting it is ineffective (Billingslea, 1963; Trahan & Stricklen, 1979; Field, Bolton & Dana, 1982; Dixon, 1998; Ożer, 2010) and other research demonstrating its utility as a measure of emotional disturbance (Rossini & Kaspar, 1987; Belter, McIntosh, Finch, Williams & Edwards, 1989). The Koppitz scoring system has been found to have test-retest reliability, with a correlation of .80 over 8 to 146 months. Further, the reliability of three independent scorers ranged from .92 to .95 (Hustak, Dinning & Andert, 1976).

Attention Deficit Hyperactivity Disorder

Attention Deficit Hyperactivity Disorder (ADHD) is considered a neurodevelopmental disorder, affecting the neurobiology of the frontal lobes of the brain (Faraone, 2004), impacting different areas of executive functioning, such as self-regulation of arousal and mood, nonverbal working memory, and difficulty keeping the inner-monolog private (Barkley, 1997). According to *The Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM–5*; American Psychiatric Association, 2013), there are several criteria that need to be met for a diagnosis of Attention-Deficit Hyperactivity Disorder (ADHD). The *DSM-5* divides the criteria between hyperactive features and inattentive features. To meet criteria for inattentiveness, one must have at least six of the following features:

- Often fails to give close attention to details or makes careless mistakes in schoolwork, at work, or during other activities.
- Often has difficulty sustaining attention in tasks or play activities.
- Often does not seem to listen when spoken to directly.
- Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace.
- Often has difficulty organizing tasks and activities.
- Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort.
- Often loses things necessary for tasks or activities.
- Is often easily distracted by extraneous stimuli.
- Is often forgetful in daily activities (American Psychiatric Association, 2013, p. 59).

To meet criteria for hyperactivity, one must have at least six of the following features:

- Often fidgets with or taps hands or feet or squirms in seat.
- Often leaves the seat in situations when remaining seated is expected.
- Often runs about or climbs in situations where it is inappropriate. (**Note:** In adolescents or adults, may be limited to feeling restless).
- Often unable to play or engage in leisure activities quietly.
- Is often "on the go," acting as if "driven by a motor".
- Often talks excessively.
- Often blurts out an answer before a question has been completed.
- Often has difficulty waiting his or her turn.
- Often interrupts or intrudes on others (American Psychiatric Association, 2013, p. 60).

For any of the hyperactive or inattentive criteria to be met, one must have experienced the symptom for at least 6 months, and it must be impairing their daily activities. Further criteria include symptoms appearing before the age of 12 and appearing in multiple domains (I.e., home and school/work). The symptoms must impair functioning and cannot be caused by another psychological or medical problem (American Psychiatric Association, 2013).

There are some important changes in diagnosing ADHD with the release of the DSM-5. The first major change is the cut-off age. In the DSM-IV, symptoms were required before the age of 6, but now they are needed before the age of 12 to meet criteria. Unlike the DSM-IV, to meet criteria the child must have several symptoms among multiple domains, instead of the vague terminology of the DSM-IV which required some impairment in more than one domain. One change that makes an ADHD diagnosis of adults easier is the need for only 5 symptoms instead of 6 for hyperactivity and/or inattentiveness (Centers for Disease Control and Prevention [CDC], 2013).

Diagnosis of ADHD in adulthood can be difficult since the symptoms must have been present before the age of 12. Many adults have difficulty accurately recalling their childhood behaviors and oftentimes tend to underestimate ADHD symptomology. However, parents of young adults (such as college populations) may be better historians, providing more accurate recollections of their child's behavior (Fischer &Barkley, 2007; Barkley, Fischer, Smallish & Fletcher, 2002). As adults age, however, it becomes increasingly likely that the parent will not have enough evidence of current functioning since their child does not live with them or return home as frequently and there may be less frequent communication about current functioning that would allow the parent to report accurate judgments (Fischer & Barkley, 2007).

Fischer and Barkely (2007) chose to use less stringent criteria for re-diagnosing adults with ADHD that had previously been diagnosed as children. The adult has to have 4 or more symptoms present from either the hyperactivity symptoms or the inattentive symptoms to re-qualify for the diagnosis. The researchers indicated this would still put the adult in or above the 93rd percentile, which may be an indication of severe impairment. However, this may not be applicable when assessing an adult who has never been previously diagnosed with ADHD since the DSM-5 clearly states that symptomology must be present before the age of 12.

According to Wadsworth and Harper (2007), approximately forty percent of children that have been diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) continue to meet full criteria for ADHD in adulthood, and another sixty percent still have some symptoms, even if they do not meet full criteria (Rapport, 2001; Wadsworth & Harper, 2007). In adulthood, the majority of hyperactive symptoms lessen or disappear entirely, while the inattentive symptoms remain (Millstein, Wilens, Biederman & Spencer, 1997; Wadsworth & Harper, 2007), which can make diagnosis more difficult.

Attention Deficit Hyperactivity Disorder impacts an adult's life in several ways. Seidman, Biederman, Faraone, Weber, and Ouellette (1997) found that executive functioning impairments are persistent in older adolescents and likely beyond, suggesting the neuropsychological deficits may be enduring traits. These findings have indeed been confirmed in adults (Rohlf et al., 2012; Gonzalez-Gadea et al., 2013 *cf.* Johnson et al., 2001) even after accounting for comorbid disorders (Rohlf et al., 2012; Silva et al., 2013). However, in a review of the literature, Seidman (2006) cautions that not all adults with ADHD have executive functioning deficits. Garcia et al. (2012) looked at the prevalence of negative life events in the lives of adults with ADHD. They found a significant association between negative life events and ADHD severity. They argue that these findings indicate those with ADHD in adulthood do indeed have more setbacks and the findings also dispel the assumption that being ADHD comes with certain gifts or advantages. Further, those with ADHD as adults tend to accomplish less occupationally and have more achievement dysfunctions (Seidman et al., 1998).

Assessment of Attention Deficit Hyperactivity Disorder

Assessment of ADHD typically involves a battery of assessments to ensure criteria are met for the diagnosis while also ruling out other disorders. These batteries typically include self-report measures, cognitive assessment measures and continuous performance measures. The battery aims to assess childhood symptoms, current symptoms, psychosocial functioning, cognitive abilities and different types of attention (Wadsworth & Harper, 2007). However, Seidman (2006) cautions that data do not support the use of neuropsychological assessments to clinically diagnose ADHD. Childhood symptoms are often reported through self-report measures but can also be corroborated through childhood report cards or interview or questionnaire information from parents or caregivers (Nugent & Smart, 2014).

Self-report behavioral checklists are completed by the patient and are quick to administer. Some self-report rating scales often used by psychologists include the Wender Utah Rating Scale (WURS; Wender, 1995), Brown Attention-Deficit Disorder Scale for Adults (BADDS; Brown, 1996) Conners's Adult ADHD Rating Scales (CAARS; Connors, Erhart & Sparrow, 1999), Barkley's Quick-Check for Adult ADHD Diagnosis (Barkley, 2006) Current Symptoms Scale—Self-Report Form (CSS; Barkley & Murphey, 1998) Adult Attention Deficit Disorders Evaluation Scale Self-Report Version (AADDES; McCarney & Anderson, 1996) and the Adult ADHD Rating Scale—Self-Report (ARS; Kessler et al., 2005). In Nugent and Smart's (2014) review, they indicated the WURS assesses childhood and current symptoms of ADHD and it has been validated specifically in college students. A study of convergent validity among five self-report assessments—the CSS, BADDS, CAARS, AADDES, and WURS—found strong agreement among the measures and conclude that the choice of assessment measure depends on time constraints and personal preference of the assessor (Rodriguez & Simon-Dack, 2013). Further, Alexander and Liljequist (2016) found there were no significant differences between accuracy of self-reporting symptoms and symptom report from an observer such as a friend or colleague, which also gives clinicians more freedom in their approach to assessing ADHD. However, Harrison, Nay, and Armstrong (2016) found that the CAARS "had an unacceptably high false positive rate and false negative rate" (p. 1), with 20-45% of clinical control participants being incorrectly identified as having ADHD. Further, the CAARS only had around a 50% chance of accurately predicting ADHD when the participant indeed had ADHD.

Cognitive measures are useful since adults with ADHD often have "difficulties related to disinhibition of the executive function" (Wadsworth & Harper, 2007, p. 104) which are major components of the complaints of adults being assessed for ADHD. Again, though, it has been cautioned that this is not always true, so a lack of cognitive deficits does not immediately rule out a diagnosis of ADHD (Seidman, 2006). Some of the areas that cognitive measures assess that are useful in detecting ADHD include processing speed, verbal fluency, and divided attention (Wadsworth & Harper, 2007). Two meta-analyses that compared full-scale IQ performance found that adults with ADHD typically perform lower than their non-ADHD counterparts (Frazier, Demaree & Youngstrom, 2004; Hervey, Epstein & Curry, 2004). However, a third meta-analysis focusing only on adults assessed with a Wechsler cognitive assessment found that adults with ADHD perform similarly to non-ADHD controls (Bridgett & Walker, 2006). However, even when an average IQ score is obtained, heterogeneity among the indices can paint a much bigger picture of a person's cognitive abilities (Psychological Corporation, 1997).

Inattention and slower processing speed are often seen on the WAIS-III for those with ADHD (Walker, Shores, Trollor, Lee & Sachdev, 2000). For the WAIS-III, the Psychological Corporation (1997 as cited by Alexander & Liljequist, 2016) notes that the Working Memory Index (WMI) scores for adults with ADHD, were, on average, just over 8 points lower than their Verbal Comprehension Index (VCI) scores. Further, they reported that compared to the Perceptual Reasoning Index (PRI) scores, adults with ADHD, on average, scored 7.5 points lower on the Processing Speed Index (PRI). Using regression analysis, Alexander and Liljequest (2016) found that CAARS scores accounted for a significant amount of variance in WAIS-III VCI-WMI discrepancy scores, but not for PRI-PSI discrepancy scores, indicating the VCI-WMI discrepancy may be more meaningful in the context of diagnosing ADHD.

Lastly, continuous performance measures are used to assess attention-related problems, including the areas of sustained attention, impulsivity, and inattention. These tests include the Connor's Continuous Performance Test 2nd (CPT-II; Conners, 2004) and 3rd edition (CPT 3; Conners, 2014), the Integrated Visual and Auditory Continuous Performance Test (IVA+Plus; Sanford & Turner, 2004) and the Test of Variables of Attention (TOVA; Dupuy & Cenedala, 1996).

The CPT-II is a computerized continuous performance test of visual attention and impulse control. The specific indices on the CPT-II include response time, response time variability, the error rate of commissions and omissions, and a confidence index. The CPT-II has been shown to have difficulty differentiating clinical cases from non-clinical cases of attention deficits (Riccio, Reynolds, Lowe, 2001; Sollman et al., 2010; Suhr et al., 2011). The newest version promises it is better at distinguishing between these two cases, though no research has been published since it has been released.

The IVA+Plus is a computerized continuous performance test of visual and auditory attention and impulse control. The IVA+Plus has two full-scale quotients (Full-Scale Response and Full-Scale Attention) which are then broken down based on auditory performance and visual performance. The test also provides measures of impulsivity, focus, speed, stamina and response inhibition. Further, it also offers a score for fine motor regulation. The IVA+Plus has been found to discriminate clinical from non-clinical cases of ADHD (Quinn, 2003) and has been validated with Functional Magnetic Resonance Imaging (fMRI; Tinius, 2003) and Quantitative Electroencephalography (qEEG) to detect ADHD (White, Hutchens & Lubar, 2005; Kim et al., 2015) and differentiate between ADHD and other impairments, such as mild TBI (Tinius, 2003). However, in a study using forensic psychiatric outpatients, the researchers found that when compared to several self-report measures of ADHD, IVA+Plus did not have adequate concurrent or discriminant validity and it showed low diagnostic predictive power (Kingston, Ahmed, Gray, Bradford & Seto, 2013).

Lastly, the TOVA is also a computerized continuous performance test of visual and auditory attentional control. The TOVA includes measures of error (omission and commission), mean correct response time and standard deviation of response time. In regard to diagnosing ADHD, the TOVA has mainly been used with children (e.g., Kim, 2003; Preston, Fennell & Bussing, 2005; Llorente et al., 2008) and has been found to aid in the diagnosis of ADHD (e.g., Forbes, 1998). However, it has been shown to over-diagnose attentional problems (Schatz, Ballantyne & Trauner, 2001) so it should not be used in isolation to diagnose ADHD. Further, Preston, Fennell, and Bussing (2005) caution the TOVA does not distinguish between children with ADHD from those with cognitive problems or subclinical levels of behavior. It is unclear whether this may pertain to adult populations as well.

Research utilizing the TOVA to aid in the diagnosis of ADHD in adults is scarce. In one study utilizing the TOVA with adults newly diagnosed with ADHD compared to controls without ADHD, the researchers found significant fluctuations in attention levels from the adults with ADHD. Further, based on assessed executive functioning deficits, the researchers found TOVA omission errors predicted difficulties in the area of organization of materials, while commission errors predicted informant-reported difficulties in the same area of organization of materials. (Grane, Enderstad, Pinto, Solbakk & Vaidya, 2014). However, Weyandt, Mtzlaff, and Thomas (2002) found adults with ADHD only differed from the IQ-matched non-ADHD group in the area of errors of omission, with no significant differences found on the rest of the variables.

To summarize, Riccio et al. (2001) report in their extensive review of continuous performance measures that as a whole, they are not effective in assessing ADHD. Although newer versions of the assessments have been released, it is important to use discretion when using continuous performance tests based on the unfavorable results of false-positives that have been found in the past. In a more recent example, Fazio, Doyle, and King (2014) compared the CPT-II and the TOVA to see if one had better classification accuracy over the other. Each demonstrated poor classification accuracy, with the CPT-II only slightly outperforming the TOVA. Although these findings were with children, they again caution the use of continuous performance measures in assessing ADHD.

Attention Deficit Hyperactivity Disorder and College Populations

As stated previously, roughly 40% of children diagnosed with ADHD continue to meet full criteria for ADHD in adulthood, and another 60% percent still have some symptoms, even if they do not meet full criteria (Rapport, 2001; Wadsworth & Harper, 2007). Prevalence of ADHD in college populations ranges from 2% to 8% (Green & Rabiner, 2012; Nugent & Smart, 2014), with up to 12% of students reporting clinical levels of ADHD symptoms (Nugent & Smart, 2014). Further, individuals with ADHD make up over 25% of college students with disabilities (Green & Rabiner, 2012). Attention Deficit Hyperactivity Disorder symptoms appear to affect grade point averages, class withdrawal rates, risky behavior (Nugent & Smart, 2014) and satisfaction with life (Gudjonsson, Sigurdsson, Eyjolfsdottir, Smari & Young, 2009).

However, it may be appealing to college students to procure a diagnosis of ADHD to receive academic accommodations (Harrison, 2006; Sullivan, May & Galbally, 2007; Young & Gross, 2011), such as test settings with less distraction and additional time for tests and assignments (Wolf, 2001) or obtain stimulant medication (Harrison, 2006; Sullivan, May & Galbally, 2007; Young & Gross, 2011). Many students believe stimulant medication can enhance academic performance while others use it or sell it as a recreational drug (Harrison, 2006; White et al., 2006; Rabiner et al., 2009; Young & Gross, 2011; Garnier-Dykstra et al., 2012) Recently, Lindstrom, Nelson and Foels (2015) found that very little verification of ADHD as a disability is required in most institutions, and little agreement was found between institutions as to what components are needed for ADHD verification.

Malingering of Attention Deficit Hyperactivity Disorder

As discussed previously, there appear to be many reasons why students would want to receive a diagnosis of ADHD. As the number of students seeking this diagnosis has risen, so has the concern of individuals malingering the disorder (Harrison, 2006). In one study, though with a small sample, the researchers found the base rate of students malingering ADHD to be between 25-48%, with the lower end being those being assessed for ADHD and LD concurrently (Sullivan, May & Galbally, 2007).

Researchers have attempted to develop measures that can distinguish those malingering ADHD from those with clinically significant ADHD symptomology, with varying success. Consistently, research suggests that self-report measures are not sufficient for an ADHD diagnosis, since someone wanting the disorder can easily feign impairment on these measures, with profiles exceedingly similar to those with ADHD (Quinn, 2003; Harrison, Edwards & Parker, 2007; Sollman, Ranseen & Berry, 2010; Young & Gross, 2011; Booksh, Pella, Singh & Gouvier, 2010; Sansone & Sansone, 2011).

Several studies have shown how easy it is for college students and other adults to successfully feign ADHD symptoms during a neuropsychological assessment (e.g., Sollman, Ranseen & Berry, 2010; Suhr, Hammers, Dobbins-Buckland, Zimak & Hughes, 2008; Quinn, 2003; Jachimowicz & Geiselman, 2004; Booksh, Pella, Singh & Gouvier, 2010; Harrison, Edwards & Parker, 2007; Harrison, Green & Flaro, 2008; Suhr, Sullivan & Rodriguez, 2011). For example, Jachimowicz and Geiselman (2004) found that college students were able to feign ADHD on four different self-report measures of current symptomology (WURS, BADDS, CAARS, and ARS). The WURS was the least susceptible to feigning while the BADDS was most susceptible. However, even the WURS falsely identified over 60% of the students as having ADHD. Other measures that can be used in other settings—such as specific subtests on the Wechsler Memory Scales—to detect feigned performance, may not work as well in a college setting; students are typically higher functioning than the average adult and therefore large differences in their scores are not typically seen (Sollman, Ranseen, & Berry, 2010). Yet, to date, there are no consistently useful measures of feigned performance specifically in the area of ADHD symptomology (Harrison, 2006), even though a review of the literature has indicated a great need for valid measures of ADHD malingering (Musso & Gouvier, 2014).

Symptom Validity Tests

Marshall, Hoelzle, Heyerdahl, and Nelson (2016) used retrospective data to assess how many cases of ADHD malingering would have gone undetected if SVTs had not been administered to the evaluees. Of the 554 cases they extracted, 115 were found as putting forth suspect effort but were able to manifest profiles nearly indistinguishable from those with ADHD. They highlight that many, if not all of these cases would have been diagnosed as ADHD when using “the most commonly employed assessment methods: an interview alone (71%); an interview and ADHD behavior rating scale combined (65%); and an interview, behavior rating scales, and most continuous performance tests combined (62%)” Marshall et al., 2016, p. 1290).

In a study that included the TOMM and several other SVTs not discussed in this literature review, promising results were found among all the SVTs in the detection of feigned ADHD, with particularly promising results on the first trial of the TOMM, using trial 2 criteria ($\leq$45). Further, combining two or more SVT failures resulted in robust specificity (Sollman, Ranseen & Berry, 2010). Similar results were also found by Jasinski et al. (2011); these authors found that a failure rate of 2 or more SVTs resulted in a specificity of 100%. According to Frazier, Frazier, Busch, Kerwood, and Demaree (2008), the Validity Indicator Profile (VIP) and hard item accuracy scores of the VSVT are useful in classifying ADHD simulators from those with adequate effort.

Efficient Detection Assessments

Fuermail et al. (2016), attempted to create an embedded measure of malingering detection, called the Conner’s Adult ADHD Rating Scale Infrequency Index (CII). However, data did not support the use of the scale since it could not differentiate patients malingering from patients with sufficient effort

(Fuermail et al., 2016; Cook, Bolinger & Suhr, 2016). The CII has been used since, with minimal effectiveness; it was able to identify approximately one-half of ADHD simulators (Robinson & Rogers, 2017).

Harp, Jasinski, Shandera-Ochsner, Mason, and Berry (2011), attempted to detect feigned ADHD with the MMPI-2-RF. They found the feigning group was able to produce profiles that were comparable to honestly-responding clinical profiles and participants with ADHD were able to exaggerate their symptoms while producing a less severe clinical profile than the feigning group. The only scale that showed potential for detecting feigned ADHD is the Fp-r scale, with a significantly lowered cut score than that suggested by the test manual. According to Young and Gross (2011), MMPI-2 has the potential to aid in the detection of feigned ADHD symptoms. They found the Fp scale was best at detecting feigned performance, followed by F, Fb, Response Bias Scale (RBS), Henrey-Heilbronner Index scale (HHI) and FBS. However, the recommended cutoffs for the three latter scales had poor sensitivity and specificity, indicating new cutoffs may be necessary for this population if the scales are to be used. Robinson and Rogers (2017) created a scale from the MMPI-2-RF with the specific function of detecting feigned ADHD, the Ds-ADHD scale. This scale was created by asking different groups of participants (i.e. ADHD feigners, general psychological disorder feigners, and honest responders) by asking each of them to circle the questions within the MMPI-2-RF that they believed to be about ADHD. The found the 23 most commonly circled items and compared feigned responses to MMPI-2-RF profiles of individuals who had previously been diagnosed with ADHD. The researchers found that the scale identified 75% of the individuals feigning ADHD and preserved a low false-positive rate of .03.

Three of the malingering detection scales (Rogers Discriminant Function, NIM, and PIM) successfully detect the feigned performance of ADHD on the Personality Assessment Inventory-Adolescent (PAI-A: Morey, 2007), with the Rogers Discriminant Function again being the most useful (Rios & Morey, 2013). However, among college students, feigned ADHD was not detected on the PAI with current recommended cutoffs. With new, proposed alternative cut-off scores of ≥ 77 on the NIM, ≥ 3

on the MAL and ≥1 on the RDF, however, the PAI produced excellent specificity to detect feigned ADHD (Musso, Hill, Barker, Pella & Gouvier, 2016). However, when analyzing past data of patients self-referred for ADHD or ADHD/LD assessment that were likely feigning based on their failed VST scores, Sullivan et al. (2007) found there were no significant elevations on the PAI, including the scales specifically used to detect ADHD. They suggest this is because the PAI does not have face-validity for ADHD symptomology, making it unlikely that an embedded measure is a useful way to detect ADHD malingering.

Other findings among imbedded indices have been promising, such as Edmunson, Berry, Combs, Brothers, Harp, Williams, Rojas, Saleh and Scott's (2017) analysis that found that both uncoached participants feigning ADHD and coached participants feigning ADHD performed significantly worse on the Processing Speed Index of the WAIS-IV, while Frazier et al. (2008) found that those feigning ADHD performed lower on the Digit Symbol subtest of the WAIS-III when compared to honest-responding participants. Suhr et al. (2008) found that individuals feigning ADHD performed significantly worse on the WAIS-IV Working Memory Index than the psychological symptom group and the group of individuals diagnosed with ADHD. However, there appears to be very little replication of these findings published in the literature.

Lastly, summarizing 19 peer-reviewed articles from 2002-2011 that investigated college students malingering ADHD, the authors concluded that there is a great need for measures designed specifically to detect malingered ADHD; the profile of a malingerer and that of individuals with ADHD were too similar (Musso & Gouvier, 2014).

Continuous Performance Measures

Another measure that has been used to differentiate Individuals with ADHD from individuals without ADHD, and, potentially from individuals feigning ADHD, has been the Conner's Continuous Performance Test (CPT). However, it has been shown that this measure is insensitive to ADHD, and those feigning had a profile, not unlike that expected of someone truly presenting with ADHD (Sollman et al., 2010). Further, the CPT-II has not been able to distinguish feigned ADHD from true ADHD. In two separate studies, not only were those feigning ADHD able to successfully feign on the CPT-II, but the test also had trouble distinguishing between honest responders and those diagnosed with ADHD (Sollman et al., 2010; Suhr et al., 2011). For example, Suhr et al. (2011) followed the CPT-II manual suggested criterion of failing (e.i., getting a T=60 or greater) two subtests or more and found that nearly 80% of the ADHD feigners met this criterion, whereas 39% of the control group and only 44% of the ADHD group met this criterion. However, according to Conners (2008), the newest edition of the test can detect attention deficits and differentiate non-clinical from clinical cases.

The IVA-CPT appears to adequately distinguish between individuals feigning ADHD and individuals diagnosed with ADHD. 81% of the IVA-CPT subtests showed significant differences between the two groups. Further, the test yielded a sensitivity of .81 and specificity of .91 (Quinn, 2003). The IVA-CPT has an index score to assess the likelihood of malingering as well (Sanford & Turner, 2004).

The TOVA has not been used to detect malingering of ADHD, however, in a study of litigants with mild TBIs, the probable malingering group performed significantly worse on all TOVA variables compared to those in the non-malingering group. It was found that $\geq$3 omission errors best predicted group membership (Henry, 2005).

Figure and Human Figure Drawings

One area of interest critical to the current research is malingering detection through drawings, both HFDs and FDs. Recently, Carmody and Crossman (2011) sought to contribute to the current research by assessing the malingering abilities of young adults along with assessing the DAP's vulnerability to feigned performance. They conducted two experiments to test their hypotheses. In the first experiment, the researches included 62 undergraduate students. First, they were asked to draw a man, a woman and themselves in five minutes or less. They were then provided a vignette about being involved in a motor vehicle accident resulting in their claim of distress and were asked to draw the same three figures again to reflect the distress they were claiming due to the accident. All figures were scored according to Naglieri's Quantitative Scoring System, with 64 items for the cognitive portion of the assessment and 55 items for the emotional disturbance portion (Carmody & Crossman, 2011).

The first experiment concluded that there was a significant difference between the cognitive and emotional scores in the honest condition and the malingered condition, with the honest scores being higher for the cognitive scoring and lower for the emotional disturbance scoring. However, there were concerns about the motivational level of the students, since many did not use the full five minutes for the drawings. This was one of the concerns they intended to address in the second experiment (Carmody & Crossman, 2011).

Two groups were used in Experiment 2: 66 undergraduate students and 40 high school students. The procedure was the same as the first experiment, although this time the college students had to complete a debriefing form to assess their understanding of the research and their role. Further, the high school students had to sign consent forms, along with their parents and the school administrators. Lastly, the college and high school students were asked to draw for the entire 5 minutes allotted to the drawings. Again, they were scored on the same measures as used in the first experiment (Carmody & Crossman, 2011).

The researchers concluded that participants were able to malinger distress on the DAP, but only while decreasing their cognitive scores in the process. In both studies, when participants tried to malinger distress, they drew figures that were "more primitive than they are capable of drawing" (Carmody & Crossman, 2011, p. 6). The researchers indicated that in the future, using the DAP while also using a cognitive measure could help identify if a) the cognitive scores align between the DAP and the other measure, so if not, b) the lower cognitive score on the DAP with an elevated emotional disturbance score could be a sign of malingering distress.

The research remains unsettled in the detection of malingering/suboptimal performance on the RCFT; some have found it to be useful in detecting malingering (e.g., Bernard, Houston & Natoli, 1993, Meyers & Volbrecht, 2003; Gallagher & Burke, 2007; Reedy et al., 2013) even with more sophisticated populations, such as college students in the field of psychology (Meyers & Volbrecht, 1999). However, others have found that scoring cutoffs need improvement (Blaskewitz, Merten & Brockhaus, 2009; Bernard, Houston & Natoli, 1993). Gorp et al. (1999) found it was not even useful to detect malingering when used in tandem with other commonly administered neuropsychological assessments, however, there were very few subjects and many variables included in the analysis, making the results very preliminary.

The Bender-Gestalt has been found to detect malingering of brain injury (Bruhn & Reed, 1975), psychosis and intellectual disability (Schretlen & Arkowitz, 1990). Schretlen, Wailkins, Van Gorp and Bobholtz (1992) expanded on Schretlen and Arkowitz's (1990) initial work to validate using the MMPI and Bender Gestalt, along with a malingering measure created for the studies, to detect faked psychosis or intellectual disability. In the first experiment, 40 men incarcerated in a medium-security prison and 20 men hospitalized in a general psychiatric ward were assessed in the study. They were each given a battery of assessments or had prior assessments reviewed/rescored for the current study. The assessments included the Bender-Gestalt, the MMPI and a measure of malingering (Schretlen, Wilkins, Gorp, & Bobholtz, 1992).

Six markers of malingering have been identified on the Bender Gestalt and were used in the study with some changes to increase interrater reliability, originally operationalized by Bash and Alpert (1980). These markers included:

(a) Inhibited figure size, each figure that could be completely covered by a 3.2 cm square was scored + 1;

(b) *changed position*, each easily recognized figure whose position was rotated greater than 45 degrees was scored + 1;

(c) *distorted relationship,* each easily recognized figure with correctly drawn parts that were misplaced in relationship to one another was scored + 1;

(d) *complex additions,* each easily recognized figure that contained addition complex or bizarre details was scored + 1;

(e) *gross simplification,* each figure that showed a developmental level of 6 years or less was scored + 1;

> (f) *inconsistent form quality*, each *protocol* that contained at least one drawing with a developmental level of 6 years or less and at least one drawing with a developmental level of 9 years or more was scored +1. (Schretlen, et al., 1992, p. 78).

The first five scores were summed to create a faking composite index.

Another assessment included a Malingering Scale (MgS), created for their research. The items were arranged into four subtests: Vocabulary, Abstraction, Information, and Arithmetic. This assessment was found to successfully differentiate feigned intellectual disability from moderate intellectual disability in prison inmates, and differentiated psychiatric patients from prison inmates faking psychosis (Schretlen et al., 1992).

In the first assessment, the researchers conducted a discriminant analysis that identified eight predictor variables, including the four Malingering Scale subsets, MMPI *F* raw and *F-K* difference scores, the Bender-Gestalt faking composite index and the final Bender score that included the inconsistent form quality scores. Then, using a method of variable selection, they found that optimal classification was obtained with MMPI *F-K* difference scores, the MgS Vocabulary subtest and the Bender-Gestalt faking composite index. Overall, 80% of the fakers were correctly identified with no false positives (Schretlen et al., 1992).

In a second experiment, the researchers sought to cross-validate their initial results. The sample included 22 veterans in a substance abuse unit that were given incentive to fake pathology and 20 primarily hospitalized individuals diagnosed with schizophrenia who were given standard instructions. The testing procedures and instructions were the same as the first experiment (Schretlen et al., 1992).

Overall, the individuals faking performed more deviantly than the inpatient participants on all indexes of faking. One participant who was faking was identified as honest, generating a hit rate of 97.6% with the same discriminant function as used in the previous study. Between the two studies, no false positive errors were committed and 80% or more of fakers were identified. These results are especially helpful considering they chose to use individuals that were identified as “at-risk” for malingering as participants in their sample (Schretlen et al., 1992). Lastly, regarding the WMS scales, Visual Reproduction I and II have been found to be unreliable as a measure of malingering (Gorp et al., 1999).

Research Questions and Hypotheses

The literature shows there is a great need for a measure to specifically detect ADHD malingering, which this research seeks to do. This research is exploratory in nature; the goal of the research is to quantify differences in the drawings of those done by controls and those asked to feign ADHD. More precisely, the research will explore any quantifiable differences in the drawings distinguish between someone feigning ADHD from someone who is not. According to Bauer and Mccaffrey, (2006), the validity and security of SVTs are threatened based on the amount of information that is available through Google searches and coaching. Therefore, it is imperative to continue finding new ways to assess feigned performance. The following hypotheses will be defined more operationally in the data analysis.

1) Based on the work of Bash and Alpert (1980), Schretlen and Arkowitz (1990) and Schretlen et al. (1992), it is hypothesized that drawings made by those feigning ADHD will contain less detail than those of honest responders. Details of HTP, according to Buck (1948), are identified elements drawn within the context of each drawing that speak to a specific part of a person's personality, tending to make the drawings more complete and complex. One example of a detail would be a knothole drawn onto the tree trunk in a HTP drawing. Another example would be curtains pulled back on the inside of a house window, which would actually be two details, with the curtains counting as a separate detail within the window. Each detail will be tallied within the drawing to create a total detail score for each image. Only details that pertain to one specific drawing will be used in this checklist (i.e., drawing size is a detail and measure of personality according to Buck (1948), however, since it pertains to all drawings, it will not be used as a counted detail). Further, no singular element will be used as a marker of feigned performance; according to Riethmiller and Handler (1997) one way to keep HFDs more valid is to use a global approach, such as tallying the

presence of specific details, so to assess this hypothesis, only a tallied score of all specific drawing details will be used.

