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AN ANALYSIS OF THE DIFFERENTIAL POWER OF THE FAKE BAD SCALE OF THE MMPI-2

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ABSTRACT

An Analysis of the Differential Power of the Fake Bad Scale of the MMPI-2

by

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This study examined the ability of the Fake Bad Scale of the Minnesota Multiphasic Personality Inventory-2 to differentiate among individuals who have a traumatic brain injury, individuals with a somatoform disorder, and individuals who are malingering. Participants were chosen from a pool of 283 personal injury and workers compensation cases obtained from an established neuropsychological practice in a major Southwestern city. Each of these participants was involved in litigation and received a diagnosis that included traumatic brain injury, a somatoform disorder, or malingering. Complete neuropsychological and psychological test batteries were conducted on each participant, and the complete medical records for each participant were reviewed. Of the available cases 30 individuals with a diagnosis of malingering, 31 individuals with a diagnosis of a somatoform disorder, and 21 individuals with a traumatic brain injury were selected for analysis.

The first aspect of the Fake Bad Scale that was examined was its ability to differentiate among individuals with traumatic brain injury, a somatoform disorder, or

who are malingering. These data were analyzed utilizing a one-way Analysis of Variance (ANOVA). The ANOVA indicated that the mean Fake Bad Scale scores for each group were significantly different; thus, a Bonferroni comparison was made. This comparison demonstrated that the Fake Bad Scale significantly differentiated between each possible pairwise comparison of the three groups of interest in terms of mean score. The sensitivity and specificity of the Fake Bad Scale were also examined and indicated that significantly different mean scores did not necessarily imply accuracy of classification given that the Fake Bad Scale correctly classified individuals with Somatoform Disorder less than 50 percent of the time.

Next, the Fake Bad Scale of the MMPI-2 was compared to other validity measures of the MMPI-2 by using a separate one-way ANOVA for each validity scale of interest These analyses indicated that the F Scale, the F-K Index, and the F(b) Scale each produced significantly different mean scores for the three groups of interest. Subsequent Bonferroni comparisons indicated that none of these scales significantly differentiated between malingerers and individuals with a traumatic brain injury. The sensitivity and specificity for each MMPI-2 validity scale were also considered, and resulted in the conclusion that the F(b) Scale provided the most consistent classification of each diagnostic group.

The final question that was considered was whether there were gender differences in the ability of the Fake Bad Scale to differentiate among the three groups of interest. These data were analyzed using Analysis of Variance (ANOVA). Gender differences on the Fake Bad Scale were not found.

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CHAPTER 1

INTRODUCTION

The diagnosis of malingering, or the feigning of medical or psychological symptoms, has been a much debated topic in the field of neuropsychology for many years. This is primarily because there is no hard and fast rule regarding what is the best method for detecting and definitively diagnosing malingering. While nearly any psychological or medical disorder can be malingered, the disorder of interest in this research is traumatic brain injury.

Accurate assessments of traumatic brain injury, and the malingering of traumatic brain injury, are both important and problematic. They are important because head injuries are the most common acute neurological disorder in the United States (Kraus & Sorenson, 1994), and because litigation in head injury cases can often result in settlements that run into the millions of dollars. Thus, there is high motivation for people to malinger head injuries. The assessment of head injury malingering can be very problematic due to the fact that there is no "gold-standard" for measures of head injury malingering, and most of these malingering measures have been developed using normal participants who are instructed to feign a head injury (e.g. Reitan & Wolfson, 2002). The problems with this research methodology are fully articulated in the literature review which follows (cf. Chapter II).

In addition to being important and problematic, accurate assessment of head injury and its malingering is difficult. One reason for this difficulty is that frequently there are not accurate records of an individual's prior level of functioning (e.g., people rarely have had prior I.Q. tests to determine cognitive functioning), which are often an important part of detecting malingering. Another reason for the difficulty in determining malingering of traumatic brain injury is the fact that on occasion the medical records do not coincide with the expressed symptomology, as would be the case in a somatization disorder, which is distinctly different from malingering (American Psychiatric Association, 2000). However, the primary assessment problem in the area of traumatic head injury is that of differential diagnosis; that is, being able to differentiate among individuals who are actually experiencing symptoms related to traumatic brain injury and have medical test results that support the diagnosis of traumatic brain injury, individuals who have a somatization disorder of some type, and individuals who are, in fact, feigning their symptoms.

There are many possible measures that can be used to assess malingering as are reviewed subsequently in Chapter II However, one measure that is the focal point of this research, and that is commonly used in the detection of malingering, is the Minnesota Multiphasic Personality Inventory – 2 (MMPI-2; Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989). The MMPI-2 consists of ten clinical scales and nine validity scales (Graham, 2000). There are several other validity indicators on the MMPI-2 as well, one of which is particularly important in the detection of malingering, namely the Fake Bad Scale (FBS; Lees-Haley, English, & Glenn, 1991).

The Fake Bad Scale (FBS) was specifically developed as a means to detect malingering among personal injury litigants (Lees-Haley, English, & Glenn, 1991). There has been substantial research on the ability of the FBS to detect malingering among personal injury litigants, which has led to mixed results. For example, while Larrabee (1998) found that elevations on the FBS, combined with elevations on the Hypochondriasis and Hysteria clinical scales of the MMPI-2, were indicative of malingering, other researchers have found that the FBS is more likely to assess general maladjustment and somatic complaints rather than malingering per se (e.g. Butcher, Arbisis, Atlis, & McNulty, 2003). Another study has found that the FBS may be superior at detecting malingering in applied forensic settings but not in more general settings where litigation is not involved (Greiffenstein, Baker, Axelrod, Gervais, & Peck, 2004).

Inasmuch as the detection and differential diagnosis of malingering is of considerable importance, particularly where litigation is involved, and inasmuch as the FBS has been shown to be inconsistent in its diagnostic efficacy, perhaps due to the various assessment contexts in which it has been used, it seems appropriate further to investigate the efficacy of the FBS in detecting malingering and to do so to assess personal injury litigants , which is the population for whom the FBS was originally designed.

It is the overarching goal of the present research to utilize data from purported head injury patients to ascertain the efficacy of the MMPI-2 Fake Bad Scale in assessing malingering and in differentiating bona fide head injury patients from those with somatization disorder or who were malingering. Essentially, the present research intends to further examine the validity of the Fake Bad Scale in terms of its differential

diagnostic ability among individuals who are malingering, those with a somatoform disorder, and those who have incurred a traumatic brain injury.

