

2011

A Multi-Method Assessment Approach to the Detection of Malingered Pain: Association with the MMPI-2 Restructured Form

Jaime L. Anderson
Eastern Kentucky University

Follow this and additional works at: <http://encompass.eku.edu/etd>



Part of the [Clinical Psychology Commons](#)

Recommended Citation

Anderson, Jaime L., "A Multi-Method Assessment Approach to the Detection of Malingered Pain: Association with the MMPI-2 Restructured Form" (2011). *Online Theses and Dissertations*. 19.
<http://encompass.eku.edu/etd/19>

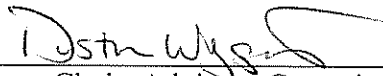
This Open Access Thesis is brought to you for free and open access by the Student Scholarship at Encompass. It has been accepted for inclusion in Online Theses and Dissertations by an authorized administrator of Encompass. For more information, please contact Linda.Sizemore@eku.edu.

A Multi-Method Assessment Approach to the Detection of Malingered Pain: Association
with the MMPI-2 Restructured Form

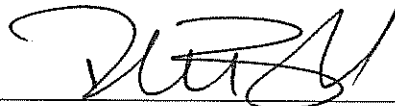
By

Jaime L. Anderson

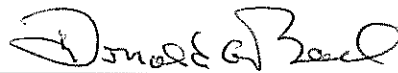
Thesis Approved:



Chair, Advisory Committee



Member, Advisory Committee



Member, Advisory Committee



Dean, Graduate School

STATEMENT OF PERMISSION TO USE

In presenting this thesis in partial fulfillment of the requirements for a Master of Science degree at Eastern Kentucky University, I agree that the Library shall make it available to borrowers under rules of the Library. Brief quotations from this thesis are allowable without special permission, provided that accurate acknowledgment of the source is made. Permission for extensive quotation from or reproduction of this thesis may be granted by my major professor, or in his absence, by the Head of Interlibrary Services when, in the opinion of either, the proposed use of the material is for scholarly purposes. Any copying or use of the material in this thesis for financial gain shall not be allowed without my written permission.

Signature James Anderson

Date 4/4/11

A Multi-Method Assessment Approach to the Detection of Malingered Pain: Association
with the MMPI-2 Restructured Form

By

Jaime L. Anderson

Thesis Approved:

Chair, Advisory Committee

Member, Advisory Committee

Member, Advisory Committee

Dean, Graduate School

STATEMENT OF PERMISSION TO USE

In presenting this thesis in partial fulfillment of the requirements for a Master of Science degree at Eastern Kentucky University, I agree that the Library shall make it available to borrowers under rules of the Library. Brief quotations from this thesis are allowable without special permission, provided that accurate acknowledgment of the source is made. Permission for extensive quotation from or reproduction of this thesis may be granted by my major professor, or in his absence, by the Head of Interlibrary Services when, in the opinion of either, the proposed use of the material is for scholarly purposes. Any copying or use of the material in this thesis for financial gain shall not be allowed without my written permission.

Signature _____

Date _____

A Multi-Method Assessment Approach to the Detection of Malingered Pain: Association
with the MMPI-2 Restructured Form

Jaime Anderson

Bachelor of Arts
University of Dayton
Dayton, Ohio
2009

Submitted to the Faculty of the Graduate School of
Eastern Kentucky University
in partial fulfillment of the requirements
for the degree of
Master of Science
May, 2011

ACKNOWLEDGEMENTS

I would like to thank my mentor, Dr. Dustin Wygant, for his patience and irreplaceable guidance throughout the completion of this project. I would also like to thank my other thesis committee members, Dr. Don Beal and Dr. Robert Brubaker, for their time and helpful evaluation through this process. Finally, I wish to thank Dr. Robert Granacher for the use of this archival data set collected at his private practice.

Abstract

The present study investigated the utility of the MMPI-2-Restructured Form (MMPI-2-RF) over-reporting scales (F-r, Fp-r, Fs, and FBS-r) and the Response Bias Scale (RBS) to detect symptom exaggeration among litigants claiming chronic pain. Utilizing the Bianchini et al. (2005) multi-method criteria for Malingered Pain Related Disability (MPRD), patients were classified along a continuum ranging from incentive only to definite malingering. Malingering classification was found to have a significant effect on MMPI-2-RF over-reporting scales, particularly the RBS, Infrequent Symptoms Scale (F-r), and Infrequent Somatic Responses scale (Fs), which supports the use of the MMPI-2-RF in forensic disability evaluations.

TABLE OF CONTENTS

CHAPTER	PAGE
I. Introduction	1
Introduction to Response Styles.....	1
Malingering.....	4
Relevance to Forensic Psychology	6
DSM Diagnosis.....	7
Alternative Diagnostic Criteria.....	8
Domains of Malingering.....	10
Detecting Response Bias and Malingering.....	11
Detection of Feigned Psychological Symptoms	11
Detection of Feigned Neurocognitive Symptoms.....	14
Detection of Feigned Physical/Somatic Symptoms.....	16
Malingering and the MMPI-2	18
Malingering and the MMPI-2-RF.....	20
The Present Study	23
II. Method	25
Participants.....	25
Instruments.....	25
Procedure	28
Statistical Analyses	28
III. Results.....	30
Differential Symptom Presentation.....	30
Validity Scale Malingering Group Differences	31
Classification Accuracy	32
IV. Discussion.....	34
Limitations and Future Directions	37

References.....	39
Appendices.....	50
A. Scoring Criteria for Response Bias Measures.....	50
B. Classification Accuracy and Predictive Power	52
C. MMPI-2-RF Validity Scales and Criteria for MPRD	56
D. MMPI-2-RF Restructured Clinical Scales and Criteria for MPRD	59
E. Mean Over-Reporting Validity Scale Scores	62
F. Mean Restructured Clinical Scale Scores.....	64

Chapter I

Introduction

Each year, disability fraud costs the United States approximately 6 billion dollars (ABC News, May, 2006) and individuals claiming to experience symptoms of chronic pain make up a portion of these costs. It is the responsibility of physicians to make difficult decisions regarding a claim of disability, and often times, psychologists are called upon to provide objective testing in order to evaluate the legitimacy of an individual's claims. It is important that aids to the reduction of this growing economic problem be researched and validated.

Introduction to Response Styles

Many psychological, somatic, and cognitive dysfunctions are predominately experienced internally. Consequently, they can best be measured by self-report methods. Indeed, self-report measures are the most widely used and researched personality and psychopathology assessment methods (Ben-Porath, 2003). However, while self-report is in some cases the sole method to obtain information on the internal experiences of an individual; these measures are not without their limitations. When relying on the self-report of a test-taker, assessing the validity of the results is a necessary component to the evaluation. External influences can include the stressful and financial effects of litigation, as well as pressure from attorneys, family members, or other individuals of interest (Rogers & Bender, 2003). Internal influences on self-report, on the other hand, can involve effects of a genuine disorder, a reaction to questioned integrity, the stigmatization of mental and physical disorders and disabilities, or the effort of the individual to obtain undeserved incentive (Rogers & Bender, 2003).

These internal and external influences during test-taking can produce an invalid protocol on a self-report measure. Protocol validity is the degree to which an examinee's responses on a psychological test are an accurate representation of his or her symptomatology. Ben-Porath (2003) discussed two broad threats to the protocol validity of a self-report inventory: non-content and content based invalid responding. Non-content based invalid responding is characterized by an individual's responses being based on something other than the accurate reading, processing, and comprehension of the test items (e.g. random responding). Content-based invalid responding, on the other hand, is characterized by the intentional distortion of test results by the test taker. Individuals undergoing psychological assessments, particularly in forensic settings, may intentionally distort their psychological characteristics in order to alter assessment results and portray themselves in an unrealistic fashion. When an individual undergoing a psychological assessment intentionally skews his or her results on the measure, resulting in a misleading representation, that individual is said to exhibit content-based invalid responding, or response bias.

Ben-Porath (2003) also discusses the two types of content-based invalid responding: over-reporting and underreporting. The over-reporting of symptoms occurs when an individual reports exaggerated symptoms or symptoms that do not exist. Underreporting is the opposite; it occurs when an individual lessens his or her symptoms or denies that symptoms exist completely. An individual may distort his or her symptoms for many different reasons. On one hand, he or she may portray his or her level of adjustment in a very positive light in order to appear more appealing to a future employer or in order to appear better fit to obtain custody of children in a parental fitness

evaluation. On the other hand, an individual may distort him or herself in order to appear more impaired, whether it is for attention-based purposes or for a more tangible incentive, such as monetary compensation in a civil suit or a lesser criminal sentence in light of a diagnosis of a mental illness (e.g., an insanity defense).

Going beyond the dichotomous classifications of over-reporting or underreporting presented by Ben-Porath (2003), Rogers (2008) identified four separate types of response bias: nonspecific terms, overstated pathology, simulated adjustment, and other response styles, the first three of which will be discussed here. The first of these types, nonspecific terms, is a general response style that entails the degree to which an individual's response pattern contains unreliability, nondisclosure, self-disclosure, deception, or dissimulation. This response style is a much more general assumption about a pattern of responses than a style such as malingering or factitious presentations, both of which involve the intentional production of symptoms or symptom exaggeration (APA, 2000). This type simply asserts that the information is invalid, and does not also assume the intention of the individual behind the invalidation. Unreliability refers to the accuracy of the information presented by the individual, nondisclosure is the amount of information the individual has withheld, self-disclosure is the amount of information presented by the individual about him or herself, deception is the individual's attempt to distort his or her self-representation, and dissimulation is the purposeful distortion by the individual of his or her psychological symptoms.

Overstated pathology, the second of the over-reporting styles presented by Rogers (2008) includes three subtypes. Beginning with the most general of these subtypes, feigning is the exaggeration or fabrication of psychological and/or physical symptoms,

without any assertion as to the motive behind this exaggerated or fabricated response pattern. Factitious presentation, the second subtype, is identified by an individual's intentional invention of physical or psychological symptoms in order to assume a sick role (APA, 2000). Finally, malingering, which will be more thoroughly addressed later is the intentional exaggeration or production of physical or psychological symptoms, motivated by an external incentive (APA, 2000).

Defensiveness, social desirability, and impression management are the three subtypes of the simulated adjustment response style, the third of the response styles presented by Rogers (2008). Again beginning with the most general of these styles, impression management is defined as an individual's intentional attempt to affect the opinions others have of him or her, without assumption of the individual's motive for this desired perception. Defensiveness is the deliberate attempt to minimize or deny psychological and/or physical symptoms. The third impression management style, social desirability, is characterized by the individual attempting to present him or herself in the most positive light, which can involve the denial of any presumed negative qualities and the attribution of perceived positive or socially desirable qualities.

Malingering

The DSM-IV-TR defines malingering as “the intentional production of false or grossly exaggerated physical or psychological symptoms, motivated by external incentives such as avoiding military duty, avoiding work, obtaining financial compensation, evading criminal prosecution, or obtaining drugs” (APA, 2000, p. 739). As suggested in the DSM-IV-TR definition, malingering can become a substantial concern in many circumstances, including obtaining medication, work or military

avoidance, and when a case concerns the potential for evading criminal prosecution, or financial incentive, as in disability cases.

Bender (2008) states that malingering falls into four subtypes, ranging from transference to the more extreme type, invention. Transference is a type in which an individual has problematic symptoms, yet they are not related to or affected by the symptoms currently being claimed by that individual. Secondly, there is exaggeration, in which, as the name suggests, the individual does in fact have the symptoms presented, but the individual has amplified their severity. Preservation is the third type, wherein an individual once had the actual symptoms he or she is claiming, however the symptoms have since dissipated and the individual is feigning their continuance. The fourth and final type of malingering is invention, a type in which the individual does not have and has never had the symptoms which he or she is claiming; the symptoms are completely fabricated.