2) Also based on the work of Bash and Alpert (1980), Schretlen and Arkowitz (1990) and Schretlen et al. (1992) it is hypothesized drawings made by those feigning ADHD will be smaller than those of the honestly responding group. The HTP drawings will be measured for a calculation of the overall drawing size by measuring length x width from the furthest point of each side (i.e. farthest mark on top to farthest mark on bottom x farther mark on left to farthest mark on right). It is proposed that the overall mean of the malinger group drawings will be smaller than those in the control. Further, also based on the work of Bash and Alpert (1980), it is believed there will be more variability in the sizes of drawings from one drawing to the next (e.g., the house drawing will be small, then a large tree and then a different sized person drawing).
3) There will be significant differences in pressure by those feigning ADHD than the honest responders. The application that will be used for several calculations of HTP drawings will measure the amount of pressure applied to the iPad from the iPad Pencil for each drawing. The mean pressure score for those feigning ADHD will be significantly different from those in the control group. Children with ADHD have been found to use more pressure while producing HFDs, resulting in thick, heavy lines (Saneei et al., 2011), however, there is not any research regarding how someone faking ADHD will emphasize the lines of their drawing.
4) There will be more open junctions in the drawings of those feigning ADHD than the honest responders. Open junctions are defined as any intersection of two lines that are meant to connect to complete an image. For example, when the roofline of the house meets the side of the house, an open junction would suggest the roof is not touching the side of the house, which would make it appear incomplete. Any space where two items should meet will be defined as unclosed when the space is more than 1/16 of an inch from one line to the next.

“Closure difficulty” has been described for the Bender-Gestalt as lines that fail to meet at the vertex or lines that overlap at the vertex (Moses, 2013) and closure difficulties have been found among different personality styles (Homs, Dungan & Medlin, 1984) but to date, there is no research on the use of open junctions or closure difficulty as a measure of feigned performance.

5) It is hypothesized that those feigning ADHD will finish their drawings more quickly than those honestly responding. Haghighi, Khaterizadeh, Chalbianloo, Toobaei, and Ghanizadeh (2014) found significant differences in the completion time of ADHD drawings between ADHD children and normal children. It is believed that those feigning ADHD will perceive those with ADHD to be too hyperactive to remain focused on the task at hand and therefore will finish quicker. The application used to measure different features of the drawing will create two timed scores. It will begin timing each individual drawing from the first time the pencil touches the blank “paper” screen to a) the time the final mark is made and b) the time the “finished” button is pressed. This will create an active time score and a completion time score. It is hypothesized that the mean of the active time scores for all three drawings and the completion time scores for all three drawings will be lower than those of the controls.
6) Participants who fake ADHD will produce different MCMI-IV profiles than those responding honestly. (i.e., can the MCMI-IV, a popular test of clinical personality variables, be used to discriminate between those feigning ADHD and normal responders?) the MCMI creates several different personality profiles and is hypothesized that there will be key elevations that are similar among those feigning ADHD. According to Musso, Hill, Barker, Pella, and Gouvier (2016), the PAI was very susceptible to ADHD malingering, however, with alternative cutoff scores, the validity indices could improve detection of ADHD malingering. The researchers of the current study hope to find similar results with the MCMI-IV, as it is a newer assessment. Prior research on the MCMI-III (Millon, Millon & Davis, 1997) has shown that modifying indices have been fairly effective in detecting inconsistent response

biases, over-reporting and underreporting response styles of respondents who have been asked to feign performance on the test (Bagby & Marshall, 2005). Also, the Disclosure (DIS) and Debasement (DEB) scales have been found to be potentially useful in detecting feigned PTSD on the MCMI-II (Lees-Haley, 1992). In opposition, Schoenberg, Dorr, and Morgan (2003) found the MCMI-III had very low PPP for the modifying indices, indicating it is minimally sensitive to malingering. The authors suggest a DIS scale base rate cut-off of 89, but caution that a score above this would only suggest the presence of untruthful responding. They emphasize that alternate testing is needed to confirm a pattern of untruthful responding. However, no research could be found regarding the use of the MCMI in detecting feigned ADHD.

7) This research will determine if the TOMM and the FIT can discriminate between honest responders and those faking ADHD. Symptom Validity Tests often use a cut-off score that separates passing scores from failing scores. When one fails, it is said that they are likely faking bad based on the unlikelihood that anyone could perform so poorly (e.g. less than chance, or below scores achieved by significantly impaired respondents). The TOMM will use a method derived from Sollman, Ranseen, and Berry (2010), which uses only the first trial of the TOMM, and scores it using trial 2 criteria ($\leq$45 correct). The FIT will be scored by the standard guidelines (Strauss et al., 2006).

CHAPTER II

METHODS

Participants

Forty-six students from the University of North Dakota (UND) and Lake Region State College (LRSC) participated in the study, however, two were discontinued due to exclusion criteria of prior diagnoses of ADHD, resulting in forty-four participants being included in the data set. The participants were each entered into two drawings for a gift card, and the University of North Dakota students received course credit for their participation. Participants ranged in age from 18 to 45 with a mean age of 21.2. Thirty women and 14 men completed the study. In regard to ethnicity, the sample was primarily Caucasian (N=31, 70.5%), followed by Hispanic (N=4, 9.1%), Asian (N=3, 6.8%), Native American (N=2, 4.5%), Middle Eastern (N=2, 4.5%), and Multicultural (N=2, 4.5%). In regard to ethnicity, the sample was generally representative of the undergraduate population at UND (Office of Institutional Research, 2017) and LRSC (Institutional Data, 2017).

Materials

Structured Clinical Interview. A structured clinical interview was developed and administered to participants to obtain demographic information and screen for ADHD. The interview included questions about age, prior diagnoses of ADHD, and interest in drawing.

Feedback Questionnaire. The Feedback Questionnaire (Booksh, Pella, Signh & Gouvier, 2010) asked participants to summarize the instructions given to them during the experimental phase, rate on a 10-point Likert-scale from 0 (low) to 10 (high) compliance with the instructions and also how well they think they succeeded in completing the task under the specific parameters (i.e., honestly responding if asked to do so or feigning ADHD if asked to do so) during the experimental phase.

Millon Clinical Multiaxial Inventory, Fourth Edition (MCMI-IV). The MCMI-IV is a self-report questionnaire that takes 25-30 minutes to complete. The MCMI-IV assesses personality characteristics that may be helpful in the diagnosis and treatment of mental disorders. Previous versions of the MCMI were closely aligned with previous DSM personality disorder diagnoses, and many within the current version overlap with the current DSM-5 criteria for various personality disorders. Further, it is guided by both research and theory, based on Millon's theory of personality conceptualization (Millon, Grossman & Millon, 2015).

Measure of ADHD Symptoms

Barkley's Quick-Check for Adult ADHD Diagnosis. This Barkley scale is an interview-style questionnaire that screens for ADHD symptoms by asking about current symptomology (Barkley & Murphy, 2006). The participant is asked if they often behave in a given manner, and if so, the interviewer checks the "yes" box. The checked boxes are tallied to give an overall score. If they have more than six of the nine current symptoms listed, then they are more likely to need a full evaluation for ADHD symptoms.

Effort Tests

Rey 15-Item Memorization Task (FIT). The FIT measures memory effort through a non-forced choice recognition task. The participant is shown five rows of three related items (e.g., A B C) and then asked to draw the items from memory (Lezak, 1995).

Test of Memory Malingering (TOMM). The TOMM measures test-taking effort using a simple recognition paradigm. Participants are shown 50 visual stimuli, one at a time, and then asked to recall them in a forced-choice recognition task (Tombaugh, 1996). A second trial is given of the same images, in a different order, and then again, individuals are asked to recall them in a forced-choice recognition task. However, for the current research, only the first trial was used.

House-Tree-Person-Modified (H-T-P-M). The H-T-P assessment is traditionally a qualitative test used to assess unconscious thoughts, strivings, needs, etc. (Buck, 1948). However, for this research, the test was given in a standardized fashion to quantify differences in drawings. The H-T-P-M requires the participant to draw a house, a tree and person in this order on separate screens of the iPad application. There are no additional instructions or restrictions for these drawings.

House-Tree-Person Checklist. As discussed previously, a list of individual details found in drawings, derived from Buck (1948) and Naglieri (1988), was used to identify the details found in each drawing. These items were scored simply for presence (score of 1) or absence (score of 0) of each detail item.

Technology

A first-generation iPad Pro with 12.9" screen and a first-generation iPencil were used to administer the tablet-based application of the H-T-P-M. The device was password protected, and participant data was saved using their participant number with no other identifying information. An Urban Armor featherlight, military drop-tested hard case was used to protect the tablet, as was a .2-inch-thick Tech Armor ballistic glass screen protector with touch sensitivity. The application was proven to work seamlessly with the glass screen protector, as was the iPencil. The H-T-P-M application itself was designed in collaboration with and created by an outside programmer. The H-T-P-M was the only measure used on the iPad.

The H-T-P-M was administered by the principal investigator or the research assistant. While in administration mode, the "blank page" feature of each drawing locked the screen so it would not auto-rotate, as it also hid the taskbar, clock, and any other features normally shown on a tablet screen. To access the menu to change to the next page or end the test, the tablet screen must be tapped twice with nothing else touching it (i.e., another part of the hand or iPencil). Then the administrator could change “pages” and begin the next drawing administration. Each page was saved within the application by the administrator before moving to the next page.

The application auto calculated black-to-white ratio per image and average of black-to-white ratio among each individual’s three images, erasures per image and average of erasures among each individual’s three images, and line pressure of the iPencil on the screen per image and the line pressure average among each individual’s three images. The application was intended to measure the active time of the iPencil on the screen and total time for each image, but that function proved to be inaccurate and therefore unusable for the current research. The detail variable was measured by the principle investigator; for each image, the details within the details list were tallied to create a total score per image, and then the three scores were summed for a total detail score. Image size was manually measured by the principle investigator with a ruler, measuring length x width of each image, from the furthest point of each side (i.e farthest mark on top to farthest mark on bottom x farther mark on left to farthest mark on right). The variability of image sizes was calculated by subtracting each participant’s largest image size from their smallest image size, creating a drawing size variability score for each individual. Lastly, the open junctions were manually identified by the principle investigator by measuring potential open junctions with a ruler, identifying any unmet lines with a gap larger than 1/16 of an inch as an open junction, and then tallying the number of open junctions per image and per set of images. The application includes a function that is used to place a small circle around the identified unclosed junctions, making it easier to total the number of unclosed junctions in each image.

Prior to working with participants, one research assistant was trained to use the tablet and relevant software, as well as to administer all remaining assessments. The research assistant was trained to identify cut-off criteria within the assessment, as outlined in the clinical interview. All data were scored by the principal investigator.

Procedure

The study commenced after approval from the University of North Dakota Institutional Review Board (approval number IRB-201709-051) and the Lake Region State College Institutional Review Board. Participants were recruited through flyers, word of mouth, and specifically for UND students, through the SONA research system. After giving informed consent, each participant was screened for ADHD. The screening included a structured clinical interview and the Barkley Quick Check for Adult ADHD Diagnosis to screen for current inattention/hyperactivity symptoms. Once screened and found not to meet screening criteria for possible ADHD, they were randomly assigned into one of two groups; ADHD simulators and controls. They were given one of the two following scripts to inform their performance for the duration of the testing.

The control condition received the following script adapted from Booksh (2005):

> As a student of UND, you pride yourself on putting forth effort in your classes and gaining knowledge. To ensure you are maximizing your potential in school, you decide to professionally assess your cognitive strengths and weaknesses to help aid in your study plans, course load, etc. To complete the assessment, you will be taking a battery of neuropsychological tests. Some of the tests contain validity measures of effort and honesty that indicate whether you are putting forth good effort. It is important that you apply maximum effort and attention while taking the tests and perform to the best of your ability.
>
> Measures of effort are included, so only participants with passing scores will be entered in a drawing for a $25 gift certificate.
>
> You will now get ten minutes to relax, check your phone, search the internet on the iPad, etc. and then testing will begin.

According to An, Zakzanis and Joordens (2012) when given three measures of effort (SVTs), over 55% of non-clinical, healthy college undergraduates failed at least one SVT in the first session and over 30% failed an SVT during the second session, suggesting the base rate of suboptimal performance among healthy college students is high. However, research since that time have indicated much lower base rates in healthy undergraduate students, ranging from 2.6% to 12% (Ross, Poston, Rein, Salvatore, Wlls & York, 2016); nevertheless, the script includes information about effort assessment to help ensure adequate effort on the assessment measures.

Participants in the feign ADHD condition received the following script, adapted from Booksh (2005):

> Imagine that you have significant problems with inattention, impulsivity, and/or hyperactivity that are interfering with your academic performance. You believe that if you are diagnosed with ADHD you may be given some academic accommodations, such as extended time for tests, or medication, such as Ritalin, that will improve your grades. Your job in this experiment is to successfully convince the experimenter that you have ADHD, so you want to perform on these tests as if you actually have ADHD. Some of the tests you will take contain validity measures of effort and honesty that indicate whether you are putting forth good effort. You want to convince the experimenter you have ADHD.
>
> Participants that successfully simulate ADHD and have acceptable validity scores will be entered in a drawing for a $25 gift certificate.
>
> You will now get ten minutes to research ADHD via the internet if you think it will improve your performance and ability to fool us.

Although Bury and Bagby (2002) indicate that allowing patients access to information regarding a disorder does not enhance their malingering skills, several other authors purport that many can malinger the symptoms of ADHD, often without detection (Harrison, Edwards, & Parker, 2007; Jachimowicz & Geiselman, 2004; Quinn, 2003; Sollman, Ranseen, & Berry, 2010; Young & Gross, 2011). Therefore, the participants were given the opportunity to access information regarding the symptoms of ADHD since it is likely that someone trying to fake a disorder would have done research to improve their odds of faking.

Participants in each group completed the FIT, TOMM, H-T-P-M and MCMI-IV in random order. When asked to complete the three HTP drawings on the IPad Pro, the abilities of the app were demonstrated to the participant (e.g., erasing function, line pressure, ability to rest hand on the screen without marking or erasing the screen) and they were given time before the test started to use the app and become comfortable with the drawing and erasing features. There were no time limits to the drawings and no further instructions or prompts were given to them during the drawings. They were then given the feedback questionnaire and debriefed regarding the purpose of the study.

CHAPTER III

RESULTS

To assess each of the hypotheses, a series of independent samples t-test were utilized, analyzed on SPSS version 25. An independent samples t-test is used to detect significant differences between the means of two separate variables, but to utilize the test, there are a set of assumptions that must be met. For example, the variables being measured must be independent, with both samples existing in the same population and generally representative of the total population (Maverick, 2018). Ideally, the variables should have equal variances, however, the t-test also conducts an F test to assess for unequal variances and adjusts for that change. A t-test concurrently assesses the data with equal variance assumed and with equal variance not assumed, providing a t-test, the significance of the t-test and the corresponding degrees of freedom for each. Lastly, to control for familywise error rate, only variables at the alpha level of .01 or below will be considered as significant.

House-Tree-Person-Modified

Several hypotheses were made regarding elements of H-T-P-M drawings, including differences in the amount of details drawn, the average size of the drawings, the variation within the drawing sizes of one responder, the amount of time taken to complete the drawings, average line pressure, and the total amount of unclosed junctions within the drawing. The amount of time spent on the drawings could not be measured due to a technical error within the iPad application. The total amount of detail was the only significant variable (t (42) = 2.72, p <.01). Those honestly responding created significantly more details (*M:*28.91, *SD:*10.16) than those feigning ADHD (*M:*21.95, *SD:*6.16). Refer to Table 2 for all H-T-P-M variables and coordinating t scores.

Table 2

Mean (and Standard Deviation) of H-T-P-M Variable Raw Scores Among Honest Responders and ADHD Feigners

Drawing Variables	Honest Responders	ADHD Feigners	t	Sig.
Total amount of details	28.91 (10.16)	21.95 (06.14)	2.72⁺	.009**
Average Size of Drawing	26.98 (16.60)	23.58 (14.69)	.72	.478
Drawing Size Variation	21.26 (17.36)	21.49 (15.79)	.05	.963
Average Line Pressure	03.30 (01.38)	03.67 (01.35)	.89	.379
Percent of Black Space	01.35 (01.49)	01.00 (01.44)	.81	.424
Erasures	08.00 (23.24)	02.52 (05.72)	1.05	.300
Unclosed Junctions	01.87 (02.74)	03.67 (03.79)	1.82	.076

Note. df for all variables = 42
**significant at .01 level
⁺Equal Variances Not Assumed

Table 3

Mean (and Standard Deviation) of Symptom Validity Tests Scores Among Honest Responders and ADHD Feigners

Test	Honest Responders	ADHD Feigners	t	Sig.
FIT	15.00 (00.00)	11.81 (12.96)	3.78⁺	.001**
TOMM	47.91 (05.45)	33.81 (09.42)	6.68⁺	.001**

Note. df for all variables = 42
**significant at .01 level
⁺Equal Variances Not Assumed

Symptom Validity Tests

The current research sought to determine if the TOMM and the FIT could accurately identify individuals feigning ADHD. In order to examine differences in TOMM scores between the honestly-responding and malingering groups, an independent samples t-test was conducted. The results of the SVT variables are presented in Table 3. Given a violation of Levene's test for homogeneity of variances, (F (1,42) = 12.34, p = <.05), a t-test not assuming homogeneous variances was calculated. The results of this test indicated that there was a significant difference in TOMM scores observed between the two groups (t (22.24) = 6.68, p = <.01). Those feigning ADHD performed scored significantly lower (*M:*33.81, *SD:*9.42) than those honestly responding (*M:*47.91, *SD:*5.45).

An independent samples t-test was also conducted to analyze the differences between the two groups on the FIT test scores. Given a violation of Levene's test for homogeneity of variances, (F (1,42) = 44.85, p <.05), a t-test not assuming homogeneous variances was calculated. There was a statistically significant difference in FIT scores between the honest responders and those feigning ADHD (t (20.00) = 3.78, p <.01). Again, those feigning ADHD produced significantly lower scores (*M:*11.81, *SD:*12.96) than those honestly responding (*M:*15, *SD:*0).

Millon Clinical Multiaxial Inventory, Fourth Edition

It was hypothesized that individuals feigning ADHD would produce significantly different profiles on the MCMI-IV than those honestly responding. Results from the series of t-tests indicate that all but three scores from the MCMI-IV were significantly different at alpha level of .01. The results of the MCMI-IV t-tests are presented in Tables 4, 5, 6, and 7.

Among the Validity Scales, the first variable examined was the Invalidity Scale; given a violation of Levene's test for homogeneity of variances, (F (1,42) = 67.04, p <.05), a t-test not assuming homogeneous variances was calculated. The results of this test indicated that there was a significant difference in Invalidity scores observed between the two groups (t (20.00) = -2.91, p = .01). Those honestly responding scored lower (*M:*0, *SD:*0) than those feigning ADHD (*M*.47, *SD*.75). The mean differences between honest responders and participants feigning ADHD were significant on the

Disclosure score (t (42) = 4.95, p <.01, indicating that those feigning ADHD performed significantly higher (*M:*78, *SD:*18.22) than those honestly responding (*M:*49.04, *SD:*20.42). The mean differences in the Desirability score were analyzed using a t-test not assuming homogeneous variances as Levene's test for homogeneity of variances was violated (F (1,42) = 7.26, p =.01). There was a significant difference in the mean scores among the two groups within the Desirability scores (t (31.81) = 3.05, p <.01), indicating that those honestly responding scored significantly higher (*M:*69.70, *SD:*31.81) than those feigning ADHD (*M:*50.71, *SD:*24.87). Lastly, there was a significant difference in the Debasement score means (t (42) = 4.04, p <.01); those honestly responding scored significantly lower (*M:*38.43, *SD:*24.19) than those feigning ADHD (*M:*67.76, *SD:*23.9).

There were several significant variables among the Clinical Personality Patterns and the Severe Personality Pathology Scales. The Schizoid scale scores were significantly different among the two groups (t (42) = 3.12, <.01). Those honestly responding scored significantly lower (*M:*36.87, *SD:*27.35) than those feigning ADHD (*M:*61.29, *SD:*24.26). The Avoidant scale scores were significantly different among the feigners and honest responders (t (42) = 2.69, p =.01); the honest responders scored significantly lower (*M:*44.91, *SD:*32.77) than the feigning group (*M:*70.43, *SD:*29.9). The Melancholic scale produced significantly different scores among the two groups (t (42) = 2.79, p <.01) with the honest responders scoring significantly lower (*M:*38.78, *SD:*29.73) than those feigning ADHD (*M:*64.24, *SD:*30.81). Scores on the Dependent scale were significantly different between honest responders and ADHD feigners (t (42) = 2.68, p = .01); those feigning ADHD scored significantly higher (*M:*71.62, *SD:*23.89) than those honestly responding (*M:*52, *SD:*24.54). Given a violation of Levene's test for homogeneity of variances, (F (1, 42) = 4.59, p <.05), a t-test not assuming homogeneous variances was calculated for the Narcissistic scale scores. The results of this test indicated that there was a significant difference in the Narcissistic scores observed between those feigning and those honestly responding (t (41.04) = 5.31,

p <.01). Those honestly responding scored lower (*M:*39.74, *SD:*26.98) than individuals feigning ADHD

Table 4

Mean (and Standard Deviation) of MCMI-IV Validity Index Base Rate Scores Among Honest Responders and ADHD Feigners

Validity Indices	Honest Responders	ADHD Feigners	t	Sig.
Invalidity (V)	00.00 (00.00)	00.47 (00.75)	2.91^{+}	.009**
Inconsistency (W)	01.65 (01.27)	02.71 (01.82)	2.26	.029
Disclosure (X)	49.04 (20.42)	78.00 (18.22)	4.95	.000**
Desirability (Y)	69.70 (14.67)	50.71 (24.87)	3.05^{+}	.005**
Debasement (Z)	38.43 (24.19)	67.76 (23.90)	4.04	.000**

Note. df for all variables = 42
**significant at .01 level
$^{+}$Equal Variances Not Assumed

Table 5

Mean (and Standard Deviation) of MCMI-IV Clinical Personality Patterns and Severe Personality Pathology Index Base Rate Scores Among Honest Responders and ADHD Feigners

Clinical Personality Patterns	Honest Responders	ADHD Feigners	T	Sig.
Schizoid (1)	36.87 (27.35)	61.29 (24.26)	3.12	.003**
Avoidant (2A)	44.91 (32.77)	70.43 (29.91)	2.69	.010**
Melancholic (2B)	38.78 (29.73)	64.24 (30.81)	2.79	.008**
Dependent (3)	52.00 (24.54)	71.62 (23.89)	2.68	.010**
Histrionic (4A)	59.09 (21.21)	57.95 (27.84)	.15	.879
Turbulent (4B)	60.96 (20.35)	56.05 (26.24)	.70	.490
Narcissistic (5)	39.74 (26.98)	78.29 (21.04)	5.31^{+}	.000**
Antisocial (6A)	41.48 (29.44)	79.96 (35.45)	3.93	.000**
Sadistic (6B)	32.26 (27.88)	81.33 (29.66)	5.66	.000**
Compulsive (7)	59.70 (19.03)	29.57 (23.34)	4.71	.000**
Negativistic (8A)	32.00 (27.99)	75.52 (32.01)	4.81	.000**
Masochistic (8B)	36.96 (31.17)	69.48 (28.41)	3.61	.001**
Severe Personality Pathology Scales				
Schizotypal (S)	37.61 (26.92)	73.62 (26.82)	4.44	.000**
Borderline (C)	27.91 (30.97)	68.29 (31.85)	4.26	.000**
Paranoid (P)	40.39 (27.15)	71.19 (27.33)	3.75	.001**

Note. df for all variables = 42

**significant at .01 level

$^{+}$Equal Variances Not Assumed

(*M:*78.29, *SD:*21.04). The Antisocial scale mean scores were significantly different among the two groups (t (42) = 3.93, p <.01). The honestly responding group scored lower (*M:*41.48, *SD:*29.43) than those feigning ADHD (*M:*79.95, *SD:*35.45). The Sadistic scale produced significantly different scores among the two groups (t (42) = 5.66, p <.01). The feigning ADHD group scored significantly higher (*M:*81.33, *SD:*29.66) than the honest responding group (*M:*32.26, *SD:*27.88). On the Compulsive scale, the two groups' means scores were significantly different (t (42) = 4.71, p <.01); those honestly responding scored significantly higher (*M:*59.7, *SD:*19.03) than those feigning ADHD (*M:*29.57, *SD:*23.34). There was a significant difference in the Negativistic scale scores (t (42) = 4.81, p <.01) with those honestly responding scoring lower (*M:*32, *SD:*27.99) than those feigning ADHD (*M:*75.52, *SD:*32.01). The Masochistic scale was significantly different among the two groups (t (42) = 3.61, p <.01). Those in the feigning ADHD group scored significantly higher (*M:*69.48, *SD:*28.41) than those in the honestly responding group (*M:*36.96, *SD:*31.17).

On the Schizotypal scale, the first of the Severe Pathology scales, the honest responders and ADHD feigners performed significantly different (t (42) = 4.44, p <.01). Those honestly responding performed significantly lower (*M:*37.61, *SD:*26.92) than those feigning ADHD (*M:*73.62, *SD:*26.82). Scores on the Borderline scale were significantly different for the two groups (t (42) = 4.26, p <.01); those honestly responding scored significantly lower (*M:*27.91, *SD:*30.97) than those feigning ADHD (*M:*68.29, *SD:*31.85). Lastly, the honest responders performed significantly different than those feigning ADHD on the Paranoid scale scores (t (42) = 3.75, p <.01), with those feigning ADHD performing significantly higher (*M:*71.19, *SD:*27.33) than those honestly responding (*M:*40.39, *SD:*27.15).

Each of the Clinical Syndrome and Severe Clinical Syndrome scales from the MCMI-IV yielded significant group-wise differences. Given a violation of Levene's test for homogeneity of variances, (F (1, 42) = 7.06, p <.05), a t-test not assuming homogeneous variances was calculated for the General Anxiety scale. The results of this test indicated that there was a significant difference in the Generalized Anxiety scores observed between those feigning and those honestly responding (t (41.12) = 5.27, p <.01). Those honestly responding scored lower (*M:*37.74, *SD:*33.82) than those feigning ADHD (*M:*85.9, *SD:*26.56).

Table 6

Mean (and Standard Deviation) of MCMI-IV Clinical Syndrome Scales and Severe Clinical Syndromes Base Rate Scores Among Honest Responders and ADHD Feigners

Clinical Syndrome Scales	Honest Responders	ADHD Feigners	T	Sig.
Generalized Anxiety (A)	37.74 (33.82)	85.90 (26.56)	5.28^{+}	.000**
Somatic Symptom (H)	22.30 (25.32)	58.90 (28.58)	4.50	.000**
Bipolar Spectrum (N)	49.48 (27.99)	91.10 (24.16)	5.26	.000**
Persistent Depression (D)	27.91 (29.95)	62.48 (31.90)	3.71	.001**
Alcohol Use (B)	34.04 (33.94)	74.10 (34.56)	3.88	.000**
Drug Use (T)	36.83 (33.41)	66.67 (30.94)	3.08^{+}	.004**
Post-Traumatic Stress (R)	22.74 (29.19)	68.00 (23.89)	5.60	.000**
Severe Clinical Syndromes				
Schizophrenic Spectrum (SS)	27.91 (24.73)	68.24 (24.72)	5.40	.000**
Major Depression (CC)	24.30 (29.89)	66.24 (32.69)	4.45	.000**
Delusional (PP)	40.43 (30.33)	74.19 (11.44)	4.97^{+}	.000**

Note. df for all variables = 42
**significant at .01 level
$^{+}$Equal Variances Not Assumed

Table 7

Mean (and Standard Deviation) of MCMI-IV Noteworthy Responses Raw Scores Among Honest Responders and ADHD Feigners

Noteworthy Responses	Honest Responders	ADHD Feigners	t	Sig.
Adult ADHD (AD)	01.74 (01.66)	04.57 (01.94)	5.22	.000**
Autism Spectrum (AS)	01.65 (01.30)	04.86 (02.06)	6.24	.000**

Note. df for all variables = 42
**significant at .01 level
$^{+}$Equal Variances Not Assumed

There was a significant difference in mean scores of those feigning ADHD and those honestly responding on the Somatic Symptom scale (t (42) = 4.5, p <.01). The honest responding group performed significantly lower (*M:*22.3, *SD:*25.32) than the feigned ADHD group (*M:*58.9, *SD:*28.58). On the Bipolar Spectrum scale, there was a significant difference between the two groups' mean scores (t (42) = 5.26, p <.01); the honest responders scored significantly lower (*M:*49.48, *SD:*27.99) than those feigning ADHD (*M:*91.1, *SD:*24.16). There was a significant difference in mean scores of the two groups on the Persistent Depression scale (t (42) = 3.71, p <.01), with those feigning ADHD scoring higher (*M:*62.48, *SD:*31.9) than those honestly responding (*M:*27.91, *SD:*29.95). The two groups scored significantly differently on the Alcohol Use scale (t (42) = 3.88, p <.01), with those honestly responding scoring lower (*M:*34.04, *SD:*33.94) than those feigning ADHD ((*M:*74.1, *SD:*34.56). Given a violation of Levene's test for homogeneity of variances, (F (1, 42) = 5.54, p <.05), a t-test not assuming homogeneous variances was calculated for the Drug Use scale. The results of this test indicated that there was a significant difference in the mean Drug Use scores observed between those feigning and those honestly responding (t (41.99) = 3.08, p <.01). Those honestly responding scored lower (*M:*36.83, *SD:*33.41) than those feigning ADHD (*M:*66.67, *SD:*30.94). The difference in scores on the Post-Traumatic Stress scale between those honestly responding and those feigning ADHD was significant (t (42) = 5.6, p <.01); those honestly responding scored significantly lower (*M:*22.74, *SD:*29.19) than those feigning ADHD (*M:*68, *SD:*23.89).

On the first of the Severe Clinical Syndromes, the honest responders and ADHD feigners scored significantly different on the Schizophrenic Spectrum scale (t (42) = 5.40, p <.01). Those honestly responding scored lower (*M:*27.91, *SD:*24.73) than those feigning ADHD (*M:*66.24, *SD:*24.72). There was a significant difference in the scores produced by each group on the Major Depression scale (t (42) = 4.45, p <.01). Those honestly responding produced scores lower (*M:*24.3, *SD:*29.89) than those feigning ADHD (*M:*66.24, *SD:*32.69). Lastly, given a violation of Levene's test for homogeneity of variances, (F (1, 42) = 56.90, p <.05), a t-test not assuming homogeneous variances was calculated for the Delusional scale. The results of this test indicated that there was a significant difference in the Delusional scale scores observed between those feigning and those honestly responding (t (28.63) = 4.97, p <.01). Those honestly responding scored lower (*M:*40.43, *SD:*30.33) than those feigning ADHD (*M:*74.19, *SD:*11.44).