In general, prior research has shown that many individuals who malinger are likely to portray physical rather than cognitive symptoms (Aubrey, Dobbs, & Rule, 1989; Gouvier, Presholdt, & Warner, 1988; Willer, Johnson, Rempel, & Linn, 1993). However, this is not necessarily consistent with the known sequelae of traumatic brain injury. For example, after a mild brain injury, most people will complain of decreased concentration, memory deficits, headaches, and dizziness (Bigler & Clement, 1997). As brain injuries increase in severity from moderate to very severe or profound, these same sequelae are seen with the addition of posttraumatic amnesia, contusions and shearing damage, some degree of permanent neurological deficit, and, in the most severe cases, a persistent vegetative state (Bigler & Clement, 1997). There has been significant controversy regarding the duration of these sequelae, particularly postconcussion syndrome in mild head injury cases where there is litigation (Rutherford, 1989; Fisher, 1982; Ewing, McCarthy, Groenwall, & Wrightson, 1980).

Somatoform disorders differ significantly from traumatic brain injuries in their associated symptomology. These disorders are critical to consider in the differential diagnosis of malingering versus traumatic brain injury, particularly given that, as stated above, many who malinger make physical complaints (Aubrey, Dobbs, & Rule, 1989; Gouvier, Presholdt, & Warner, 1988; Willer, Johnson, Rempel, & Linn, 1993). In general, unlike the sequelae typically associated with traumatic brain injury, the defining characteristic of a somatoform disorder is a complaint of physical pain. Typically, these complaints are not fully explained by, or are in excess of what would be accepted due to,

a general medical condition or the direct effects of a substance. Furthermore, these complaints are not intentionally produced or feigned.

Toward that end, in the subsequent pages a description of traumatic brain injury and its sequelae will be presented followed by a discussion of somatization disorders. Next, alternative methods of assessing malingering among potential head injury patients will be reviewed, followed by an in depth discussion of the MMPI-2 as a tool for diagnosing malingering. Lastly, the Fake Bad Scale, the F Scale, the F-K Index, and the F(b) Scale of the MMPI-2 will be reviewed and analyzed for their ability to differentiate among head injury, somatoform and malingering patient groups. The Fake Bad Scale consists of several items from the Hypochondriasis and Hysteria Clinical Scales of the MMPI-2 (Larrabee, 1003b). The items on these scales tend to involve illness, disease, and physical complaints (Groth-Marnat, 1999). As described above, physical complaints may not play as large of a role in the diagnosis of traumatic brain injury as in the diagnosis of a somatoform disorder or malingering. More simply, physical complaints may not be as consistent with the sequelae of traumatic brain injury as they are with both somatoform disorders and malingering. The other MMPI-2 validity scales have all been examined by previous research and have demonstrated sensitivity to overreporting of symptoms; there is, in fact, significant empirical literature on the faking of head injury symptoms on the MMPI and the MMPI-2 (e.g., Butcher, Arbisi, Atlis, & McNulty, 2003; Greiffenstein et al., 2004; Larrabee, 1998; Berry & Butcher, 1998). Furthermore, analog studies have suggested that those who are faking and/or potentially exaggerating symptoms of head injury tend to show elevated MMPI-2 overreporting symptom scales (Berry & Butcher, 1998).

As will emerge from this literature review, the present research was designed more specifically to address the following hypotheses:

1. It is hypothesized that the Fake Bad Scale will successfully differentiate between individuals with a traumatic brain injury and individuals who are malingering and between individuals with a traumatic brain injury and those with a somatoform disorder, but that the Fake Bad Scale will be less successful at differentiating between individuals who are malingering and those with a somatoform disorder.
2. It was further hypothesized that the Fake Bad Scale would be comparable to other MMPI-2 validity scales as well as to the Portland Digit Recognition Test and the Test of Memory Malingering when differentiating between traumatic brain injuries and somatoform disorders as well as between traumatic brain injury and malingering, but that the Fake Bad Scale would be less successful than other MMPI-2 validity scales and the above mentioned malingering measures when differentiating between somatoform disorders and malingering
3. The final hypothesis is that there would not be gender differences in how well the Fake Bad Scale differentiates between individuals with traumatic brain injury, individuals with somatoform disorders, and individuals who are malingering.

CHAPTER 2

REVIEW OF RELATED LITERATURE

Head Injury

Head injury is the most common acute neurological disorder in the United States, and head injuries vary considerably in their severity (Kraus & Sorenson, 1994). Over nine million new cases of traumatic brain injury are reported each year (Gouvier, Hayes, & Smiroldo, 1998), with males aged 16 to 25 years being most at risk (Sorenson & Kraus, 1991). It is estimated that over two million of these cases suffer some degree of permanent, measurable cerebral damage from the head injury (Goldstein, 1990). Two types of head injuries can lead to traumatic brain injuries. A closed head injury (CHI) occurs when the skull remains intact after the injury, such as when a skull fracture occurs. Closed head injuries usually occur during motor vehicle accidents, falls, and blows to the head. With this type of injury there is a greater likelihood of more generalized cerebral damage (Bigler & Clement, 1997). Penetrating head injuries (PHI) occur when the skull is perforated or penetrated, such as from a bullet wound. With PHI there is a greater likelihood of focal brain damage.

Traumatic brain injury can be divided into four categories of severity. Mild brain injury is characterized by the individual experiencing transient loss of, or alteration in, consciousness that lasts for no longer than 60 minutes (Bigler & Clement, 1997). There is a rapid return to the previous level of consciousness. Posttraumatic symptoms of mild

brain injuries include headache, dizziness, poor concentration, and poor memory. Some data (Wrightson, 1989; Ewing, McCarthy, Groenwall, & Wrightson, 1980) indicated that there is the potential for permanent damage even with a mild brain injury. Moderate brain injuries typically involve an alteration in consciousness that lasts for more than 60 minutes. In this instance, the potential for a good recovery depends upon whether or not an individual's critical systems were involved. Moderate brain injury has the same posttraumatic symptoms as a mild brain injury, but may also involve posttraumatic amnesia. Posttraumatic amnesia is the period of time from the trauma to the return of consistent memory function; if there is a loss of consciousness posttraumatic amnesia begins when consciousness is regained (Bigler & Clement, 1997). The next level for brain injuries is a severe brain injury. In the case of a severe brain injury the individual is immediately incapacitated in terms of his or her ability to follow simple instructions. The individual may be fully comatose. Motor deficits and pathological reflexes are present. With severe brain injuries, posttraumatic amnesia usually lasts from one to seven days, but can last even longer. Brain contusions and shearing damage to white matter are common with these injuries, and some degree of permanent neurological deficit usually persists (Bigler & Clement, 1997). The final, and most severe, category is very severe/profound brain injury. With this level of injury the individual is unconscious and unresponsive immediately or shortly after the injury. The individual is unable to communicate and cannot follow simple instructions. Many who suffer profound brain injuries die within a few minutes of the injury. If the individual survives, a persistent vegetative state is common; higher cortical functioning is not recovered (Bigler & Clement, 1997).