Malingering, regardless of its type, has been found to have high rates within assessment, particularly forensic assessment. A base rate is the number which represents the projected prevalence for a condition within a given population. The prevalence, or the base rate, of malingering varies from study to study and within different referral circumstances (medical, criminal, civil, disability, etc.). Mittenberg, Patton, Canyock, and Condit (2002) collected surveys from 131 members of the American Board of Clinical Neuropsychology (ABCN), which estimated the percentage of probable malingering cases within their practices to range from 8% to 31% across various types of clinical settings. Much of this wide range is due to the range of referral circumstances for which malingering would be assessed. The base rate of malingering in, for example, a chronic

pain setting is different than the base rate of malingering in head injury claims. For instance, it has been estimated that probable malingering has base rates of 39% in mild head injury claims, 35% with fibromyalgia/chronic fatigue, 31% of chronic pain, 27% of neurotoxic, and 22% of electrical injury claims (Mittenberg, Patton, Canyock, & Condit, 2002). While varying studies report slight variations of these estimates due to differing domains and referral questions, each study presents an estimated base rate that suggests the importance of the accurate detection of malingering, regardless of the referral circumstances. Overall, if malingering measures were to be administered in all referrals, it is estimated that the base rate would fall between 10-30% (Rogers, 2008).

Relevance to Forensic Psychology

Malingering is an issue of particular importance in a forensic setting. Psychologists are often called upon to provide psychological assessments in civil and criminal cases. In a civil case, financial stakes can be extremely high, giving any involved individual incentive to feign or exaggerate symptoms (Wygant, Ben-Porath, Arbisi, Berry, Freeman, & Heilbronner, 2009). A psychologist utilizing assessment measures is able to provide the legal system with an objective measure of an individual's probability of malingering. Given that forensic psychology is a context in which much is typically at stake for an individual undergoing a psychological assessment, the assessment measures for malingering becomes an integral clinical consideration for any forensic assessment battery. Though base rates of malingering in forensic settings vary, each estimate identifies a significant minority of individuals who fall into a probable or definite malingering category (Mittenberg, Patton, Canyock, & Condit, 2002), which can have a significant effect on the judicial system.

In regards to disability claims, financial incentive produces a major influence on the rates of malingering. According to the National Insurance Crime Bureau, in the first quarter of 2009, worker's compensation fraud increased 71% from the previous year (Florida Department of Financial Services, 2009). An accurate and efficient method of malingering detection in these situations is important so as to prevent individuals malingering their symptoms from obtaining health care resources that would be more deserved by individuals who have genuine substantial disabilities (Bianchini, Greve, & Glynn, 2005).

DSM Diagnosis

It has long been recognized that the Diagnostic and Statistical Manual from the American Psychiatric Association (DSM; APA, 2000) provides little guidance in assessing malingering (see Rogers, 2008 for extensive discussion of this topic). While the DSM provides an accurate definition of what malingering entails, it does not provide clinicians and researchers with an objective and measureable method to systematically diagnose when it occurs. Currently classified as a V-code under Additional Conditions That May Be a Focus of Clinical Attention, malingering, as defined in the DSM-IV-TR, lacks criteria to diagnose this problematic clinical behavior. While the DSM-IV-TR does list conditions under which malingering should be suspected and thus assessed (APA, 2000), these conditions do not assist a clinician on how to assess for malingering when the mentioned conditions have been met. Even the use of the DSM-IV-TR in screening individuals for possible malingering has failed entirely. In fact, in a criminal forensic screening, use of the DSM-IV-TR malingering criteria alone has rendered a false-positive

rate of around 80% (Rogers, 1990), suggesting this lack of DSM-IV-TR criteria is a significant problem.

Alternative Diagnostic Criteria

It is due to this lack of criteria that separate and more specific diagnostic criteria outside of the DSM-IV-TR system have been established, most notably the diagnostic criteria of Slick et al. (1999) and Bianchini et al. (2005) (utilized later in this study). Slick and colleagues (1999) responded to this growing problem of a lack of measureable and systematic criteria by establishing their own diagnostic criteria to detect malingered neurocognitive dysfunction (MND). Following the lead of these researchers, Bianchini and colleagues (2005) later established related criteria to detect malingered pain related disability (MPRD). Each list of proposed criteria is used to assess the degree of symptom feigning, ranging from possible malingering, to probable malingering, to definite malingering.

Prior to the publication of the Bianchini et al. criteria, malingered pain was assessed using the Slick et al. MND criteria. For instance, Etherton and colleagues (2005) used the Slick et al. criteria in a study determining the sensitivity and specificity of the Reliable Digit Span measure in assessing malingered pain.

Although the Slick et al. criteria have been applied in malingered pain studies, the symptoms evaluated in these studies are limited to cognitive impairment complaints. The later established Bianchini et al. criteria addressed this problem with the development of specific criteria for identifying MPRD. These criteria are a potential asset in a medico-legal context, as MPRD has been found to be a prevalent issue. In fact, among pain patients, the most reliable estimates of malingered disabilities are between 20%-40%

(Greve, Ord, Bianchini, & Curtis, 2009). The growing trends of disability related to chronic pain are reflective of an epidemic (Melhorn, Lazarovic, & Roehl, 2009), making the accurate detection of MPRD an important clinical and social issue. The development of the Bianchini et al. criteria enables clinicians to make determinations regarding the possibility to malingering specifically in the domain of these physical symptom complaints.

The MPRD have already been examined with the Minnesota Multiphasic Personality Inventory-2 (MMPI-2). Bianchini and colleagues (2008) utilized the MPRD criteria in order to determine the accuracy of the validity scales included on the MMPI-2 in detecting malingered pain-related disability. Individuals classified as definite MPRD were found to have higher scores on the MMPI-2 over-reporting validity scales in general. Specifically, FBS and Fb were found to have the largest effect sizes in distinguishing individuals who were malingering from those determined to respond honestly.

As previous research has shown, the Slick et al. (1999) and the Bianchini et al. (2005) criteria may be considered a suitable addition to the use of the definition of malingering presented in the DSM-IV-TR (APA, 2000) in the diagnosis of malingered pain related disability and malingered neurocognitive dysfunction. Each of these sets of criteria provides an assessor with the tools to objectively measure the possibility of malingering. With criteria regarding performance on neuropsychological measures (particularly symptom validity tests) and evidence obtained from self-report measures, a clinician is able to form a more distinct picture of that individual's probability of malingered pain related disability or neurocognitive dysfunction. The two sets of criteria

even allow the assessor to determine different levels of malingering, indicating the likelihood of malingered symptomatology. While the DSM-IV-TR presents criteria that are very broad, subjective, and open to the clinician's interpretation, the Bianchini et al and the Slick et al criteria enable the clinician to place an individual in one of three categories of malingering by use of performance on valid and reliable assessment measures.

Domains of Malingering

Feigning, and in particular, malingering can be broken down into three domains. These domains are psychopathology, neurocognitive dysfunction, and physical/somatic dysfunction. Any particular individual's response bias may not be limited to one domain within malingering. An examinee attempting to misrepresent him or herself may attempt to feign symptoms which fall within any combination of the three domains. For example, an individual reporting chronic pain may also present with decreased performance on measures used to detect cognitive dysfunction. Research by Burchett and Ben-Porath (2010) has shown this through the use of the self-report personality inventory, the Minnesota Multiphasic Personality Inventory-2- Restructured Form (MMPI-2-RF; Tellegen & Ben-Porath, 2008). Their research demonstrated that individuals instructed to feign symptoms of psychopathology not only obtained the highest scores on scales measuring psychological dysfunction, but also scored highest (in some cases significantly higher than the somatic feigning simulation group) on scales designed to measure somatic symptoms.

Reported base rates for malingering differ across these three different domains. Within the psychological dysfunction domain, researchers have estimated that up to 20%

of criminal forensic cases and 30% of civil forensic cases involve over-reporting of psychological symptoms (Mittenberg, Patton, Canary, & Condit, 2002; Rogers, Salekin, Sewell, Goldstein, & Leonard, 1998; Rogers, Sewell, & Goldstein, 1994). Within the physical/somatic domain, the base rates for malingering among chronic pain patients ranges from 20-50% (Greve et al., 2009). In addition, Greve and colleagues (2009) found that, though the majority of pain patients in their sample did not meet the full criteria for malingering, nearly half of the sample exhibited some evidence of symptom exaggeration on symptom validity measures. Finally, within the domain of cognitive dysfunction, malingering base rates in mild head injuries cases have been found to fall between 38-41% (Mittenberg, Patton, Canary, & Condit, 2002).

Detecting Response Bias and Malingering

Each domain of malingering will have a different clinical presentation, and so, each domain in turn has varying detection strategies (Rogers & Bender, 2003). As would be expected, there are different validity measures designed to detect the malingering of psychological symptoms than those designed to detect the malingering of somatic symptoms. However, as previously stated, malingering individuals may present symptoms falling in multiple domains, so examinees should be administered detection measures representative of each domain in which the individual is suspected to be malingering.

Detection of Feigned Psychological Symptoms

The detection of feigned psychological symptoms typically involves the use of self-report measures and structured interviews. Given that psychological and psychiatric

symptoms represent internal experiences that need to be expressed through self-report, the premise of most methods for detecting malingering in this domain is that the individual will report experiences that are inconsistent with a genuine or common representations of mental illness (Wygant, 2007). Rogers (2008) identified several methods utilized in the detection of feigning. These methods employ the use of identifying rare symptoms, quasi-rare symptoms, improbable symptoms, symptom combinations, spurious patterns of psychopathology, indiscriminant symptom endorsement, symptom severity, obvious symptoms, reported versus observed symptoms, and erroneous stereotypes. In identifying those preceding aspects of an individual's responses, assessors can see the endorsement of symptoms that are rarely and not likely to be claimed by genuinely mentally ill individuals, unlikely symptom combinations, symptoms which are not supported by the observed behavior of the individual, or symptoms that are endorsed due to a false stereotype about symptoms of the mental illness an individual is attempting to feign.

Several personality inventories have built-in validity scales in order to detect response bias. There are in fact two widely used inventories that have been shown to accurately detect response bias and, in particular, over-reporting. The Minnesota Multiphasic Personality Inventory-2 (MMPI-2; Butcher, Graham, Ben-Porath, Tellegen, Dahlstrom, & Kaemmer, 2001), which will later be addressed in detail, and the Personality Assessment Inventory (PAI; Morey, 1991, 2007), both of which have built-in validity scales which can be used to detect feigning (Rogers & Bender, 2003). Most of the built-in validity scales in these personality measures use the rare or unlikely symptom approach to determine if an individual's personality profile is exaggerated.

In addition to personality inventories with built-in validity scales, there have also been separate validity measures, in the form of structured interviews, specifically aimed to detect malingering, two of which are aimed toward detecting feigned psychological dysfunction. The Structured Interview of Reported Symptoms (SIRS; Rogers, Bagby, & Dickens, 1992) uses each of the detection methods discussed by Rogers (2008), with the exception of erroneous stereotypes (Rogers & Bender, 2003). Used for the systematic assessment of malingered mental disorders, the SIRS classifies interviewees into three categories: feigning, indeterminate, and non-feigning (Rogers, Bagby, & Dickens, 1992). Its most recent version, the Structured Interview of Reported Symptoms-Second Edition (SIRS-2; Rogers, Sewell, & Gillard, 2010) breaks the continuum down even further by classifying individuals into four categories: genuine responding, indeterminate-general, indeterminate-evaluate, and feigning. The Miller Forensic Assessment of Symptoms Test (M-FAST; Miller, 2001) is a structured 25-item screening measure validated to assess for malingered psychopathology. Through the use of seven different scales it utilizes several of the methods identified by Rogers (2008), including reported versus observed symptoms, symptom severity, and rare combinations. In addition, however, this measure also includes a suggestibility item, which in known groups of individuals with genuine psychopathology was never endorsed (Miller, 2001).