Two noteworthy responses were analyzed due to their direct connection to the symptoms of, or associated with, ADHD. The first scale, the Adult ADHD scale, was found to produce significantly different scores between the two groups (t (42) = 5.22, <.01). The honestly responding group scored lower (*M:*1.74, *SD:*1.66) than the feigning ADHD group (*M:*4.57, *SD:*1.94). Second, the Autism Spectrum scale score difference was also statistically significant (t (42) = 6.24, p <.01); again the honest responding group scored lower (*M:*1.85, *SD:*1.3) than the feigned ADHD group (*M:*4.86, *SD:*2.06).

ROC Analyses

For each significant t-test with minimum significance at .01, a corresponding Receiving Operator Characteristic (ROC) Curve was plotted. Receiving Operator Characteristic Curves come from Signal Detection Theory and are useful for evaluating, graphically and quantitatively, a test's ability to discriminate between those with a target trait from those without, or in the current research, those malingering from those who are not (McFall & Treat, 1999). In SPSS, ROC curves plot sensitivity ("hit rate") versus 1-specificity ("false alarm" rate) for every possible cut score (i.e., every possible test score), and produce a table displaying the sensitivity and specificity of each possible cut score. An Area Under the Curve (AUC) statistic is generated, representing the percentage of the total possible area under a curve with the perfect prediction that falls under the ROC curve generated by the current test. The ROC graph includes a diagonal reference line (AUC = .50), representing chance discrimination. Only ROC Curves of variables having significance identified with the t-tests were plotted in the results. Again, to control for familywise error rate, data will be analyzed at the alpha level of .01. To see the graphical representation of each ROC curve and the coordinates of the curve, please refer to Appendix B.

The ROC Curve for the total amount of detail drawn variable was not significant (AUC = .711, p >.01), indicating that the total amount of details produced in the drawings cannot differentiate between feigners and honest responders at a rate higher than chance. No other ROC Curve analyses were used for

Table 8

ROC Area Under the Curve (AUC) for the H-T-P-M Details Raw Score

				95% confidence	interval
H-T-P-M Variable	AUC	Standard Error	P Value	Lower Limit	Upper Limit
Details	.711	.078	.017	.559	.864

**significant at .01 level

Table 9

ROC Area Under the Curve (AUC) for SVT Overall Scores

				95% confidence	interval
Symptom Validity Test	AUC	Standard Error	P Value	Lower Limit	Upper Limit
TOMM	.950	.041	.000**	.869	1.000
FIT	.762	.076	.003**	.613	.911

**significant at .01 level

H-T-P-M variables as no other variables were significant. Please see Table 8 for the ROC Curve AUC; further, please see Appendix B, Figure 1 and Table 1 for ROC Curve and coordinates of the curve.

Each of the two SVT's had significant mean differences, so ROC curves were analyzed for each of them. The ROC Curve for the TOMM was significant (AUC = .950, p <.01), indicating that the TOMM scores can differentiate between feigners and honest responders at a rate higher than chance. The ROC Curve for the FIT variable was also significant (AUC = .762, p <.01), indicating that the FIT scores can differentiate between feigners and honest responders at a rate higher than chance. Please see Table 9 for the Roc Curve AUCs; further, please see Appendix B, Figures 2 and 3 along with Tables 2 and 3 for ROC Curve and coordinates of the curve for both SVTs.

Each of the validity variables from the MCMI-IV had significant mean differences, so subsequent ROC Analyses were conducted for each of them. All ROC Curve AUC statistics are presented in Tables 10, 11, 12, and 13. Further, the MCMI-IV ROC Curve and Coordinates of the Curve can be found in Appendix B, Figures 4 through 33 and Tables 4 through 33. The ROC Curve analysis for the Invalidity scale score was not significant (AUC = .667 p >.01) indicating that the Invalidity score cannot differentiate between feigners and honest responders at a rate higher than chance. The ROC Curve analysis was significant for the Disclosure scale (AUC = .853 p <.01) indicating that it can differentiate between feigners and honest responders at a rate higher than chance. ROC Curve analysis was not significant for the Desirability score (AUC = .727 p < .01) indicating that the Desirability score can differentiate between feigners and honest responders at a rate higher than chance. Lastly, ROC Curve analysis was significant for the Debasement score (AUC = .821 p <.01) indicating that this score can differentiate between feigners and honest responders at a rate higher than chance.

The ROC Curve analysis was significant for the Schizoid scale (AUC = .782 p <.01) indicating that this scale can differentiate between feigners and honest responders at a rate measurably higher than chance. The ROC Curve analysis for the Avoidant scale was significant (AUC = .724 p ≤.01) indicating that the Avoidant scale can differentiate between feigners and honest responders at a rate measurably higher than chance. The ROC Curve analysis was not significant for the Melancholic scale (AUC = .713 p > .01) indicating that it cannot differentiate between feigners and honest responders at a rate higher than chance. The ROC Curve analysis was significant for the Dependent scale (AUC = .739 p = .01) indicating that the scale can differentiate between feigners and honest responders at a rate measurably higher than chance. The ROC Curve analysis was significant for the Narcissistic scale (AUC = .870 p <.01) indicating that the Narcissistic scale can differentiate between feigners and honest responders at a rate higher than chance. The ROC Curve analysis for the Antisocial scale was significant (AUC = .842 p <.01) indicating that the Antisocial scale can differentiate between feigners and honest responders at a rate higher than chance. The ROC Curve analysis was significant for the Sadistic scale (AUC = .906 p <.01) indicating that this scale can differentiate between feigners and honest responders at a rate higher than chance. The ROC Curve analysis was also significant for the Compulsive scale (AUC = .812 p <.01) indicating that the Compulsive scale can differentiate between feigners and honest responders at a rate higher than chance. The ROC Curve analysis was significant for the Negativistic scale (AUC = .871 p <.01) indicating that the Negativistic scale can differentiate between feigners and honest responders at a rate measurably higher than chance. The ROC Curve analysis for the Masochistic scale was also significant (AUC = .761 p <.01) indicating that the scale can differentiate between feigners and honest responders at rate measurably higher than chance.

All three of the Severe Personality Scales were significant, so ROC Curves were analyzed for each of them. The ROC Curve analysis was significant for the Schizotypal scale (AUC = .886 p <.01) indicating that the Schizotypal scale can differentiate between feigners and honest responders at a rate higher than chance. The ROC Curve analysis was also significant for the Borderline scale (AUC = .807 p <.01) indicating that the Borderline scale can differentiate between feigners and honest responders at a rate higher than chance. Lastly, the ROC Curve analysis for the Paranoid scale was significant (AUC =

.839 p <.01) indicating that the Paranoid scale can differentiate between feigners and honest responders at a rate higher than chance.

Among the Clinical Syndrome Scales, the ROC Curve analysis was significant for the Generalized Anxiety scale (AUC = .878 p <.01) indicating that this scale can differentiate between feigners and honest responders at a rate higher than chance. The ROC Curve analysis was also significant for the Somatic Symptom scale (AUC = .828 p <.01) indicating that the Somatic Symptom scale can differentiate between feigners and honest responders at a rate higher than chance. The ROC Curve analysis for the Bipolar Spectrum scale was significant (AUC = .887 p <.01) indicating that the Bipolar Spectrum scale can differentiate between feigners and honest responders at a rate measurably higher than chance. The ROC Curve analysis was significant for the Persistent Depression scale (AUC = .782 p <.01) indicating that the Persistent Depression scale can differentiate between feigners and honest responders at a rate measurably higher than chance. The ROC Curve analysis was significant for the Alcohol Use scale (AUC = .822 p <.01) indicating that the Alcohol Use scale can differentiate between feigners and honest responders at a rate higher than chance. The ROC Curve analysis for the Drug Use scale was significant (AUC = .792 p <.01) indicating that it can differentiate between feigners and honest responders at a rate measurably higher than chance. The ROC Curve analysis was also significant for the Post-Traumatic Stress scale (AUC = .843 p <.01) indicating that the Post-Traumatic Stress scale can differentiate between feigners and honest responders at a rate higher than chance. The ROC Curve analysis for the Schizophrenic Spectrum was also significant (AUC = .885 p <.01) indicating that the Schizophrenic Spectrum score can differentiate between feigners and honest responders at a rate higher than chance. The ROC Curve analysis for the Major Depression scale was significant (AUC = .814 p <.01) indicating that the Major Depression scale can differentiate between feigners and honest responders at a rate measurably higher than chance. Lastly, the ROC Curve analysis was also significant for the Delusional scale (AUC = .918 p <.01) indicating that the Delusional scale score can differentiate between feigners and honest responders at a rate higher than chance.

Table 10

ROC Area Under the Curve (AUC) for MCMI-IV Validity Scale Base Rate Scores

				95% confidence	interval
Variable	AUC	Standard Error	P Value	Lower Limit	Upper Limit
Invalidity (V)	.667	.084	.059	.502	.831
Disclosure (X)	.853	.063	.000**	.730	.976
Desirability (Y)	.727	.077	.010**	.575	.878
Debasement (Z)	.821	.066	.000**	.692	.950

**significant at .01 level

Table 11

ROC Area Under the Curve (AUC) for MCMI-IV Personality Pattern and Severe Pathology Scale Base Rate Scores Among Honest Responders and ADHD Feigners

				95% confidence	interval
Clinical Syndrome Scales	AUC	Standard Error	P Value	Lower Limit	Upper Limit
Schizoid (1)	.782	.071	.001**	.643	.921
Avoidant (2A)	.724	.081	.011**	.565	.882
Melancholic (2B)	.713	.080	.016	.556	.870
Dependent (3)	.739	.079	.007**	.585	.894
Narcissistic (5)	.870	.052	.000**	.768	.972
Antisocial (6A)	.842	.068	.000**	.709	.974
Sadistic (6B)	.906	.051	.000**	.806	1.00
Compulsive (7)	.812	.073	.000**	.669	.954
Negativistic (8A)	.871	.058	.000**	.758	.983
Masochistic (8B)	.761	.075	.003**	.613	.909
Severe Pathology Scales					
Schizotypal (S)	.886	.059	.000**	.770	1.00
Borderline (C)	.807	.069	.000**	.673	.942
Paranoid (P)	.839	.067	.000**	.708	.969

**significant at .01 level

The ROC Curve analysis was significant for the Adult ADHD noteworthy response raw score (AUC = .859 p <.01) indicating that the Adult ADHD scale can differentiate between feigners and honest responders at a rate higher than chance. The ROC Curve analysis for the Autism Spectrum noteworthy response raw score was also significant (AUC = .885 p <.01) indicating that the Autism Spectrum score can differentiate between feigners and honest responders at a rate higher than chance.

Table 12

ROC Area Under the Curve (AUC) for MCMI-IV Clinical Syndrome Scale Base Rate Scores

				95% confidence	interval
Clinical Syndrome Scale	AUC	Standard Error	P Value	Lower Limit	Upper Limit
Generalized Anxiety (A)	.878	.054	.000**	.771	.984
Somatic Symptom (H)	.828	.064	.000**	.702	.954
Bipolar Spectrum (N)	.887	.053	.000**	.784	.990
Persistent Depression (D)	.782	.072	.001**	.641	.922
Alcohol Use (B)	.822	.066	.001**	.692	.952
Drug Use (T)	.792	.071	.001**	.653	.931
Post-Traumatic Stress (R)	.843	.062	.000**	.721	.964
Schizophrenic Spectrum (SS)	.885	.057	.000**	.773	.998
Major Depression (CC)	.814	.066	.000**	.685	.943
Delusional (PP)	.918	.041	.000**	.838	.998

**significant at .01 level

Table 13

ROC Area Under the Curve (AUC) for MCMI-IV Noteworthy Response Raw Scores

				95% confidence	interval
Noteworthy Response	AUC	Standard Error	P Value	Lower Limit	Upper Limit
Adult ADHD (AD)	.859	.057	.000**	.747	.972
Autism Spectrum (AS)	.885	.059	.000**	.769	1.00

**significant at .01 level

CHAPTER VI

DISCUSSION

The current research sought to identify a unique way to detect feigned performance of ADHD symptoms among college students. This research is considered exploratory in nature and as such needs to be replicated to become more clinically meaningful.

House-Tree-Person-Modified

As predicted, the primary results indicated that the number of details created by individuals feigning ADHD are significantly less than those honestly responding, but no other variables were found to produce differences between the two groups. This is consistent with the findings of Schretlen et al. (1992), where many subjects created grossly simplified images when attempting to feign performance. Although the H-T-P-M findings for the detail variable are promising, the results do not have clinical significance without direct comparison with individuals with ADHD. These findings indicate proof of concept; once compared with individuals with ADHD, the findings could become clinically meaningful if individuals with ADHD tend to respond differently from these groups. However, the ROC analysis indicated that the details variable could not reliably discriminate between those who were feigning ADHD and those who were honestly responding.

Although it was hypothesized that there would be significant differences in the sizes of the drawings between the honestly responding and the feigning ADHD group, none were found. Further, there were no differences in the variability of drawing sizes within each participants’ sets of drawings from individuals feigning ADHD than those who were not feigning. Schretlen, et al. (1992) found that feigners were more likely to draw smaller images and were more likely to have variability within their image sizes. However, they utilized prison and veteran populations and were asking them to feign cognitive ability, which may have inclined the participants to perform differently than the college students asked to feign ADHD in the current research. Further, as this was completed on a tablet, there are many unknowns about how people may perform differently on a tablet when compared to a paper-and-pencil task, so the use of a tablet itself may have changed how participants responded to the task.

The current research also sought to identify a difference in the number of open junctions in the drawings of the participants feigning ADHD when compared to the honest responders; however, this hypothesis was not substantiated in the data. Prior research has found differences in the open junctions among different personality styles, although the difference was not significant enough to suggest using the Bender Gestalt as a measure of personality traits (Homs et al., 1984). While ADHD is not a personality style, it is possible that individuals with ADHD will have a significantly different number of open junctions in comparison to ADHD feigners; this should be explored in future research. Although it was not measured in the current research, it may also be possible that individuals feigning ADHD may vary significantly in the number of overlapping junctions (i.e., where two lines intersect and continue at a junction in which a typical image would have the lines end at the point of the junction). Several drawings made by those feigning ADHD indeed included overlapped junctions, however, it is unclear if this is due to the attempt to feign performance or due to the difference in using an iPencil on an iPad versus drawing the image on paper.

It was hypothesized that those feigning ADHD would produce images with more line pressure than those honestly responding, however, this was not backed by any prior research. Although no significant findings were identified in this research, the lack of differences between the two groups may be helpful in future research. Saneei et al. (2011) found that children with ADHD produced thick lines with more pressure when drawing HFDs, so further research should be done to see if similar results will be found among adults with ADHD; if these findings are similar in adults, further research could indicate the use of line pressure to distinguish feigners from those individuals with ADHD.

Due to technical difficulties with the iPad application, both timing variables were unable to be calculated and compared among the two groups. It was hypothesized that those feigning ADHD would complete the task quicker than those honestly responding. Haghighi et al. (2014) indeed found that children with ADHD completed drawings quicker than children without ADHD, but it is unclear how adults with ADHD would vary from those without, and therefore if there will be a difference between those feigning ADHD and those individuals with ADHD. It is still believed that this may be a useful variable to assess in future research. It was observed that overall, both the feigned ADHD group and the honestly responding group performed the drawing tasks very quickly. In future research, it may be helpful to assess for other, more detailed directions to be given to participants that produce more meaningful differences. Further, it may be useful to give the H-T-P-M in the context of a real assessment setting, i.e. when someone has presented for an assessment and is internally motivated to perform adequately as they are invested in the results. However, this would sacrifice some internal validity to the study.

Overall, there are several variables that may have impacted the performance and results of this research in regard to the H-T-P-M drawing variables. Beyond those variables already discussed, it is possible that participants were not given enough motivation to feign or they did not know how to feign ADHD, although the scripts were modeled after prior research that had success with undergraduate students following the script to produce the expected outcomes in similar research regarding ADHD malingering (Booksh, 2005, Quinn, 2003). Further, Wilhelm, Franzen, Grinvalds, and Dews (1991, as cited by Rogers, 2008) found that college students who were each offered a monetary incentive to feign performance were more likely to produce extreme scores that are then more likely to be detected, to the point of unbelievability. These extreme scores are likely to cause skewed results, also corrupting research, so it would likely not have been beneficial to offer more monetary incentive to current participants. Research detecting feigned performance has also utilized a lottery approach or an incentive for the "best performance," as did the current research. To date, it is unknown if a small incentive that is guaranteed to each participant is more motivating than the possibility of a large incentive based on performance or chance (Rogers, 2008).

The current research was unique in that it required participants to draw on an iPad versus with pencil and paper, which may have changed how they would have responded to the prompts. Although all participants were shown how to use the tablet with the iPencil, including varying line pressure, erasing with their finger, and resting/moving their hand on the screen without fear of it marking or erasing the image, the vast majority of participants did not rest their hand on the tablet and instead, drew with only the iPencil touching the screen and their hand not touching the screen at any point. A few individuals were observed making a grimaced face after using their finger to erase during the practice mode; it is this researcher's belief that something made them uncomfortable or disgusted about that process. This could be due to a number of things, such as viewing the natural oils on their finger smudging the screen, concerns about germs, or the unnatural nature of erasing with their finger versus an actual eraser. These differences from writing on paper may have impacted several elements of their drawings. For example, writing with their hand hovering over the screen may have reduced their ability to control line pressure and may have made it feel less like a "drawing task." This could have also made them less inclined to draw more details in their images as it is likely more tiresome on their hands/arms. The iPencil is also heavier than a typical pencil used for drawing on paper, which could impact their willingness to draw more details or draw larger images as well. Lastly, the screen is still backlit, which differs from normal "pencil and paper" experiences, which could impact an individual's performance. However, tablets are being utilized more and more in the psychological setting (e.g., Frank, Sugarman, Horowitz, Lewis, & Yurovsky, 2016; Jenkins, Lindsay, Estambolchilar, Thornton & Tales, 2016; Ormachea, Lvins, Eagleman, Davenport, Jarman & Haarsma, 2017; Laursen, 2018). As such, ways to introduce this drawing task on a tablet may need to be explored in further research. For example, maybe examinees should observe the researcher cleaning the screen and iPencil each time as to alleviate some concerns about germs. Also, it may be helpful for the researcher to address screen smudges, normalizing the experience so participants may not feel ashamed or guilty about smudging the screen accidentally.

Interestingly, Dr. Peter Laursen (2018) has a tablet application that is currently only available in Nordic countries that is used to assess several features of cognitive and memory abilities. The application includes a drawing portion that utilizes a stylus-type pen for the tablet. Although no research was available regarding the usability, validity, or accuracy of the tests, the existence of the application is an indication of future directions for tablet applications in the field of psychology.

Other recent research has explored the utility of computerized assessment, specifically on tablets, in correctional settings, and attitudes of participants in these settings. They compared individuals using tablets to complete questionnaires versus individuals utilizing paper-and-pencil versions. Both groups were highly favorable to using tablets or other computerized technology. Some other benefits to the study included the ability of the technology to force a response to each question before the participant could continue, ensuring no missed items, which proved to be significantly different than those using paper and pencil (King, Heilbrun, Kim, McWilliams, Philips, Barbera & Fretz, 2017). With the continued push for the use of technology in the field of psychology, it will continue to be important to assess differences in the way individuals experience assessments in both forms to ensure the quality of the data does not diminish, and the technology used has been well-validated, with minimal glitches or other shortcomings.

Symptom Validity Tests

One of the two decision rules provided in the TOMM manual (Tombaugh, 1996) is a score of 25 items correctly identified for the first trial, indicating that anyone who performs over chance “passes” or is not feigning. Using this criterion, the TOMM accurately identified all 23 (100%) honest responders and only identified 3/21 (14.29%) of those feigning ADHD, resulting in a specificity of 100% but only a 14% sensitivity rate. The PPP for this cutoff score is 100%, while the NPP is 56%. However, it is noted within the manual that many individuals suspected of malingering do not perform at a level below chance. The second decision rule provided within the TOMM manual suggests that a score of 45 or less on the second trial may be indicative of feigned performance. As stated previously (see Test of Memory Malingering subsection), many researchers have sought to identify alternative cutoff scores for the TOMM trials. Using the cutoff criteria suggested by Sollman et al. (2010) of scores below 45 on the first trial, the test correctly identified 19/21 (95.24%) ADHD feigners. The cutoff score also accurately classified 22/23 (95.7%) of honest responders as well, resulting in a sensitivity of 95%, a specificity of 91%, and an overall classification rate of 93%. The PPP for this cutoff score was 90% while the NPP was 95%. These findings are consistent with several other researchers (e.g., Sollman et al, 2010; Gavett, O'Bryant, Fisher, & McCaffrey, 2005); using the TOMM's trial 2 criteria for trial 1 resulted in excellent sensitivity, specificity, and overall classification rate. Other stringent cut-off scores have been suggested within the literature as well, resulting in increased classification accuracy (eg. Stenclik, Miele, Silk-Eglit, Lynch & McCaffrey, 2013); these findings should continue to be explored in order to increase the effectiveness of the TOMM in various populations.

Although the FIT was significantly different for the ADHD feigners than for the honest responders, it did not do well in detecting those feigning ADHD overall. At the recommended cutoff score of 8 or under to identify feigned performance, the test only detected 3/21 of those feigning ADHD, resulting in a sensitivity of 14.3% and specificity of 100%, with an overall classification accuracy of 59%. With an alternative cutoff score of 12 or under, the FIT alone detected 11/21 making it barely better than chance, with nearly half of the feigners achieving a 15/15 score. At the cutoff score of 12, the sensitivity is 52.4% while the specificity remains at 100%, with an overall classification rate of 77%. All 23 (100%) honest responders obtained a perfect score of 15 on the FIT. As described previously, the FIT contains five rows of items that are sequential, such as numbers or letters that are in sequential order; it was observed that those feigning would create 4/5 of the sequential orders and simply leave off a row of sequential items. Thus, even a cutoff score of 14, 13, or 12 and under would still only produce a hit rate of 52.4%. Although the sample size of this study is quite small, these findings suggest that the FIT should not be used to detect feigned ADHD performance with college populations.

Millon Clinical Multiaxial Inventory, Fourth Edition

Nearly all the MCMI-IV variables that were assessed displayed significant differences among feigners and honest responders. However, there was no singular variable that could be used to differentiate between the two groups as there were many overlapping score ranges.

Looking at studies of the previous version of this measure, the MCMI-III and its ability to detect feigned performance, Sellbom and Bagby (2008) stated, "Under no circumstances should practitioners use this instrument in forensic evaluations to determine response styles," as there was very little research on the utility of the test for this purpose. Further, there are very few validity scales included on the MCMI-III, and subsequently on the MCMI-IV, to make determinations about performance for forensic purposes (Rogers & Bender, 2018). At the time of publication, the *Clinical Assessment of Malingering and Deception, Fourth Edition*, noted that there is currently no published research regarding the use of the MCMI-IV with malingering or feigned performance. They note that the MCMI-IV manual itself cautions the use of the MCMI-IV for any non-clinical population, such as child custody evaluations (Rogers & Bender, 2018). Indeed, in the current research, the validity scales were not particularly useful in identifying those feigning from those honestly responding.

In the past, it has been suggested that there may be utility in combining validity scores with other clinical syndrome scales to assess for malingering, such as a high Debasement score with a low Somatoform, Bipolar, and Borderline scale scores for example (Thomas-Peter, Jones, Campbell & Oliver, 2000), but no research appears to have followed this suggestion to analyze its utility. As there were so many significant elevations among the different MCMI-IV scales in the current research, it may be possible to identify a combination of elevations that can detect feigned performance. In the current research, an approach similar to that of Thomas-Peter et al. (2000) was taken by analyzing the ROC curve analyses and identifying the three clinical syndrome scales with the best predictive power and combining them to identify feigned performance. These three scales included the Bipolar scale, the Schizophrenic Spectrum scale, and the Delusional scale. Based on the ROC data, scores higher than a 73.5 on the Bipolar scale resulted in a sensitivity of 81% with a specificity of 83%, scores higher than a 63.5 on the Schizophrenic Spectrum scale resulted in a sensitivity of 86% and a specificity of 91%, and a score higher than 65 on the Delusional scale resulted in a sensitivity of 81% and specificity of 91%. When all three cut off scores were applied to the current data, zero honest responders were misclassified, while 16/21 feigners were correctly classified, resulting in a sensitivity of 76%, a specificity of 100%, and overall classification rate of 88%. Further, if any participant met two of the three cutoff scores, 90% of the participants were correctly classified with zero honest responders misclassified as ADHD feigners. Meeting two of the three cut off criteria resulted in an increase to 81% sensitivity and still 100%

specificity. Other combinations of scores were considered, included specific cut off scores for the Sadistic and Negativistic scales, which resulted in the same sensitivity, specificity, and overall classification rate as using the three clinical syndrome scales, meaning that utilizing a criteria of meeting two out of the three cut off scores for the clinical syndrome scales has proven to be the most sensitive and specific for this research. These findings could be useful in future research and should also be compared to individuals with ADHD.

The two noteworthy responses that were analyzed (ADHD and Autism Spectrum) were indeed significant, however, it is exceedingly likely that the ADHD score will be elevated among individuals with ADHD. It is unknown if the Autism Spectrum scale will have any utility until it can be compared with individuals with ADHD. The MCMI-IV manual does not provide any descriptive information regarding the noteworthy response scores (Millon, Grossman & Millon, 2015). No further research regarding the noteworthy responses was found.

Future Research

Future research should look at utilizing the H-T-P-M with adults who have been identified as having ADHD to distinguish patterns that are different among them and individuals feigning ADHD. Although some attempts to identify tools to detect feigned ADHD in adults have been successful (i.e. Fuermaier, Tucha, Koerts, Grabski, Lange, Weisbrod, Aschenbrenner & Tucha, 2016), this is still a fairly new concept in need of continued exploration.

Another possible direction for this research may be to administer an SVT, such as the TOMM, prior to the H-T-P-M, and immediately confront the feigner about their non-valid performance. Suchy, Chelune, Franchow, and Thorgusen (2012) found that confronting a feigning individual immediately after the non-credible score has been obtained led to over fifty percent of the individuals performing credibly on the re-administration of the SVT and then more credible performances on the following tests as well. It is possible that this confrontation would change how individuals proceeded with the testing, making them more aware of how they would proceed to get their needs met.

Future research should continue to aim to identify variable groups that when scored together, increase sensitivity and specificity of the MCMI-IV scales that can be used to reliably detect feigned ADHD performance. Although the current study utilized a small sample, there were distinct differences among many of the MCMI variables; it is likely that this pattern would be seen among feigned performance for different disorders as well, as many of the questions on the MCMI could depict symptoms or deficits that overlap in many disorders. Indeed, malingered performance on another measure of personality, the PAI, has found that profiles of those malingering tend to have several marked elevations, with sharper distinctions in scale elevations than those produced by random responders (Morey, 1996). The current MCMI-IV findings are quite similar, with a higher number of significant base rate elevations in the profiles of those feigning ADHD.

Limitations

There were several limitations to the current research. The sample size of the current research was small and did not include any individuals with ADHD. To produce more meaningful and clinically relevant results, data from individuals with ADHD would be quite beneficial. Further, the sample was comprised of only two college populations, which may limit the findings. Individuals from LRSC were not given extra credit, as directed by their IRB, which may have made it less appealing to participate to LRSC students when compared to UND students. Although there were a relatively even number of participants from either school, this may have changed the type of students that were willing to participate in the research, affecting the randomness of the data pool. Lastly, a few of the students included in the research were English as a Second Language students and expressed more difficulty with completing the self-report measure. Although they were included in the data as they met criteria and were able to comprehend the testing process and what was asked of them, this may have affected their responding on the various measures. Further, cultural differences may have changed their willingness to outright feign symptoms that they were not currently experiencing, although this was not expressed to the researcher.

Another limitation of the current research involved technical difficulties with the application, as it was developed for the current research and was on its first trial of use. Future research will need to continue to work with the developer to correct the current problems with the data output and current difficulties with iPencil lag.

Only analyzing individuals' performance by way of tablet application may have been limiting to the results. It may have been helpful to look at pencil and paper versions of the assessment to address if there were significant differences between the two types of data collection. However, as the future continues to move in the direction of technology-based approaches to assessment and data collection, this should be considered moving forward.

It may be possible that other SVT's would be more useful and appropriate in future research; the FIT misclassified many of the responders, and although it had significant differences between the two groups, it proved to be useless for clinical utility and therefore may not be the best measure of feigned performance for future research. Other, more robust tests may be found to have more meaningful results.

Conclusion

To summarize, the current research aimed to identify a novel approach to the detection of feigned ADHD performance among college students, as this is a growing need within this population. Although the current research utilized a small sample, the results of the current research indeed found that the amount of drawing details may be useful in the detection of feigned ADHD, as those feigning ADHD created significantly fewer drawing details. Further, even the non-significant results may also prove to be useful in the future when compared to individuals with ADHD. In the future, the MCMI-IV may have clinical utility in detecting feigned ADHD. It remains clear that college students are able to feign ADHD performance, and as such, research should continue to strive to find ways to detect feigned ADHD.

REFERENCES

10.3 sensitivity, specificity, positive predictive value and negative predictive value (2016). *PennState Eberly College of Science.*

Aamondt, M. G. & Custer, H. (2006). Who can best catch a liar? A meta-analysis of individual differences in detecting deception. *The Forensic Examiner, 15*(1), 6-12.

Abbate-Daga, G., Buzzichelli, S., Marzola, E., Aloi, M., Amianto, F. & Fassino, S. (2015). Does depression matter in neuropsychological performances in anorexia nervosa? A descriptive review. *The International Journal of Eating Disorders, 48*(6), 736-745.

Aikerman, K. G., Belter, R. W., & A. J. Finch, J. (1992). Human figure drawings: validity in assessing intellectual level and academic achievement. *Journal of Clinical Psychology, 48*(1), 114-120.

Akobeng, A. K. (2006). Understanding diagnostic tests 3: receiver operating characteristic curves. *Acta Pediatrica, 96*, 644-647.

Alexander, L. & Liljequist, L. (2016). Determing the accuracy of self-report versus informant-report using the Conners' Adult ADHD Rating Scale. *Journal of Attention Disorders, 20*(4), 346-352.

Allen, R. & Decker, S. (2008). Utility of the Bender Visual-Motor Gestalt Test-Second Edition in the assessment of Attention-Deficit/Hyperactivity Disorder. *Perceptual and Motor Skills, 107*(3), 663.

Aloi, M., Rania, M., Caroleo, M., Bruni, A., Palmieri, A., Cauteruccio, M. A., De Fazio, P. & Segura-García, C. (2015). Decision making, central coherence and set-shifting: a comparison between Binge Eating Disorder, Anorexia Nervosa and healthy controls. *BMC Psychiatry, 15*(1), 6.

Alpanda, S. (2015). The investigation of the relationship between ADHD and visual-spatial functions. *Procedia—Social and Behavioral Sciences, 174*, 2219-2225.

Antshel, K. M., Faraone, S. V., Maglione, K., Doyle, A. E., Fried, R., Seidman, L. J., & Biederman, J. (2010). Executive functioning in high-IQ adults with ADHD. *Psychological Medicine, 40*, 1909-1918.

Arbisi, P. A., Ben-Porath, Y. S. & Mcnulty, J. (2006). The ability of MMPI-2 to detect feigned PTSD within the context of compensation seeking. *Psychological Services, 3*(4), 249-261.

Armistead-Jehle, P. (2010). Symptom validity test performance in U.S. veterans referred for evaluation of mild TBI. *Applied Neuropsychology, 17*(1), 52-59.