Traumatic brain injury is measured using the Glasgow Coma Scale (GCS). This scale is used to evaluate the severity of impairment of function in the very early stages of a traumatic brain injury (Bigler & Clement, 1997). The Glasgow Coma Scale is a 15-point scale that measures functioning in terms of: eye opening, from no eye opening even in response to pain to spontaneous eye opening; motor response, from inability to move to ability to follow simple instructions; and verbal response, from no response to normal orientation to person, place, and time (Teasdale and Jennett, 1976, 1974). Scores range from 3 to 15, with lower scores indicating poorer functioning. Glasgow Coma Scale scores of 8 and lower are associated with severe head injury, scores between 9 and 12 with moderate head injury, and scores between 13 and 15 with mild head injury.

There are many factors involved in a traumatic brain injury. The first is the impact of the injury itself. The impact of the injury can range from a simple bump on the head to a skull fracture or penetrating head injury, with the risk for traumatic brain injury increasing with the impact of the injury. There are also clearly identified signs and symptoms associated with traumatic brain injuries. The presence or absence of a subdural hematoma also is a factor in traumatic brain injury. Approximately 30 percent of individuals who suffer a severe closed head injury will develop subdural hematomas (Genarelli, 1990). Those who develop subdural hematomas suffer greater cerebral atrophy, especially in frontal regions, and greater ventricular dilation (Cullum & Bigler, 1985). Additionally, these individuals perform more poorly on neuropsychological measures, especially memory tests, than those who had closed head injuries but did not develop a subdural hematoma (Cullum & Bigler, 1986). Acute subdural hematomas are associated with a mortality rate of above 60 percent (Eisenberg & Weiner, 1987). A third

factor in traumatic brain injury is increased intracranial pressure. This can cause damage to brain tissue, and, in very severe cases, herniation of the medulla through the foramen magnum (Bigler & Clement, 1997). Increased intracranial pressure can be caused by hemorrhaging that leads to a hematoma and by cerebral edema that causes brain swelling. Anoxia, or insufficient oxygen to the brain, results in severe neuronal damage very quickly and can produce devastating and widespread effects on the brain. Whether or not anoxia occurs is an important factor in traumatic brain injury.

Posttraumatic degenerative changes can also impact traumatic brain injured individuals. Over the course of time after a traumatic brain injury, axons that were injured at the time of impact will degenerate. This results in the diffuse wasting of key white matter tracts. For example, if this occurs in the ventricles, the result can be ventricular system dilation (Bigler & Clement, 1997). Several studies have indicated that this occurrence is one of the most sensitive indicators of pathological central nervous system changes (Bigler, 1990; Johnson, Bigler, Burr, & Blatter, 1994; Cullum & Bigler, 1996; Levi, Guilburd, Lemberger, Soustiel, & Feinsod, 1990; Massman, Bigler, Cullum, & Naugle, 1986). Related to posttraumatic degenerative changes is another factor in traumatic brain injury, hydrocephalus. When brain tissue degenerates cerebrospinal fluid expands to fill the space, resulting in hydrocephalus ex vacuo (Bigler & Clement, 1997). After a traumatic brain injury, other types of hydrocephalus may develop, including an impaired flow of cerebrospinal fluid and normal pressure hydrocephalus (Fishman, 1978; Jennett & Teasdale, 1981). Other factors related to traumatic brain injury include posttraumatic epilepsy, which affects between 5 and 30 percent of those who suffer head injuries, and cranial nerve damage (Bigler & Clement, 1997).

Sequelae of Traumatic Brain Injury

Other aspects of traumatic brain injury that must be considered in the diagnostic process are the neuropsychological sequelae of moderate and severe head injuries, including cognitive, emotional, and executive functioning, postconcussion syndrome, and cognitive rehabilitation. These are critical factors because they can provide significant insight into the individual's current level of functioning, which then can be compared to the individual's prior level of functioning in order to determine the severity of decline since the injury. In the case of cognitive sequelae, neuropsychologists must determine the length of the loss of consciousness as well as the length of posttraumatic amnesia. In general, the longer the length of the posttraumatic amnesia, the greater is the likelihood that the individual will have lasting cognitive deficit and failure to return to his or her pre-injury level of employment (Paniak, Shore, Rourke, Finlayson, & Mostacalis, 1992). Individuals with moderate to severe closed head injuries typically have difficulty with most measures of cognitive functioning. As early as 1942, Goldstein indicated that patients with diffuse damage, like what is suffered with a moderate to severe closed head injury, generally have deficits in speed of performance and sustained attention along with most other measures of cognitive functioning. Another key area of deficit that must be evaluated in head-injured individuals is memory. Significant memory deficits are common in those who have suffered a traumatic brain injury, and these individuals should be assessed for both retrograde and anterograde memory deficits.

Emotional and executive functioning must also be considered in terms of level of functioning both pre- and post-injury when assessing patients who have suffered a moderate to severe closed head injury. However, many of the commonly used measures

of emotional disturbance are not appropriate for individuals with a traumatic brain injury. For example, when given the MMPI, traumatic brain injured populations typically have elevated scores on Scales 2 (Depression), 8 (Schizophrenia), 1 (Hypochondriasis), 3 (Hysteria), and 7 (Psychasthenia; Leininger, Kreutzer, & Hill, 1991; Alfano, Neilson, Panniak, & Finlayson, 1992). Additionally, Gass and Russell (1991) further examined this population's performance and found that on the Depression scale most complaints were of mental dullness and physical problems. Gass and Russell (1991) also found that on other elevated scales the primary complaints were of a physical or cognitive nature. So, while it is important to assess for emotional distress and personality changes in those who have suffered traumatic brain injury, clinicians must be aware that elevations on commonly used measures may be more indicative of cognitive and physical, rather than affective, complaints. According to Jennett and Teasdale (1981), there are three primary areas of personality change that should be assessed in individuals with a moderate to severe head injury. These are drive, affective change, and deficits in executive functioning. With regard to drive, these individuals typically experience diminished drive, with the patient lacking initiative and having diminished motivation and interest. Affective changes are also common, with emotional lability being a frequent complaint. Lastly, deficits in executive functioning, such as judgment and social restraint, often result in impulsivity, a lower frustration tolerance, and an impaired sense of what is socially acceptable. Smaller subsets of those with traumatic brain injuries develop more significant psychological disorders, such as major depression, mania, bipolar disorder, and schizophrenia-like symptoms (Fedoroff et al, 1992; Jorge et al., 1993; Zwil, McAllister, Cohen, & Halpern, 1993; Buckley et al., 1993).