Finally, there is also a self-administered multi-axial inventory, the Structured Inventory of Malingered Symptomatology (SIMS; Widows & Smith, 2005), that is used to detect not only symptom feigning in the psychological domain, but also in the neurocognitive domain. This 75-item screening measure utilizes five different scales measuring feigned psychosis, neurological impairment, amnesic disorders, low

intelligence, and affective disorders (Widows & Smith, 2005). When using a sample of college simulators, Widows and Smith (2005) found that the SIMS exhibited high sensitivity and specificity with its cut off score of ≥ 14 .

Detection of Feigned Neurocognitive Symptoms

In addition to the SIMS, several other unique detection strategies have been used in the identification of MND. These measures differ from the typical measures used to detect malingered psychopathology because they must focus specifically on cognitive symptoms (Rogers & Bender, 2003).

Reliable Digit Span (RDS; Greiffenstein, Baker, & Gola, 1994) is an internal validity measure developed from digit span tests found on several common clinical neurological tests, such as the Wechsler Adult Intelligence Scale-IV (WAIS-IV; Wechsler, 2008), the Wechsler Memory Scale-IV (WMS-IV; Wechsler, 2009), the Stanford-Binet-V (SB-V; Roid, 2003), and the Neuropsychological Assessment Battery (Stern & White, 2003). Individuals may attempt to exaggerate or fabricate their impairment on digit span tests based on their assumption that the test seems to be one on which individuals with brain injuries will perform poorly (Meyers & Volbrecht, 1998). However, individuals with genuine brain dysfunction, even amnesia, tend to have fairly well preserved the skills needed to complete digit span tasks (Greiffenstein, Baker, & Gola, 1994). Generally, RDS scores of 7 or lower have been associated with a specificity of more than 90% in both brain-injured and healthy individuals (Larrabee, 2003; Meyers & Volbrecht, 1998). Therefore, an RDS score 7 or lower is rarely or never seen in individuals with genuine brain dysfunction, and scores in this range imply poor effort and/or response bias (Etherton, Bianchini, Greve, & Heinly, 2005).

The Post-Concussive Symptom Questionnaire (PCSQ) is a brief self-report measure used to evaluate symptom validity among individuals presenting with neurocognitive complaints. Tsanadis and colleagues (2008) found that the PCSQ was able to discriminate between individuals with genuine traumatic brain injury and individuals meeting the criteria for at least probable malingering. Van Dyke and colleagues (2010) found similar results, showing that the PCSQ measures significant variance distinct from cognitive performance.

Symptom validity tests (SVT) and their abilities to accurately detect malingering have been a major focus point within neuropsychology (Bianchini, Mathias, & Greve, 2001). First used to detect exaggerated memory complaints by Pankratz in 1983 (Bianchini, Mathias & Greve, 2001), the use of SVT's has grown and several different symptom validity measures have been established. Of those currently used, the first was the Digit Memory Test (DMT), where an individual is given a string of numbers and later asked to recognize which string was seen on a forced choice recognition test (Hiscock & Hiscock, 1989). This format is typical of SVTs; most measures involve forced-choice recognition tasks over a series of trials (Bickart, Meyer, & Connell, 1991). Very similar in format to the DMT is the most widely used SVT, the Portland Digit Recognition Test, which requires the test taker to be able to recognize 72 five-digit strings of numbers (Binder, 1993). In contrast to the DMT, however, this test has a perceived increase in difficulty, as it utilizes differing lengths of distracter techniques between trials (Binder, 1993). Again, stemming from the DMT is the Victoria Symptom Validity Test (VSVT), which is a shortened computerized version of the original Digit Memory Test (Slick, Hopp, & Strauss, 1995). Finally, differing from the aforementioned SVTs in that it

involves a picture recognition task, is the Test of Memory Malingering (TOMM; Tombaugh, 1996). The TOMM has been validated by having high correct response rates with genuinely neurologically impaired individuals (Tombaugh, 1997), and it is one of the most comprehensively studied symptom validity tests (Bianchini, Mathias, & Greve, 2001).

Due to the nature of these detection strategies, there are several reasons beyond malingering that a person could perform below his or her ability level. These reasons can include genuine cognitive impairment, a comorbid condition such as depression, expectations of failure, stress, or reactions to inferences from the assessor that his or her impairment is trivial (Rogers & Bender, 2003). However, the multi-method assessment approach proposed by Bianchini et al. (2005) assumes individuals identified as probably or definite malingering will not be identified as such due to genuine dysfunction or sole lack of effort. This further necessitates the use of multiple detection measures (self-report, SVT's, interviews, etc.)

Detection of Feigned Physical/Somatic Symptoms

Granacher and Berry (2008) suggest that the domain of physical/somatic malingering has proven to be the most difficult form of malingering to detect. This is largely due to effects of genuine physical disorders or from the difficulty for clinicians to differentiate between malingering and a psychological disorder such as conversion or factitious disorders. Physical/somatic malingering is often presented by an individual as neurological impairment, however, any physical condition can be malingered (Granacher & Berry, 2008). When neurological symptoms are reported, typical detection strategies for neurological malingering can be utilized. For instance, RDS has been found to be

effective in detecting malingering amongst individuals reporting pain-related disability (Etherton, Bianchini, Greve, & Heinly, 2005). Since symptoms presented are not always neurological, more physical and somatically based measures must be utilized to detect malingering in this form. In either case, assessors must use detection methods that are based on non-anatomical or non-physiological presentations of physical disorders (Granacher & Berry, 2008).

Beyond the use of measures such as SVT's and various neurological tests in detecting MPRD, other measures have been found to be effective. One such measure is the PAI (Morey, 1991). The PAI includes indicators related to somatic symptoms, such as the Somatic Complaints Scale (SOM), which differentiated pain patients from healthy respondents (Karlin, Creech, Grimes, Clark, Meagher, & Morey, 2005), along with several other scales including those which assess depression, anxiety, and treatment motivation, which have been found to be important in assessing the impact of pain (Turk & Okifuji, 2002). Hopwood and colleagues (in press) have found that the PAI's validity scales have significant effect sizes in differentiating between genuine pain patients and individuals attempting to feign pain-related symptoms. The researchers also found that even when simulators were coached on the existence of the validity indicators within the test, there was a minimal effect on improved ability to feign. Finally, the researchers found that SOM scale scores were higher for the individuals attempting to feign somatic symptoms than for individuals with genuine somatic complaints, thus demonstrating the effectiveness of the PAI in the detection of malingered pain related disability.

Malingering and the MMPI-2

The MMPI-2 and MMPI-2-RF are two other personality inventories used to detect malingering across all domains. The MMPI-2 is a 567 true or false self-report questionnaire that is the most widely used psychological test in the United States (Graham, 2006). In addition, this measure stands as the most extensively researched psychological measure of feigned mental disorders (Rogers, Sewell, Martin, & Vitacco, 2003). This measure includes built-in protocol validity scales used to detect inconsistent responding, random responding, defensiveness, and the over-reporting of symptoms.

The MMPI-2 validity scales used to detect feigning include the F (Infrequency) scale, Fp (F-Psychiatric) scale, Fb (Back Infrequency) scale, and FBS (Symptom Validity) scale, along with the more recent addition of the experimental RBS (Response Bias Scale; Gervais, Ben-Porath, Wygant, & Green, 2007) scale. Extensive research has been conducted in order to show the validity of these scales in detecting the exaggeration or fabrication of symptoms. According to Rogers and colleagues (2003), the MMPI-2 employs the rare symptoms, symptom severity, obvious versus subtle symptoms, symptom selectivity, and erroneous stereotypes strategies within the validity scales aimed toward the detection of feigning. Most notable of these strategies are the rare symptoms and erroneous stereotypes approaches.

The rare symptoms approach is a strategy used in the F, Fb, and Fp scales based on features that are very infrequently reported by genuine clinical populations (Rogers, 2008). This strategy is based upon the assumption that individuals attempting to feign symptoms will be unable to differentiate between genuine features and these seemingly appropriate symptoms found within these validity scales. The F and Fb scales were

created based on the items endorsed by individuals from the normative sample. However, from a rare symptoms approach, these two scales are limited in that at least fifteen items on the F scale are endorsed by 25% of individuals from a clinical sample (Greene, 1997). Therefore, when the F or Fb scale is elevated, it could be due to the feigning of symptoms however, it could also be a matter of the individual having a genuine psychological disorder which would cause this scale elevation. It was through the development of the Fp scale (Arbisi & Ben-Porath, 1995) that this rare symptoms limitation was addressed; this scale is used to identify rarely endorsed symptoms from a genuine clinical population. Indeed, it has been found that the F and Fp scales have the largest average effect sizes in the detection of feigning (Rogers, Sewell, Martin, & Vitacco, 2003; Arbisi & Ben-Porath, 1995).

Erroneous stereotypes is an approach toward detecting feigning that utilizes items on the MMPI-2 that individuals attempting to exaggerate or fabricate symptoms would falsely associate with a certain condition. The development of the FBS scale (Lees-Haley, English & Glenn, 1991) utilized this erroneous stereotypes strategy in order to provide a validity measure specific to individuals attempting to feign symptoms within a personal injury case. Research has later shown that the scale is also effective in the detection of exaggerated somatic symptoms (Larrabee, 1998, 2003). Although the FBS scale has been faced with criticism for its narrow focus and possible high false positive rate (e.g. Rogers, Sewell, Martin, & Vitacco, 2003; Butcher, Arbisi, Atlas & McNulty, 2003), a meta-analysis by Nelson and colleagues (2010) found that the FBS performed as well, if not better, than other scales used in the detecting the over-reporting of psychological symptoms. The researchers found that, in particular, the FBS is useful in determining

effort status and TBI, even finding that the FBS has larger effect sizes in comparison to other validity scales (F, Fb, and Fp) in these areas. This was shown by Ross and colleagues (2004) who found that the FBS scale is capable of discriminating between non-litigating individuals with confirmed traumatic brain injury and litigating individuals who showed poor effort. Consequently, the Symptom Validity Scale was added to the official list of scored validity scales on the MMPI-2.

The RBS was designed for the MMPI-2 as a measure specifically developed to sensitively detect cognitive response bias and predict an individual's failure on SVT's (Gervais, Ben-Porath, Wygant, & Green, 2007). Although FBS scores have been found to be more elevated by individuals who fail SVT's than individuals who do not in both criminal and civil forensic settings (Wygant, Sellbom, Ben-Porath, Stafford, Freeman, & Heilbronner, 2007), the RBS has been found to be an effective addition to the standard MMPI-2 validity scales (Gervais, Ben-Porath, Wygant & Green, 2007). RBS scores have been found to be unlikely to elevate due to genuine memory deficits and its utility (Gervais, Ben-Porath, Wygant & Green, 2007). Furthermore, the RBS has been found to be useful in identifying individuals with poor performance on SVT's as well as identifying individuals with secondary gain among both criminal and civil forensic groups (Nelson, Sweet, & Heilbronner, 2007; Wygant, Ben-Porath, Gervais, Sellbom, Stafford, & Freeman, et al. 2010).