Ashendorf, L., Constantinou, M. & Mccaffrey, R. J. (2004). The effect of depression and anxiety on the TOMM in community-dwelling older adults. *Archives of Clinical Neuropsychology, 19*(1), 123-130.

Ashton, V. L., Donders, J. & Hoffman, N. M. (2005). Rey Complex Figure Test performance after traumatic brain injury. *Journal of Clinical and Experimental Neuropsychology, 27*, 55-64.

Assessment of effort in clinical testing of cognitive functioning for adults (2009). *The British Psychological Society.*

Aucone, E. J., Raphael, A. J., Golden, C. J., Espe-Pfeifer, P., Seldon, J., Pospisil, T., . . . Calabria, M. (1999). Reliability of the Advanced Psychodiagnostic Interpretation (API) scoring system for the Bender Gestalt. *Assessment, 6*(3), 301-303.

Backhaus, S. L, Fichtenberg, N. L. & Hanks, R. A. (2004). Detection of sub-optimal performance using a floor effect strategy in patients with truamatic brain injury. *The Clinical Neuropsychologist, 18*(4), 591-603.

Bagby, R. M. & Marshall, M. B. (2005). Assessing response bias with the MCMI modifying indices in R. J. Craig (Ed.), *New directions in interpreting the Millon Clinical Multiaxial Inventory-III (MCMI-III),* (pp. 227-247). Hoboken, NJ: John Wiley & Sons, Inc.

Bagby, R. M., Marshall, M. B. & Bacchiochi, J. R. (2005). The validity and clinical utility of the MMPI-2 malingering depression scale. *Journal of Personality Assessment, 85*(3), 304-311.

Bagby, R. M., Nicholson, R. A., Bacchiochi, J. R., Ryder, A. G. & Bury, A. S. (2002). The predictive capaity of the MMPI-2 and the PAI validity scales and indexes to detected coached and uncoached feigning. *Journal of Personality Assessment, 78*(1), 69-86.

Bagby, R. M., Nicholson, R. A., Buis, T. & Bacchiochi, J. R. (2000). Can the MMPI-2 validity scales detect depression fiegned by experts? *Assessment, 7*(1), 55-62.

Bagby, R. M., Rogers, R., Buis, T., Nicholson, R. A., Cameron, S. L., Retor, N. A., Schueller, D. R. & Seeman, M. V. (1997). Detecing feigned depression and schizophrenia on the MMPI-2. *Journal of Personality Assessment, 68*(3), 650-664.

Baity, M. r. , Siefert, C. J., Chambers A. & Blais, M. (2007). Deceptiveness o the PAI: A study of naïve faking with psychiatric inpatients. *Journal of Personality Assessment, 88*(1), 16-24.

Baker, L. B., Conroy, D. E. & Kenney, W. L. (2007). Dehydration impairs vilgilance-related attention I male basketball players. *Medicine and Science in Sports and Exercise, 39*(6), 976-983.

Barkley R.A (2014). *Attention Deficit Disorder: A Handbook for Diagnosis and Treatment* (4th ed.). New York: Guilford Press.

Barkley, R. A. & Murphy, H. R. (2006). Barkley's Quick-Check for Adult ADHD Diagnosis. Sudbury: Jones and Barlett Learning.

Barkley, R. A., Fischer, M., Smallish, L., & Fletcher, K. (2002). The persistence of Attention Deficit/Hyperactivity disorder into young adulthood as a function of reporting source and definition of disorder. *Journal of Abnormal Psychology, 111*, 279-289.

Barkley, R. A. & Murphy, K R. (1998). *Attention Deficit-Hyperactivity Disorder: a clinical workbook.* (2nd ed.) New York, NY: Guilford.

Bartell, S. S., & Solanto, M. V. (1995). Usefulness of the Rorschach inkblot test in assessment of attention deficit hyperactivity disorder. *Perceptual and Motor Skills, 80*, 531-541.

Bash, I. Y. & Alpert, M. (1980). The determination of malingering. *Annuals of the New York Academy of Science, 347*, 86-99.

Bauer, L. & Mccaffrey, R. J. (2006). Coverage of the Test of Memory Malingering, Victoria Symptom Validity Test and Word Memory Test on the internet: is test security threatened? *Archives of Clinical Neuropyschology, 21*(1), 121-126.

Bauer, L., O'Bryant, S. E., Lynch, J. K., Mccaffrey, R. J. & Fisher, J. M. (2007). Examining the Test of Memory Malingering trial 1 and Word Memory Test Immediate Recognition as screening tools fr insufficient effort. *Assessment, 14*(3), 215-222.

Behnken, A., Schöning, S., Gerß, J., Konrad, C., de Jong-Meyer, R., Zwazger, P. & Arolt, V. (2010). Persistent non-verbal memory impairment in remitted major depression--caused by encoding deficits? *Journal of Affective Disorders, 122*(1), 144-148.

Belter, R. W., McIntosh, J. A., Finch, A. J. & Williams, L. D. (1989). The Bender-Gestalt as a method of perosnality assessment with adolescents. *Journal of Clinical Psychology, 45*(3), 414-423.

Bender, L. (1938). *A Visual-Motor Gestalt Test and its Clinical Use.* American Orthopsychiatric Association Monograph Series Number 3. NY: American Orthopsychiatric Association.

Bennett-Levy, J. (1984). Determinants of performance on the Rey-Osterreith Complex Figure Test: an analysis and a new technique for single case assessment. *British Journal of Clinical Psychology, 23*, 109-119.

Bernard, L. C. (1991). The detection of faked deficits on the Rey Auditory Verbal Learning Test: the effect of serial position. *Archives of Clinical Neuropsychology, 6*(1-2), 81-88.

Bernard, L. C., Houston, W. & Natoli, L. (1993). Malingering on neuropsychological memory tests: potential objective indicators. *Journal of Clinical Psychology, 49*(1), 45-53.

Bernard, L. C. & Fowler, W. (1990). Assessing the validity of memory complaints: Performance of brain-damaged and normal individuals on Rey's task to detect malingering. *Journal of Clinical Psychology, 46,* 432-436.

Bianchini, K. J., Etherton, J. L., Greve, K. W., Keinly, M. T. & Meyers, J. E. (2008). Classification accuracy of the MMPI-2 validity scales in the detection of pain-realted malingering: a known-groups study. *Assessment, 15*(4), 435-449.

Bieliauskas, V. J., & Moens, J. F. (1961). An investigation of the validity of the H-T-P as an intelligence test for children. *Journal of Clinical Psychology, 17*(2), 178-180.

Billingslea, F. Y. (1963). The Bender Gestalt: a review and perspective. *Psychological Bulletin, 60*(3), 233-251.

Blain, G. H., Bergner, R. M., Lewis, M. L., & Goldstein, M. A. (1981). The use of objectively scorable House-Tree-Person indicators to establish child abuse. *Journal of Clinical Psychology, 37*(3), 667-673.

Blanchard, D. , McGrath, R., Pogge, D. & Khadivi, A. (2003). Comparison of the PAI and MMPI-2 as predictors of faking bad. *Journal of Personality ASsesment, 80*(2), 197-205.

Blaskewitz, N., Merten, T., & Brockhaus, R. (2009). Detection of suboptimal effort with the Rey Complex Figure Test and Recognition Trial. *Applied Neuropsychology, 16*, 54-61.

Blaskewitz, N., Merten, T. & Kathmann, N. (2008). Performance of children on symptom validity tests: TOMM, MSVT and FIT. *Archives of Clinical Neuropsychology, 23*(4), 379-391.

Boccaccini, M. T., Murrie, D. C. & Duncan, S. A. (2006). Screening for malingering in a criminal-forensic sample with the Personality Assessment Inventory. *Psychological Assessment, 18*(4), 415-423.

Booksh, R. L. (2005). *Ability of college students to simulate ADHD on objective measures of attention* (Order No. 3199715). Available from ProQuest Dissertations & Theses A&I. (304989300). Retrieved from http://ezproxy.library.und.edu/login?url=http://search.proquest.com/docview/304989300?accountid=28267

Booksh, R. L., Pella, R. D., Singh, A. N., & Gouvier, W. D. (2010). Ability of college students to simulate ADHD on objective measures of attention. *Journal of Attention Disorders, 13*(4), 325-338.

Boone, K. B., Salazar, X., Lu, P., warner-Chacon, K., & Razani, J. (2002). The Rey-15 item recognition trial: A technique to enhance sensitivity of the Rey 15-item memorization test. *Journal of Clinical and Experimental Neuropsychology, 24*(5), 561-573.

Borkowska, A. R., Slopień, A., Pytlińskia, N., Rajewski, A., Dmitrzak-Weglarz, M., Szczepankiewicz, A. & Wolańiczyk, T. (2011). Visual-spatial functions and organization of grapho-motor actions in ADHD children. *Psychiatria Polska, 45*(3), 367-378.

Brand, B. L. & Chasson, G. S. (2015). Distinguishing simulated from genuine Dissociative Identity Disorder on the MMPI-2. *Psychological Trauma: Theory, Research, Practice and Policy, 7*(1), 93-101.

Brannigan, G. & Decker, S. (2003). *Bender Visual-Motor Gestalt Test, Second Edition.* Itasca, IL; Riverside Publishing.

Bridgett, D. J. & Walker, M. E. (2006). Intellectual functioning in adults with ADHD: a meta-analytic examination of full scale IQ differences between adults with and without ADHD. *Psychological Assessment, 18*(1), 1-14.

Brooks, B. L. (2012). Victoria Symptom Validity Test perfomance in children and adolescents with neurological disorders. *Archives of Clinical Neuropsychology, 27*(8), 858-868.

Brooks, B. L., Sherman, E. M. S., & Krol, A. L. (2012). Utility of TOMM trial 1 as an indicator of effort in children and adolescents. *Archives of Clinical Neuropsychology, 27*, 23-29.

Brown, T. E. (1996). *Brown attention-deficit disorder scales.* San Antonio, TX: the Psychological Corporation.

Bruhn, A. R., & Reed, M. R. (1975). Simulation of brain damage on the Bender-Gestalt test by college subjects. *Journal of Personality Assessment, 39*(3), 244-255.

Buck, J. N. (1948). The H-T-P test. *Journal of Clinical Psychology, 4*(2), 151-159.

Burns, R. C. & Kaufman, S. H. (1987). *Kinetic Family Drawings (K-F-D): an interpretive manual.* New York: Brunner/Mazel.

Bury, A. S. & Bagby, R. M. (2002). The detection of feigned unchoach and coached Posttraumatic Stress Disorder with MMPI-2 in a sample of workeplace accident victims. *Psychological Assessment, 14*, 472-484.

Bush, S. S., Ruff, R. M., Troster, A. I., Barth, J. T., Koffler, S. P., Pliskin, N. H., . . . Silver, C. H. (2005). Symptom validity assessment: practice issues and medical necessity NAN policy and planning committee. *Archives of Clinical Neuropsychology, 20*, 419-426.

Butcher, J. N., Dahlstrom, W. G., Graham, J. R., Tellegen, A. & Kaemmer, B. (1989). *Minnesota Multiphasic Pesronality Inventory (MMPI-2). Manual for administration and scoring.* Minneapolis, MN: University of Minnesota Press.

Calhoun, P. S., Earnst, K. S., Tucker, D. D., Kirby, A. C. & Beckham, J. C. (2000). Feigning combat-related Posttraumatic Stress Disroder on the Personality Assessment Inventory. *Journal of Personality Assessment, 75*(2), 338-350.

Cannoni, E., Norcia, A. D., Bombi, A. S. & Giunta, L. D. (2015). The Bicycle Drawing Test: What does it measure in developmentally typical children? *Assessment, 22*(5), 629-639.

Carmody, D. P., & Crossman, A. M. (2011). Artful liars: malingering on the Draw-A-Person task. *The Open Criminology Journal, 4*, 1-9.

Centers for Disease Control and Prevention. (2013). Attention-Deficit/Hyperactivity Disorder. Retrieved from http://www.cdc.gov/ncbddd/adhd/diagnosis.html.

Chafetz, M. D., Prentkowski, E., & Rao, A. (2011). To work or not to work: motivation (not low IQ) determines symptom validity test findings. *Archives of Clinical Neuropsychology, 26*, 306-313.

Chan, A. S., Cheung, M. C., Han, Y. M. Y., Sze, S. L., Leung, W. W., Man, H. S. & To, C. Y. (2009). Executive function deficits and neural discordance in children with Autism Spectrum Disorders. *Clinical Neurophysiology, 120*(6), 1107-1115.

Chan, A. S., Han, Y. M. Y., Sze, S. L., Cheung, M. C., Leung, W. W. M., Chan, R. C. K. & To, C. Y. (2011). Disordered connectivity associated with memory deficits in children with Autism Spectrum Disorders. *Research in Autism Spectrum Disorders, 5*(1), 237-245.

Cheng, M. K., Frank, J. B. & Hopwood, C. J. (2010). Assessment of motor vehicle accident claimants with the PAI. In Blais, M. A., Baity, M. R. & Hopwood, C. J. (Eds.), *Clinical Applications of the Personality Assessment Inventory,* New York, NY: Routledge (pp. 177-194).

Chmielewski, M. , Zhu, J., Burchett, D., Bury, A. S. & Bagby, R. M. (2016). The comparative capacity of the Minnesota Multiphasic Personality Inventory-2 (MMPI-2) and MMPI-2 Restructured Form (MMPI-2 RF_ validity scales to detect suspected malingering in a disability claimant sample. *Psychological Assessment, 28*(8).

Conners, K. C. (2004). *Conners Continuous Performance Test (2nd ed.)*. Toronto, Canada: Multi Health Systems.

Conners, K.C. (2014*). Conners Continuous Performance Test (3rd ed).* Toronto, Canada: Multi Health Systems.

Conners, C. K., Erhardt, D. & Sparrow, E. (1999). *Conner's Adult ADHD Rating Scale.* North Tonawanda, NY: Multi-Health Systems.

Cook, C. M., Bolinger, E. & Suhr, J. (2016). Further validation of the Conner's Adult Attention Deficit/Hyperactivity Rating Scale Infrequency Index (CII) for detection of non-credible report of Attention Deficit/Hyperactivity Disorder symptoms. *Archives of Clinical Neuropsychology, 31*(4), 358-364.

Davis, J. J., Wall, J. R. & Whitney, K. A. (2012). Derivation and clinical validation of consistency indices on the Test of Memory Malingering. *Archives of Clinical Neuropsychology, 27*(7), 706-715.

Darcy, A. M., Fitzpatrick, K. K., Manasse, S. M., Datta, N., Klabunde, M., Colborn, D., Aspen, V., Stiles-Shields, C., Labuschagne, Z., Le Grange, D. & Lock, J. (2015). Central coherence in adolescents with bulimia nervosa spectrum eating disorders. *The International Journal of Eating Disorders, 48*(5), 487-493.

Deckersbach, T., Savage, C. R., Henin, A., Mataix-Cols, D., Otto, M. W., Wilhem, S., Rauch, S. L., Baer, L. & Jenike, M. A. (2000). Reliablity and validity of a scoring system for measuring organizational apporach in the Complex Figure Test. *Journal of Clinical Experimental Neuropsychology, 22*(5), 640-648.

Delain, S. L., Stafford, K. P. & Ben-Porath, Y. S. (2003). Use of the TOMM in a criminal court forensic assessment setting. *Assessment, 10*(4), 370-381.

Denning, J. H. (2012). The efficiency and accuracy of the Test of Memory Malingering Trial 1, errors on the first 10 items of the Test of Memory Malingering, and five embedded measures in predicting invalid test performance. *Archives of Clinical Neuropsychology, 27*, 417-432.

Devore, J. E., & Fryrear, J. L. (1976). Analysis of juvenile delinquents' hole drawing responses on the tree figure of the House-Tree-Person technique. *Journal of Clinical Psychology, 32*(3), 731-736.

Dixon, J. (1998). Concurrent validity of the Koppitz Bender-Gestalt emotional indicators among women with mental retardation. *Perceptual and Motor Skills, 86*(1), 195-197.

Doi, A., Oochou, K., Yamanaka, E., Inoue, H., & Seino, Y. (2001). The Synthetic House-Tree-Person (S-HTP) drawing test in patients with enuresis [in Japanese]. *Yanyousyoukennkyo, 6*, 33-38.

Donders, J. (2005). Performance on the Test of Memory Malingering in a mixed pediatric sample. *Child Neuropsychology, 11*(2), 221-227.

Drob, S. L., Meehan, K. B. & Waxman, S. E. (2009). Clinical and conceptual problems in the attribution of malingering in forensic evaluations. *Journal of the American Acadamy of Psychiatry and the Law, 37*(1), 98-106.

Duncan, A. (2005). The impact of cognitive and psychiatric impairment of psychotic disorders on the Test of Memory Malingering. *Assessment, 12*(2), 123-129.

Duncan, S. A. & Ausborn, D. L. (2002). The use of reliable digits to detect malingering in a criminal forensic pretrial population. *Assessment, 9*(1), 56-61.

Dupuy, T. R., & Cenedala, M. (1996). *Test of Variables of Attention: User's Guide*, Los Alamitos, CA: Universal Attention Disorders.

Eakin, D. E., Weathers, F. W., Benson, T. B., Anderson, C. F. & Funderburk, B. (2006). Detection of feigned Posttraumatic Stress Disorder: A comparison of the MMPI-2 and PAI. *Journal of Psychopathology and Behavioral ASsesment, 28*(3), 145-155.

Edens, J. F., Poythress, N G. & Watkins-Clay, M. M. (2007). Detection of malingering in psychiatric unit and general population prison inamates: A comparison of the PAI, SIMS, and SIRS. *Journal of Personality Assessment, 88*(1), 33-42.

Elhai, J. D., Gold, P. B., Frueh, B. C. & Gold, S. N. (2000). Cross-validation of the MMPI-2 in detecing malingered Postraumatic Stress Disorder. *Journal of Personality Assessment, 75*(3), 449-463.

Elhai, J. D., Gold, S. N., Sellers, A. H. & Dorfman, W. I. (2001). The detection of malingered posttraumatic stress disorder with MMPI-2 fake bad indices. *Assessment, 8*(2), 221-236.

Elhai, J. D., Naifeh, J. A., Zucker, I. S., Gold, S. N., Deitsh, S. E. & Frueh, B. C. (2004). Discriminating malingered from genuine civilian posttraumatic stress disorder: a validiation of three MMPI-2 infrequency scales. *Assessment, 11*(2), 139-144.

Etherton, J. L., Bianchini, K. J., Greve, K. W. & Ciota, M. A. (2005). Test of Memory Malingering performance is unaffected by laboratory-induced pain: implications for clinical use. *Archives of Clinical Neuropsychology, 20*(3), 375-384.

Etherton, J. L., Bianchini, K. J., Heinly, M. T. & Greve, K. W. (2006). Pain, malingering and performance on the th WAIS-III Processing Speed Index. *Journal of Clinical and Experimental Neuropsychology, 28*(7), 1218-1237.

Faraone, S. V. (2004). Genetics of adult attention deficit hyperactivity disorfer. *Psychiatric Clinics of Norht America, 27*, 303-321.

Faust, D., Hart, K., & Guilmette, T. J. (1988). Pediatric malingering: the capacity of children to fake believable deficits on neuropsychological testing. *Journal of Consulting and Clinical Psychology, 56*(4), 578-582.

Fazio, R., Doyle, L. & King, J. (2014). CPT-II versus TOVA: assessing the diagnostic power of continuous performance tests. *Archives of Clinical Neuropsychology, 29*(6), 540.

Feuerstein, S., Coric, V., Fortunati, F., Southwick, S., Temporini, H., & Morgan, C. A. (2005). Malingering and forensic psychiatry. *Psychiatry (Edgmont), 2*(12), 25-28.

Field, K., Bolton, B. & Dana, R. H. (1982). An evaluation of three Bender-Gestalt scoring systems as indicators of psychopathology. *Journal of Clinical Psychology, 38*(4), 838-842.

Finn, S. E. (2009). Incorporating base rate information in daily clinical decision making. In J. N. Butcher (Ed.), *Oxford handbook of personality assessment* (pp. 140-149). New York, NY: Oxford University Press.

Fischer, M. & Barkley, R. A. (2007). The persistence of ADHD into adulthood: (Once again) it depends on whom you ask. *The ADHD Report, 15*(4), 7-16.

Forbs, G. B. (1998). Clinical utility of the Test of Variables of Attention (TOVA) in the diagnosis of attention-deficit/hyperactivity disorder. *Journal of Clinical Psychology, 54*(4), 461-476.

Frank, M. C., Sugarman, E., Horowitz, A. C., Lewis, L. & Yurovsky, D. (2016). Using tablets to collect data from young children. *Journal of Cognition and Development, (17)*1, 1-17.

Frazier, T. W., Demaree, H. A. & Youngstrom, E. A. (2004). Meta-analysis of intellectual and neuropsychological test performance in attention-deficit/hyperactivity disorder. *Neuropsychology, 18*, 543-555.

Frazier, T. W., Frazier, A. R., Busch, R. M., Kerwood, M. A., & Demaree, H. A. (2008). Detection of simulated ADHD and reading disorder using symptom validity measures. *Archives of Clinical Neuropsychology, 23*, 501-509.

Frederick, R. I. (2000). A personal floor effect strategy to evaluate the validity of performance on memory tests. *Journal of Clinical and Experimental Neuropsychology, 22*(6), 720-730.

Frederick, R. I., Crosby, R. D. & Wynkoop, T. F. (2000). Performance curve classification of invalid responding on the Validity Indicator Profile. *Archives of Clinical Neuropsychology, 15*(4), 281-300.

Fuermaier, A. B. M., Tucha, O., Koerts, J., Grabski, M., Lange, K. W., Weisbrod, M., Aschenbrenner, S. & Tucha, L. (2016). The development of an embedded figures test for the detection of feigned Attention Deficit Hyperactivity Disorder in adulthood. *PloS ONE, 11*(10): e0164297.

Fuermaier, A. B. M., Tucha, L., Koerts, J., Weisbrod, M., Grabemann, M., Mette, C., Aschenbrenner, S. & Tucha, O. (2016). Evaluation of the CAARS infrequency index for the detection of noncredible ADHD symptom report in adulthood. *Journal of Psychoeduational Assessment.*

Fujii, C., Okada, A., Akagi, T., Shigeyasu, Y., Shimauchi, A., Hosogi, M., . . . Morishima, T. (2016). Analysis of the Synthetic House-Tree-Person drawing test for developmental disorder. *Pediatrics International, 58*, 8-13.

Garcia, C.R., Bau, C. H. D., Silva, K.I., Callegari-Jacques, S. M., Salgado, C.A.I., Fischer, A. G., Victor, M. M., Sousa, N.O., Karam, R. G., Rohde, L. A., Belmonte-de-Abreu, P. & Grevet, E. H. (2012). The burdened life of adults with ADHD: impairment beyond comorbidity. *European Psychiatry, 27*, 309-313.

Garnier-Dykstra, L. M., Caldeira, K. M., Vincent, K. B., O'Grady, K. E., & Arria, A. M. (2012). Non-medical use of prescription stimulants during college: four-year trends in exposure opportunity, use, motives, and sources. *Journal of American College Health, 60*(3), 226-234.

Gavett, B. E., O'Bryant, S. E., Fisher, J. M. & Mccaffrey, R. J. (2005). Hit rates of adequate performance based on the Test of Memory Malingering (TOMM) trial 1. *Applied Neuropsychology, 12*(1), 1-4.

Gervais, R. O., Rohling, M. L., Green, P. & Ford, W. (2004). A comparison of WMT, CARB, and TOMM failure rates in non-head injury disability claimants. *Archives of Clinical Neuropsychology, 19,* 475-487.

Goldstein, A. P. & Rawn, M. L. (1957). The validity of interpretive signs of aggression in the drawing of the human figure. *Journal of Clinical Psychology, 13*(2), 169-171.

Gonzalez-Gadea, M. L., Baez, S., Torrala, T., Castellanos, F. X., Rattazzi, A. Bein, V., Rogg, K. Manes, F. & Ibanez, A. (2013). Cognitive variability in adults with ADHD and AS: Disentangling the roles of executive functions and social cognition. *Research in Developmental Disabilities: A Multidisciplinary Journal, 34*(2), 817-830.

Gorp, W. G. v., Humphrey, L. A., Kalechstein, A., Brumm, V. L., McMullen, W. J., Stoddard, M. & Pachana, N. A. (1999). How well do standard clinical neuropsychological tests identify malingering? A preliminary analysis. *Journal of Clinical and Experimental Neuropsychology, 21*(2), 245-250.

Grane, V. A., Enderstad, T., Pinto, A. F., Solbakk, A. K. & Vaidya, C. (2014). Attentional control and subjective executive function in treatment-naïve adults with attention deficit hyperactivity disorder. *PLoS ONE, 9*(12), 2014.

Green, A. L. & Rabiner, D. L. (2012). What do we really know about ADHD in college students? *Neurotherapeutics, 9*(3), 559-568.

Green, C. M., Kirke, J. W., Connery, A. K., Baker, D. A. & Kirkwood, M. W. (2014). The use of the Rey 15-Item test and recognition trial to evaluate noncredible effort after pediatric mild traumatic brain injury. *Journal of Clinical and Experimental Neuropsychology, 36*(3), 261-267.

Green, P., Allen, L. & Astner, K. (1996). *The Word Memory Test: A user's guide to the oral and computer-assisted forms, US version 1.1.*Durham, NC: CogniSyst.

Green, P. Iverson, G. L. & Allen, L. (1999). Detecting malingering in head injury litigation with the Word Memory Test. *Brain Injury, 13*(10), 813-819.

Green, R. H. (1979). *Sampling design and statistical methods for environmental biologists*. New York, NY: John Wiley and Sons.

Greiffenstein, M. F., Baker, W. J., & Gola, T. (1994). Validation of malingered amnesia measures with a large clinical sample. Psychological Assessment, 6, 218-224.

Greiffenstein, M. F., Baker, W. J. & Gola, T. (1996). Comparison of multiple scoring methods for Rey's malingered amnesia measures. *Archives of Clinical Neurpsyhology, 11,* 283-23.

Gresham, F. M. (1993). "What's wrong in this picture?": response to Motta et al.'s review of Human Figure Drawings. *School Psychology Quarterly, 8*(3), 182-186.

Greve, K. W., Bianchini, K. J. & Doane, B. M. (2006). Classification accuracy of the Test of Memory Malingering in traumatic brain injury: results of a known-groups analysis. *Journal of Clinical and Experimental Neuropsychology, 28*, 1176-1190.

Greve, K. W., Springer, S., Bianchini, K. J., Black, F. W., Heinly, M. T., Love, J. M., Swift, D. A. & Ciota, M. A. (2007). Malingering in toxic exposure: classifcation accuracy of Reliable Digit Span and WAIS-III Digit Span scaled scores. *Assessment, 14*(1), 12-21.

Groth-Marnat, G., & Roberts, L. (1998). Human Figure Drawings and House Tree Person drawings as indicators of self-esteeM:a quanititative approach. *Journal of Clinical Psychology, 54*(2), 219-222.

Gudjonsson, G. H., Sigurdsson, J. F., Eyjolfsdottir, G. A., Smari, J. & Young, S. (2009). The relationship between satisfaction with life, ADHD symptoms, and associated problems among university students. *Journal of Attention Disorders, 12*(6), 507-515.

Gunn, D., Batchelor, J. & Jones, Mike. (2010). Detection of simulated memory impairment in 6-to 11-year-old children. *Child Neuropsychology, 16*(2), 105-118.

Guriel-Tennant, J. & Fremouw, W. (2006). Imapct of trauma history and coaching on malingering of posttraumatic stress disorder using the PAI, TSI, and M-FAST. *Journal of Forensic Psychiatry & Psychology, 17*(4), 577-592.

Hammer, E. (1958). *The Clinical Application of Projective Drawings.* New York, NY: New York University.

Harp, J. P., Jasinski, L. J., Shandera-Ochsner, A. L., Mason, L. H. & Berry, D. T. R. (2011). Detection of malingered ADHD using the MMPI-2-RF. *Psychological Injury and Law, 4*(1), 32-43.

Harrison, A. G. (2006). Adults faking ADHD: you must be kidding! *ADHD Report, 14*, 1-7.

Harrison, A. G., Edwards, M. J., & Parker, K. C. H. (2007). Identifying students faking ADHD: Preliminary findings and strategies for detection. *Archives of Clinical Neuropsychology, 22*, 577-588.

Harrison, A. G., Green, P., & Flaro, L. (2012). The importance of symptom validity testing in adolescents and young adults undergoing assessments for learning or attention difficulties. *Canadian Journal of School Psychology, 27*(1), 98-113.

Harrsion, A. G., Nay, S. & Armstrong, I. T. (2016). Diagnostic accuracy of the Conners' Adult ADHD Rating Scale in a postsecondary population. *Journal of Attention Disorders*, *21*, 1-9.

Hartl, T. L., Frost, R. O., Allen, G. J., Deckersbach, T., Steketee, G., Duffany, S. R. & Savage, C. R. (2004). Actual and perceived memory deficits in individuals with compulsive hoarding. *Depression and Anxiety, 20*(2), 59-69.

Heaton, R. K., H. H. Smith, J., Lehman, R. A. W., & Vogt, A. T. (1978). Prospects for faking believable deficits on neuropsychological testing. *Journal of Consulting and Clinical Psychology, 46*(5), 892-900.

Heinly, M. T., Greve, K. W., Bianchini, K. J., Love, J. M. & Brennan, A. (2005). WAIS Digit Span-based indicators of malingered neurocognitive dysfunction: classification accuracy in traumatic brain injury. *Assessment, 12*(4), 429-444.

Henrey, G. (2005). Probable malingering and performance on the Test of Variables of Attention. *Clinical Neuropsychologist, 19*(1), 121-129.

Hervey, A. S., Epstein, J. N. & Curry, J. F. (2004). Neuropsychology of adults with attentinon-deficit/hyperactivity disorder: a meta-analytic review. *Neuropsychology, 18*, 485-503.

Hiscock, C., Branham, J. & Hiscock, M. (1994). Detection of feigned cognitive impairment: The two-alternative forced-choice method compared with selected conventional tests. *Journal of Psychopathology and Behavioral Assessment, 16,* 95-109.

Holmes, C. B., Dungan, D. S. & Medlin, W. J. (1984). Reassessment of inferring personality traits from Bender-Gestalt drawing styles. *Journal of Clinical Psychology, 40*(5), 1241-1243.

Holmes, C. B., & Stephens, C. L. (1984). Consistency of edging on the Bender-Gestalt, Memory-For-Designs, and Draw-A-Person tests. *The Journal of Psychology, 117*, 269-271.

Holtz, R., Brannigan, G. G. & Schofield, J. J. (1980). The Kinetic Family Drawing as a measure of interpersonal distance. *The Journal of Genetic Psychology, 137*, 307-308.

Hopwood, C. J., Blais, M. A. & Baity, M. R. (2010). Introduction. In Blais, M. A., Baity, M. R. & Hopwood, C. J. (Eds.), *Clinical Applications of the Personality Assessment Inventory,* New York, NY: Routledge (PP. 1-12).

Horner, M. D., Bedwell, J. S. & Duong, A. (2008). Abbreviated form of the Test of Memory Malingering. *International Journal of Neuroscience, 116*(10), 1181-1186.

Hoskins, L. L., Binder, L. M., Chaytor, N. S., Williamson, D. J. & Drane, D. L. (2010). Comparison of oral and computrized versions of the Word Memory Test. *Archives of Clinical Neuropsychology, 25*, 590-600.