Postconcussion syndrome is a third important factor in head injury cases. After sustaining a head injury, particularly a mild head injury, most people complain of headache, dizziness, poor concentration, poor memory, fatigue, and increased irritability (Bigler & Clement, 1997). There is significant controversy regarding how long these symptoms may persist, especially in litigation cases. However, some studies do indicate that even very mild head injuries can result in significant damage (Rutherford, 1989; Fisher, 1982; Ewing, McCarthy, Groenwall, & Wrightson, 1980).

After considering each of these factors in cases of traumatic brain injury, the next step in the diagnostic process is to determine the potential for cognitive rehabilitation. This aspect can have special importance in head injury litigation in terms of the amount of compensation that occurs for lifetime care. There is a clearly identified neuropsychological progression of recovery (Gouvier, Hayes, & Smiroldo, 1998). Several studies indicate that it is possible for significant rehabilitation of cognitive functioning to occur in individuals who have suffered traumatic brain injuries (Goldstein & Oakley, 1985; Incagnoli & Newman, 1985; Prigatano, 1986; Franzen & Harris, 1993). Despite the fact that some deficits will be permanent, especially when significant structural abnormalities are present, areas of strength and/or intact functioning can be used as a basis for the individual to adapt to or compensate for the deficit (Prigatano, 1986; Sbordone, 1984).

Once the nature and symptomology of traumatic brain injury are understood, it follows that symptoms of other disorders, that may resemble traumatic brain injury, must also be considered in order to be sure an accurate differential diagnosis is made. This is especially important in litigation cases where a differentiation must be made between

traumatic brain injury, a psychological disorder such as somatization disorder, and malingering. Along these lines, the Somatoform Disorders must be carefully defined so that an appropriate diagnosis can be made. The Somatoform Disorders are relevant in differentiating true head injury from malingering because many individuals who malinger are likely to portray physical rather than cognitive symptoms (Aubrey, Dobbs, & Rule, 1989; Gouvier, Presholdt, & Warner, 1988; Willer, Johnson, Rempel, & Linn, 1993)

Somatization Disorders

Somatization Disorder, historically known as hysteria or Briquet's syndrome, is a multisymptomatic disorder (APA, 2000). This disorder typically begins before the age of 30 and often lasts for many years. It is characterized by pain of a gastrointestinal, sexual, and/or pseudoneurological nature that is unsubstantiated by lab results. Individuals with somatization disorder usually describe their complaints in colorful, exaggerated ways but often lack specific factual information. Additionally, there are often inconsistencies in the history of complaints, and these individuals often seek treatment from multiple physicians at the same time. Anxious and depressive symptoms are common as are impulsive and/or antisocial behaviors, suicide threats and/or attempts, and marital discord. Somatization Disorder affects between .2% and 2% of women and less than .2% of men (APA, 2000). The DSM-IV-TR (APA, 2000) criteria for somatization disorder include the following:

- History of many physical complaints beginning before 30 years of age that occur over several years and result in treatment seeking behaviors or

significant impairment in social, occupational, or other important areas of function

- Four Pain Symptoms: history of pain in at least four different areas or functions, e.g., head, back, joints, abdomen, extremities, chest, rectum, during menstruation, sexual intercourse, or urination
- Two Gastrointestinal Symptoms: other than pain, e.g., nausea, bloating, vomiting, etc.
- One Sexual Symptom: other than pain, e.g., sexual indifference, erectile dysfunction, irregular menses
- One Pseudoneurological Symptom: suggesting a neurological condition not limited to pain, e.g., conversion symptoms, paralysis or localized weakness, hallucinations, loss of touch or pain sensation, double vision, amnesia, etc.
- Either of these:
    - After appropriate examination, each of the above symptoms cannot be fully explained by a known general medical condition or by the direct effects of a substance
    - When there is a related medical condition, the complaints are in excess of what would be expected
- Symptoms are not intentionally produced or feigned; not malingering

The final DSM-IV-TR (APA, 2000) criterion for somatization disorder is what clearly separates it from a diagnosis of malingering. The remaining criteria, particularly the lack

of medical findings to support complaints, separate somatization disorder from traumatic brain injury.

A second disorder that falls under the umbrella of Somatoform Disorders is Undifferentiated Somatoform Disorder. This disorder is characterized by unexplained physical complaints for at least six months that do not meet criteria for Somatization Disorder and by an unpredictable course. Young women of low socioeconomic status are most frequently afflicted, but the disorder is not limited to one gender, age, or sociocultural group. The DSM-IV-TR (APA, 2000) criteria for Undifferentiated Somatoform Disorder are:

- One or more physical complaints: fatigue, loss of appetite, gastrointestinal, or urinary complaints
- Either of these:
    - After appropriate examination, each of the above symptoms cannot be fully explained by a known general medical condition or by the direct effects of a substance
    - When there is a related medical condition, the complaints are in excess of what would be expected
- Symptoms cause clinically significant distress or impairment in various functions
- Symptoms last for at least six months
- Symptoms are not better accounted for by another mental disorder
- Symptoms are not intentionally produced or feigned; not malingering

Like Somatization Disorder, Undifferentiated Somatoform Disorder is clearly differentiated from both traumatic brain injury and malingering.