Malingering and the MMPI-2-RF

The MMPI-2-RF is a revised form of the MMPI-2 consisting of 338 true or false items (Ben-Porath & Tellegen, 2008). Much like its previous version, this measure

includes built-in protocol validity scales used to detect inconsistent responding, random responding, defensiveness, and the over-reporting of symptoms.

The MMPI-2-RF uses four over-reporting validity scales, including the F-r (Infrequent Responses) scale, the Fp-r (Infrequent Psychopathology Responses) scale, the Fs (Infrequent Somatic Responses) scale, and the FBS-r (Symptom Validity) scale. In addition, RBS, originally developed for the MMPI-2, can be scored on the MMPI-2-RF in its entirety. Gervais, Ben-Porath, Wygant, & Green (2007) developed RBS as a scale indicative of poor performance on cognitive SVT's and research has been promising regarding its effectiveness in doing so in both disability (Gervais, Ben-Porath, Wygant, & Green, 2007; Gervais, Ben-Porath, Wygant, & Green, 2008) and criminal forensic settings (Wygant, Sellbom, Gervais, Ben-Porath, Stafford, Freeman, & Heilbronner, 2010). Furthermore, RBS was found to outperform the original MMPI-2 validity scales in predicting poor performance on the TOMM (Whitney, Davis, Shepard, & Herman, 2008). The Infrequent Somatic Responses (Fs; Wygant, Ben-Porath, & Arbisi, 2004) scale, designed specifically for the MMPI-2-RF, was developed to measure over-reported somatic complaints using the traditional infrequency approach. Research by Wygant (2007) showed that the scale is significantly elevated among samples of individuals who failed SVT's and individuals who were instructed to feign somatic symptoms. In addition, the scale was found to add incrementally to the original MMPI-2 validity scales in detecting response bias.

Wygant, Gervais, and Ben-Porath (2010) have utilized the MMPI-2-RF in the study of neurocognitive malingering and the Slick et al. (1999) criteria for detecting malingered neurocognitive dysfunction. These authors found that over-reporting validity

scales were significantly elevated for patients classified in the probable or definite malingering group in comparison to patients classified as non-malingering. RBS and F-r were found to have the largest effect sizes in detecting malingering in the neurocognitive domain. This suggests that the MMPI-2-RF is congruent with the Slick et al. (1999) criteria in detecting MND. In a similar study, Gervais and colleagues (2010) found that the overreporting scales and RBS were significantly elevated in a sample of patients with low performance on measures designed to detect feigned memory complaints. Furthermore, Youngjohn and colleagues (2011) found that FBS-r accounted for a significant amount of variance in the detection of individuals who had failed formal effort tests. These studies, again, confirm the effective utility of the MMPI-2-RF in the detection of neurocognitive malingering.

The MMPI-2-RF has also been utilized in the detection of over-reported psychopathology. Sellbom and Bagby (2010) found that the MMPI-2-RF validity scales (F-r, Fp-r, Fs, and FBS-r) were effective in discriminating between individuals instructed to feign psychopathology and a known-group of severely mentally-ill psychiatric hospital patients. In fact, even when simulators were coached on the validity scales on the MMPI-2-RF, over-reporting scale scores with the exception of those from FBS-r remained significantly higher than the scores obtained by the sample of known psychiatric patients.

Specific to the realm of forensic psychology, the MMPI-2-RF has been researched in regards to the detection of malingering within both criminal and civil forensic settings. Sellbom and colleagues (2010) found, using a criterion-groups design, that the MMPI-2-RF over-reporting validity scales (F-r, Fp-r, Fs, and FBS-r) were effective in detecting malingered psychopathology among a sample of criminal defendants, with F-r and Fp-r

producing the largest effect sizes. In a study by Wygant and colleagues (2009), consisting of a sample of both medical and head injury simulators along with personal injury and disability claimants, similar positive results were obtained. F-r, Fp-r, and Fs were significantly elevated for exaggerated neurocognitive symptom groups in comparison to controls and all over-reporting scales analyzed (F-r, Fp-r, Fs, and FBS-r) were significantly elevated in the medical symptom exaggeration group in comparison to controls. Results of these studies show positive results in regards to the use of the MMPI-2-RF in detecting malingering across forensic settings and varying domains of malingering.

The Present Study

The current study investigates the utility of the MMPI-2-RF in the detection of somatic/physical malingering. While previous studies have shown encouraging results in regards to the MMPI-2-RF effectively discriminating between individuals who are and are not malingering, farther research is needed. The present investigation adds to previous research for several reasons. The participants were classified using the Bianchini et al. criteria designed specifically for the detection of malingered pain. This expands on previous research as it eliminates the use of neurocognitive malingering classifications being utilized in the classification of somatic malingering. In addition, the use of this set of criteria demands that participants be given a large battery of measures in order to employ a multi-model strategy of detection. Furthermore, this study uses a known groups design consisting of disability claimants reporting chronic pain, which improves upon former studies using college student simulators.

The purpose of this investigation was to examine the utility of the MMPI-2-RF in detecting malingering among a sample of individuals classified using criteria for the detection of malingered pain-related disability. In regards to malingering classification, it was first hypothesized that each over-reporting scale would be significantly elevated for participants classified as malingering in comparison to participants classified in a *non-malingering* group. In particular, it is hypothesized that F-r and RBS will perform the best at discriminating between malingering and non-malingering groups, given that previous research has demonstrated their utility in civil forensic settings (Gervais et al., 2010; Wygant et al., 2010). However, given the nature of the referral (pain/physical injuries), it is also anticipated that Fs will exhibit utility in making these classifications, given that this scales was designed to assess non-credible somatic responding (Tellegen & Ben-Porath, 2008; Wygant et al., 2009). It is anticipated that Fp-r, which was developed to measure over-reporting of severe psychopathology, will show the least utility in classifying litigants in this sample, given the nature of this civil (versus criminal) setting and this scale was developed to measure exaggerated severe psychopathology.

In regards to the symptom presentation of the malingering group, it is hypothesized that individuals who are classified as malingering will have significantly elevated scores on the Restructured Clinical scales, specifically RC1 (Somatic Complaints) and RC2 (Low Positive Emotions), both of which should be conceptually related to pain.

Chapter II

Method

Participants

This archival sample comprised 169 individuals evaluated by Dr. Robert Granacher at his forensic neuropsychiatric practice in Lexington, KY between 2001 and 2004 for the purpose of disability determination. Each participant received an evaluation based on self-reported symptoms of chronic pain. The sample was predominantly male (68%) and Caucasian (94%) with a mean age of 41.1 (SD = 9.4) and mean education of 11.7 years (SD = 2.3).

Instruments

Self-Report Measures:

MMPI-2-Restructured Form (MMPI-2-RF). Participants were administered the MMPI-2. However, because this study focuses on the utility of the MMPI-2-RF scales to detect malingered pain-related disability, the MMPI-2-RF scales were archivally scored from the full MMPI-2 administration. Previous research has established the equivalence of scale scores produced with the two versions of the instrument (Tellegen & Ben-Porath, 2008; Van Der Heijden, Egger, & Derksen, 2010).

Structured Inventory of Malingered Symptomatology (SIMS; Widows & Smith, 2005). The SIMS is a self-report measure used to detect malingering consisting of 75 true/false items. The test includes five subscales, including Psychosis (P), Neurologic Impairment (NI), Amnestic Disorders (AM), Low Intelligence (LI), and Affective Disorder (AF), each of which assesses a separate domain of symptom exaggeration. When using a sample of college simulators, Widows and Smith (2005) found that the

SIMS exhibited a sensitivity of 95% and a specificity of 88% with a cut off score of ≥ 14 . However, research by Wisdom et al. (2010) in relation to the Slick et al. (1999) criteria for malingered neurocognitive dysfunction found that the SIMS cutoff of 14 resulted in a 36% false positive rate in the classification of malingering. In fact, these authors found that a Total Score cutoff of ≥ 23 was necessary for a false positive rate of less than 10% and a specificity of .55.

Interview-based response bias measures:

Miller Forensic Assessment of Symptoms Test (M-FAST; Miller, 2001). The Miller Forensic Assessment of Symptoms Test (M-FAST; Miller, 2001) is a structured 25-item screening measure validated to assess for malingered psychopathology. The M-FAST includes seven scales, Reported vs. Observed (RO), Extreme Symptomatology (ES), Rare Combinations (RC), Unusual Hallucinations (UH), Unusual Symptom Course (USC), Negative Image (NI), and Suggestibility (S). Research by Miller (2001) showed that in a clinical sample the recommended a cutoff score of 6 for the Total Score produced a negative predictive power (NPP) of .97, positive predictive power (PPP) of .68, specificity of .83, and sensitivity of .93. This cutoff score has had similar support in farther research (Miller, 2004; Guy & Miller, 2004).

Structured Inventory of Reported Symptoms (SIRS; Rogers, Bagby, & Dickens, 1992). The SIRS is a 172-item structured interview designed to capture various over-reported response styles. It includes eight primary scale, including Rare Symptoms, Improbable and Absurd Symptoms, Symptom Combinations, Blatant Symptoms, Subtle Symptoms, Symptom Severity, Symptom Selectivity, and Reported vs. Observed Symptoms. Scores are classified into three categories: feigning, indeterminate, and non-

feigning. Previous studies have illustrated internal consistencies ranging from .77 - .96 for the various scales in addition to having inter-rater reliability ranging from .97 - 1.00 (Rogers, Bagby & Dickens, 1992; Ustad, 1998; Vitacco, Rogers, Gabel, and Munizza, 2007).

Cognitive symptom validity measures:

Test of Memory Malingering (TOMM; Tombaugh, 1996) is a widely used visual recognition test. The TOMM is one of the most comprehensively studied symptom validity tests (Bianchini, Mathias, & Greve, 2001) and previous work (Rees, Tombaugh, Gansler, and Moczynski, 1998) has found the TOMM to produce high sensitivity and specificity rates in distinguishing between individuals with genuine impairment and feigning simulators.

Victoria Symptom Validity Test (VSVT; Slick, Hopp, Strauss, & Thompson, 1997). The VSVT is a computerized forced-choice digit recognition test. Performance falls into three categories: Valid, Questionable, or Invalid. Research by Slick, Hopp, Strauss, Hunter, and Pinch (1994) using control groups consisting of non-compensation-seeking post-concussion patients, and unimpaired participants feigning post-concussion syndrome found that all control participants performed above cutoffs for malingering (i.e., 100% specificity). In addition, 83% of the simulators feigning dysfunction scored in the questionable or invalid range (i.e., 83% sensitivity).

Letter Memory Test (LMT; Inman, Vickery, Berry, Lamb, Edwards, & Smith, 1998). The LMT is a computer administered forced-choice letter recognition test. Inman and colleagues (1998) found that a performance cut-off of 93% exhibited a sensitivity of .84 among analogue malingerers, .95 among traumatic brain injury patients with poor

effort scores on the Digit Memory Test, while exhibiting a specificity of 1.00 for non-compensation seeking neurological patients.

Procedure

Upon completion of the assessment battery, the individual tests were scored according to their respective manuals and research criteria, which are presented in Table 1¹. We then grouped participants into one of four classifications based on the Bianchini et al. (2005) criteria for Malingered Pain Related Disability (MPRD). These criteria included the presence of external incentive (Criterion A), performance on cognitive symptom validity tests (Criterion C1-C2), discrepancies between reported and observed behavior (Criterion D4) and scores on the SIRS, M-FAST, and SIMS for Criterion D5. In no case could a psychiatric, developmental, or neurological disorder fully account for classifications of malingering. Therefore, no participants were excluded for Criterion E. Participants were classified as either *Incentive Only* ($n = 68$), *Possible Malingering* ($n = 35$), *Probable Malingering* ($n = 55$), or *Definite Malingering* ($n = 15$).