Hubley, A. M. & Hamilton, L. (2002, October). U*sing the Bycicle Drawing Test with adults.* Poster session presented at the 22nd Annual Meeting of the NAtional Academy of Neuropsychology, Miami, FL.

Hung, S. , Root, J. C. & Bascetta, B. L. (2014). Effort testing in Schizophrenia and Schizoeffective disorder: validity indicator profile and Test of Memory Malingering performance characteristics. *Archives of Clinical Neyropsychology, 29*, 164-172.

Hustak, T. L., Dinning, W. D., & Andert, J. N. (1976). Reliability of the Koppitz scoring system for the Bender Gestalt test. *Journal of Clinical Psychology, 32*(2), 468-469.

Imuta, K., Scarf, D., Pharo, H. & Hayne, H. (2013). Drawing a close to the use of human figure drawings as a projective measure of intelligence. *PloS One, 8*(3), e58991.

Institutional Data, Lake Region State College (2017). *Quick Data 2017-2018.* Retrieved from https://www.lrsc.edu/discover-lrsc/institutional-research-effectiveness/institutional-data

IVA Plus: Integrated Visual and Auditory Continuous Performance Test (CPT). (2011, October 31). Retrieved November 10, 2015, from http://www.braintrain.com/iva-plus/

Iverson, G. L., Slick, D. J. & Franzen, M. D. (2000). Evaluation of a WMS-R malingering index in a non-litigating clinical sample. *Journal of Clinical and Experimental Neuropsychology, 22*(2), 191-197.

Jachimowicz, G., & Geiselman, R. E. (2004). Comparison of ease of falsification of Attention Deficit Hyperactivity Disorder diagnosis using standard behavioral rating scales. *Cognitive Science Online, 2*, 6-20.

Jacobs-Kayam, A., Lev-Wiesel, R., & Zohar, G. (2013). Self-mutilation as expressed in self-figure drawings in adolescent sexual abuse survivors. *The Arts in Psychotherapy, 40*, 120-129.

Jasinski, L. J., Berry, D. T. R., Shandera, A. L., & Clark, J. A. (2011). Use of the Wechsler Adult Intelligence Scale Digit Span subest for malingering detection: a meta-analytic review. *Journal of Clinical and Experimental Neuropsychology, 33*(3), 300-314.

Jasinski, L. J., Harp, J. P., Berry, D. T., Shandera-Ochsner, A. L., Mason, L. H. & Ranseen, J. D. (2011). Using symptom validity tests to detect malingered ADHD in college students. *Clinical Neuropsychology, 25*(8), 1415-1428.

Javanmard, G. H. (2011). The study of default mode transcendence in Schizophrenic patients with negative and positive symptoms by Bender-Gestalt and Wisconsin Card Sorting tests. *Procedia--Social and Behavioral Sciences, 30*, 1031-1036.

Jelicic, M., Ceunen, E., Peters, M. J. V., & Merckelbach, H. (2011). Detected coached feigning using the Test of Memory Malingering (TOMM) and the Structured Inventory of Malingered Symptomology (SIMS). *Journal of Clinical Psychology, 67*(9), 850-855.

Jenkins, A., Lindsay, S., Estambolchilar, P., Thornton, I. M. & Tales, A. (2016). Administering cognitive tests through touch screen tablet devices: potential issues. *Journal of Alzheimer's Disease, (54)*3, 1169-1182.

Johnson, D. E., Epstein, J. N., Waid, L. R., Latham, P. K., Voronin, K. E., & Anton, R. F. (2001). Neuropsychological performance deficits in adults with Attention Deficit/Hyperactivity Disorder. *Archives of Clinical Neuropsychology, 16*(6), 587-604.

Johson, D. H. (1981). How to measure habitat—a statistical perspective. In D. E. Capen (ed.) *The use of multivariate statistics in studies of wildlife habitiat* (pp. 53-57) USDA For. Sev. Gen. Tech. Rep. RM-87.

Jolles, I. (1952). A study of the validity of some hypotheses for the qualitative interpretation of the H-T-P for children of elementary school age: II. The "phallic tree" as an indicator of psycho-sexual conflict. *Journal of Clinical Psychology, 8*(3), 245-255.

Kato, D., & Suzuki, M. (2016). Personality traits and the expression area of Synthetic House-Tree-Person drawings in early adolescent Japanese. *Psychological Thought, 9*(1), 67-74.

Kawabata, K., Tachibana, H. & Kasama, S. (2002). Cerebral blood flow and cognitive function in Parkinson's disease. *International Congress Series, 1232*, 583-586.

Keppeke, L. D. F., Cintra, I. D. P. & Shoen, T. H. (2013). Bender Visual-Motor Gestalt Test in adolescents: relationship between visual-motor development and the Tanner Stages. *Perceptual and Motor Skills, 117*(1), 257-275.

Kessler, R. C., Adler, L., Ames, M., Demier, O., Faraone, S., Hiripi, E., Howes, M. J., Jin, R., Secnik, K. Spencer, T., Ustun, T. B. & Walters, E. E. (2005). The World Health Organization Adult ADHD Self Report Scale (ASRS): a short screening scale for use in the general population. *Psychology and Medicine, 35*(2), 245-256.

Killgore, W. D. S. & DellaPietra, L. (2000). Using the WMS-III to detect malingering: empirical validation of the Rarely Missed Index (RMI). *Journal of Clinical and Experimental Neuropsychology, 22*(6), 761-771.

Kim, J. H. (2003). Diagnosis of ADHD among gifted children in relation to KEDi-WISC and T.O.V.A. preformance. *The Gifted Child Quarterly, 47*(3), 192-201.

Kim, J. W., Lee, Y. S., Han, D. H., Min, K. J., Kim, D. H. & Lee, C. W. (2015). The utility of quantitiative electroencephalography and Integrated Visual and Auditory Continous Perofrmance Test as auxiliary tills for attention deficit hyperactivity disorder diagnosis. *Clinical Neuropsychology, 126*(3), 532-540.

Kim, M. S., Namgoong, Y. & Youn, T. (2008). Effect of organizational strategy on visual memory in patients with schizophrenia. *Psychiatry and Clinical Neurosciences, 62*(4), 427-434.

Kim, M. S., Park, S. J., Shin, M. S. & Kwon, J. S. (2002). Neurpsychological profile in patients with obsessive-compulsive disorder over a period of 4-month treatment. *Journal of Psychiatric Research, 36*(4), 257-265.

Kim, S., Han, J., Kim, Y., & Oh, Y. (2011). A Computer Art Therapy System for Kinetic Family Drawing (CATS_KFD). *The Arts in Psychotherapy, 38*, 17-28.

King, C. M., Heilbrun, K., Kim, N. Y., McWilliams, K., Phillips, S., Barbera, J. & Fretz, R. (2017). Tablet computers and forensic and correctional psychological assessment: a randomized control study. *Law and Human Behavior, 41*(5), 468-477.

Kingston, D. A., Ahmed, A. G., Gray, J., Bradford, J. & Seto, M. C. (2013). The assessment and diagnosis of Attention Deficit Hyperactivity Disorder in adult forensic psychiatric outpatients. *Journal of Psychopathology and Behavior Assessment, 35*(3), 293-300.

Kirk, J. W., Harris, B., Hutaff-Lee, C. F., Koelemay, S. W., Dinkins, J. P. & Kirkwood, M. W. (2011). Performance on the Test of Memory Malingering (TOMM) along a large clinic-referred pediatric sample. *Child Neuropsychology, 17*(3), 242-254.

Kirkwood, M. W., Hargrave, D. D. & Kirk, J. W. (2011). The value of the WISC-IV Digit Span subtest in detecting noncredible performance during pediatric neuropsychological examinations. *Archives of Clinical Neuropsychology, 26*(5), 377-384.

Kohketsu, C., & Morita, M. (2011). Drawing features of S-HTP of contemprary youth seen from the viewpoint of the attitude to interact with friends [in Japanese]. *Journal of Japanese Clinical Psychology, 29*, 634-639.

Kucharski, L. T., Toomey, J. P., Fila, K. & Duncan, S. (2007). Detection of malingering of psychiatric disorder with the Personality Assessment Inventory: an investication of criminal defendants. *Jouranl of Personality Assessment, 88*(1), 25-32.

Lamb, D. G., Berry, D. T. R., Wetter, M. W. & Baer, R. A. (1994). Effects of two types of information on malingerin of closed head injury on the MMPI-2: an analog investigation. *Psychological Assessment, 6*(1), 8-13.

Lande, R., & Williams, L. (2013). Prevalence and characteristics of military malingering. *Military Medicine, 178*(1), 50-54.

Lange, R. T., Iverson, G. L., Brooks, B. L. & Rennison, V. L. A. (2010). Influence of poor effort on self-reported symptoms and neurocognitive test performance following mild traumatic brain injury. *Journal of Clinical and Experimental Neuropsychology, 32*(9), 961-972.

Lange, R. T., Sullivan, K. A. & Anderson, D. (2005). Ecological validity of the WMS-III Rarely Missed Index in personal injury litigation. *Journal of Clinical and Experimental Neuroposychology, 27*(4), 412-424.

Lange, R. T., Sullivan, K. A. & Scott, C. (2010). Comparison of MMPI-2 and PAI validity indicators to detect feigned depression and PTSD symptom reporting. *Psychiatry Research, 176*(2), 229-235.

Langeluddecke, P. M. & Lucas, S. K. (2003). Quantitative measures of memory malingering on the Wechsler Memory Scale-Third edition in mild head injury litigants. *Archives of Clinical Neuropsychology, 18*(2), 181-197.

Larrabee, G.J. (1990). Cautions in the use of neuropsychological evaluation in legal settings. *Neuropsychology,* 4, 239-247.

Larrabee, G. J. (2003). Detection of symptom exaggeration with the MMPI-2 in litigants with malingered neurocognitive dysfunction. *Clinical Neuropsychologist, 17*(1), 54-68.

Laursen, P. (2018). Cognitive Function Scanner Mobile Full Test Suite (CFSX-4.01.04) [Mobile application software]. Retrieved from https://play.google.com/store/apps/details?id=dk.crs.cfsx&pcampaignid=MKT-Other-global-all-co-prtnr-py-PartBadge-Mar2515-1

Lee, D. H., Oakand, T., Jackson, G., & Glutting, J. (2008). Estimated prevalence of attention-deficit/hyperactivity disorder symtpoms among college freshman: Gender, race and rater effects. *Journal of Learning Disabilities, 41*, 371-384.

Lee, G. P., Loring, D. W. & Martin, R. C. (1992). Rey's 15 Item Visual Memory Test for the detection of malingering: normative observations on patients with neurlogical disorders. *Psychological Assessment, 4*(1), 43-46.

Lees-Haley, P. R. (1992). Efficacy of MMPI-2 validity scales and MCMI-II modifier scales for detecting spurious PTSD claims: F, F-K, Fake Bad Scale, Ego Strength, Subtle-Obvious subscales, DIS and DEB. *Journal of Clinical Psychology, 48*(5), 681-689.

Lezak, M. (1995). *Neuropsychological Assessment* (3rd ed.). New York: Oxford University Press.

Lezak, M. D., Howieson, D. B. & Loring, D. W. (2004). *Neuropsychological Assessment* (4th ed.). New york: Oxford University Press.

Liberman, J., Stewert, W., Seines, O. & Gordon, B. (1994). Rater agreement for the Rey-Osterrieth Complex Figure Test. *Journal of Clinical Psychology, 50*(4), 615-624.

Liff, C. D. (2003). The detection of neuropsychological malingering. (Doctoral Dissertation). Retrieved from http://digital.library.unt.edu/ark:/67531/metadc4309/m2/1/high_res_d/dissertation.pdf.

Lilienfeld, S. O., Wood, J. M. & Garb, H. N. (2000). The scientific status of projective techniques. *Psychological Scienc ein the Public Interest 1*(2), 27-66.

Liljequist, L., Kinder, B. N. &Schinka, J. A. (1998). An investigation of malingering Posttraumatic Stress Disorder on the Personality Assessment Inventory. *Journal of Personality Assessment, 71*(3), 322-336.

Lindstrom, W., Nelson, J. M. & Foels, P. (2015). Postsecondary ADHD documentation requirements: common practices in the context of clinical issues, legal standards, and empirical findings. *Journal of Attention Disorders, 19*(8), 655-665.

Llorente, A .M., Voigt, R., Jensen, C. L., Fraley, J. K., Heird, W. C. & Rennie, K. M. (2008). The Test of Variables of Attention (TOVA): Internal consistency (Q 1 vs. Q 2 and Q 3 vs. Q4) in children with attention deficity/hyperactivity disorder (ADHD). *Child Neuropsychology, 14*(4), 314-322.

Loring, D. W., Lee, G. P. & Meador, K. J. (1988). Revising the Rey-Osterrieth: rating right hemisphere recall. *Archives of Clinical Neuropsychology, 3,* 239-247.

Loughan, A., Perna, R., Le, J. & Hertza, J. (2014). Abbreviating the Test of Memroy Malingering: TOMM Trial 1 in children with ADHD. *Archives of Clinical Neuropsychology, 29*(6), 605-606.

Loughan, A. R., Perna, R. & Hertza, J. (2012). The value of the Wechsler Intelligence Scale for Children-Fourth Edition Digit Span as an Embedded Measure of Effort: An investigation into children with dual diagnoses. *Archives of Clinical Neuropsychology, 27*(7), 716-724.

Love, C. M., Glassmire, D. M., Zanolini, S. J. & Wolf, A. (2014). Specificity and fals positive rates of the Test of Memory Malingering, Rey 15-Item Test and Rey Word Recognition Test among forensic inpatients with intellectual disabilities. *Assessment, 21*(5), 618-627.

Lu, P. H., Boone, K. B., Cozolino, L., & Mitchell, C. (2003). Effectiveness of the Rey-Osterrieth Complex Figure Trest and the meyers and meyers recognition trial in the detection of suspect effort. *The Clinical Neuropsychologist, 17*, 426-440.

Macallister, W. S., Nakhutina, L., Bender, H. A., Karantzoulis, S. & Calson, C. (2009). Assessing effor tduring neuropsychological evaluation with the TOMM in children and adolescents with epilepsy. *Child Neurology, 15*(6), 521-531.

Macciocchi, S. N., Steel, R. T., Alderson, A. & Godsall, R. (2006). Victoria Symptom Validity Test performance in acute severe tarumatic brain injury: implications for test interpretation. *Archives of Clinical Neuropsychology, 21*(5), 395-404.

Maloney, M. P. & Glasser, A. (1982). An evaluation of the clinical utility of the Draw-A-Man test. *Journal of Clinical Psychology, 38*(1), 183-190.

Marshall, M. B. & Bagby, R. M. (2006). The incremental validity and clinical utility of the MMPI-2 infrequency posttraumatic stress disorder scale. *Assessment, 13*(4), 417-429.

Marshall, P. S., Hoelzle, J. B., Heyerdahl, D., & Nelson, N. W. (2016). The Impact of Failing to Identify Suspect Effort in Patients Undergoing Adult Attention-Deficit/Hyperactivity Disorder (ADHD) Assessment. *Psychological Assessment*, advanced online publication doi:10.1037/pas0000247

Martin, R. C., Franzen, M. D. & Orey, S. (1998). Magnitude of error as a strategy to detect feigned memory impairment. *The Clinical Neuropsychologist, 12*(1), 84-91.

Maserati, M. S., D’Onofrio, R., Matacena, C., Sambati, L., Oppi, F., Poda, R., De Matteis, M., Naldi, I., Liguori, R. & Capellari, S. (2018). Human figure drawing distinguishes Alzheimer’s patients: a cognitive screening test study. *Neurological Sciences, 39*(5), 851-855.

Mason, L. H., Shandera-Ochsner, A. L., Williamson, K. D., Harp, J. P., Edmundson, M., Berry, D .T. R. & High, W. M. (2013). Accuracy of MMPI-2-RF validity scales for identifying feigned PTSD symptoms, random responding, and genuine PTSD. *Journal of Personality Assessment, 95*(6), 585-593.

Mathias, C. W., Greve, K. W., Bianchini, K. J., Houston, R. J. & Crouch, J. A. (2002). Detecting malingered neurocognitive dysfunction using the reliabile digit span in traumatic injury. *Assessment, 9*(3), 301-308.

Matto, H. C., & Naglieri, J. A. (2005). Race and ethnic differences and Human Figure Drawings: clinical utility of the DAP:SPED. *Journal of Clinical Child and Adolescent Psychology, 34*(4), 706-711.

Maverick, J. B. (2018). What assumptions are made when conducting a t-test? *Investopedia,* retrieved Dec. 11, 2018 from https://www.investopedia.com/ask/answers/073115/what-assumptions-are-madewhen-conducting-ttest.asp

McCaffrey, R. J. & Weber, M. (1999). A clinical approach to evaluating malingering in forensic neuropsychological evaluations. *Revista Esañola de Neuropsicología, 2*(3), 21-36.

McCarney, S. & Anderson, P. D. (1996). *Adult Attention Deficit Disorders Evaluation Scale.* Columbia, MO: Hawthorne Educational Services.

McCarthy, J., Rabinowitz, D., Habib, M. & Goldman, H. (2002). Bender Gestalt recall as a measure of short-term visual memory in children and adolescents with psychotic and other severe disorders. *Perceptual and Motor Skills, 95*(3), 1233-1238.

McDermotte, B. E., & Sokolov, G. (2009). Malingering in a correctional setting: the use of the structured interview of reported symptoms in a jail sample. *Behavioral Sciences and the Law, 27*, 753-765.

McLachlan, J. F. C., & Head, V. B. (1974). An impairment rating scale for human figure drawings. *Journal of Clinical Psychology, 30*(3), 405-407.

McNeish, T. J., & Naglieri, J. A. (1993). Identification of individuals with serious emotional disturbance using the Draw a Person: screening procedure for emotional disturbance. *The Journal of Special Education, 27*(1), 115-121.

McPhee, J. P., & Wegner, W. (1976). Kinetic-Family-Drawing styles and emotionally disturbed childhood behavior. *Journal of Personality Assessment, 40*(5), 487-491.

Merten, T., Bossink, L. & Schmand, B. (2007). On the limits of effort testing: Symptom validity tests and severty of neurocognitive symptoms in nonlitigant patients. *Journal of Clinical and Experimental Neuropsychology, 29*(3), 308-318.

Messerli, P., Seron, X. & Tissot, R. (1979). Quelques aspects des troubles de la programmation dans le syndrome frontal. *Archives Suisse de Neurologie, Neurochirurgie et de Psychiatrie, 125*, 23-35.

Meyers, J. E., & Meyers, K. R. (1995). *Rey Complex Figure Test and Recognition Trial: Professional manual.* Lutz, FL: Psychological Assessment Resources.

Meyers, J. E. & Volbrecht, M. E. (1999). Detection of malingering using the Rey Complex Figure and Recognition Trial. *Applied Neuropsychology, 6*(4), 201-207.

Meyers, J. E. & Volbrecht, M. E. (2003). A validation of multiple malingering detectino methods in a large clinical sample. *Archives of Clinical Neuropsychology, 18*, 261-276.

Miele, A. S., Gunner, J. H., Lynch, J. K. & Mccaffrey, R. J. (2012). Are embedded validity indices equivalent to free-standing symptom validity measures? *Archives of Clinical Neuropsychology, 27*(1), 10-22.

Mikami, N. (1995). *S-HTP hou-tougougata HTP hou ni okeru rijshouteki hattatsuteki approach [S-HTP method: Clinical and developmental appraoch of the synthetic HTP method]*. Tokyo: Seishin Shobo.

Miller, H. (1961). Accident Neurosis. *British Medical Journal, 1,* 919-925.

Millon, T., Grossman, S., & Millon, C. (2015). *MCMI-IV Millon Clinical Multiaxial Inventory-IV manual.* Bloomington, MN: Pearson.

Mitrushina, M. , Boone, K., Razani, J. & D'Elia, L. F. (2005). *Handbook of Normative Data for Neuropsychological Assessment, Second Edition.* New York, NY: Oxford University Press.

Millstein, R. B., Wilens, T. E., Biederman, J. & Spencer, T. J. (1997). Presenting ADHD symptoms and subtypes in clinically referred adults with ADHD. *Journal of Attention Disorders, 2*, 159-166.

Mittenberg, W., Azrin, R., Millsaps, C. & Heilbronner, R. (1993). Identification of malingered head injury on the Wechsler Memory Scale-Revised. *Psychological Assessment, 5,* 34-40.

Mittenberg, W., Patton, C., Canyock, E. M., & Condit, D. C. (2002). Base rates of malingering and symptom exaggeration. *Journal of Clinical and Experimental Neuropsychology, 24*(8), 1094-1102.

Mogge, N. L., Lepage, J. S., Bell, T. & Ragatz, L. (2010). The negative distortion scale: A new PAI validity scale. *Journal of Forensic Psychiatry & Psychology, 21*(1), 77-90.

Moore, B. A. & Donders, J. (2004). Predictors of invalid neuropsychological test performance after traumatic brain injury. *Brain Injury, 18*(10), 975-984.

Morel, K. R. & Shepherd, B. E. (2008). Developing a symptom validity test for Posttraumatic Stress Disroder: Application of the binomial disribution. *Journal of Anxiety Disorders, 22*(8), 1297-1302.

Morey, L. C. (1996). *An Interpretive Guide to the Personality Assessment Inventory (PAI).* United States of America: Psychological Assessment Resources, Inc.

Morey, L. C. (1991). *Personality Assessment Iventory professional manual.* Odessa, FL: Psychological Assessment Resources.

Morey, L. C. (2007). *Personality Assessment Inventory-Adolescent professional manual.* Lutz, FL: Psychological Assessment Resources.

Morey, L. C. (2014). Personality Assessment Inventory. In Archer, R. P. & Smith, S. R. (Eds.), *Personality assessment, Second Edition.* New York, NY: Routledge (pp. 181-228).

Morey, L. C. & Lanier, V. W. (1998). Operating characteristics of six response distortion indicators for the Personality Assessment Iventory. *Assessment, 5*(3), 203-214.

Morgan, C. D., & Murray, H. A. (1935). A method for investigating phantasies: the Thematic Apperception Test. *Neurology and Psychiatry, 34,* 289-306.

Moses, Jr., J. A. (2013). Assessment of visual-motor skills in Golden, C. J. & Vicente, P. J. (Eds.) *Foundations of Clinical Neuropsychology,* (pp. 25-64). New York, NY: Plentum Press.

Motta, R. W., Little, S. G., & Tobin, M. I. (1993). The use and abuse of Human Figure Drawings. *School Psychology Quarterly, 8*(3), 162-169.

Musso, W. M. & Gouvier, W. D. (2014). “why is this so hard?” a review of detection of malingered ADHD in college students. *Journal of Attention Disorders, 18*(3), 186-201.

Musso, W. M., Hill, B. D., Pella, R. D. & Gouvier, W. D. (2016). Utility of the Personality Assessment Inventory for detecting malingered ADHD in college students. *Journal of Attention Disorders, 20*(9), 763-774.

Naglieri, J. A. (1988). *Draw A Person: A Quantitative Scoring System.* San Antonio, TX: Psychological Corporation.

Naglieri, J. A., McNeish, T. J. & Bardos, A. N. (1991). *Draw-A-Person: Screening Procedure for Emotional Disturbance.* Austin, TX: ProEd.

Naglieri, J. A., & Pfeiffer, S. I. (1992). Performance of disruptive behavior disordered and normal samples on the Draw a Person: screening procedure for emotional disturbance. *Psychological Assessment, 4*(2), 156-159.

Naoko, M. (2009). the basic research for the effective use of the synthetic house-tree-person technique as a psylogical assessment for children [in Japanese]. *Meiji University Humanities Research Institute Bulletin, 65*, 293-338.

Nugent, K. & Smart, W. (2014). Attentino-deficity/hyperactivity disorder in postsecondary students. *Neurpsychiatric Disease and Treatment, 10*, 1781-1791.

Oas, P. 1984. Validity of the Draw-A-Person and Bender Gestalt tests as measures of impulsivity with adolescents. *Journal of Consulting and Clinical Psychology, 52*(6), 1011-1019.

O’Bryant, S. E., Finlay, C. G. & O’Jile, J. R. (2007). TOMM performances and self-reported symptoms of depression and anxiety. *Journal of Psychopathology and Behavioral Assessment, 29*(2), 111-114.

O’Bryant, S. E., Gavett, B. E., Mccaffrey, R. J., O’Jile, J. R., Huerkamp, J. K., Smitherman, T. A. & Humphreys, J. D. (2008). Clinical utility of trial 1 of the Test of Memory Malingering (TOMM). *Applied Neuropsychology, 15*(2), 113-116.

Office of Institutional Research, University of North Dakota (2017). *Fall Enrollment by racial/ethnic origin and gender.* Retrieved from http://www1.und.edu/research/institutional-research/_files/docs /factbook/2017/s7-racialethnic.pdf

Ormachea, P. A., Lovins, B. K., Eagleman, D. M., Davenport, S., Jarman, A. & Haarsma, G. (2017). The role of tablet-based psychological tasks in risk assessment. *Criminal Justice and Behavior, 44*(8), 993-1008.

Osterrieth, P. A. (1944). Filetest de copie d'une figure complex: contribution a l'etude de la perception et de la memoire. [The test of copying a complex figure: A contribution ot the study of perception and memory]. *Archives de Psychologie, 30,* 286-356.

Ożer, S. (2010). A comparison of clinical and nonclinical groups of children on the Bender-Gestalt and Draw a Person tests. *Procedia Social and Behavioral Science, 5*, 449-454.

Palmer, L., Farrar, A. R., Valle, M., Ghahary, N., Panella, M., & DeGraw, D. (2000). An investigation of the clinical use of the House-Tree-Person projective drawings in the psychological evaluation of child sexual abuse. *Child Maltreatment, 5*(2), 169-175.

Pankratz, L. (1988). Malingering on intellectual and neuropsychological measures. In R. Rogers (Ed.), *Clinical Assessment of Malingering and Deception*, (pp. 169-192). New York: Guilford.

Parikh, R., Mathai, A., Parikh, S., Sekhar, G. C. & Thomas, R. (2008). Understanding and using sensitivity, specificity and predictive values. *Indian Journal of Ophthalmology, 56*(1), 45-50.

Pelfrey, W. (2004). The relationship between malingerers’ intelligence and MMPI-2 knowledge and their ability to avoid detection. *International Journal of Offender Therapy and Comparative Criminology, 48*(6), 649-663.

Pendés, R., Catalán, R., Andrés, S., Salamero, M. & Gastó, C. (2005). Executive function and nonverbal memory in obsessive-compulsive disorder. *Psychiatry Research, 133*(1), 81-90.

Perets-Dubrovsky, S., Kaveh, M., Deutsch-Castel, T., Cohen, A. & Tirosh, E. (2010). The Human Figure Drawing as related to Attention-Deficit Hyperactivity Disorder (ADHD). *Journal of Child Neurology, 25*(6), 689-693.

Perry, G. G., & Kinder, B. N. (1990). The susceptability of Rorschach to malingering: a critical review. *Journal of Personality Assessment, 54*(1 & 2), 47-57.

Pierson, A., Rosenfeld, B., Green, D. & Belfi, B. (2011). Investigating the relationship between antisocial personality disorder and malingering. *Criminal Justice and Behavior, 38*(2), 146.

Pinto, P. S. P., Iego, S., Nunes, S., Menezes, H., Mastrorosa, R. S., Oliveira, I. R. & Rsario, M. C D. (2011). Influence of specific obsessive-compulsive symptom dimensions on strategic planning in patients with obsessive-compulsive disorder. *Revista Brasileira d Psiquitria, 33*(1), 40-46.

Poythress, N. G., Edens, J. F. & Watkins, M. M. (2001). The relationship between psychopathic personality features and malingering symptoms of major mental illness. *Law and Human Beahvor, 25*(6), 567-582.

Preston, A. S., Fennel, E. B. & Bussing, R. (2005). Utility of a CPT in diagnosing ADHD among a representitive sample of high-risk children: a cautionary study. *Child Neuropsychology, 11*(5), 459-469.

Psychological Corporation. (1997). *WAIS-III and WMS-III technical manual.* San Antonio: Harcourt Brace and Company.

Quemada, J. I., Muñoz Céspedes, J. M., Ezkerra, J., Ballesteros, J., Ibarra, N. & Urruticoechea, I. (2003). Outcome of memory rehabilitation in traumatic brain injury assessed by neurpsychological tests and questionnaires. *Journal of Head Trauma and Rehabilitation, 18*(6), 532-540.

Quinn, C. A. (2003). Detection of malingering in assessment of adult ADHD. *Archives of Clinical Neuropsychology, 18*, 379-395.

Rabiner, D. L., Anastopoulus, A. D., Costello, J. E., Hoyle, R. H., McCabe, S. E. & Swartzwelder, H. S. (2009). Motives and percived consequences of nonmedical ADHD medication use by college students: are students treating themselves for attention problems? *Journal of Attention Disorders, 13*(3), 259-270.

Rachel, L. W. (1999). The use of the Machover Draw-A-Person test in detecting adult survivors of sexual abuse: A pilot study. *American Journal of Art Therapy, 37*, 106-107.

Rapport, M. D. (2001). Attention-deficit/hyperactivity disorder. In herson & Van Hasselt (Eds.), *Advanced abnormal psychology, second edition* (pp. 191-208). New York: Kluwer Academic/Plenum Publishers.

Raggio, D. J. (1999). Visuomotor perception in children with attention deficit hyperactivity disorder--combined type. *Perceptual and Motor Skills, 88*(2), 448-450.

Reedy, S. D., Boone, K. B, Cottingham, M. E., Glaser, D. F., Lu, P. H., Victor, T. L., Ziegler, E. A., Zeller, M. A. & Wright, M. J. (2013). Cross validation of the Lu and colleagues (2003) Rey-Osterrieth Complex Figure Test effort equation in large known-group sample. *Archives of Clinical Neuropsychology, 28*(1), 30-37.

Rees, L. M., Tombaugh, T. N & Boulay, L. (2001). Depression and the Test of Memory Malingering. *Archives of Clinical Neuropsychology, 16*(5), 501-506.

Rees, L. M., Tombaugh, T. N., Gansler, D. A. & Moczynski, N. P. (1998). Five validation experiments of the Test of Memory Malingering (TOMM). *Psychological Assessment, 10*(1), 10-20.

Reese, C. S., Suhr, J. A. & Riddle, T. L. (2012). Exploration of malingering indices in the Wechsler Adult Intelligence Scale-Fourth Edition Digit Span subtest. *Archivves of Clinical Neuropsychology, 27*(2), 176-181.

Reichenberg, N. & Raphael, A. J. (1992). *Advanced Psychodiagnostic Interpretation of the Bender Gestalt Test: Adults and Children.* Praeger.

Resnick, P. J., West, S., & Payne, J. W. (2008). Malingering of posttraumatic disorders. In R. Rogers (Ed.), *Clinical assessment of malingering and deception* (3rd ed., pp. 109-127). New York, NY: Guilford Press.

Rey, A. (1941). L'examen psychologique dans les cas d'encephalopathie traumatique. (Les Problems.). *Archives de Psychologie, 28*, 215-285.

Rey, A. (1964). *L'examen clinique en pschologie.* Paris: Presses Universitaires de France.

Reynolds, C. R., & Kamphaus, R. W. (Eds.). (2003). *Handbook of Pyschological and Educational Assessment of Children: Personality, Behavior and Context* (2 ed.): The Guilford Press.

Reznek, L. (2005). They Rey 15-item Memory Test for malingering: A meta-analysis. *Brain Injury, 19*(7), 539-543.