Conversion Disorder consists of unexplained symptoms or deficits that affect voluntary motor or sensory function. These symptoms or deficits are usually suggestive of a neurological or general medical condition (APA, 2000). Additionally, psychological factors are typically associated with the symptoms or deficits. An important feature of Conversion Disorder is termed 'La Belle Indifference', which means that most people who suffer from Conversion Disorder may present with either a relative lack of concern about the nature or implications of the symptoms or may present histrionically. These patients are often suggestible, and many are from rural populations, of low socioeconomic status, and have lesser knowledge regarding medical and psychological concepts. Conversion Disorder is more common in women than in men and, especially in women, symptoms are more common on the left side of the body. Up to 3% of outpatient referrals to mental health clinics, and from 1% to 14% of general medical/surgical inpatients, demonstrate symptoms of Conversion Disorder (APA, 2000). The DSM-IV-TR (APA, 2000) criteria for Conversion Disorder are:

- One or more symptoms or deficits affecting voluntary motor or sensory functions; these symptoms should suggest a neurological or other general medical condition.
- Psychological factors are associated with symptoms and/or deficits such that initiation or exacerbation of the symptoms and/or deficits is preceded by conflicts or other stressors.
- Cannot be fully explained by a general medical condition or direct effects of a substance
- Causes clinically significant impairment in various areas of functioning

- Not limited to pain or sexual dysfunction, does not occur exclusively during the course of Somatization Disorder, is not better accounted for by another mental disorder
- Symptoms are not intentionally produced or feigned; not malingering
- Specific type of symptom and/or deficit:
    - Motor
    - Sensory
    - Seizures or Convulsions
    - Mixed Presentation

Conversion Disorder can be very difficult to differentiate from malingering due to the fact that it often closely mimics a neurological or general medical condition.

Pain Disorder is also difficult to differentiate from malingering in many cases. The defining quality of Pain Disorder is that pain is the predominant focus of the clinical attention (APA, 2000). Psychological factors must have an important role in the onset, severity, exacerbation, or maintenance of the pain. Individuals who suffer from Pain Disorder often have severe disruptions to their daily life, such as unemployment, disability, and family problems. Other potential problems for these patients are the development of Iatrogenic Opioid Dependence or Abuse and/or Benzodiazepine Dependence or Abuse. Pain Disorder can occur at any age, has an unclear prevalence rate, and is somewhat more common in females than in males. The DSM-IV-TR (APA, 2000) for Pain Disorder includes:

- Pain in one or more anatomical sites as the clinical focus, with pain being severe enough to warrant clinical attention.

- Pain causes clinically significant distress in various areas of functioning
- Psychological factors are key in onset, severity, maintenance, or exacerbation of the pain
- Symptoms are not intentionally feigned; not malingering
- Not better accounted for by mood, anxiety, or psychotic disorders, and does not meet criteria for dyspareunia
- Subtypes:
    - With Psychological Factors, Acute or Chronic
    - With Both Psychological Factors and a General Medical Condition, Acute or Chronic
    - With a General Medical Condition

The difficulty in diagnosing Pain Disorder lies in the fact that there may actually be general medical findings associated with the pain. However, the pain may also be present in the absence of objective findings, or the objective findings may be coincidental to the pain.

The final Somatoform Disorder that relates to malingering is Hypochondriasis. This is the fear of having, or the idea that one has, a serious disease based on the person's misinterpretation of bodily symptoms or bodily functions. Fears of aging and death are also common with this disorder as is "doctor-shopping" (APA, 2000). Precursors to the development of Hypochondriasis frequently include serious illness in childhood and/or past experience with disease in a family member. The defining characteristic of this disorder is that neither laboratory findings nor physical examination findings confirm the individual's preoccupations. Hypochondriasis has a prevalence rate of 1% to 5% in the

general population and of 2% to 7% in primary care outpatients. The DSM-IV-TR (APA, 2000) for Hypochondriasis includes:

- Preoccupation with the fear or having, or the idea that one has, a serious disease based upon the person's misinterpretation of bodily symptoms or bodily functions
- This preoccupation persists despite appropriate medical evaluation and reassurance
- The belief is not delusional in intensity and is not restricted to a specific circumstance about appearance
- Causes clinically significant distress or impairment in multiple areas of functioning
- Lasts for at least six months
- Not better accounted for by GAD, OCD, Panic Disorder, Major Depressive Episode, Separation Anxiety, or another Somatoform Disorder
- Specify:
    - With Poor Insight

Hypochondriasis may be somewhat simpler to differentiate from malingering due to the fact that there are clearly no medical findings associated with the person's preoccupation. Additionally, Hypochondriasis is not characterized so much by symptoms as by the fear of having symptoms.

Malingering

After having an understanding of traumatic brain injury and the psychological somatoform disorders that can at times mimic traumatic brain injury, the possibility of

malingering, or the feigning of medical or psychological symptoms, must be considered to make an accurate differential diagnosis, particularly in cases where there is a known possibility for secondary gain such as a lawsuit. The Diagnostic and Statistical Manual – IV- Text Revision (APA, 2000) 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). Malingering may be conscious or unconscious in terms of the person's awareness of motivation, but attempts to falsify test results are always deliberate. Greiffenstein et al. (2002) add to this definition of malingering by proposing that there may in fact be two types of malingering, generalized and domain-specific. They also posit that there may be three forms of malingering within these two types; the three forms include psychiatric, cognitive, and somatic malingering. Somatic malingering is defined by Greiffenstein et al. (2004) as being domain-specific and "the promotion of physical illness and weakness out of proportion to injury characteristic (p.1598)." There must be a differentiation between exaggeration due to unconscious factors, inability to cooperate for emotional or neuropsychological reasons, or the inability to tolerate the stress of normal testing situations and malingering so that an accurate diagnosis can be made. Iverson et al. (2002) and Rogers, Sewell, and Ustad (1995) elaborate on this point by defining the difference between malingering and negative response bias. These researchers concur that negative response bias applies to exaggerated behavior with no reference to the motivation for that behavior; thus negative response bias is not necessarily synonymous with malingering. According to these studies, in order for an individual to be diagnosed

with malingering, the negative response bias must be caused by the plausible attainment of some external, secondary gain.

Often malingerers feel justified in their actions rather than seeing it as deception or a criminal act (Golden & Grier, 1998). Malingering should be suspected in cases where there is a medico-legal presentation or in cases where there is a marked discrepancy between the individual's claimed stress or disability and the objective findings. Additional cues for clinicians to be aware of with regards to potential malingering are a lack of cooperation during the diagnostic evaluation and in complying with the prescribed treatment regimen and the presence of Antisocial Personality Disorder. Malingering differs from Conversion Disorder and other Somatoform Disorders due to the presence of intentional symptom production, the obvious, external incentives associated with it, and the fact that suggestion and/or hypnosis often do not result in symptom relief (Golden & Grier, 1998).