Statistical Analyses

It was hypothesized that participants in the probable/definite malingering group actually exaggerate their symptom presentation relative to the non-malingering participants on the clinically substantive measures of the MMPI-2-RF (Restructured Clinical scales). To examine this, a one-way multivariate analysis of variance (MANOVA) was utilized to assess if malingering and non-malingering groups have

¹ All Tables and Figures can be found in the Appendices.

significant scale score differences for the Higher Order, Restructured Clinical, and Somatic/Cognitive Specific Problems scales on the MMPI-2-RF.

To examine whether the scales exhibit significant mean differences across the various pain malingering classifications, another one-way MANOVA was used.

Finally, classification analyses were conducted to examine the accuracy of various cut scores for the MMPI-2-RF validity scales in determining the classification of malingering. In particular, the accuracy of classification was examined in relation to false positive and false negative classifications of malingering.

Chapter III

Results

Differential Symptom Presentation

In order to investigate the symptom presentation of individuals who were malingering, the Restructured Clinical (RC) scales on the MMPI-2-RF were also evaluated. Differences between the three malingering groups were analyzed using a one-way MANOVA. The overall multivariate analysis of variance (MANOVA) for the three malingering groups was significant, Wilk's Lambda = .555, $F(18, 324) = 6.154$, $p < .001$. Six of the nine Restructured Clinical scales were found to differ significantly across all three of the groups (*Incentive Only* to *Possible*, and *Possible* to *Probable/Definite*), with RC3 (Cynicism), RC4 (Antisocial Behavior), and RC9 (Hypomanic Activation) being the exceptions. Among the three exceptions, however, RC3 and RC4 were found to differ significantly from the *Incentive Only* to the *Probable/Definite* malingering groups. Interestingly, RC8 (Aberrant Experiences) and RC6 (Ideas of Persecution) were found to differ between the groups most significantly. Following closely behind, as may be expected, RCd (Demoralization) and RC1 (Somatic Complaints) were found to have the third and fourth greatest significant differences, suggesting that individuals classified as malingering pain endorsed symptoms consistent with feeling sad and unhappy, reporting multiple somatic complaints, and experiencing unusual thought and perceptual processes on the MMPI-2-RF. Results of the MANOVA analysis can be seen in Table 4 with the mean restructured clinical scale profiles presented in Figure 2.

Validity Scale Malingering Group Differences

Each of the MMPI-2-RF validity scales and RBS were compared across the malingering classification groups. For the purpose of these analyses, the *Probable Malingering* group and *Definite Malingering* groups were combined due to the small size of each group. The combination of these two groups in malingering studies has been utilized in previous work (Greve et al., 2006, Greve et al., 2009; Larrabee, 2003).

A one-way analysis of variance (ANOVA) was conducted in order to determine the differences in the MMPI-2-RF over-reporting validity scales across each of the three malingering group classifications. The individual validity scales were then compared across each group. Each of the over-reporting validity scale scores in the *Probable/Definite Malingering* group was significantly higher in comparison to the scores in the *Incentive Only* group, which is presented in Table 3. In addition, each over-reporting validity scale with the exception of Fp-r there was significantly higher in the *Possible Malingering* groups. Mean scores for each of the scales are shown in Figure 1.

Cohen's *d* effect size estimates were calculated between the *Incentive Only* and *Probable/Definite Malingering* groups. As hypothesized, RBS rendered the largest effect ($d = 1.67$), followed closely by F-r ($d = 1.63$). Fs and FBS-r also rendered large effect sizes with $d = 1.37$ and 1.16 , respectively. Finally, not surprisingly given the nature of the forensic context in this sample, Fp-r was found to have the lowest effect size ($d = .93$). In addition, comparisons were made between the *Incentive Only* and *Possible Malingering* groups. Four of the five scales, with Fp-r being the one exception, showed utility in differentiating between these two groups. Fs was found to have the best utility in

discriminating between the two groups, followed closely by F-r and RBS. The results of these analyses are also presented in Table 3.

Classification Accuracy

Table 2 provides the classification accuracy of the MMPI-2-RF over-reporting validity scales. In addition, this table shows the sensitivity, specificity, and predictive powers for hypothetical base rates ranging from .10 to .50 for these five scales. The *Incentive Only* and *Possible Malingering* groups were combined and compared with the *Probable/Definite Malingering* group for the purpose of these analyses.

In regards to classification accuracy, it was found that lower cutoff scores for the scales generally yielded good sensitivity, at the loss of specificity. As cutoff scores were increased, specificity increased. For instance, when analyzing the over-reporting scales at the lowest cutoff, RBS = 80 and FBS = 80 were found to have excellent sensitivity and good specificity (.94/.62 and .90/.56, respectively). F-r and Fs were found to render good sensitivities of .74 and .56, respectively at the lowest cutoffs (F-r = 90 and Fs = 80), with specificities of .81 and .90. Fp-r was an exception, however, and showed low sensitivity (.26) with high specificity (.97) at the lowest cutoff (Fp-r = 70). As the cutoffs were increased, the specificity increased in all cases (naturally, with decreased sensitivities). At the highest cutoffs, F-r (F-r = 120) had a sensitivity of .30 and specificity of .99, Fp-r (Fp-r = 100) had a sensitivity of .07 and a specificity of 1.00, Fs (Fs = 100) had a sensitivity of .26 and a specificity of 1.00, FBS (FBS = 100) had a sensitivity of .16 and specificity of .99, and RBS (RBS = 100) had a sensitivity of .44 and a specificity of .93. These results in addition to the sensitivities and specificities at alternate cut-off scores can be seen in Table 2.

Given that in clinical settings, psychologists will typically examine the complete set of validity scales together when reviewing MMPI-2-RF results, the classification accuracy of the scales was examined together as well. When any one scale was elevated (regardless of which particular scale was elevated), a sensitivity of .80 and specificity of .71 was found. When two scales were elevated (again, regardless of which particular scales were elevated), there was a sensitivity of .88 and specificity of .85. Finally, when three scales were elevated, a sensitivity of .94 and a specificity of .89 were found. These results are also exhibited in Table 2.

In addition to analyzing the sensitivities and specificities of each scale, the positive and negative predictive powers were also evaluated and can also be seen in Table 2. These estimates indicate the malingering classification probability at a certain cut-off. Due to the fact that estimates of predictive power are heavily influenced by the base-rate of the condition, positive and negative predictive powers were analyzed at hypothetical base rates ranging from .10 to .50.

Generally, acceptable positive predictive power (PPP) rates were found with increased base rates and cut-off scores for these scales. For instance, F-r reached a PPP of .80 at the lowest cut-off, only when the base rate was set at .50. On the other hand, F-r reached a PPP of .88 at a base rate of .20, but at the highest cut-off. Similar patterns were found for both Fp-r and Fs. In the case of FBS-r and RBS, however, it was found that regardless of the base rate, PPP was not at or above .80 at the lowest cut-offs. In addition, on RBS, even with a higher cut-off score, a base rate of .40 was still needed in order to obtain a PPP of at least .80.

Chapter IV

Discussion

The current study investigates the association between the MMPI-2-RF over-reporting validity scales and structured malingered pain criteria among a sample of civil litigants claiming symptoms of chronic pain. The purposes of this study was to examine the utility of the MMPI-2-RF over-reporting validity scales in the classification of malingered pain disability.

Overall, the over-reporting validity scales of the MMPI-2-RF were found to have good utility in the detection of malingered pain related disability. Each of the scales was found to be significantly higher between the *Incentive Only* and the *Probable/Definite Malingering* groups. As expected, RBS and F-r were found to have the greatest effect sizes in making these comparisons. This is not surprising given the basis for the construction of each of these scales. In particular, the high performance of RBS was expected given that the scale was constructed in order to predict the failure of cognitive SVT's and the Bianchini et al. (2005) MPRD criteria include performance on SVTs. This study shows evidence that RBS is in fact performing as intended. Also as hypothesized, Fp-r had the lowest effect size. This is also not surprising, because individuals in a civil forensic disability context are not as likely to be presenting symptoms of severe mental illness (Wygant et al., 2007). In regard to Fs and FBS-r, promising findings were also obtained. Though the effect sizes were much smaller than those found for F-r and RBS in this study, both Fs and RBS-r did show utility in distinguishing all three malingering groups. These results are consistent with previous research of these scales on their use in civil forensic contexts (Wygant et al., 2009, 2010) which have found the over-reporting

validity scales to have utility in distinguishing malingering groups among disability litigants, particularly F-r and RBS. In addition, given that sensitivity and specificity increased as more than one scale was utilized at a time to make a malingering diagnosis, this research supports the use of the over-reporting validity scales as a whole. Clinicians are especially encouraged to use the over-reporting scales of the MMPI-2-RF in combination with one another in order to assist making malingering determinations. In terms of classification accuracy, it was generally found that having low cut-off scores yielded good sensitivity at the loss of specificity. When the cut-off scores were raised, specificity also rose, but of course at the loss of sensitivity. Since validity scales of the MMPI-2-RF are intended to be analyzed as a whole, and determinations are not suggested to be made on the basis of one scale, classification accuracy was found for multiple scale elevations, which yielded positive findings. When more than one scale was elevated, high rates were found for both sensitivity and specificity. In terms of cut-off scores to be used for each of these over-reporting scales, it would be suggested that lower cut-off scores be utilized in order to increase the sensitivity of the measure. While if the MMPI-2-RF were being utilized alone in order to classify individuals as malingering or non-malingering, these lower cut-off scores would render a high rate of false-positives, the practice of using one measure for malingering determination would be considered poor clinical judgment. Therefore, it is suggested that the lower cut-off scores of the over-reporting scales on the MMPI-2-RF be utilized as one piece of evidence in a large battery of measures used to determine the level of symptom over-reporting. Furthermore, it is suggested that the MMPI-2-RF be utilized as a screening measure with the use of

lower cut-off scores in order to determine which individuals need to be tested further for symptom feigning or magnification.

The hypothesis was generally supported that the Restructured Clinical scales of the MMPI-2-RF would be significantly elevated in the *Probable/Definite Malingering* group in comparison to the *Possible Malingering* and *Incentive Only* groups in a theoretically consistent manner. Eight of the nine scales were found to be significantly higher in the *Probable/Definite Malingering* group compared to the *Incentive Only* group (with RC9, Hypomanic Activation, being the one exception). This shows that, as would be expected, and even assumed, those classified as malingering were endorsing a greater amount of symptoms. Most expectedly, RC1 (Somatic Complaints) was among the scales with the greatest significant differences between the groups. This finding is not surprising given that the sample consisted of individuals claiming chronic pain and RC1 includes items reflecting somatic dysfunction. Also not surprising, RCd was significantly elevated in the malingering group, suggesting that these litigants were presenting themselves as depressed, pessimistic, and dejected. Interestingly, RC8 (Aberrant Experiences) exhibited the largest difference between the groups. This is inconsistent with previous studies (e.g., Larrabee, 2003; Wygant et al., 2007), which suggests that disability litigants are unlikely to report symptoms of severe psychopathology (e.g., psychosis). Further research would be needed in order to formulate hypotheses for why these results were found, such as evaluating whether there was a pattern with the malingering individuals elevating this scale in regards to which specific items were being endorsed.