Riccio, C. A., Reynolds, C. R. & Lowe, P. A. (2001). *Clinical applications of continuous performance tests:measuring attention and impulsive responding in children and adults.* New York: Wiley.

Rios, J. & Morey, L. C. (2013). Detecting feigned ADHD in later adolescence: an examination of three PAI-A negative distortion indicators. *Journal of Personality Assessment, 95*(6), 594-599.

Robach, H. B. !968). Human figure drawings: their utility in the clinical psychologist's armamentarium for personality assessment. *Psychological Bulletin, 70*(1), 1-19.

Robinson, E. V. & Rogers, R. (2017). Detection of feigned ADHD across two domains: The MMPI-2-RF and CAARS for faked symptoms and TOVA for simulated attention deficits. *Journal of Psychopathology and Behavioral Assessment, 40*, 376-385.

Rodriguez, P. D. & Simon-Dack, S. L. (2013). Factor analysis of five adult ADHD self-report measures: are they all the same? *Journal of Attention Disorders, 17*(1), 64-69.

Rogers, R. (1990). Development of a new classificatory model of malingering. *Bulletin of the American Academy of Psychiatry and Law, 18*(3), 323-333.

Rogers, R. (2008) Research response styles. In R. Rogers (Ed.), *Clinical Assessment of Malingering and Deception* (3rd ed.). New York, NY: Guilford Press.

Rogers, R., Bagby, R. M. & Chakraborty, D. (1993). Feigning Schizophrenic disorders on the MMPI-2: detection of coached simulators. *Journal of Personality Assessment, 60*(2), 215-226.

Rogers, R. & Bender, S. D. (eds.) (2018). *Clinical Assessment of Malingering and Deception* (4th ed.), New York, NY: Guilford Press.

Rogers, R., Gillard, N., Berry, D. & Granacher, R. (2011). Effectiveness of the MMPI-2-RF validity scales for feigned mental disorders and cognitive impairment: a known-groups study. *Journal of Psychopathology and Behavioral Assessment, 33*(3), 355-367.

Rogers, R., Harrell, E. H. & Liff, C. D. (1993). Feigning neuropsychological impairment: A critical review of methodological and clinical considerations. *Clinical Psychology Review, 13*, 255-274.

Rogers, R., Orduff, S. R. & Sewell, K. W. (1993). Feigning specific disorders: a study of the Personality Assessment Inventory. *Journal of Personality Assessment, 60*(3), 554-560.

Rogers, R., Sewell, K. W., Martin, M. A. & Vitacco, M. J. (2003). Detectin of feigned mental disorders: a meta-analysis of the MMPI-2 and malingering. *Assessment, 10*(2), 160-177.

Rohlf, H., Jucksch, V., Gawrilow, C., Huss, M., Hein, J., Lehmkuhl, U. & Salbach-Andrae, H. (2012). Set shifting and working memory in adults with attention deficit/hyperactivity disorder. *Journal of Neural Transmission, 119*(1), 95-106.

Rorschach, H. (1921). *Psychodiagnostik.* Bircher: Bern.

Rosen, G. M. & Powel, J. E. (2003). Use of a symptom validity test in the forensic assesment of Posttramatic Stress Disorder. *Journal of Anxiety Disorders, 17*(3), 361-367.

Ross, S. R., Millis, S. R., Krukowski, R. A., Putnam, S. H. & Adams, K. M. (2004). Detecting incomplete effort on the MMPI-2: an examination of the Fake-Bad Scale in mild head injury. *Journal of Clinical and Experimental Neuropsychology, 26*(1), 115-124.

Ross, T. P., Poston, A. M, Rein, P. A., Salvatore, A. N., Wills, N. L. & York, T. M. (2016). Performance invalidity base rates among healthy undergraduate research participants. *Archives of Clinical Neuropsychology, 31*(1), 97-104.

Rossini, E. D. & Kaspar, J. C. (1987). The validity of the Bender-Gestalt emotional indicators. *Journal of Personality Assessment, 51*(2), 254-261.

Ruiz, M., Drake, E., Glass, A., Marcotte, D. & van Gorp, W. (2002). Trying to beat the systeM:misues of the internet to assist in avoiding the detection of psychological symptom dissimulation. *Professional Psychology: Research and Practice, 33*(3), 294-299.

Ryan, J. J., Glass, L. A., Hinds, R. M. & Brown, C. N. (2010). Administration order effects on the Test of Memory Malingering. *Applied Neuropsychology, 17*(4), 246-250.

Sami, N., Carte, E. T., Hinshaw, S. P. & Zupan, B. A. (2004). Performance of girls with ADHD and comparison girls on the Rey-Osterrieth Complex Figure: evidence for executive processing deficits. *Child Neuropsychology, 9*(4), 237-254.

Sánchez, G., Jiménez, F., Ampudia, A & Merino, V. (2012). In search of a fast screening method for detecting the malingering of cognitive impairment. *The European Journal of Psychology Applied to Legal Context, 4*(2), 135-158.

Sandyk, R. (1996). Brief communication: Electromagnetic fields improve visuospatial performance and reverse agraphia in a Parkinsonian patient. *International Journal of Neuroscience, 87*, 209-217.

Saneei, A., Bahrami, H., & Haghegh, S. A. (2011). Self-esteem and anxiety in human figure drawing of Iranian children with ADHD. *The Arts in Psychotherapy, 38*, 256-260.

Sanford, J. A. & Turner, A. (2004). Manual for the Integrated Visual and Auditory Continuous Performance Test. Richmond, VA: Brain Train.

Sansone, R. A. & Sansone, L. A. (2011). Faking Attention Deficit Hyperactivity Disorder. *Innovations in Clinical Neuroscience, 8*(8), 10-13.

Savage, C. R., Deckersbach, T., Wilhelm, S., Rauch, S. L., Baer, L., Reid, T. & Jenike, M. A. (2000). Strategic processing and episodic memory impairment in obsessive compulsive disorder. *Neuropsychology, 14*(1), 141-151.

Schatz, A. M., Ballantyne, A. O. & Trauner, D. A. (2001). Sensitivity and specificity of a computerized test of attention in the diagnosis of attention-deficit/hyperactivity disorder. *Assessment, 8*(4), 357-365.

Schretlen, D., & Arkowitz, H. (1990). A psychological test battery to detect prison inmates who fake insanity or mental retardation. *Behavioral Sciences and the Law, 8*, 75-84.

Schretlen, D., Wilkins, S. S., Gorp, W. G. V., & Bobholtz, J. H. (1992). Cross-validation of a psychological test battery to detect faked insanity. *Psychological Assessment, 4*(1), 77-83.

Seidman, L. J., Biederman, J., Faraone, S. V., Weber, W., & Ouellette, C. (1997). Toward defining a neuropsychology of Attention Deficit-Hyperactivity Disorder: performance of children and adolescents from a large clinically referred sample. *Journal of Counseling and Clinical Psychology, 65*(1), 150-160.

Sellbom, M. & Bagby, R. M. (2008). Response styles on multiscale inventories. In R. Rogers (Ed.), *Clinical assessment of malingering and deception* (3rd. ed., 182-206), New York, NY: Guilford Press.

Serra-Grabulosa, J. M., Junqué, C., Verger, K., Salgado-Pineda, P., Mañeru, C. & Mercader, J. M. (2005). Cerebral correlates of declarative memory dysfunctions in early traumatic brain injury. *Journal of Neurology, Neurosurgery and Psychiatry, 76*, 129-131.

Shin, M., Kim, Y., Cho, S., & Kim, B. (2003). Neuropsychologic characteristics of children with Attention-Deficit Hyperactivity Disorder (ADHD), Learning Disorder, and Tic Disorder on the Rey-Sterreith Complex Figure. *Journal of Child Neurology, 18*(12), 835-844.

Silverstein, S., Osborn, L. & Palumbo, D. (1998). Rey-Osterrieth Complex Figure Test performance in acute, chronic and remitted schizophrenia patients. *Journal of Clinical Psychology, 54*(7), 985-994.

Sollman, M. J., Ranseen, J. D., & Berry, D. T. R. (2010). Detection of feigned ADHD in college students. *Psychological Assessment, 22*(2), 325-335.

Stenclik, J. H., Miele, A. S., Silk-Eglit, G., Lynch, J. K. & McCaffrey, R. J. (2013). Can the sensitivity and specificity of the TOMM be increased with differential cutoff scores? *Applied Neuropsychology, 20*(4), 243-248.

Steffan, J. S., Morgan, R. D., Lee, J. & Sellbom, M. (2010). A comparative analysis of MMPI-2 malingering detection models among inmates. *Assessment, 17*(2), 185-196.

Strauss, E., Sherman, E. M. S., & Spreen, O. (2006). *A Compendium of Neuropsychological Tests: Administration, Norms and Commentary* (3rd ed.): Oxford University Press.

Suchy, Y., Chelune, G., Franchow, E. I. & Throgusen, S. R. (2012). Confronting patients about insufficient effort: the impact on subsequent symptom validity and memory performance. *The ClinicalNeuropsychologist,* 1-16.

Suhr, J. A. (2000). Malingering, coaching, and the serial position effect. *Archives of Clinical Neuropsychology, 17*(1), 69-77.

Suhr, J., Hammers, D., Dobbins-Buckland, K., Zimak, E., & Hughes, C. (2008). The relationship of malingering test failure to self-reported symptoms and neuropsychological findings in adults referred for ADHD evaluation. *Archives of Clinical Neuropsychology, 23*, 521-530.

Suhr, J. A., Sullivan, B. K., & Rodriguez, J. L. (2011). The relationship of noncredible perfomance to continuous performance test scores in adults referred for Attention-Deficit/Hyperactivity Disorder evaluation. *Archives of Clinical Neuropsychology, 26*, 1-7.

Sullivan, B. K., May, K., & Galbally, L. (2007). Symptom exaggeration by college adults in Attention-Deficit Hyperactivity Disorder and Learning Disorder assessments. *Applied Neuropsychology, 14*(3), 189-207.

Sullivan, K. & King, J. (2010). Detecting faked psychopathology: A comparison of two tests to detect malingered psychopathology using a simulation design. *Psychiatry Research, 176*(1), 75-81.

Swenson, C. H. (1968). Empirical evaluations of human figure drawings: 1957-1966. *Psychological Bulletin, 70*(1), 20-44.

Swihart, A. A., Harris, K. M. & Hatcher, L. L. (2008). Inability of the Rarely Missed Index to identify simulated malingering under more realistic assessment conditions. *Journal of Clinical and Experimental Neuropsychology, 30*(1), 120-126.

Tabachnick, B. G. & Fidell, L. S. (1996). *Using Multivariate Statistics (3rd Ed.).* New York, NY: HarperCollins Publishers Inc.

Tan, J. E., Slick, D. J., Strauss, E. & Hulsch, D. F. (2002). how'd they do it? Malingering strategies on symptom validity tests. *The Clinical Neuropsychologist, 16,* 495-505.

Taylor, E. M. (1959). *Psychological Appraisal of Children with Cerebral Deficits.* Cambridge, MA: Harvard University Press.

Taylor, L. A., Kreutzer, J. S. & West, D. D. (2003). Evaluation of malingering cut-off scores for the Rey 15-Item test: Abrain injury case study series. *Brain Injury, 17*, 295-308.

Taylor, L. B. (1998). Scoring criteria for the Rey-Osterrieth Complex Figure Test. Spreen, O. & Strauss, E. (Eds.) *A compendium of Neuropsychological Tests. Administration, Norms, and Commentary.* Oxford University Press, New York, NY.

Teichner, G. & Wagner, M. T. (2004). The Test of Memory Malingering (TOMM): normative data from cognitively intact, cognitively impaired, and elderly patients with dementia. *Archives of Clinical Neuropsychology, 19*(3), 455-464.

Thomas-Peter, B. A., Jones, J., Campbell, S. & Oliver, C. (2000). Debasement and faking bad on the Millon Clinical Multi-axial Inventory III: an examination of characteristics, circumstances and motives of forensic patients. *Legal and Criminological Psychology, 5*, 71-81.

Tinius, T. P. & Tinius, K. A. (2000). Changes after EEG biofeedback and cognitive retraining in adults with mild traumatic brain injury and attention deficit hyperactivity disorder. *Journal of Nuerotherapy, 4*(2), 27-44.

Tolin, D. F., Steenkamp, M. M., Marx, B. P. & Litz, B. T. (2010). Detecting symptom exaggeration in combat veterans using the MMPI-2 symptom validity scales: a mixed group validation. *Psychological Assessment, 22*(4), 729-736.

Tombaugh, T. N. (1996). *Test of memory malingering (TOMM)*: North Tonowanda, NY: Multi-Health Systems.

Tombaugh, T. N., & Butcher, J. N. e. (1997). The Test of Memory Malingering (TOMM): normative data from cognitively intact and cognitively impaired individuals. *Psychological Assessment, 9*(3), 260-268.

Tompkins, S. S. (1947). *The Thematic Apperception Test: The Theory and Technique of Interpretation.* Retrieved from https://archive.org/stream/thematicappercep007904mbp#page/n7/mode/2up.

Trahan, D. & Stricklin, A. (1979). Bender-Gestalt emotional indicators and acting-out behavior in young children. *Journal of Personality Assessment, 43*(4), 365-375.

Vanderslice-Barr, J. L., Miele, A., Jardin, B. & Mccaffrey, R. J. (2011). Comparison of computerized versus booklet versions of the TOMM. *Applied Neuropsychology, 18*(1), 34-36.

Veltri, C. O. C & Williams, J. E. (2012). Does the disorder matter? Investigating a moderating effect on coached noncredible overreporting using the MMPI-2 and PAI. *Assessment, 20*(2), 199-209.

Vickery, C. D., Berry, D. T. R., Inman, T. H., Harris, M. J., & Orey, S. A. (2001). Detection of inadequate effort on neuropsychological testing: a meta-analytic review of selected procedures. *Archives of Clinical Neuropsychology, 16*, 45-73.

Victor, T. & Abeles, N. (2004). Coaching clients to take psychological and neuropsychological tests. *Professional Psychology: Research and Practice, 35*(4), 373-379.

Viglione, D. J., Wright, D. M., Dizon, N. T., Moynihan, J. E., Dupuis, S. & Pizitz, T. D. (2001). Evading detection on the MMPI-2: does caution produce more realistic patterns of responding? *Assessment, 8*(3), 237-250.

Volker, M. A., Lopata, C., Vujnovic, R. K., Smerbeck, A. M., Toomey, J. A., Rodgers, J. D., Schiavo, A. & Thomeer, M. L., (2010). Comparison of the Bender Gestalt-II and VMI-V in samples of typical children and children with high-functioning Autism Spectrum Disorders. *Journal of Psychoeducational Assessment, 28*(3), 187-200.

Wadsworth, J. S. & Harper, D. C. (2007). Adults with Attention-Deficit/Hyperactivity Disorder: assessment and treatment strategies. *Journal of Counseling and Development, 85*(1), 101-109.

Walker, A. J., Shores, E. A., Trollor, J. N., Lee, T. & Sachdev, P. S. (2000). Neuropsychological functioning of adults with attention deficit/hyperactivity disorder. *Journal of Clinical and Experimental Neurpsychology, 22*, 115-124.

Walters, G. L. & Clopton, J. R. (2000). Effect of symptom information and validity scale infomration on the malingering of depression on the MMPI-2. *Journal of Personality Assessment, 75*(2), 183-199.

Wechsler, D. (1997). *WAIS-III administration and scoring manal.* San Antonio, TX: Ppsychological Associaton.

Wechsler, D. (2008). *Wechsler Adult Intelligence Scale-Fourth Edition: Administration and scoring manual.* San Antonio, TX: Pearson.

Wechsler, D. (2003). *Wechsler Intelligence Scale for Children-Fourth Edition.* San Antonio, TX: The Psychological Corporation.

Wechsler, D. (1997). Wechsler Memory Scale- Third Edition (WMS-III). San Antonio, TX: The Psychological Corporation.

Wechsler, D. (2009). Wechsler Memory Scale- Fourth Edition (WMS-IV). San Antonio, TX: The Psychological Corporation.

Weinborn, M., Orr, T., Woods, S. P., Conover, E. & Feix, J. (2003). A validation of the Test of Memory Malingering in a forensic psychiatric setting. *Journal of Clinical and Experimental Psychology, 25*(7), 979-990.

Weiner, I. B., & Greene, R. L. (2008). *Handbook of Personality Assessment*. Hoboken, New Jersey: John Wiley & Sons, Inc.

Wender, P. H. (1995). *Attention-deficity hyperactivity disorder in children and adults.* London, England: Oxford University Press.

Weyandt, L. L., Mtzlaff, L. & Thomas, L. (2002). The relationship between intelligence anad performance on the Test of Variables of Attention (TOVA). *Journal of Learning Disabilities, 35*(2), 114-120.

White, B. P., Becker-Blease, K. A., & Grace-Bishop, K. (2006). Stimulant medication use, misuse, and abuse in an undergraduate and graduate student sample. *Journal of American College Health, 54*(5), 261-268.

White, J. N., Hutchens, T. A. & Lubar, J. F. (2005). Quantitative EEG assessment during neuropsychological task performance in adults with attenion deficit hyperactivity disorder. *Journal of Adult Development, 12*(2), 113-121.

Whitney, K. A. (2013). Predicting Test of Memory Malingering and Medical Symptom Validity Test failure within a Veterans Affairs medical center: use of the Response Bias Scale and the Henry–Heilbronner Index. *Archives of Clinical Neuropsychology, 28*, 222-235.

Whiteside, D. M., Galbreath, J., Brown, M. & Turnball, J. (2012). Differential response patterns on the Personality Assessment Inventory (PAI) in compensation-seeking and non-compenstation-seeking mild traumatic brain injury patients. *Jouran of Clinical and Experimental Neuropsychology, 34*(2), 172-182.

Willcock, E., Imuta, K., & Hayne, H. (2011). Children's human figure drawings do not measure intellectual ability. *Journal of Experimental Child Psychology, 110*, 444-452.

Williams, C. L., Butcher, J. N, Gass, C. S., Cumella, E. & Kally, Z. (2009). Inaccuracies about the MMPI-2 Fake Bad Scale in the replay by Ben-Prath, Greve, Bianchinia nd Kaufman (2009). *Psychological Injury & Law, 2*(2), 182-197.

Wogar, M. A., van den Broek, M. D., Bradshaw, C. M. & Szabadi, E. (1998). A new performance-curve method for the detectino of simulated cognitive impairment. *British Journal of Clinical Psychology, 37*(3), 327-339.

Wolf, L. E. (2001). College students with ADHD and other hidden disabilities: outcomes and interventions. *Annals of the New York Academy of Sciences, 935*, 381-391.

Woods, D. L., Herron, T. J., Yund, E. W., Hink, R. F., Kishiyama, M. M. & Reed, B. (2011). Computerized analysis of error patterns in digit span recall. *Journal of Clinical and Experimental Neuropsychology, 33*(7), 721-734.

Wong, J., Lerner-Poppen, L. & Durham, J. (1998). Does warning reduce obvious malingerin on memory and motor tasks in college samples? *International Journal of Rehabilitation and Health, 4*(3), 153-165.

Wooley, C. N. & Rogers, R. (2015). The effectivenss of the Personality Assessment Inventory with feigned PTSD. *Assessment, 22*(4), 449-458.

Yanez, Y. T., Fremouw, W., Tennant, J., Strunk, J. & Coker, K. (2006). Effects of severe depression on TOMM performance among disability-seeking outpatients. *Archives of Clinical Neuropsychology, 21*(2), 161-165.

Young, J. G., & Gross, A. M. (2011). Detection of response bias and noncredible performance in adult Attention-Deficit/Hyperactivity Disorder. *Archives of Clinical Neuropsychology, 26*, 165-175.

Zalsman, G., Netanel, R., Fischel, T., Freudenstein, O., Landau, E., Orbach, I., . . . Apter, A. (2000). Human Figure Drawings in the evaluation of severe adolescent suicidal behavior. *Journal of the American Academy of Child and Adolescent Psychiatry, 39*(8), 1024-1031.

Zanello, A., Perrig, L. & Huguelet, P. (2006). Cognitive functions related to interpersonal problem-solving skills in schizophrenic patients compared with healthy subjects. *Psychiatry Research, 142*(1), 67-78.

APPENDICES

APPENDIX A

ACRONYM CHARTS

Table 1

Diagnoses Acronyms

Acronym	Diagnosis
ADHD	Attention Deficit Hyperactivity Disorder
ASD	Autism Spectrum Disorder
LD	Learning Disorder
PTSD	Post-Traumatic Stress Disorder
TBI	Traumatic Brain Injury

Table 2

Other Acronyms and Descriptions

Acronym	Full Title	Brief Description of Test/Term
AADDES	Adult Attention Deficit Disorder Evaluation Scale Self-Report Version	Self-report assessment of ADHD symptoms
AKOS-R	ADHD Knowledge and Opinion Survey-Revised	Measure of attitudes and knowledge regarding ADHD
ARS	Adult ADHD Rating Scale	Self-report measure of ADHD symptoms
BADDS	Brown Attention-Deficit Scale for Adults	Self-report assessment of ADHD symptoms
Barkley Scale	Barkley's Quick Check for Adult ADHD Diagnosis	Self-report assessment of ADHD symptoms
BDT	Bicycle Drawing Test	Figure drawing test of conceptual and mechanical reasoning and visuographic functioning
Bender Gestalt; Bender Gestalt II	The Bender Visual Motor Gestalt Test, first and second editions	Figure drawing assessment of motor and perceptual deficits
CAARS	Adult ADHD Rating Scales	Self-report assessment of ADHD symptoms
CATS_KFD	Computer Art Therapy System for Kinetic Family Drawing	Computerized human figure drawing projective measure
CDF	Cashel Discriminant Function	Measure of "faking good" in the Personality Assessment Inventory
CII	Conner's Adult ADHD Rating Scale Infrequency Index	Embedded measure of malingering detection within the Conner's Adult ADHD Rating Scale
CPT; CPT-II; CPT-III	Connor's Continuous Performance Test, First, Second and Third edition	Continuous performance measure of attention
CSS	Current Symptom Scale-Self Report Form	Self-report assessment of ADHD symptoms
DAP	Draw-A-Person	Human figure drawing projective measure
DAP:IQ	Draw-A-Person Intelligence Quotient	Human figure drawing cognitive assessment
DAP:SPED	Draw-A-Person Screening Procedure for Emotional Disturbance	Human figure drawing projective measure
DEB	Debasement Scale	Validity measure in the Millon Clinical Multiaxial Inventory
DIS	Disclosure Scale	Validity measure in the Millon Clinical Multiaxial Inventory
Ds	Dissimulation Scale	Measure of erroneous stereotypes in the Minnesota Multiphasic Personality Inventory
DS-ACSS	Digit Span Age-Corrected Scaled Score	Embedded malingering measure from Weschler's Digit Span subtest
Ds-ADHD		Proposed embedded measure on the MMPI-2, created to detect feigned ADHD
Dsr	Abbreviated Dissimulation Scale	Abbreviated measure of erroneous stereotypes in the Minnesota Multiphasic Personality Inventory

F	Infrequency Scale	Validity Measure from Minnesota Multiphasic Personality Inventory
Fb	Back Infrequency	Validity Measure from Minnesota Multiphasic Personality Inventory
FBS	Fake Bad Scale	Validity measure from Minnesota Multiphasic Personality Inventory
FD	Figure Drawing tests	Projective assessments that involve non-human drawings
FIT	Rey Fifteen-Item Memorization Task	Symptom validity test
F-K	F Minus K Index	Measure of malingering in the Minnesota Multiphasic Personality Inventory
fMRI	Functional magnetic resonance imaging	Measurement of blood flow to assess brain activity
Fp	Infrequency-Psychopathology	Validity measure in the Minnesota Multiphasic Personality Inventory
Fp-r		MMPI-2-RF
HFD	Human Figure Drawing tests	Projective assessments that involve drawing human figures
HHI	Henry-Heilbronner Index Scale	Embedded measure of Malingering for the Minnesota Multiphasic Inventory
HTP	House-Tree-Person	Human figure drawing projective measure
IQ	Intelligence Quotient	Summation of one's cognitive and intellectual abilities
IVA+PLUS	Integrated Visual and Auditory Continuous Performance Test	Continuous performance measure of attention
KFD	Kinetic Family Drawing	Human figure drawing projective measure
KSD	Kinetic School Drawing	Human figure drawing projective measure
LMDR	Logical Memory Delayed Recognition	Subtest from the Weschler Memory Scale
LW	Lachar and Wrobel critical item scale	Symptom severity scale in the Minnesota Multiphasic Personality Inventory
MAL	Malingering Index	Malingering measure in the Personality Assessment Inventory
MCMI-III; MCMI-IV	Millon Clinical Multiaxial Inventory, Third and Fourth Edition	Personality assessment
MMPI; MMPI-2; MMPI-2 RF	Minnesota Multiphasic Personality Inventory, first, second, and second restructured form edition	Personality assessment
MPRD	Malingered Pain-Related Disability Scale	Measure of over-reported pain in the Personality Assessment Inventory
NDS	Negative Distortion Scale	Malingering measure in the Personality Assessment Inventory
NIM	Negative Impression Management	Validity scale in the Personality Assessment Inventory
O-S	Obvious vs. Subtle	Scale on the Minnesota Multiphasic Personality Inventory

PAI; PAI-A	Personality Assessment Inventory, Personality Assessment Inventory-Adolescent	Personality assessment
PIM	Positive Impression Management	Measure of positive response set on the Personality Assessment Inventory
PRI	Perceptual Reasoning Index	Subtest of Weschler Adult Intelligence Scale
PSI	Processing Speed Index	Subtest of Weschler Adult Intelligence Scale
qEEG	Quantitative Electroencephalography	Brain-mapping procedure using electrical waves in brain activity
RBS	Response Bias Scale	Proposed validity measure for the Minnesota Multiphasic Personality Inventory
RCFT	Rey Complex Figure Test and Recognition Trial	Figure drawing neuropsychological assessment of visuospatial memory and ability
RDF	Rogers Discriminant Function	Malingering measure in the Personality Assessment Inventory
RDS	Reliable Digit Span	Embedded malingering measure from Weschler's Digit Span subtest
RMI	Rarely Missed Index	Embedded measure of feigned performance on the Weschler Memory Scale
ROCF	Rey-Osterrieth Complex Figure	Figure drawing assessment of visuospatial memory and ability
S-HTP	Synthetic-House-Tree-Person	Human figure drawing projective measure
SV	Symptom Validity	"accuracy or truthfulness of the examinee's behavioral presentation, self-reported symptoms, or performance on neuropsychological measures" (Bush et al., 2005)
SVT	Symptom Validity Test	Any test used to assess the validity of symptoms
TAT	Thematic Apperception Test	Projective assessment
TOMM	Test of Memory Malingering	Symptom validity test
TOVA	Test of Variables of Attention	Continuous performance measure of attention
VCI	Verbal Comprehension Index	Subtest of Weschler Adult Intelligence Scale
VIP	Validity Indicator Profile	Score within the Victoria Symptom Validity Test
VSVT	Victoria Symptom Validity Test	Symptom validity test
WAIS; WAIS-III; WAIS-IV	Weschler Adult Intelligence Scale, first, third, and fourth edition	Cognitive assessment
WISC-IV	Weschler Intelligence Scale for Children, fourth edition	Children's cognitive assessment
WMI	Working Memory Index	Subtest of Weschler Adult Intelligence Scale
WMS; WMS-R: WMS-III; WMS-IV	Weschler Memory Scale, first, restructured, third, and fourth edition	Memory assessment
WMT	Word Memory Test	Symptom validity test
WURS	Wender Utah Rating Scale	Self-report assessment of ADHD symptoms

APPENDIX B

ROC CURVES AND COORDINATES FOR THE CURVES

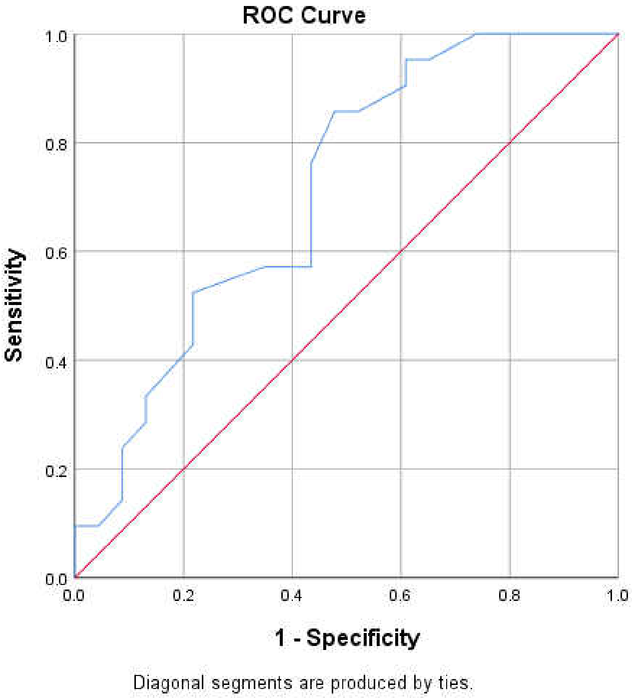

Figure 1. ROC Curve for H-T-P-M Tallied Total Details

Table 1

Coordinates of the Curve for H-T-P-M Tallied Total Details

Positive if Less Than or Equal To[a]	Sensitivity	1 - Specificity
8.00	.000	.000
11.00	.048	.000
13.50	.095	.000
14.50	.095	.043
15.50	.143	.087
16.50	.190	.087
17.50	.238	.087
18.50	.286	.130
19.50	.333	.130
20.50	.429	.217
21.50	.524	.217
22.50	.571	.348
23.50	.571	.391
24.50	.571	.435
25.50	.619	.435
26.50	.762	.435
27.50	.857	.478
28.50	.857	.522
30.00	.905	.609
31.50	.952	.609
32.50	.952	.652
33.50	1.000	.739
34.50	1.000	.783
38.00	1.000	.826
43.00	1.000	.870
46.00	1.000	.913
49.50	1.000	.957
53.00	1.000	1.000

[a] The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

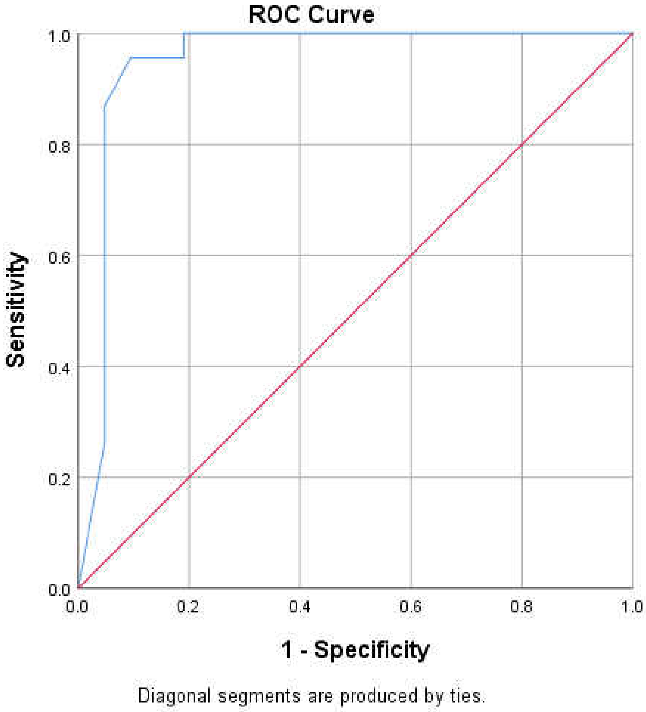

Figure 2. ROC Curve for TOMM Trial 1 Scores

Table 2

Coordinates of the Curve for TOMM Trial 1 Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
4.00	1.000	1.000
13.50	1.000	.952
23.00	1.000	.905
25.50	1.000	.857
28.50	1.000	.810
30.50	1.000	.762
31.50	1.000	.714
32.50	1.000	.619
34.00	1.000	.524
36.50	1.000	.429
38.50	1.000	.286
39.50	1.000	.190
41.00	.957	.190
43.50	.957	.095
45.50	.870	.048
46.50	.783	.048
47.50	.739	.048
48.50	.478	.048
49.50	.261	.048
51.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

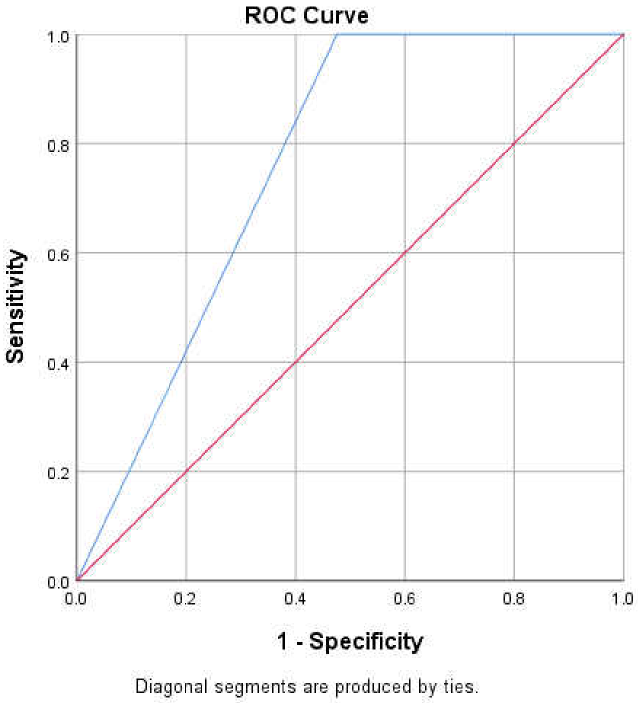

Figure 3. ROC curve for FIT scores

Table 3

Coordinates of the Curve for FIT scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
2.00	1.000	1.000
5.50	1.000	.905
8.50	1.000	.857
9.50	1.000	.714
10.50	1.000	.667
11.50	1.000	.619
13.50	1.000	.476
16.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

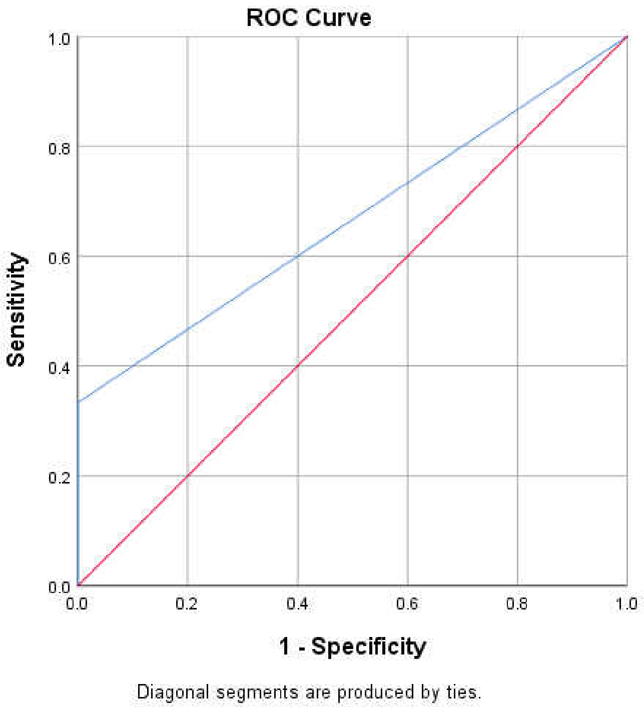

Figure 4. ROC Curve for MCMI-IV Invalidity (Scale V) Base Rate Scores

Table 4

Coordinates of the Curve for MCMI-IV Invalidity (Scale V) Base Rate Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
.50	.333	.000
1.50	.143	.000
3.00	.000	.000

The test result variable(s): V has at least one tie between the positive actual state group and the negative actual state group.