Historically, the assessment of malingering has been quite difficult for clinicians. Malingering has traditionally been viewed as a moralistic, simplistic, or simply behavioral scheme coupled with a conscious desire to obtain money or drugs, to avoid work or prosecution, or to evade undesirable duties (Cunnien, 1988). Given that any psychiatric or physical disorder can be malingered, exaggerated, or faked, the diagnosis of malingering should be done with care and should take into consideration the presence of comorbid disorders such as genuine illness, Factitious Disorder, and Conversion Disorder. One way to differentiate between these potential comorbid disorders and malingering is that malingering is more often time limited and environmentally

opportunistic while factitious disorders are more chronic and are typically accompanied by a history of prior faked illness and insistence on aggressive treatment (Cunnien, 1988).

According to Sweet (2000), the DSM-IV criteria for malingering can be insufficient for diagnosis; in fact, if one followed these criteria exactly, many people would be diagnosed with malingering who were not actually feigning their symptoms. Therefore, other factors must be considered in the differential diagnosis of this disorder. Moderator variable are one such factor. Anastasi (1987) defined a moderator variable as any factor that meaningfully impacts the predictive relationship between other variables. Failure to consider moderator variables can result in false positive diagnostic conclusions with regard to brain injury. More importantly, with regard to malingering, failure to consider these factors could result in a patient seeming "too" impaired in light of the expectations associated with the alleged neurological condition; this is especially true when variables such as age and education are ignored.

Sweet (2000) also cites the low incidence of malingering as being key to making an accurate diagnosis. The vast majority of malingerers seen by neuropsychologists will be individuals who are involved in worker's compensation, personal injury, or disability evaluations. Estimates of the base rate occurrence of malingering in neuropsychological populations involved in litigation or 'benefit seeking' range from about 7.5 to 15% (Trueblood & Schmidt, 1993) to 8.5 to 14% (Frederick, Sarfaty, Johnston, & Powel, 1994) to 18 to 33% (Binder, 1993). Binder and Rohling (1996) found that individuals with lesser injuries were more likely to be pursuing financial incentives and were also more likely to display greater impairment.

The assessment of malingering is further complicated by the fact that malingering is not typically dichotomous, and it is often accompanied by a selective presentation (Sweet, 2000). In other words, patients may perform inconsistently, giving their best ability on some measures while malingering on others. It is critical to remember that valid performance on some measures does not rule out malingering on others nor does malingering on some measures rule out valid performance on others. Research has found that malingerers are often not skilled at developing a credible neuropsychological profile because the general public does not have a good idea of what a head injury and its associated deficits actually entail (Gouvier, Prestholdt, & Warner, 1988; Willer, Johnson, Rempel, & Linn, 1993). Due to this lack of knowledge on what types of symptoms to fake, malingerers may choose many or just particular measures on which to display their poor effort. These choices are made based upon their own belief system of what a brain-injured individual should look like.

An individual's degree of intention and degree of exaggeration also must be considered in the diagnosis of malingering because without intentionality there cannot be a diagnosis of malingering and there may be some legitimate symptoms present that would require treatment that are simply being exaggerated. These can be quite challenging to measure. Intentionality cannot be determined with complete certainty; therefore, it is not possible to measure a person's true degree of intention to malinger. The degree of exaggeration can be equally difficult to assess because given more information about the actual nature of a disorder, subjects are able to more accurately fake deficits. In fact, most malingerers perform at or well above chance, with only a small percentage performing significantly below chance (Nies & Sweet, 1994).

The malingering of variable deficits, the use of multiple strategies, and the presence of multiple dimensions of insufficient effort further complicate the assessment of malingering. Memory difficulties are the most frequent complaint of malingerers (Sweet, 2000). However, other commonly malingered deficits include sensory-perceptual, motor, and cognitive impairments (Binder & Willis, 1992; Mittenberg, Rothole, Russell, & Heilbronner, 1996). Furthermore, the strategies used to malinger can vary between and within individuals. Beetar & Williams (1995) suggest that malingerers often use the following strategies: random responding, intentional wrong responses, delayed responding, and inattentiveness. Lastly, one must consider the possibility that multiple dimensions of insufficient effort may be present. For example, in cases where test performance cannot be accounted for by brain dysfunction or the presence of moderator variables, and is significantly worse than, or different from, performance standards known to be associated with genuine neurological deficits, other psychological disorders must be considered. In rare cases these disorders would include true depressive pseudodementia or atypical somatoform disorder. The degree to which individuals will consent to serious and protracted medical treatment regimens can help to clarify in this arena. True malingerers will typically not consent to these treatments, while the treatments are often, in fact, the goal for many individuals with somatoform and/or factitious disorders (Sweet, 2000).

Additionally, there are many potential sources for these false symptom reports. The diagnosis of malingering presumes that those who feign or grossly exaggerate psychological complaints after a head injury are producing these complaints based on sources other than accurate self-reports (Berry & Butcher, 1998). Some of the possible

etiologies of false reports include exaggeration of actual experiences, difficulties that were experienced immediately after the injury but which have since subsided, complaints "borrowed" from role models (e.g., fellow patients) who have experienced considerable head injuries, popular media outlets, and health care workers who ask detailed questions about the presence of commonly experienced head injury symptomology may inadvertently give information on symptoms that the patient "should be" experiencing.

A final difficulty in the assessment of malingering has to do with the methodology that is commonly utilized to develop measures of malingering. As stated previously, there is no one widely accepted, standard measure of malingering, and most measures designed to detect malingering are developed using normal participants who are instructed to act as if they have suffered a head injury (Reitan & Wolfson, 2002). There are multiple problems with this method, the primary one being that college-aged individuals may not fully comprehend the implications of litigation for a head-injured individual. Reitan & Wolfson (2002) state that "normal subjects pretending to be brain-damaged share none of the stresses, anxieties, guilt, depression, and desperation experienced by many litigants whose future financial stability may depend on the outcome of the neuropsychological examination (p.276)." Thus, the results of these studies may have limited generalizability. Conversely, research done with clinical samples may have increased generalizability, but lack the control of the experimental, analogue setting (Berry et al., 1995).

With so many obstacles to the assessment and diagnosis of malingering, it is not surprising that some of these factors are commonly overlooked in the interpretation of neuropsychological test results from patients with head injuries. One factor that is not

only commonly overlooked, but is actually not even readily available, is the base rate for malingering. Base rates are best looked at as the current population prevalence (Gouvier, Hayes, & Smiroldo, 1998). If base rate data were readily available, it is thought that it would significantly improve the accuracy of malingering diagnoses. Even with tests of 90% accuracy and 15% base rates, the classification of malingering is only slightly better than chance, and is nowhere near the accuracy that could be achieved using base rates alone. Problems with base rates can be overcome via history collection, records review, selecting tests that vary alone a sensitivity continuum, and retrospective self-report and collateral interviews (Gouvier, Hayes, & Smiroldo, 1998).