Limitations and Future Directions

The current study is not without its limitations. The first of these limitations is that the present investigation did not include a non-litigating clinical comparison group. Though there were individuals who were classified as “non-malingering”, these individuals were not a “no incentive” group as each individual did have a financial incentive at stake. Since previous research has shown that “no incentive” and “incentive only” groups can actually differ in their symptom presentation (Bianchini et al., 2008), this is a limitation of the current study. Future research in regards to the use of multi-method malingered pain detection criteria should utilize a comparison group of individuals without an incentive to exaggerate their symptoms. An optimal choice for such group would include a sample of non-litigating chronic pain patients.

In addition, a second limitation of the current study is the lack of a specific somatic malingering measure administered in the testing battery. This is indeed a challenge to the field in general, as there are few validated measures used to detect malingered somatic symptoms, but the present study would have been made stronger had the few validated measures used for this detection been utilized in this sample. For instance, future research in this area should use measures such as the Modified Somatic Perception Questionnaire (MSPQ; Main, 1983) and Waddell’s signs of non-organic pain (Waddell, McCulloch, Kummel, & Venner, 1980) in order to better validate the use of the MMPI-2-RF over-reporting validity scales, particularly the Fs scale, in the detection of malingered pain. Future research in the general field of somatic malingering should also investigate expanding the options for somatic malingering measures. When a greater

number of measures are available for this purpose, the study of the MMPI-2-RF in relation to this topic will be more simple and meaningful.

In conclusion, the results of this study are generally supportive of the use of the MMPI-2-RF in the detection of malingered pain related disability. A strength of the present study was the use of the Bianchini et al. Malingered Pain-Related Disability criteria in order to classify individuals on a continuum of malingering. This gives a more accurate classification than the use of single response bias criteria, and therefore creates a more stringent analysis of the MMPI-2-RF over-reporting validity scales. Results were very promising in that even under the more strict conditions of the structured malingering criteria, the MMPI-2-RF validity scales performed very well in the classification of malingering. In addition, the over-reporting validity scales were found to have good sensitivity and specificity, which support the use of the mMMPI-2-RF in the use of screening individuals for possible malingering symptomatology. Finally, the hypotheses put forth were generally supported and it would be expected that the MMPI-2-RF over-reporting validity scales will continue to perform well in the use of detecting malingered pain related disability.

References

- ABC News Good Morning America (2006, May 3). Cheating disability claimants cost you. Retrieved on February 10, 2009, from <http://abcnews.go.com/GMA/Story?id=1914153&page=1>
- American Psychiatric Association. (2000). Diagnostic and statistical manual of mental disorders (4th ed., revised). Washington, DC: Author.
- Arbisi, P.A., & Ben-Porath, Y.S. (1995). An MMPI-2 infrequent response scale for use with psychopathological populations: The Infrequency Psychopathology scale, F(p). *Psychological Assessment, 7*, 424-431.
- Bender, S.D. (2008). Malingered traumatic brain injury. In R. Rogers (Ed.), *Clinical Assessment of Malingering and Deception* (pp. 69-86). New York: The Guilford Press.
- Ben-Porath, Y. S. (2003). Assessing personality and psychopathology with self-report inventories. In Graham, J. R. & Naglieri, J. A. (Eds.), *Handbook of psychology: Assessment psychology, Volume 10* (pp. 553-577). Hoboken, NJ: John Wiley & Sons Inc.
- Ben-Porath, Y. S., & Tellegen, A. (2008). *Minnesota Multiphasic Personality Inventory-2 Restructured Form; Manual for administration, scoring, and interpretation*. Minneapolis, MN: University of Minnesota Press.
- Bianchini, K.J., Etherton, J.L., Greve, K.W., Heinly, M.T., & Meyers, J.E. (2008). Classification accuracy of MMPI-2 validity scales in the detection of pain-related malingering. *Assessment, 15*, 435-449.

- Bianchini, K.J., Greve, K.W., & Glynn, G. (2005). Review article: On the diagnosis of malingered pain-related disability: Lessons from cognitive malingering research. *The Spine Journal*, 5, 404-417.
- Bianchini, K.J., Mathias, C.W., & Greve, K.W. (2001). Symptom validity testing: A critical review. *The Clinical Neuropsychologist*, 15, 19-45.
- Bickart, W.T., Meyer, R.G., & Connell, D.K. (1991). The symptom validity technique as a measure of feigned short-term memory deficit. *American Journal of Forensic Psychology*, 9, 3-11.
- Binder, L.M. (1993). Assessment of malingering after mild head trauma with the Portland Digit Recognition Test. *Journal of Clinical and Experimental Neuropsychology*, 15, 170-182.
- Butcher, J.N., Arbisi, P.A., Atlis, M.M., & McNulty, J.L. (2003). The construct validity of the Lees-Haley Fake Bad Scale: Does this scale measure somatic malingering and feigned emotional distress? *Archives of Clinical Neuropsychology*, 18, 473-485.
- Burchett, D.L., & Ben-Porath, Y.S. (2010). The impact of overreporting on MMPI-2-RF substantive scale score validity. *Assessment*.
- Butcher, J.N., Graham, J.R., Ben-Porath, Y.S., Tellegen, A., Dahlstrom, W.G. & Kaemmer, B. (2001). *MMPI-2: Manual for administration and scoring* (Revised ed.). Minneapolis: University of Minnesota Press.
- Cohen, J., Cohen P., West, S., & Aiken, L. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences*. Manwah, NJ: Erlbaum.

- Etherton, J.L., Bianchini, K.J., Greve, K.W., & Heinly, M.T. (2005). Sensitivity and specificity of Reliable Digit Span in malingered pain-related disability. *Assessment, 12*, 130-136.
- Florida Department of Financial Services (2009). Impacts of the economy and insurance fraud. Retrieved from:
http://www.myfloridacfo.com/fraud/forms/Economic_Impacts_8-2009.pdf.
- Gervais, R.O., Ben-Porath, Y.S., Wygant, D.B., & Green, P. (2007). Development and validation of a Response Bias Scale (RBS) for the MMPI-2. *Assessment, 14*, 196-208.
- Gervais, R.O., Ben-Porath, Y.S., Wygant, D.B., & Green, P. (2008). Differential sensitivity of the Response Bias Scale (RBS) and MMPI-2 validity scales to memory complaints. *The Clinical Neuropsychologist, 22*, 1061-1079.
- Gervais, R.O., Ben-Porath, Y.S., Wygant, D.B., & Sellbom, M. (2010). Incremental validity of the MMPI-2-RF over-reporting scales and RBS in assessing the veracity of memory complaints. *Archives of Clinical Neuropsychology*.
- Graham, J.R. (2006). *MMPI-2: Assessing Personality and Psychopathology (4th Ed.)*. New York: Oxford University Press, Inc.
- Granacher, R.P. & Berry, D.T.R. (2008). Feigned Medical Presentations. In R. Rogers (Ed.), *Clinical Assessment of Malingering and Deception* (pp. 145-156). New York: The Guilford Press.
- Greene, R.L. (1997). Assessment of malingering and defensiveness of multiscale inventories. In R. Rogers (Ed.), *Clinical assessment of malingering and deception* (2nd ed., pp. 169-207). New York: Guilford.

- Greiffenstein, M.F., Baker, W.J., & Gola, T. (1994). Validation of malingered amnesia measures with a large clinical sample. *Psychological Assessment, 6*, 218-224.
- Greve, K. W., Bianchini, K.J., Love, J.M., Brennan, A., & Heinly, M.T. (2006). Sensitivity and specificity of MMPI-2 validity scale and indicators to malingered neurocognitive dysfunction in traumatic brain injury. *The Clinical Neuropsychologist, 20*, 491-512.
- Greve, K.W., Ord, J.S., Bianchini, K.J., & Curtis, K.L. (2009). Prevalence of Malingering in Patients with Chronic Pain Referred for Psychological Evaluation in a Medico-Legal Context. *Archives of Physical Medicine and Rehabilitation, 90*, 1117-1126.
- Guy, L., & Miller, H. (2004). Screening for Malingered Psychopathology in a Correctional Setting: Utility of the Miller-Forensic Assessment of Symptoms Test (M-FAST). *Criminal Justice and Behavior, 31*, 695-716.
- Hiscock, M., & Hiscock, C.K. (1989). Refining the forced-choice method for the detection of malingering. *Journal of Clinical and Experimental Neuropsychology, 11*, 967-974.
- Hopwood, C.J., Orlando, M., & Clark, T.C. (in press). The detection of malingered pain-related disability with the Personality Assessment Inventory. *Rehabilitation Psychology*.
- Inman, T.H., Vickery, C.D., Berry, D.T.R., Lamb, D.G., Edwards, C.L., & Smith, G.T. (1998). Development and initial validation of a new procedure for evaluating adequacy of effort given during neuropsychological testing: The Letter Memory Test. *Psychological Assessment, 10*, 128-139.

- Karlin, B.E., Creech, S.K., Grimes, J.S., Clark, T.S., Meagher, M.W., & Morey, L.C. (2005). The Personality Assessment Inventory with chronic pain patients: Psychometric properties and clinical utility. *Journal of Clinical Psychology, 61*, 1571-1585.
- Larrabee, G.J. (1998). Somatic malingering on the MMPI and MMPI-2 in personal injury litigants. *The Clinical Neuropsychologist, 12*, 196-206.
- Larrabee, G.J. (2003). Exaggerated pain report in litigants with malingered neurocognitive dysfunction. *The Clinical Neuropsychologist, 17*, 395-401.
- Lees-Haley, P.R., English, L.T., & Glenn, W.J. (1991). A fake bad scale on the MMPI-2 for personal injury claimants. *Psychological Reports, 68*, 203-210.
- Main, C.J. (1983). The modified somatic perception questionnaire (MSPQ). *Journal of Psychosomatic Research, 27*, 503-514.
- Melhorn, J.M., Lazarovic, J. & Roehl, W.K. (2009). Do we have a disability epidemic? In I.Z. Schultz & R.J. Gatchel (Eds.) *Handbook of complex occupational disability claims: early risk identification, intervention and prevention*. New York: Springer.
- Meyers, J.E., & Volbrecht, M. (1998). Validation of Reliable Digits for detection of malingering. *Assessment, 5*, 303-307.
- Miller, H.A. (2001). *Miller Forensic Assessment of Symptoms Test (M-FAST) and professional manual*. Lutz, FL: Psychological Assessment Resources.
- Miller, H. (2004). Examining the Use of the M-FAST With Criminal Defendants Incompetent to Stand Trial. *International Journal of Offender Therapy and Comparative Criminology, 48*, 268-280.

- 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*, 1094-1102.
- Morey, L.C. (1991). *Professional Manual for the Personality Assessment Inventory (PAI)*. Odessa, FL: Psychological Assessment Resources.
- Nelson, N.W., Hoelzle, J.B., Sweet, J.J., Arbisi, P.A., & Demakis, G.J. (2010). Updated meta-analysis of the MMPI-2 Symptom Validity Scale (FBS): Verified utility in forensic practice. *The Clinical Neuropsychologist, 24*, 701-724.
- Nelson, N.W., Sweet, J.J., & Heilbronner, R.L. (2007). Examination of the new MMPI-2 response bias scale (Gervais): Relationship with MMPI-2 validity scales. *Journal of Clinical and Experimental Neuropsychology, 29*, 67-72.
- 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*, 10-20.
- Rogers, R. (1990). Development of a new classificatory model of malingering. *Bulletin of the American Academy of Psychiatry and Law, 18*, 323-333.
- Rogers, R. (2008). (Ed.). *Clinical Assessment of Malingering and Deception (3rd Ed.)*. New York: The Guilford Press.
- Rogers, R., Bagby, R.M., & Dickens, S.E. (1992). *Structured Interview of Reported Symptoms (SIRS) and professional manual*. Odessa, FL: Psychological Assessment Resources.