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

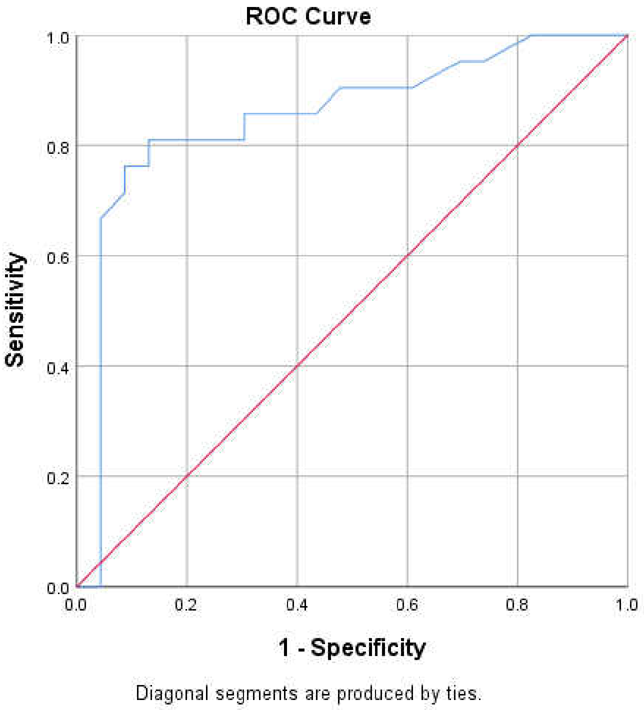

Figure 5. ROC Curve for the MCMI-IV Disclosure (Scale X) Base Rate Scores

Table 5

Coordinates of the Curve for MCMI-IV Disclosure (Scale X) Base Rate Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
22.00	1.000	1.000
24.00	1.000	.870
27.50	1.000	.826
33.50	.952	.739
38.00	.952	.696
41.00	.905	.609
44.00	.905	.565
46.00	.905	.522
47.50	.905	.478
48.50	.857	.435
54.50	.857	.348
61.00	.857	.304
62.50	.810	.304
65.50	.810	.261
69.00	.810	.130
70.50	.762	.130
73.50	.762	.087
78.00	.714	.087
81.00	.667	.043
83.00	.571	.043
85.00	.524	.043
86.50	.476	.043
87.50	.429	.043
88.50	.381	.043
90.00	.190	.043
91.50	.143	.043
92.50	.048	.043
96.50	.000	.043
101.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

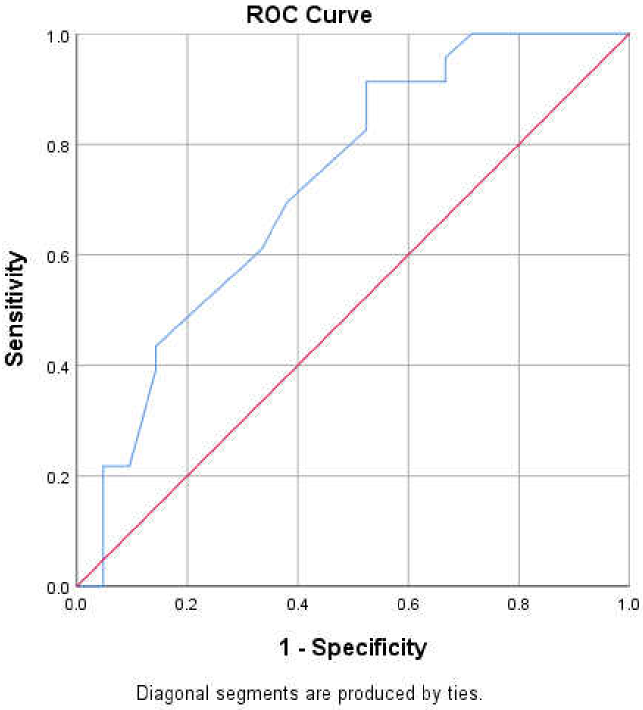

Figure 6. ROC Curve for the MCMI-IV Desirability (Scale Y) Base Rate Scale Scores

Table 6

Coordinates of Curve for the MCMI-IV Desirability (Scale Y) Base Rate Scale Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
7.50	1.000	.952
17.50	1.000	.905
25.00	1.000	.810
35.00	1.000	.714
42.00	.957	.667
44.50	.913	.667
47.50	.913	.524
52.50	.870	.524
57.50	.826	.524
61.50	.696	.381
64.50	.609	.333
67.50	.565	.286
70.50	.478	.190
73.50	.435	.143
76.50	.391	.143
79.50	.217	.095
83.00	.217	.048
87.00	.174	.048
91.00	.043	.048
95.00	.000	.048
98.00	.000	.000

The test result variable(s): Y has at least one tie between the positive actual state group and the negative actual state group.

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

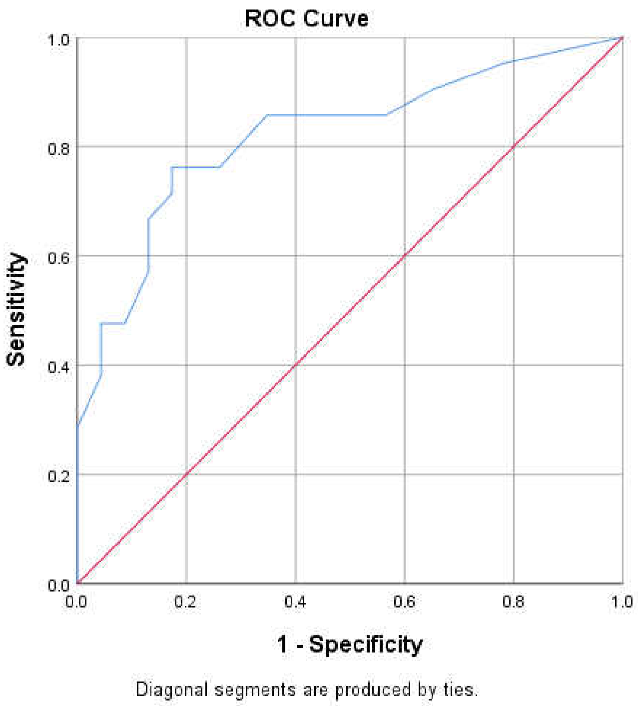

Figure 7. ROC Curve MCMI-IV Debasement (Scale Z) Base Rate Scores

Table 7

Coordinates of the Curve MCMI-IV Debasement (Scale Z) Base Rate Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
17.50	.952	.783
36.50	.905	.652
39.50	.857	.565
44.00	.857	.348
48.50	.810	.304
53.00	.762	.261
58.00	.762	.217
61.00	.762	.174
63.00	.714	.174
65.00	.667	.130
67.00	.571	.130
71.00	.476	.087
74.50	.476	.043
76.00	.429	.043
78.00	.381	.043
80.00	.286	.000
82.00	.238	.000
88.00	.190	.000
94.00	.143	.000
96.00	.095	.000
98.50	.048	.000
101.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

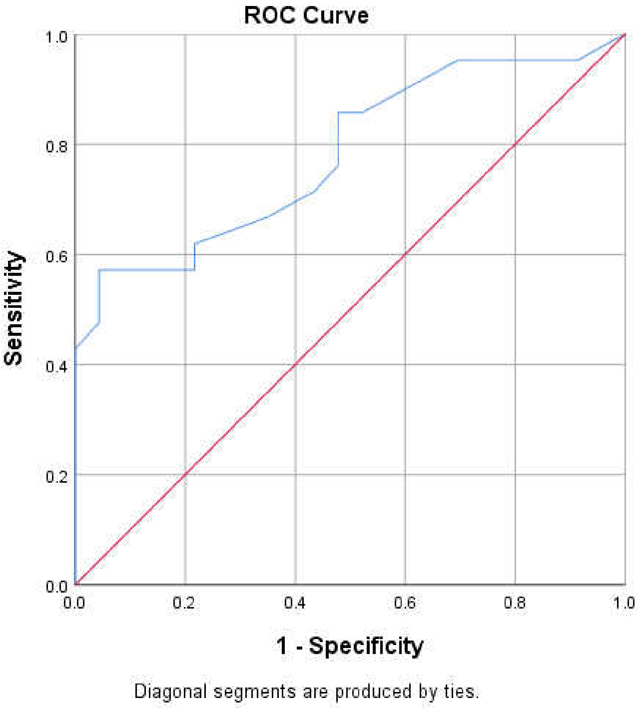

Figure 8. ROC Curve for MCMI-IV Schizoid (Scale 1) Base Rate Scores

Table 8

Coordinates of the Curve for MCMI-IV Schizoid (Scale 1) Base Rate Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
4.50	.952	.913
13.00	.952	.696
25.50	.857	.522
38.50	.857	.478
47.50	.762	.478
56.00	.714	.435
61.00	.667	.348
63.00	.619	.217
65.00	.571	.217
67.50	.571	.130
70.00	.571	.043
72.00	.476	.043
74.00	.429	.000
75.50	.381	.000
77.50	.286	.000
80.00	.238	.000
81.50	.143	.000
83.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

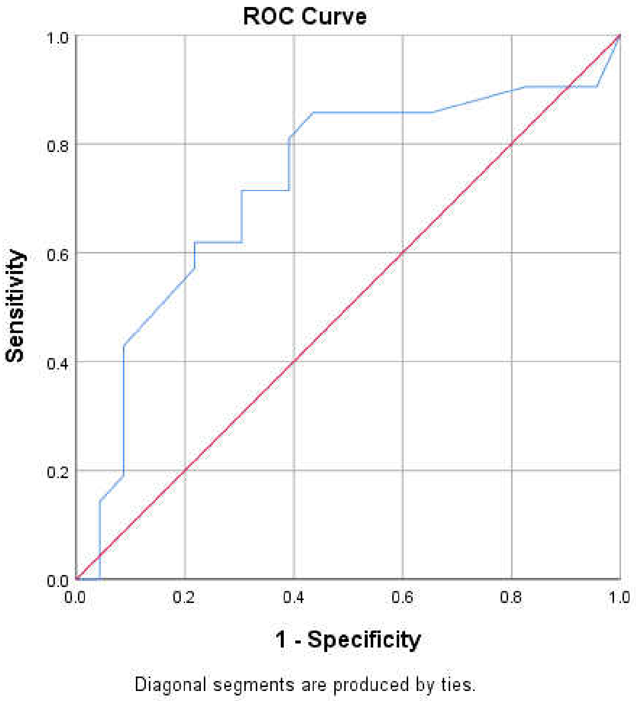

Figure 9. ROC Curve for MCMI-IV Avoidant (Scale 2A) Base Rate Scores

Table 9

Coordinates of the Curve for MCMI-IV Avoidant (Scale 2A) Base Rate Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
4.50	.905	.957
13.00	.905	.826
21.00	.857	.652
29.50	.857	.522
38.50	.857	.478
47.50	.857	.435
56.00	.810	.391
62.50	.762	.391
67.50	.714	.391
72.50	.714	.304
75.50	.619	.304
76.50	.619	.217
78.00	.571	.217
80.00	.524	.174
81.50	.476	.130
82.50	.429	.087
83.50	.381	.087
84.50	.333	.087
88.00	.190	.087
94.00	.143	.043
100.00	.095	.043
106.00	.000	.043
110.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

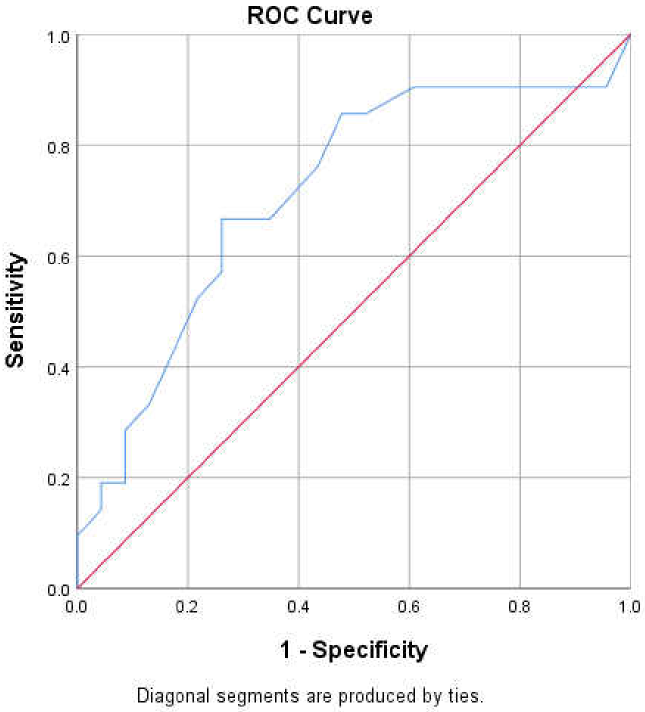

Figure 10. ROC Curve for MCMI-IV Melancholic (Scale 2B) Base Rate Scores

Table 10

Coordinates of the Curve for MCMI-IV Melancholic (Scale 2B) Base Rate Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
4.00	.905	.957
11.50	.905	.783
18.50	.905	.609
25.50	.857	.522
33.00	.857	.478
41.00	.762	.435
52.50	.667	.348
65.00	.667	.261
72.50	.619	.261
75.50	.571	.261
76.50	.524	.217
78.00	.429	.174
79.50	.333	.130
80.50	.286	.087
81.50	.238	.087
82.50	.190	.087
83.50	.190	.043
84.50	.143	.043
97.00	.095	.000
110.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

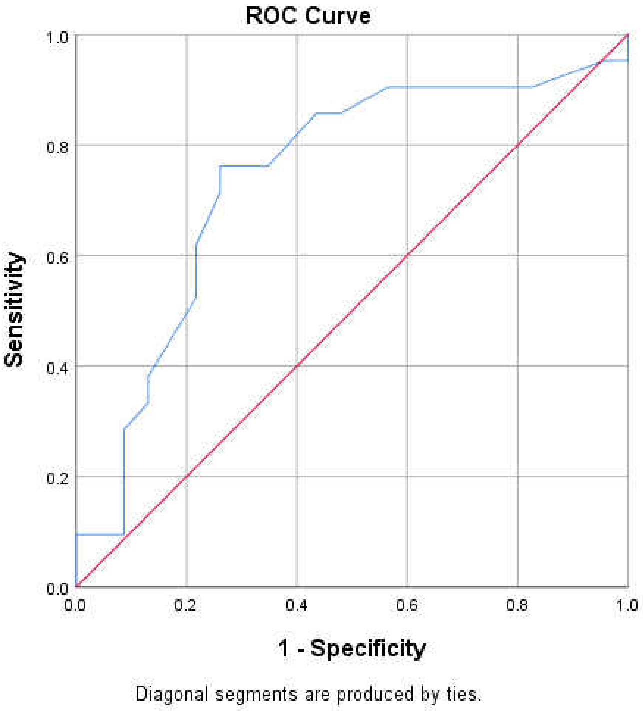

Figure 11. ROC Curve for MCMI-IV Dependent (Scale 3) Base Rate Scores

Table 11

Coordinates of the Curve for MCMI-IV Dependent (Scale 3) Base Rate Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
5.00	.952	1.000
15.00	.952	.957
25.00	.905	.826
35.00	.905	.696
45.00	.905	.565
55.00	.857	.478
62.00	.857	.435
66.00	.762	.348
70.00	.762	.261
73.50	.714	.261
75.50	.619	.217
77.00	.524	.217
78.50	.381	.130
80.00	.333	.130
81.50	.286	.087
83.50	.095	.087
90.00	.095	.043
97.50	.095	.000
105.00	.048	.000
111.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

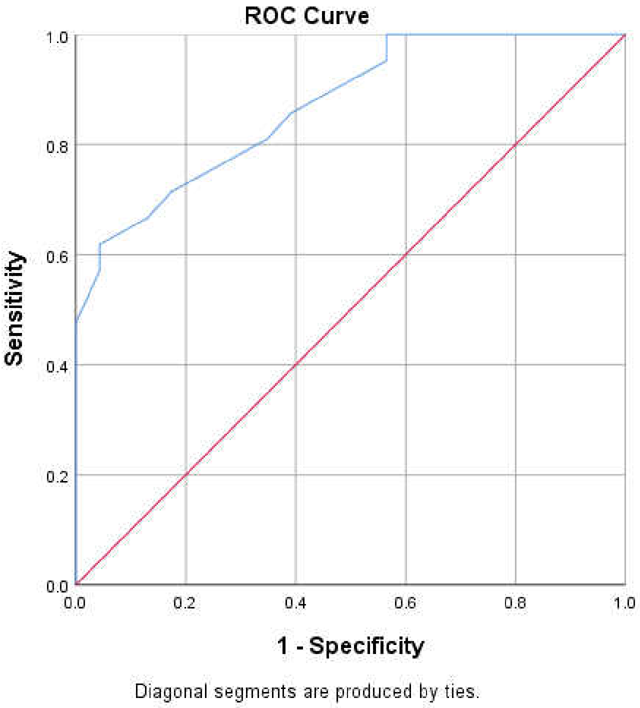

Figure 12. ROC Curve for MCMI-IV Narcissism (Scale 5) Base Rate Scores

Table 12

Coordinates of the Curve for MCMI-IV Narcissism (Scale 5) Base Rate Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
6.00	1.000	.826
18.00	1.000	.739
30.00	1.000	.565
42.00	.952	.565
54.00	.857	.391
61.00	.810	.348
63.50	.762	.261
66.00	.714	.174
69.50	.667	.130
73.50	.619	.043
76.00	.571	.043
78.00	.476	.000
81.00	.429	.000
84.00	.381	.000
86.50	.333	.000
91.50	.286	.000
97.00	.238	.000
100.50	.190	.000
106.50	.095	.000
112.00	.048	.000
114.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

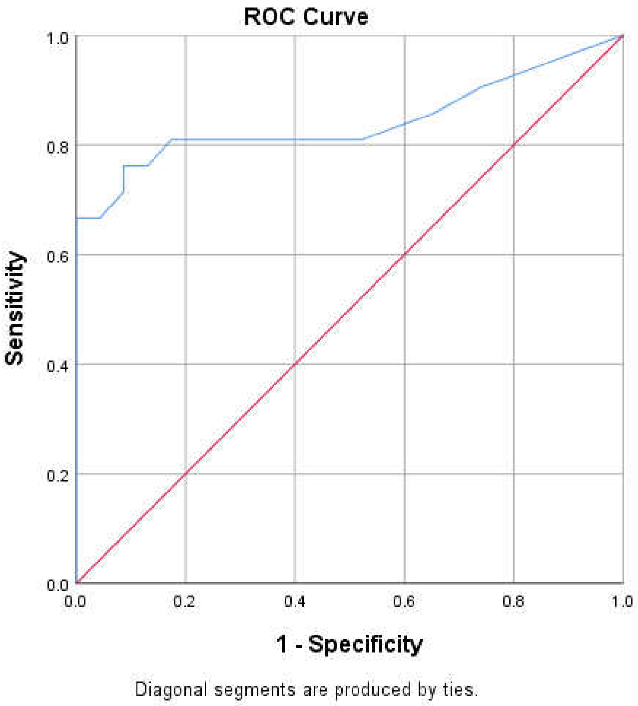

Figure 13. ROC Curve for MCMI-IV Antisocial (Scale 6B) Base Rate Scores

Table 13

Coordinates of the Curve for MCMI-IV Antisocial (Scale 6B) Base Rate Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
10.00	.905	.739
30.00	.857	.652
50.00	.810	.522
61.00	.810	.391
63.00	.810	.304
66.50	.810	.174
71.00	.762	.130
74.00	.762	.087
76.00	.714	.087
78.00	.667	.043
81.00	.667	.000
84.00	.619	.000
87.50	.524	.000
97.50	.429	.000
107.50	.190	.000
111.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

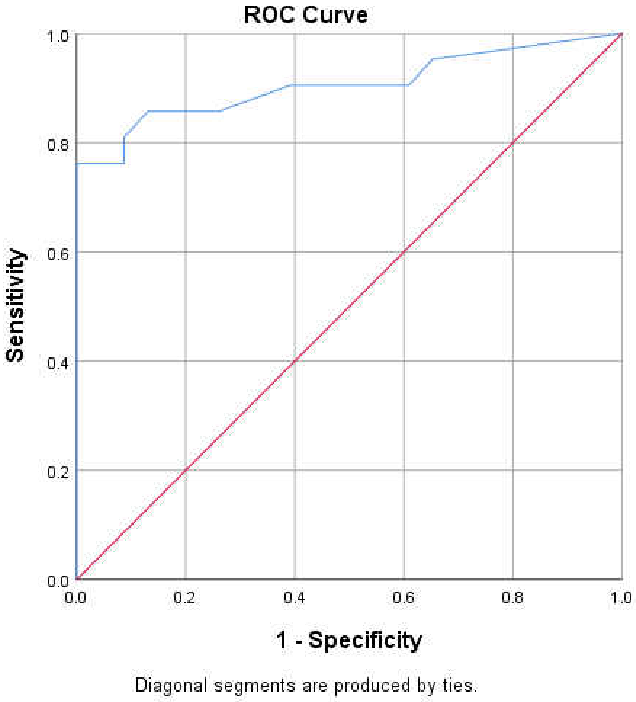

Figure 14. ROC Curve for MCMI-IV Sadistic (Scale 6B) Base Rate Scores

Table 14

Coordinates of the Curve for MCMI-IV Sadistic (Scale 6B) Base Rate Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
7.50	.952	.652
22.50	.905	.609
37.50	.905	.435
52.50	.905	.391
60.50	.857	.261
62.00	.857	.130
64.50	.810	.087
66.50	.762	.087
68.00	.762	.043
72.00	.762	.000
77.00	.714	.000
80.00	.619	.000
83.00	.524	.000
88.50	.429	.000
95.50	.333	.000
102.50	.238	.000
110.50	.143	.000
116.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

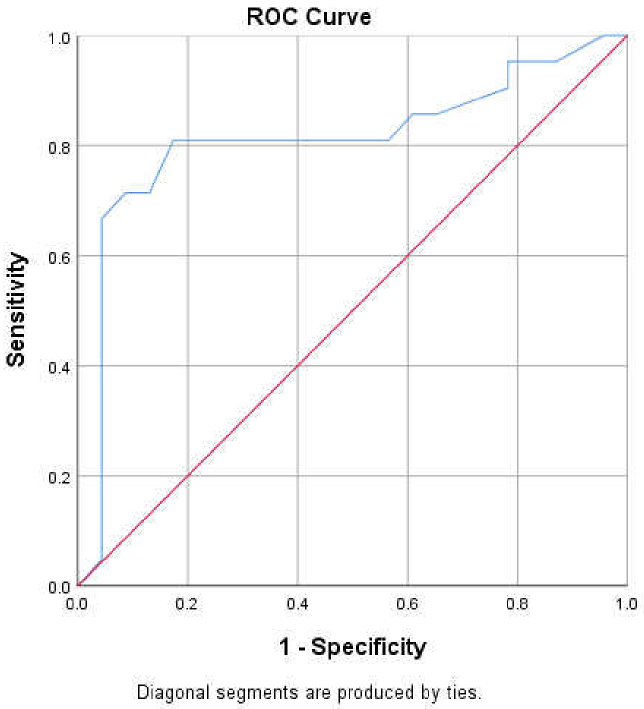

Figure 15. ROC Curve for the MCMI-VI Compulsive (Scale 7) Base Rate Scores

Table 15

Coordinates of the Curve for the MCMI-VI Compulsive (Scale 7) Base Rate Scores

Positive if Less Than or Equal To[a]	Sensitivity	1 - Specificity
3.00	.000	.000
6.00	.048	.043
10.50	.238	.043
15.00	.286	.043
19.00	.476	.043
25.00	.571	.043
29.50	.619	.043
32.00	.667	.043
36.50	.714	.087
41.00	.714	.130
45.00	.810	.174
49.50	.810	.217
54.00	.810	.261
58.00	.810	.391
61.00	.810	.565
64.50	.857	.609
68.00	.857	.652
70.50	.905	.783
73.50	.952	.783
77.50	.952	.870
90.00	1.000	.957
101.00	1.000	1.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

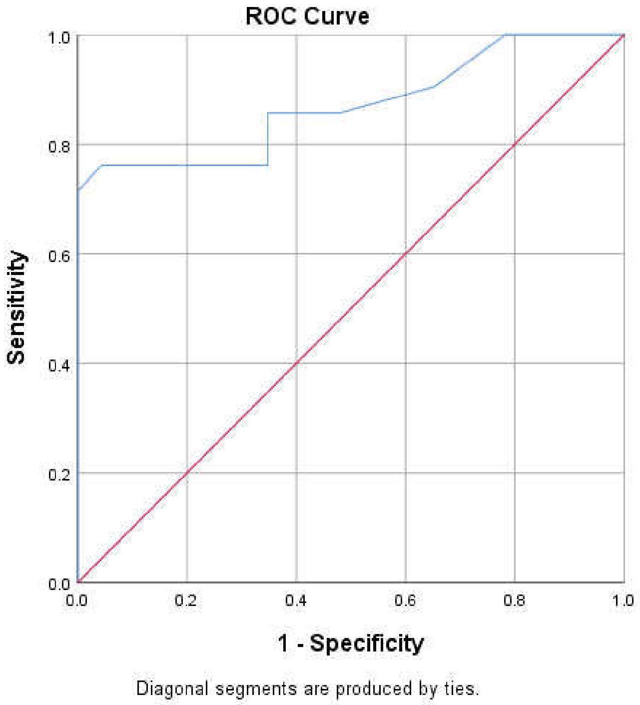

Figure 16. ROC Curve for the MCMI-IV Negativistic (Scale 8A) Base Rate Scores

Table 16

Coordinates of the Curve for the MCMI-IV Negativistic (8A) Base Rate Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
5.00	1.000	.783
15.00	.905	.652
25.00	.857	.478
35.00	.857	.348
50.00	.762	.348
61.00	.762	.261
64.50	.762	.217
68.00	.762	.130
72.00	.762	.087
75.50	.762	.043
78.00	.714	.000
80.50	.667	.000
81.50	.619	.000
83.00	.571	.000
84.50	.476	.000
87.50	.429	.000
91.00	.381	.000
95.50	.190	.000
102.50	.143	.000
110.50	.095	.000
115.50	.048	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

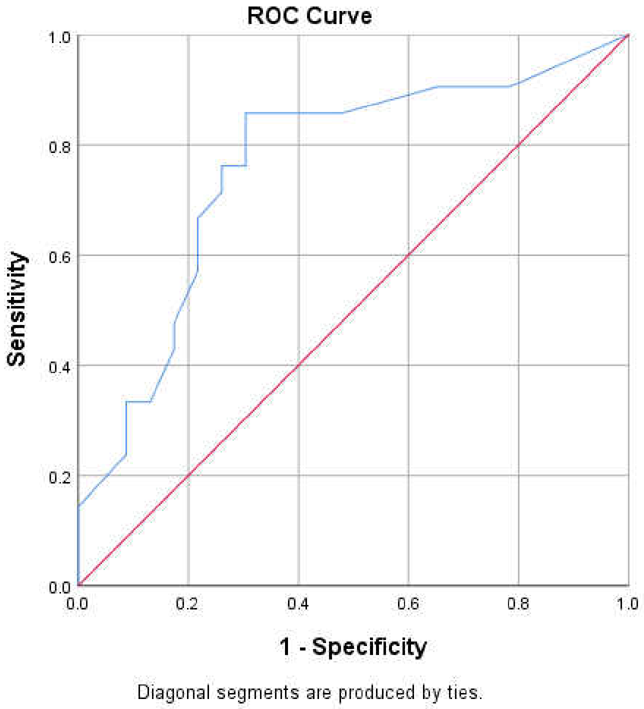

Figure 17. ROC Curve for the MCMI-IV Masochistic (Scale 8B) Base Rate Scores

Table 17

Coordinates of the Curve for the MCMI-IV Masochistic (Scale 8B) Base Rate Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
6.00	.905	.783
18.00	.905	.652
30.00	.857	.478
42.00	.857	.391
54.00	.857	.348
61.00	.857	.304
63.50	.810	.304
66.00	.762	.304
68.00	.762	.261
70.50	.714	.261
73.50	.667	.217
75.50	.571	.217
76.50	.476	.174
77.50	.429	.174
78.50	.333	.130
79.50	.333	.087
80.50	.286	.087
82.00	.238	.087
89.00	.143	.000
105.00	.048	.000
116.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