A second factor that is commonly overlooked in the assessment of traumatic brain injury and malingering is related to the sequelae of traumatic brain injury. As stated previously, the general public is surprisingly ignorant to what actually happens in TBI. Aubrey, Dobbs, & Rule (1989) examined the perceptions of college students regarding symptoms of head injury and whiplash. Most thought that physical symptoms were more common than cognitive symptoms in mild traumatic brain injuries. It follows, based upon this study, that people trying to feign mild traumatic brain injury may be more likely to portray physical symptoms. Gouvier, Presholdt, & Warner (1988) and Willer, Johnson, Rempel, & Linn (1993) further support these data. They found that misconceptions regarding traumatic brain injury might actually be pathognomonic signs of malingering when given by a patient or collateral during an interview. Despite these common misconceptions regarding traumatic brain injury, people can be somewhat effectively coached to more accurately fake a disorder. According to Wong et al. (1994), coaching tends to result in more accurately faked complaints. Furthermore, coaching also

can lead to neuropsychological test results that are more similar to those of real patients than to those of naïve malingerers who have not been coached, but still tends to exaggerate neuropsychological performance deficits (Martin, Bolter, Todd, Gouvier, & Niccolls, 1993; Martin, Gouvier, Todd, Bolter, & Niccolls, 1992).

A final factor that is often overlooked in the assessment of malingering is the fact that the symptoms noted after a head injury can also be seen in the general population (Gouvier, Uddo-Crane, & Brown, 1988). However, these symptoms are seen at higher prevalence rates among personal injury claimants who have not sustained neuropsychological injuries (Lees-Haley & Brown, 1993). Among the most commonly reported symptoms of personal injury claimants are anxiety and nervousness (93%); however, over half of control subjects complain of these as well (Gouvier, Hayes, & Smiroldo, 1998). Other common symptoms include memory difficulties and headaches, both of which are found at similar frequencies between personal injury claimants and controls.

Slick, Sherman, and Iverson (1999) offer guidelines to overcome the difficulties that are often associated with the detection of malingering. The authors' suggested diagnostic criteria include psychometric, behavioral, and collateral data that are indicative of possible, probable, and definite malingering.

As stated previously, there are many limitations to the DSM-IV criteria for the diagnosis of malingering. The DSM-IV has defined 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" (American

Psychological Association, 1994, p.683 as quoted on p.546 of Slick, Sherman, & Iverson, 1999). According to the authors, volition is critical in the DSM-IV definition of malingering as is the nature of the incentives. Volition is defined as conscious, self-directed behavior by Slick, Sherman, and Iverson (1999). These two concepts are important because they help to differentiate between other clinical disorders that involve symptom exaggeration and/or fabrication. As stated in the article, the use of dichotomous criteria (e.g. external versus psychological incentives, volitional versus unconscious behavior) is easy when it is written into definitions, but it is not quite as clear in clinical practice to determine to what degree a behavior is volitional. Furthermore, it can also be very difficult to determine which incentive is primary in cases where there are both external and internal incentives. An example provided by the authors involves the comorbidity of malingering and factitious disorder. According to the DSM-IV, such comorbidity is impossible, but there is no justification provided for this in spite of the fact that psychological and financial incentives often co-exist and behavior can also be motivated by both internal and external incentives. These limitations have inspired several clinicians and researchers to develop alternative definitions and criteria for the diagnosis of malingering.

Rogers (1990) developed one possible set of specific diagnostic criteria for the malingering of psychiatric disturbance. These criteria involved multiple sources of data from across several domains, which included self-report, test scores, behavioral observations, and collateral information. His specific criteria included the endorsement of an unusually high number of rare symptoms, contradictory collateral information, and

evidence of exaggeration or fabrication of symptoms from standardized tests. However, no data have been reported on the reliability, validity, or utility of these criteria.

Greiffenstein et al. (1994) developed a set of criteria for the diagnosis of 'overt' malingering of memory dysfunction. These criteria were specifically designed for use in neuropsychological settings, especially for use with postconcussive patients who were litigating. The four criteria are as follows: "improbably poor performance on two or more neuropsychological measures, total disability in a major social role, contradiction between collateral sources and symptom history, and remote memory loss" (p.547). Multiple studies (Greiffenstein et al., 1994; Greiffenstein, Gola, & Baker, 1995) were able to show clinically significant associations between classifications made using their index and scores on malingering measures, including forced-choice tests of symptom validity. This is not to say that these criteria are without limitations. The limitations include: not including an explicit definition of malingering, not specifying rule-out conditions or differential diagnoses, not including behavioral observations, underspecified criteria, and being restricted to the evaluation of feigned memory deficits only without providing guidelines for the evaluation of other neurocognitive domains.

Another set of criteria, which contrasts with the DSM-IV focus on motivation or volition, has been developed by Pankratz. Pankratz argues, "Intentions, awareness, conscious purposes, and psychodynamics should not be the main focus of the diagnostic process (Pankratz & Erickson, 1990, p.386 as cited on p.547). According to these criteria, it is not possible to accurately assess intent and volition, and thus, a diagnosis of malingering should not be dependent upon judgments about an individual's internal states. Pankratz and Binder (1997) developed a list of behaviors that are indicative of

malingering. The behaviors are as follows: marked inconsistency between reported and observed symptoms; marked inconsistency between diagnosis and neuropsychological findings; resistance avoidance, or bizarre responses on standardized tests; failure on specific measures of faking; functional findings on medical examination; and late onset of cognitive complaints following accident. Although Pankratz makes a compelling case for these criteria, there are still some limitations. Unquestionably, inferences about internal states and processes always have some level of uncertainty. However, the diagnosis of malingering is far from alone in this regard; many other DSM-IV diagnoses require a clinical judgment about an individual's inner state. According to Slick, Sherman, and Iverson (1999) "unless all cases of exaggeration or fabrication of deficits constitute malingering, then the exclusion of any methods or guidelines for making a determination about volition and intent is a significant limitation of purely behavioral approaches to diagnosing malingering.