- Rogers, R. & Bender, S.D. (2003). Evaluation of Malingering and Deception. In Goldstein, A.M, & Weiner, I.B. (Eds.), *Handbook of Psychology: Assessment Psychology, Volume 11* (pp. 109-129). Hoboken, NJ: John Wiley & Sons Inc.
- Rogers, R., Sewell, K.W., & Gillard, N.D. (2010). *Structured Interview of Reported Symptoms (SIRS), 2nd Edition, Professional Manual*. Lutz, FL: Psychological Assessment Resources, Inc.
- Rogers, R., Sewell, K.W., Martin, M.A., & Vitacco, M.J. (2003). Detection of feigned mental disorders: A meta-analysis of the MMPI-2 and malingering. *Assessment, 10*, 160-177.
- Rogers, R., Sewell, K.W., & Salekin, R. (1994). A meta-analysis of malingering on the MMPI-2. *Assessment, 1*, 227-237.
- Roid, G.H. (2003). *Stanford-Binet Intelligence Scales, Fifth Edition*. Itasca, IL: Riverside Publishing.
- Ross, S.R., Millis, S.R., Krukowski, R.A., Putnam, S.H., & Adams, K.M. (2004). Detecting incomplete effort of the MMPI-2: An examination of the Fake Bad Scale in mild head injury. *Journal of Clinical and Experimental Neuropsychology, 26*, 115-124.
- Sellbom, M., & Bagby, R.M. (2010). The detection of over-reported psychopathology with the MMPI-2-RF (Restructured Form) validity scales. *Psychological Assessment, 22*, 757-767.
- Sellbom, M., Toomey, J.A., Wygant, D.B., Kucharski, T.L., & Duncan, S. (2010). Utility of the MMPI-2-RF (Restructured Form) validity scales in detecting malingering

- in a criminal forensic setting: A known-groups design. *Psychological Assessment*, 22, 22-31.
- Slick, D.J., Hopp, G., & Strauss, E. (1995). *The Victoria Symptom Validity Test*. Odessa, FL: Psychological Assessment Resources.
- Slick, D., Hopp, G., Strauss, E., Hunter, M., & Pinch, D. (1994). Detecting dissimulation: Profiles of simulated malingerers, traumatic brain injury patients, and normal controls on a revised version of Hiscock and Hiscock's forced choice memory test. *Journal of Clinical and Experimental Neuropsychology*, 16, 472-481.
- Slick, D. J., Sherman, E.M.S., & Iverson, G. L. (1999). Forum: Diagnostic criteria for malingered neurocognitive dysfunction: Proposed standards for clinical practice and research. *The Clinical Neuropsychologist*, 13, 545-561.
- Stern, R.A., & White, T. (2003). *The Neuropsychological Assessment Battery*. Lutz, FL: Psychological Assessment Resources, Inc.
- Tellegen, A., & Ben-Porath, Y.S. (2008). *The Minnesota Multiphasic Personality Inventory -2 Restructured Form: Technical manual*. Minneapolis, MN: University of Minnesota Press.
- Tombaugh, T.N. (1996). *Test of Memory Malingering (TOMM)*. New York: Multi Health Systems.
- Tombaugh, T.N. (1997). The Test of Memory Malingering (TOMM): Normative data from cognitively intact and cognitively impaired individuals. *Psychological Assessment*, 9, 260-268.

- Tsanadis, J., Montoya, E., Hanks, R.A., Millis, S.R., Fichtenberg, N.L., & Axelrod, B.N. (2008). Brain injury severity, litigation status, and self-report of postconcussive symptoms. *The Clinical Neuropsychologist, 22*, 1080-1092.
- Turk, D.C., & Okifuji, A. (2002). Psychological factors in chronic pain: Evolution and revolution. *Journal of Consulting and Clinical Psychology, 70*, 678-690.
- Van Der Heijden, P. T., Egger, J. I. M. & Derksen, J. J. L. (2010). Comparability of Scores on the MMPI-2-RF Scales Generated With the MMPI-2 and MMPI-2-RF Booklets. *Journal of Personality Assessment, 92*, 254-259.
- Van Dyke, S.A., Axelrod, B.N., & Schutte, C. (2010) The utility of the Post-concussive Symptom Questionnaire. *Archives of Clinical Neuropsychology*.
- Vitacco, M. J., Rogers, R., Gabel, J., & Munizza, J. (2007). An evaluation of malingering screens with competency to stand trial patients: A known-groups comparison. *Law and Human Behavior, 31*, 249-260.
- Waddell, G., McCulloch, J.A., Kummel, E., & Venner, R.M. (1980). Nonorganic physical signs in low-back pain. *Spine, 5*, 117-125.
- Wechsler, D. (2008). *Wechsler Adult Intelligence Scale—Fourth Edition*. San Antonio, TX: Pearson Assessment.
- Wechsler, D. (2009). *Wechsler Memory Scales- fourth edition*. San Antonio, TX: Pearson Assessment.
- Whitney, K.A., Davis, J.J., Shepard, P.H., & Herman, S.M. (2008). Utility of the Response Bias Scale and other MMPI-2 validity scales in predicting TOMM performance. *Archives of Clinical Neuropsychology, 23*, 777-786.

- Wisdom, N., Callahan, J., & Shaw, T. (2010). Diagnostic Utility of the Structured Inventory of Malingered Symptomatology to Detect Malingering in a Forensic Sample. *Archives of Clinical Neuropsychology*, *25*, 118-125.
- Widows, M.R., & Smith, G.P. (2005). *Structured Inventory of Malingered Symptomatology (SIMS) and professional manual*. Lutz, FL: Psychological Assessment Resources.
- Wygant, D.B. (2007). Validation of the MMPI-2 Infrequent Somatic Complaints (Fs) scale. (Doctoral dissertation, Kent State University, 2007).
- Wygant, D.B., Ben-Porath, Y.S., & Arbisi, P.A. (2004, May). *Development and Initial Validation of a Scale to Detect Infrequent Somatic Complaints*. Poster presented at the 39th Annual Symposium on Recent Developments of the MMPI-2/MMPI-A, Minneapolis, MN.
- Wygant, D.B., Ben-Porath, Y.S., Arbisi, P.A., Berry, D.T.R., Freeman, D.B., & Heilbronner, R.L. (2009). Examination of the MMPI-2 Restructured Form (MMPI-2-RF) validity scales in civil forensic settings: Findings from simulation and known group samples. *Archives of Clinical Neuropsychology*.
- Wygant, D.B., Ben-Porath, Y.S., Gervais, R.O., Sellbom, M., Stafford, K.P., Freeman, D.B., et al. (2006, May). *Further validation of the Response Bias Scale (RBS)*. Paper presented at the 41st Annual Symposium of Recent Developments of the MMPI-2/MMPI-A, Minneapolis, MN.
- Wygant, D.B., Gervais, R.O., & Ben-Porath, Y.S. (2010) The MMPI-2 Restructured Form (MMPI-2-RF) validity scales: association with malingered neurocognitive dysfunction. Manuscript under editorial review.

Wygant, D.B., Sellbom, M., Ben-Porath, Y.S., Stafford, K.P., Freeman, D.B., & Heilbronner, R.L. (2007). The relation between symptom validity testing and MMPI-2 scores as a function of forensic evaluation context. *Archives of Clinical Neuropsychology, 22*, 489-499.

Wygant, D.B., Sellbom, M., Gervais, R.O., Ben-Porath, Y.S., Stafford, K.P., Freeman, D.B., & Heilbronner, R.L. (2010). Further validation of the MMPI-2 and MMPI-2-RF Response Bias Scale (RBS): Findings from Disability and Criminal Forensic Settings. *Psychological Assessment, 22*, 745-756.

Youngjohn, J.R., Wershba, R., Stevenson, M., Sturgeon, J., & Thomas, M.L. (2011). Independent validation of the MMPI-2-RF Somatic/Cognitive scales in TBI litigants tested for effort. *The Clinical Neuropsychologist, 1-14*.

APPENDIX A:
Scoring Criteria for Response Bias Measures

Table 1

Scoring criteria for response bias measures

Measure	Pass	Below Cutoff	Below Chance	Source
LMT	≥ 93%	< 93% correct	N/A	Inman et al. (1998)
TOMM	≥ 90% Trial 2/ Retention	36 - 89.99% (Trial 2/ Retention)	< 36% (Trial 2/ Retention)	TOMM Manual
VSVT	≥ 30 (Total Correct) or ≥ 16 (Easy/Difficult Correct)	18 - 29 (Total Correct), or 8 - 15 (Easy/Difficult Correct)	≤ 17 (Total Correct), or ≤ 7 (Easy/Difficult Correct)	VSVT Manual
	Above Cutoff			Source
M-FAST	≥ 6 Total Score			M-FAST Manual
SIMS	≥ 23 Total Score			Wisdom et al. (2010)
SIRS	≥ 1 Primary Scale in Definite Range, or ≥ 3 Primary Scales in Probable Range, or Total Score > 76			SIRS Manual

Sources: Inman, T.H., Vickery, C.D., Berry, D.T.R., Lamb, D.G., Edwards, C.L., & Smith, G.T. (1998). Development and initial validation of a new procedure for evaluating adequacy of effort given during neuropsychological testing: The Letter Memory Test. *Psychological Assessment*, 10, 128-139.; Miller, H.A. (2001). *Miller Forensic Assessment of Symptoms Test (M-FAST) and professional manual*. Lutz, FL: Psychological Assessment Resources.; Rogers, R., Bagby, R.M., & Dickens, S.E. (1992). *Structured Interview of Reported Symptoms (SIRS) and professional manual*. Odessa, FL: Psychological Assessment Resources.; Slick, D.J., Hopp, G., & Strauss, E. (1995). *The Victoria Symptom Validity Test*. Odessa, FL: Psychological Assessment Resources.; Tombaugh, T.N. (1996). *Test of Memory Malingering (TOMM)*. New York: Multi Health Systems.; Wisdom, N., Callahan, J., & Shaw, T. (2010). Diagnostic Utility of the Structured Inventory of Malingered Symptomatology to Detect Malingering in a Forensic Sample. *Archives of Clinical Neuropsychology*, 25, 118-125.