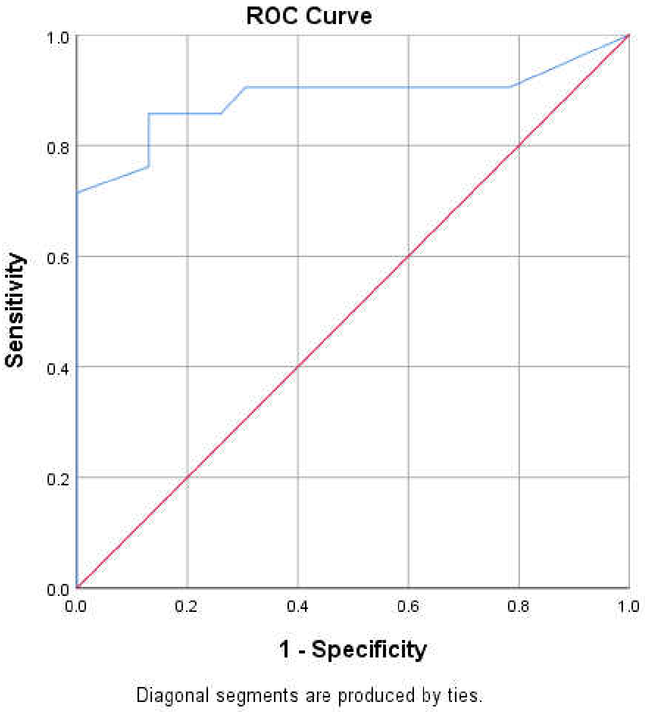

Figure 18. ROC Curve for the MCMI-IV Schizotypal (Scale S) Base Rate Scores

Table 18

Coordinates of the Curve for the MCMI-IV Schizotypal (Scale S) Base Rate Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
12.00	.905	.783
30.00	.905	.565
42.00	.905	.435
57.00	.905	.304
67.00	.857	.261
68.50	.857	.174
70.00	.857	.130
72.00	.810	.130
73.50	.762	.130
74.50	.714	.000
75.50	.667	.000
77.00	.524	.000
78.50	.381	.000
80.50	.333	.000
82.50	.286	.000
83.50	.238	.000
91.50	.143	.000
107.00	.048	.000
116.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

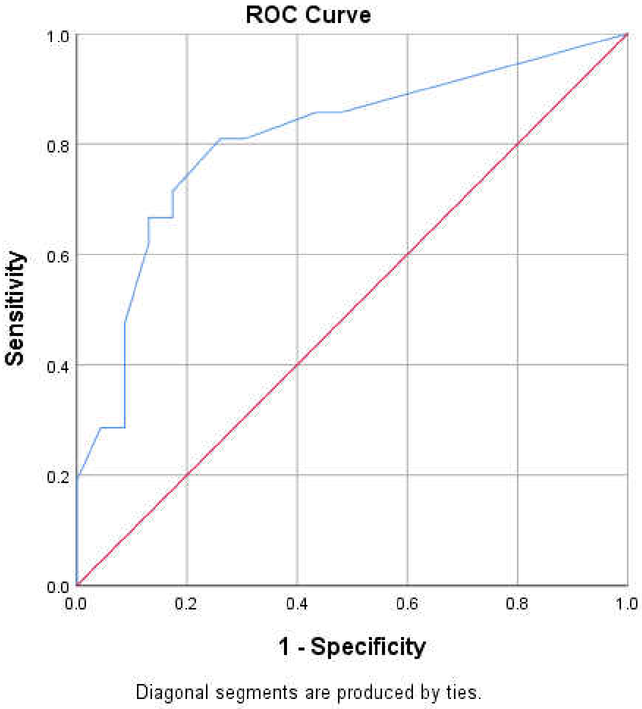

Figure 19. ROC Curve for the MCMI-IV Borderline (Scale C) Base Rate Scores

Table 19

Coordinates of the Curve for MCMI-IV Borderline (Scale C) Base Rate Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
5.00	.905	.652
15.00	.857	.478
25.00	.857	.435
39.00	.810	.304
55.50	.810	.261
64.50	.762	.217
67.50	.714	.174
70.50	.667	.174
73.50	.667	.130
76.00	.619	.130
77.50	.476	.087
78.50	.429	.087
80.00	.333	.087
81.50	.286	.087
83.00	.286	.043
84.50	.190	.000
91.50	.143	.000
104.50	.095	.000
112.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

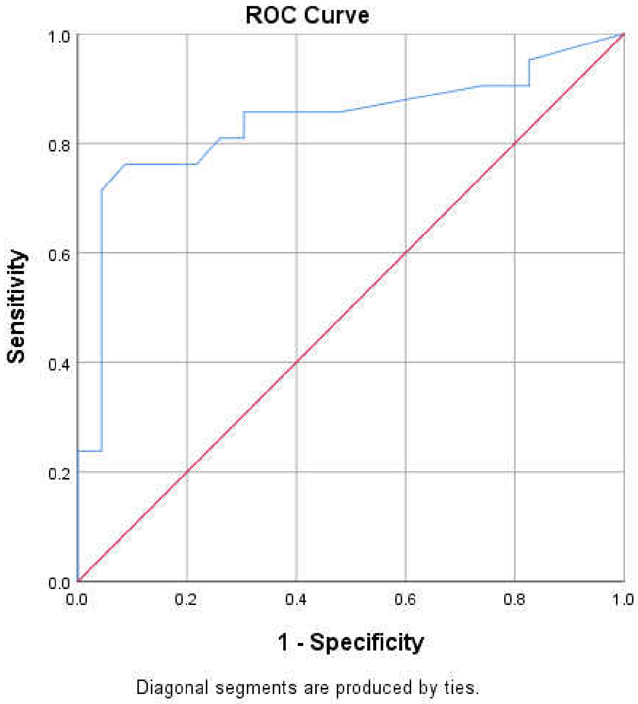

Figure 20. ROC Curve for the MCMI-IV Paranoid (Scale P) Base Rate Scores

Table 20

Coordinates of the Curve for the MCMI-IV Paranoid (Scale P) Base Rate Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
1.50	.952	.826
9.00	.905	.826
22.50	.905	.739
37.50	.857	.478
52.50	.857	.435
61.00	.857	.304
63.00	.810	.304
65.00	.810	.261
67.50	.762	.217
70.00	.762	.130
72.00	.762	.087
74.50	.714	.043
77.00	.667	.043
78.50	.619	.043
79.50	.524	.043
80.50	.381	.043
81.50	.238	.043
83.00	.238	.000
84.50	.190	.000
91.00	.143	.000
100.00	.048	.000
104.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

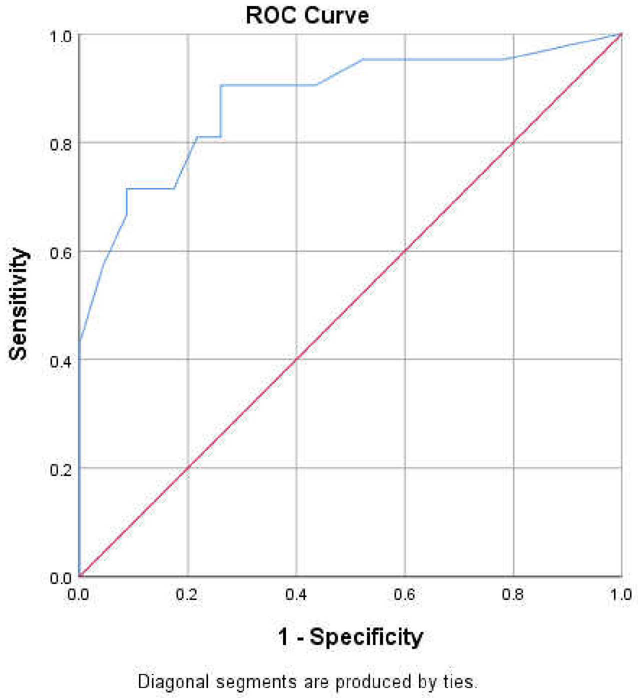

Figure 21. ROC Curve for MCMI-IV Generalized Anxiety (Scale A) Base Rate Scores

Table 21

Coordinates of the Curve for MCMI-IV Generalized Anxiety (Scale A) Base Rate Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
3.00	.952	.783
10.50	.952	.739
22.50	.952	.522
37.50	.905	.435
52.50	.905	.391
67.50	.905	.261
76.00	.810	.261
78.50	.810	.217
81.50	.714	.174
84.00	.714	.087
86.50	.667	.087
89.50	.571	.043
94.00	.429	.000
98.50	.238	.000
101.50	.190	.000
106.00	.143	.000
112.00	.095	.000
116.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

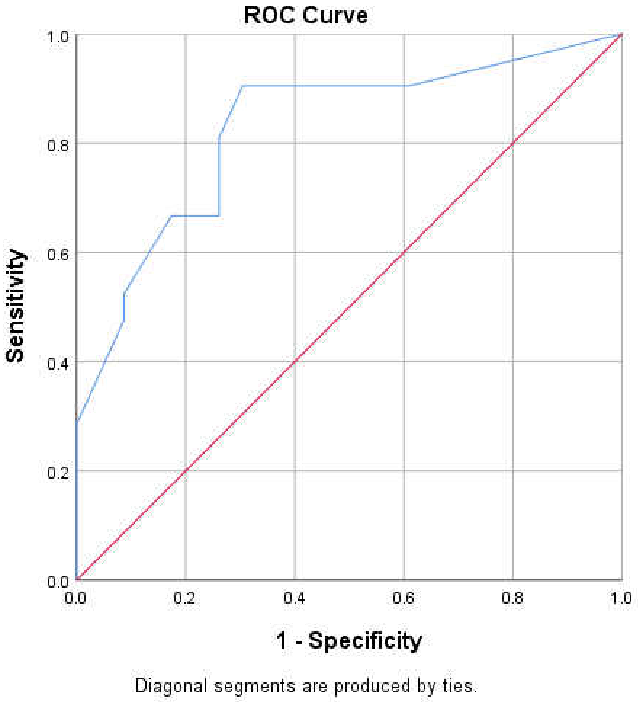

Figure 22. ROC Curve for the MCMI-IV Somatic Symptom (Scale H) Base Rate Scores

Table 22

Coordinates of the Curve for the MCMI-IV Somatic Symptom (Scale H) Base Rate Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
5.00	.905	.609
15.00	.905	.522
25.00	.905	.304
35.00	.810	.261
45.00	.667	.261
55.00	.667	.174
62.00	.524	.087
66.00	.476	.087
71.50	.381	.043
76.50	.286	.000
80.00	.238	.000
83.50	.143	.000
100.00	.048	.000
116.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

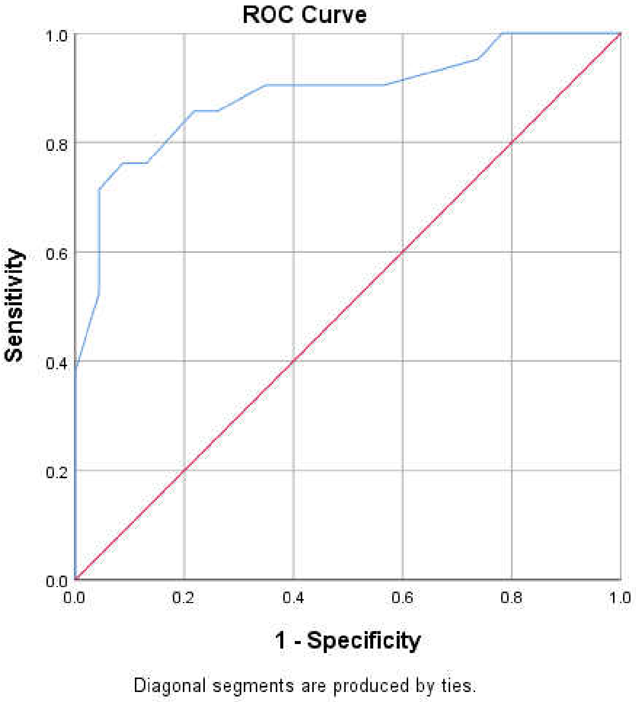

Figure 23. ROC Curve for the MCMI-IV Bipolar Spectrum (Scale N) Base Rate Scores

Table 23

Coordinates of the Curve for the MCMI-IV Bipolar Spectrum (Scale N) Base Rate Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
6.00	1.000	.957
18.00	1.000	.783
30.00	.952	.739
48.00	.905	.565
61.50	.905	.435
64.50	.905	.348
67.50	.857	.261
70.50	.857	.217
73.50	.810	.174
76.50	.762	.130
84.00	.762	.087
92.50	.714	.043
97.50	.524	.043
102.50	.381	.000
107.50	.238	.000
112.50	.048	.000
116.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

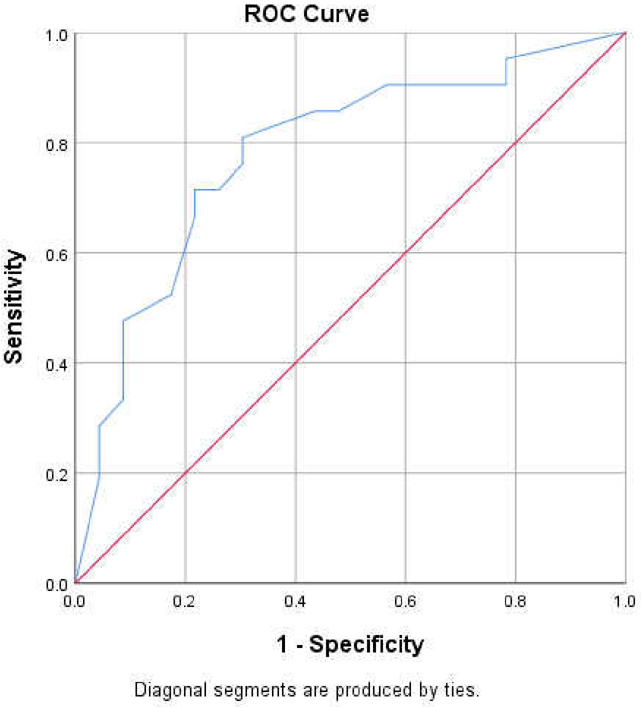

Figure 24. ROC Curve for the MCMI-IV Persistent Depression (Scale D) Base Rate Scores

Table 24

Coordinates of the Curve for the MCMI-IV Persistent Depression (Scale D) Base Rate Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
2.00	.952	.783
5.50	.905	.783
10.50	.905	.565
17.00	.857	.478
23.00	.857	.435
29.50	.810	.304
43.50	.762	.304
57.00	.714	.261
60.50	.714	.217
62.00	.667	.217
64.00	.524	.174
66.00	.476	.087
69.00	.333	.087
78.00	.286	.043
91.00	.238	.043
100.00	.190	.043
104.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

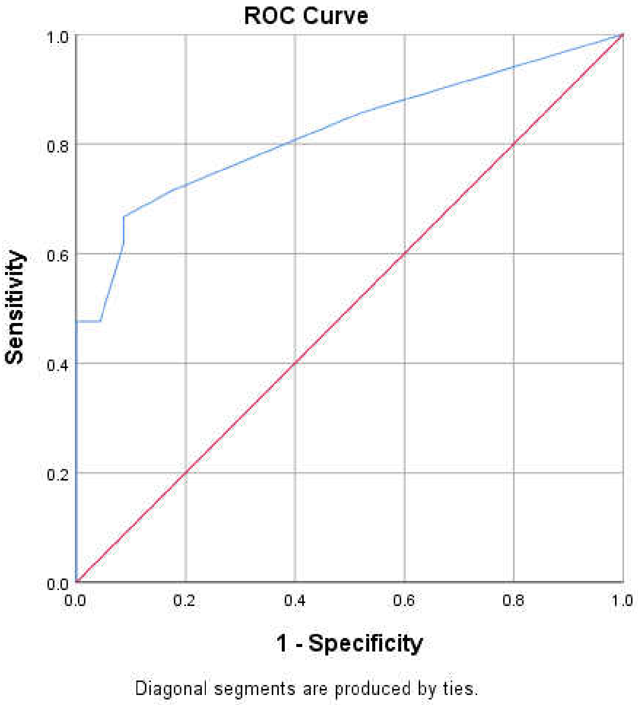

Figure 25. ROC Curve for the MCMI-IV Alcohol Use (Scale B) Base Rate Scores

Table 25

Coordinates of the Curve for the MCMI-IV Alcohol Use (Scale B) Base Rate Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
30.00	.857	.522
64.00	.714	.174
71.50	.667	.087
78.50	.619	.087
83.50	.476	.043
87.00	.476	.000
91.50	.381	.000
96.00	.333	.000
100.00	.143	.000
104.00	.095	.000
110.50	.048	.000
116.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

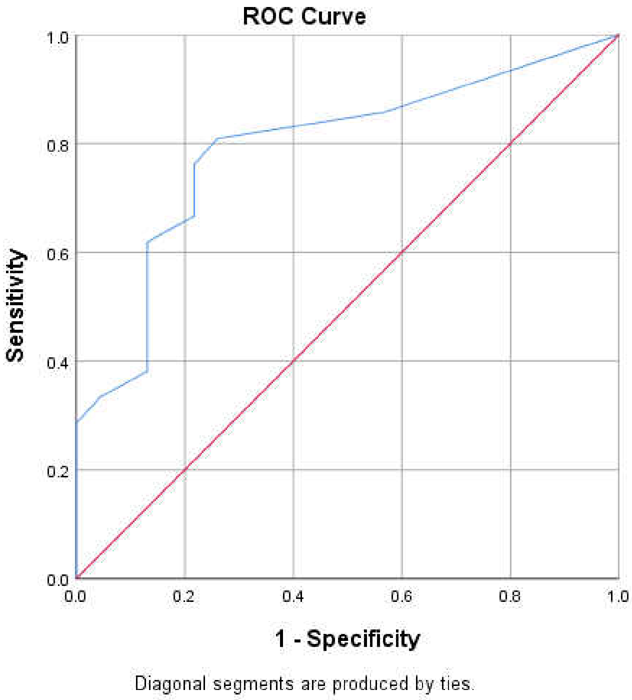

Figure 26. ROC Curve for the MCMI-IV Drug Use (Scale T) Base Rate Scores

Table 26

Coordinates of the Curve for the MCMI-IV Drug Use (Scale T) Base Rate Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
30.00	.857	.565
61.00	.810	.261
63.50	.762	.217
66.00	.714	.217
68.00	.667	.217
70.50	.619	.130
73.50	.381	.130
76.00	.333	.043
80.00	.286	.000
86.00	.190	.000
97.50	.095	.000
110.50	.048	.000
116.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

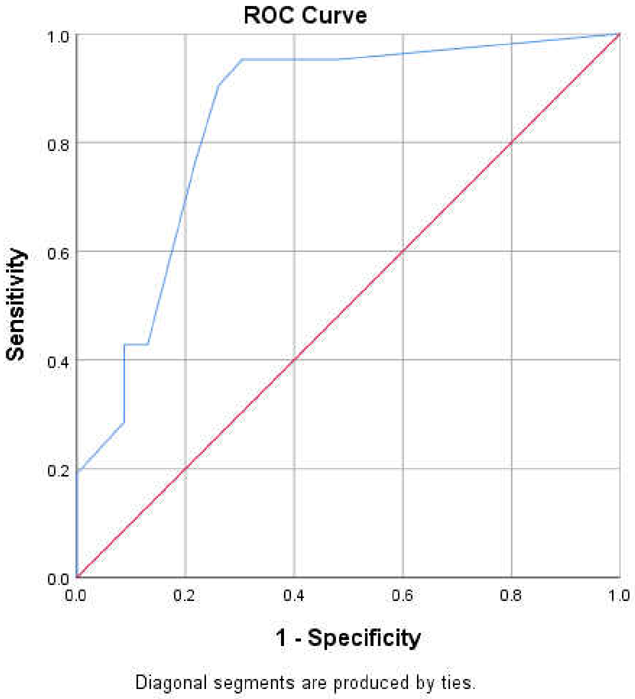

Figure 27. ROC Curve for the MCMI-IV Post-Traumatic Stress (Scale R) Base Rate Scores

Table 27

Coordinates of the Curve for the MCMI-IV Post-Traumatic Stress (Scale R) Base Rate Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
10.00	.952	.478
30.00	.952	.304
50.00	.905	.261
61.00	.762	.217
63.00	.429	.130
65.00	.429	.087
67.50	.381	.087
71.00	.286	.087
77.50	.238	.043
88.50	.190	.000
97.50	.143	.000
102.50	.095	.000
110.00	.048	.000
116.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

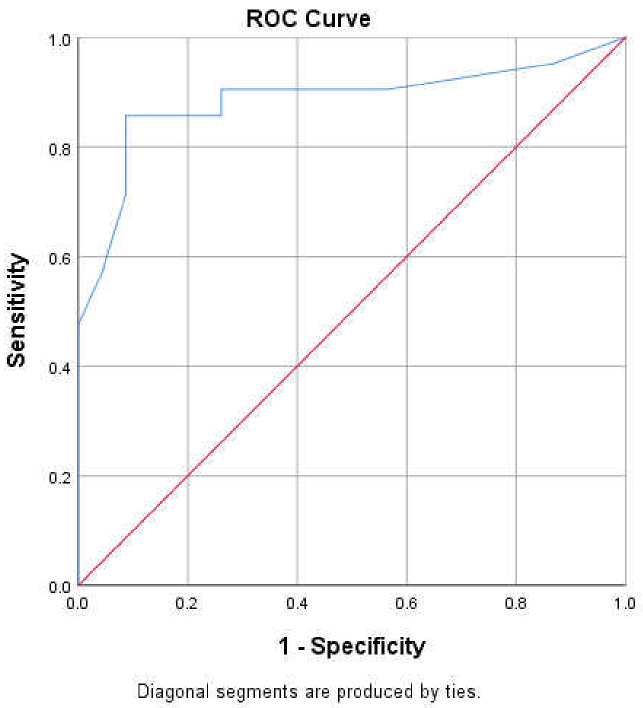

Figure 28. ROC Curve for the MCMI-IV Schizophrenic Spectrum (Scale SS) Base Rate Scores

Table 28

Coordinates of the Curve for the MCMI-IV Schizophrenic Spectrum (Scale SS) Base Rate Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
4.50	.952	.870
13.00	.905	.565
20.50	.905	.478
24.50	.905	.435
26.50	.905	.391
31.00	.905	.348
43.00	.905	.304
56.00	.905	.261
60.50	.857	.261
62.00	.857	.130
63.50	.857	.087
64.50	.810	.087
66.00	.714	.087
68.00	.571	.043
71.00	.476	.000
73.50	.381	.000
74.50	.333	.000
76.00	.238	.000
81.00	.190	.000
92.00	.095	.000
107.00	.048	.000
116.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

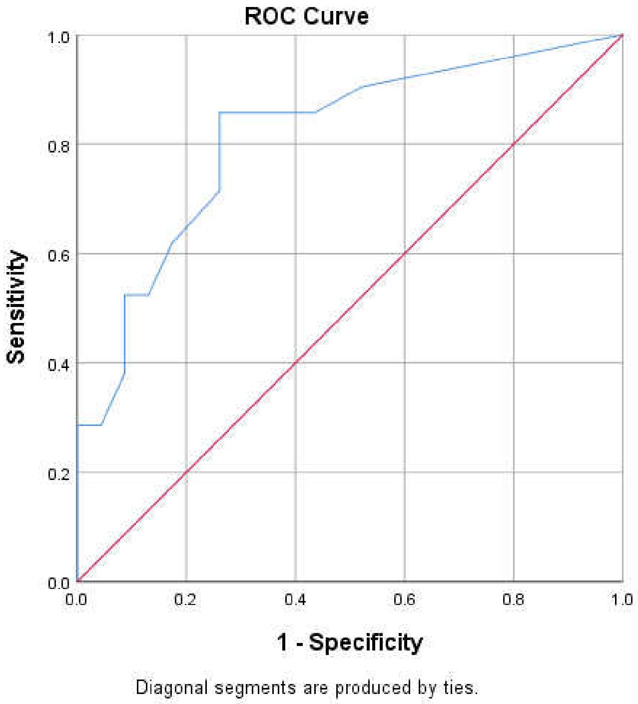

Figure 29. ROC Curve of the MCMI-IV Major Depression (Scale CC) Base Rate Scores

Table 29

Coordinates of the Curve for the MCMI-IV Major Depression (Scale CC) Base Rate Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
6.00	.905	.522
18.00	.857	.435
30.00	.857	.348
42.00	.857	.261
54.00	.714	.261
62.00	.619	.174
66.00	.524	.130
70.00	.524	.087
73.50	.429	.087
77.50	.381	.087
81.50	.286	.043
84.00	.286	.000
88.50	.238	.000
97.00	.190	.000
107.00	.095	.000
113.50	.048	.000
116.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

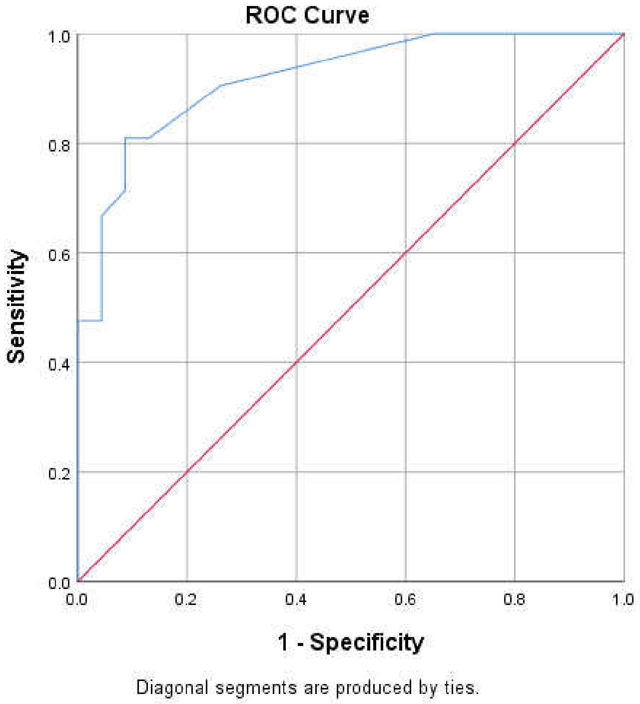

Figure 30. ROC Curve for the MCMI-IV Delusional (Scale PP) Base Rate Scores

Table 30

Coordinates of the Curve for the MCMI-IV Delusional (Scale PP) Base Rate Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
30.00	1.000	.652
61.00	.905	.261
63.00	.810	.130
65.00	.810	.087
67.00	.714	.087
69.00	.667	.043
71.00	.476	.043
73.00	.476	.000
74.50	.429	.000
77.00	.381	.000
80.00	.238	.000
81.50	.190	.000
83.50	.143	.000
90.00	.095	.000
100.00	.048	.000
106.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

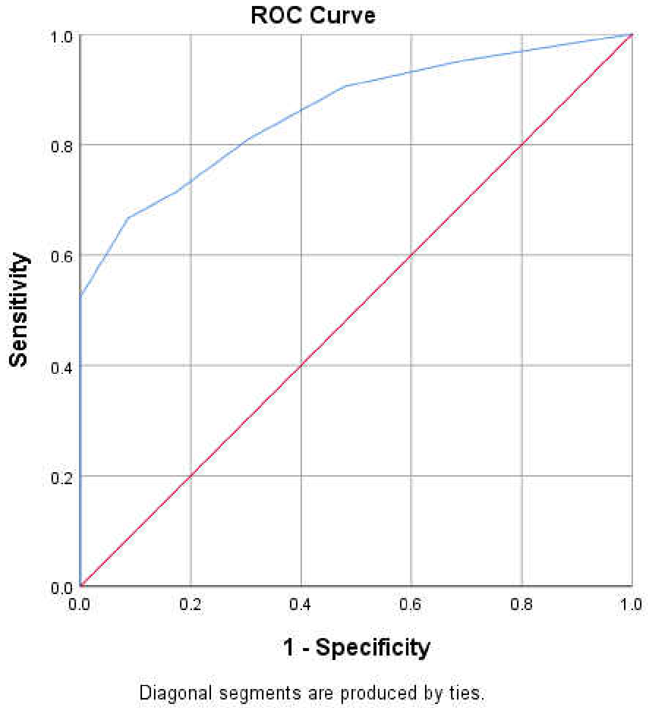

Figure 31. ROC Curve for the MCMI-IV Adult ADHD (AD) Noteworthy Response Raw Score

Table 31

Coordinates of the Curve for the MCMI-IV Adult ADHD (AD) Noteworthy Response Raw Score

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
.50	.952	.696
1.50	.905	.478
2.50	.810	.304
3.50	.714	.174
4.50	.667	.087
5.50	.524	.000
7.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

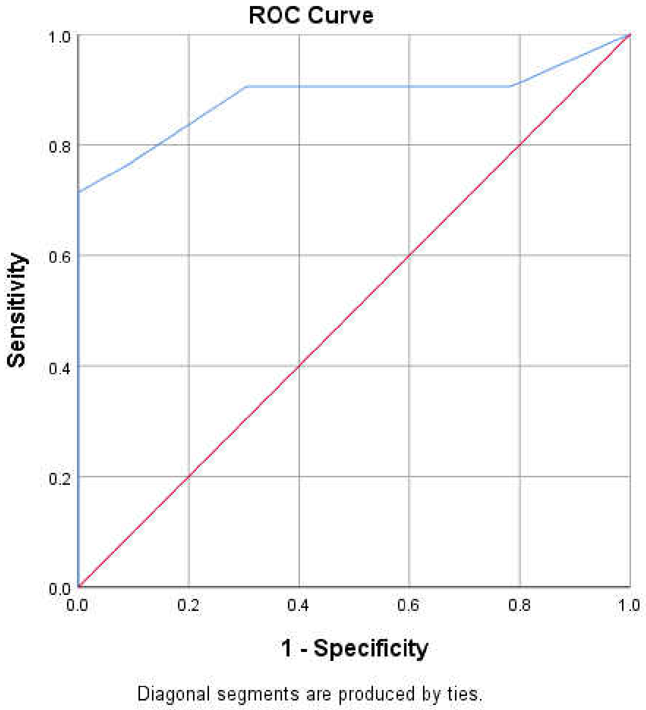

Figure 32. ROC Curve for the MCMI-IV Autism Spectrum (AS) Noteworthy Response Raw Score

Table 32

Coordinates of the Curve for the MCMI-IV Autism Spectrum (AS) Noteworthy Response Raw Scores

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
-1.00	1.000	1.000
.50	.905	.783
1.50	.905	.478
2.50	.905	.304
3.50	.762	.087
4.50	.714	.000
5.50	.476	.000
6.50	.190	.000
8.00	.000	.000

a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.