APPENDIX B:

Classification Accuracy and Predictive Power

Table 2

Classification Accuracy and Predictive Power (Incentive Only vs. Probable/Definite Malingering)

	Cutoff	SENS	SPEC	BR	Predictive Power: Positive/Negative				
					.10	.20	.30	.40	.50
F-r	90	.74	.81		.30/.97	.49/.93	.63/.88	.72/.82	.80/.76
	100	.59	.87		.34/.95	.53/.89	.66/.83	.75/.76	.82/.68
	110	.46	.94		.46/.94	.66/.87	.77/.80	.84/.72	.88/.64
	120	.30	.99		.77/.93	.88/.85	.93/.77	.95/.68	.97/.59
Fp-r	70	.26	.97		.49/.92	.68/.84	.79/.75	.85/.66	.90/.57
	80	.16	.97		.37/.91	.57/.82	.70/.73	.78/.63	.84/.54
	90	.13	.99		.59/.91	.76/.82	.85/.73	.90/.63	.93/.53

Table 2 (Continued)

	Cutoff	SENS	SPEC	BR	.10	.20	.30	.40	.50
	100	.07	1.00		1.00/.91	1.00/.81	1.00/.72	1.00/.62	1.00/.52
Fs	80	.56	.90		.38/.95	.58/.89	.71/.83	.79/.75	.85/.67
	90	.46	.96		.56/.94	.74/.88	.83/.81	.88/.73	.92/.64
	100	.26	1.00		1.00/.92	1.00/.84	1.00/.76	1.00/.67	1.00/.57
FBS-r	80	.90	.56		.19/.98	.34/.96	.47/.93	.58/.89	.67/.85
	90	.47	.82		.22/.93	.39/.86	.53/.78	.64/.70	.72/.61
	100	.16	.99		.64/.91	.80/.83	.87/.73	.91/.64	.94/.54
RBS	80	.94	.62		.22/.99	.38/.98	.51/.96	.62/.94	.71/.91
	90	.74	.82		.31/.97	.51/.93	.64/.88	.73/.83	.80/.76

Table 2 (Continued)

	Cutoff	SENS	SPEC	BR	.10	.20	.30	.40	.50
	100	.44	.93		.41/.94	.61/.87	.73/.79	.81/.71	.86/.62
Multiple Scales	1 Elevation	.80	.71		.23/.97	.41/.93	.54/.89	.65/.84	.73/.78
	2 Elevations	.88	.85		.39/.98	.59/.97	.72/.94	.80/.91	.85/.88
	3 Elevations	.94	.89		.49/.99	.68/.98	.79/.97	.85/.96	.90/.94

Note. MND = Malingered Neurocognitive Dysfunction. SENS = Sensitivity, SPEC = Specificity, BR = Hypothetical Base Rate. Multiple Scales utilized a combination of scales and considered an individual to be classified as malingering if **F-r \geq 95, Fp-r \geq 70, Fs \geq 90, FBS-r \geq 90, or RBS \geq 90.**

APPENDIX C:

MMPI-2-RF Validity Scales and Criteria for MPRD

Table 3

MMPI-2-RF validity scales and criteria for Malingered Pain Related Disability

	Malingered Pain Related Disability Classification									
	Incentive		Possible		Probable/Definite		ANOVA	Effect Size		
	Only		Malingering		Malingering					
	<i>(n</i> = 68)		<i>(n</i> = 34)		<i>(n</i> = 67)					
<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	F (2,166)	<i>p</i>	η^2	<i>d</i>	
F-r	72.46 _a	19.078	86.78 _b	20.101	106.73 _c	22.835	45.82	<.001	.36	1.63
F _p -r	51.91 _a	10.277	57.69 _a	12.921	64.93 _b	16.993	15.03	<.001	.07	0.93
F _S	59.63 _a	13.792	75.69 _b	18.072	85.32 _c	22.761	32.45	<.001	.28	1.37
FBS-r	75.26 _a	14.281	84.03 _b	14.181	90.01 _b	10.834	21.90	<.001	.21	1.16

Table 3 (Continued)

	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	F (2,166)	<i>p</i>	η^2	<i>d</i>
RBS	72.61 _a	17.224	87.07 _b	14.292	98.51 _c	13.549	48.67	<.001	.37	1.67

Note. Means for all three groups were significantly different for each scale (Tukey HSD). F-r = Infrequent Responses; F_{P-r} = Infrequent Psychopathology Responses; F_S = Infrequent Somatic Responses; FBS-r = Symptom Validity. RBS = Response Bias Scale. Cohen's *d* calculated between Incentive Only and Probable/Definite Malingering groups.

APPENDIX D:

MMPI-2-RF Restructured Clinical Scales and Criteria for MPRD

Table 4

MMPI-2-RF restructured clinical scales and criteria for Malingered Pain Related Disability

	Malingered Pain Related Disability Classification								
	Incentive		Possible		Probable/Definite		ANOVA		
	Only		Malingering		Malingering				
	<i>(n = 68)</i>		<i>(n = 35)</i>		<i>(n = 70)</i>				
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	F (2,162)	<i>p</i>	<i>d</i>
RCd	65.51 _a	11.024	71.23 _b	11.892	77.99 _c	6.392	28.97	<.001	1.13
RC1	72.40 _a	12.955	81.29 _a	11.834	86.86 _b	9.657	27.57	<.001	1.12
RC2	70.10 _a	13.020	75.89 _b	13.286	84.21 _c	10.875	23.05	<.001	1.08
RC3	53.90 _a	12.633	55.80 _{ab}	11.852	60.90 _b	11.975	5.92	.003	0.55

Table 4 (Continued)

	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	F (2,162)	<i>p</i>	<i>d</i>
RC4	47.97 _a	8.760	47.00 _{ab}	10.224	51.90 _b	10.836	3.94	.021	0.45
RC6	52.82 _a	10.172	57.54 _a	12.668	67.97 _b	15.592	23.78	<.001	1.49
RC7	56.69 _a	11.970	63.34 _b	13.647	69.96 _c	11.862	20.12	<.001	1.11
RC8	49.76 _a	10.512	56.83 _b	14.537	67.83 _c	14.344	33.60	<.001	1.72
RC9	43.85 _a	8.706	44.20 _a	11.631	46.43 _a	10.182	1.29	.279	0.30

Note. RCd = Demoralization; RC1 = Somatic Complaints; RC2 = Low Positive Emotions; RC3 = Cynicism; RC4 = Antisocial Behavior; RC6 = Ideas of Persecution; RC7 = Dysfunctional Negative Emotions; RC8 = Aberrant Experiences; RC9 = Hypomanic Activation. Cohen's *d* calculated between Incentive Only and Probable/Definite Malingering groups.

APPENDIX E:

Mean Over-Reporting Validity Scale Score

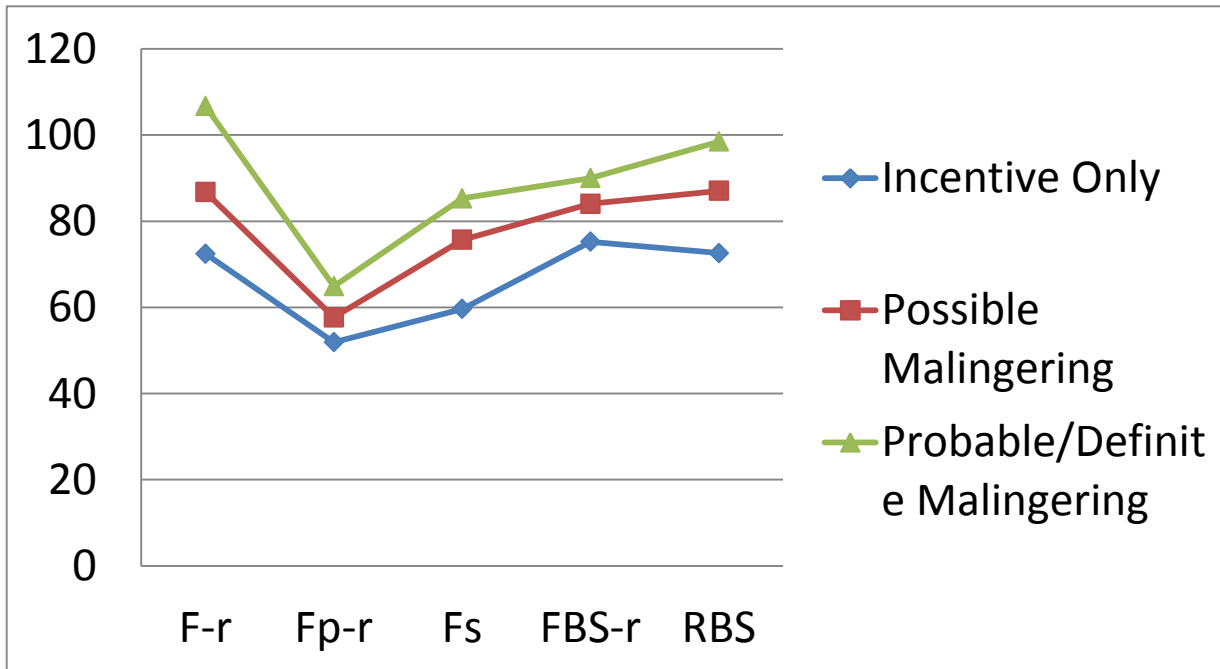


Figure 1. Mean Over-Reporting Validity Scale Scores

APPENDIX F:
Mean Restructured Clinical Scale Scores

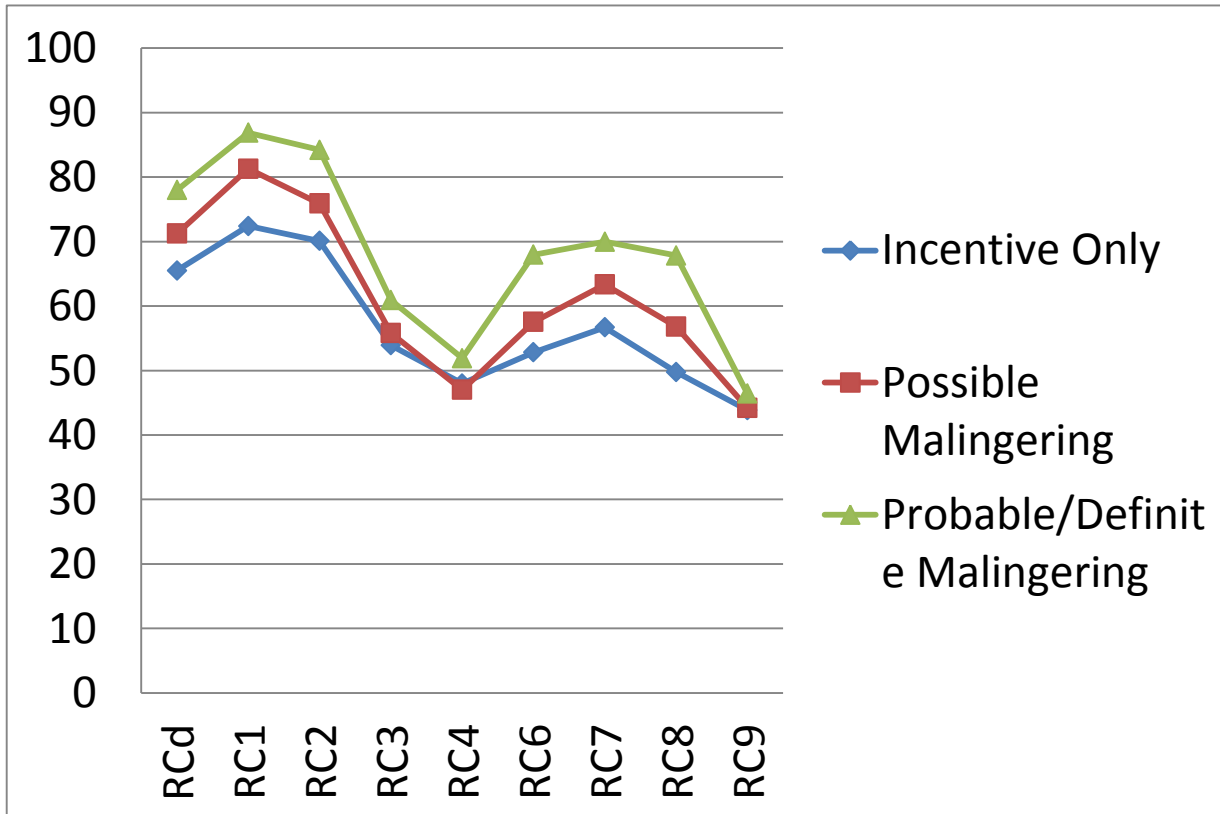


Figure 2. Mean Restructured Clinical Scale Scores