Pankratz is not the only researcher to consider behavioral manifestations of malingering. Faust and Ackley (1998) also developed a list of behaviors that may be indicative of "intentional" inaccuracies in neuropsychological test data. These behaviors include: poor effort on testing, exaggeration of symptoms, fabrication of symptoms, false attributions (purposefully withholding or distorting history concerning other causes of symptoms), presenting a false baseline (purposefully withholding or distorting information about premorbid functioning), denial or failure to acknowledge strengths, positive abilities, or positive areas of functioning. These authors go on to state that "two basic dimensions, falsification and intentionality, are inherent or intrinsic components of

malingering... [and]...to identify malingering, both dimensions will need to be assessed" (p.19 as cited in Slick et al., 1999, p.548).

As indicated by the research described above, there are a wide variety of methods and measures that are currently used to determine whether an individual is fabricating or exaggerating symptoms during a neuropsychological evaluation. These methods and measures include: inconsistencies or other signs from the individual's reported symptoms, inconsistencies or other signs from standard neuropsychological tests, and measures or indices specifically designed to detect faking of cognitive deficits. Slick et al. (1999) have developed a new proposed set of criteria to assist in the diagnosis of malingering. Several guidelines, based upon Nies and Sweet (1994), were used to guide the development of these criteria. The guidelines were the need for: a specific definition of malingering of cognitive dysfunction within the context of the neuropsychological assessment; specific, unambiguous, and reliable criteria that cover all possible sources of evidence (i.e., test-performance, observations, and collateral data); specification of the relative importance of diagnostic criteria; specification of the nature and role of clinical judgment; specification of differential diagnoses and exclusionary criteria; and specification of levels of diagnostic certainty. Based upon these guidelines, the authors developed a detailed set of criteria to diagnose Possible, Probable, and Definite Malingering of Neurocognitive Dysfunction. Slick et al. (1999) define Malingering of Neurocognitive Dysfunction as "...the volitional exaggeration or fabrication of cognitive dysfunction for the purpose of obtaining substantial material gain, or avoiding or escaping formal duty or responsibility. Substantial material gain includes money, goods, or services of nontrivial value (e.g., financial compensation for personal injury. Formal

duties are actions that people are legally obligated to perform (e.g., prison, military, or public service, or child support payments or other financial obligations). Formal responsibilities are those that involve accountability or liability in legal proceedings (e.g., competency to stand trial)" (p.552). These criteria were developed, and are widely accepted and utilized, inductively from neuropsychological practice and reasoning. Thus, there has been no study analyzing the reliability of these criteria. They are cited in multiple publications on the subject of malingering, including Larrabee (2003a). The three levels of diagnostic certainty are described as follows:

Definite Malingering of Neurocognitive Dysfunction
"...indicated by the presence of clear and compelling evidence of volitional exaggeration or fabrication of cognitive dysfunction and the absence of plausible alternative explanations." Specific criteria:

- Presence of a substantial external incentive [Criterion A]
- Definite negative response bias [Criterion B1]
- Behaviors meeting necessary criteria from group B are not fully accounted for by Psychiatric, Neurological, or Developmental Factors [Criterion D]

Probable Malingering of Neurocognitive Dysfunction
"...indicated by the presence of evidence strongly suggesting volitional exaggeration or fabrication of cognitive dysfunction and the absence of plausible alternative explanations." Specific criteria:

- Presence of substantial external incentive [Criterion A]
- Two or more types of evidence from neuropsychological testing, excluding definite negative response bias [two or more of Criteria B2-B6]

OR

- One type of evidence from neuropsychological testing, excluding negative response bias and one or more types of evidence from Self-Report [one of Criteria B2-B6 and one or more of Criteria C1-C5]
- Behaviors meeting necessary criteria from groups B and C are not fully accounted for by Psychiatric, Neurological, or Developmental Factors [Criterion D]

Possible Malingering of Neurocognitive Dysfunction
"...indicated by the presence of evidence suggesting volitional exaggeration or fabrication of cognitive dysfunction and the absence of plausible alternative explanations. Alternatively, possible MND is indicated by the presence of criteria necessary for Definite or Probably MND except that other primary etiologies cannot be ruled out." Specific criteria:

- Presence of substantial external incentive [Criterion A]
- Evidence from self-report [one or more of Criteria C1-C5]
- Behaviors meeting necessary criteria from group C are not fully accounted for by Psychiatric, Neurological, or Developmental Factors [Criterion D]

OR

- Criteria for Definite or Probable MND are met except for Criterion D (i.e., primary psychiatric, neurological, or developmental etiologies cannot be ruled out). In these cases, the alternative etiologies that cannot be ruled out must be specified.

Explanation of Criteria

Criteria A: Presence of a Substantial External Incentive
"At least one clearly identifiable and substantial external incentive for exaggeration or fabrication of symptoms is present at the time of examination (e.g., personal injury settlement, disability pension, evasion of criminal prosecution, or release from military service)."

Criteria B: Evidence from Neuropsychological Testing
"Evidence of exaggeration or fabrication of cognitive dysfunction on neuropsychological tests as demonstrated by at least one of the following:

1. *Definite Negative Response Bias.* Below chance performance ($p < .05$) on one or more forced-choice measures of cognitive function.
2. *Probable Response Bias.* Performance on one or more *well-validated* psychometric tests or indices designed to measure exaggeration or fabrication of cognitive deficits is consistent with feigning.
3. *Discrepancy between Test Data and Known Patterns of Brain Functioning.* A pattern of neuropsychological test performance that is markedly discrepant from currently accepted models of normal and abnormal central nervous system function. The discrepancy must be consistent with an attempt to exaggerate or fabricate neuropsychological dysfunction (e.g., a patient performs in the severely impaired range on verbal attention measures but in the average range on memory testing; a patient misses items on recognition testing that were consistently provided on previous free recall trials, or misses many easy items when significantly harder items from the same test are passed.
4. *Discrepancy between Test Data and Observed Behavior.* Performance on two or more neuropsychological tests within a domain are discrepant with observed level

of cognitive function in a way that suggests exaggeration or fabrication of dysfunction (e.g., a well-educated patient who presents with no significant visual-perceptual deficits or language disturbance in conversational speech performs in the severely impaired range on verbal fluency and confrontation naming tests).

5. *Discrepancy between Test Data and Reliable Collateral Reports.* Performance on two or more neuropsychological tests within a domain are discrepant with day-to-day level of cognitive function described by at least one reliable collateral informant in a way that suggests exaggeration or fabrication of dysfunction (e.g., a patient handles all family finances but is unable to perform simple math problems in testing).
6. *Discrepancy between Test Data and Documented Background History.* Improbably poor performance on two or more standardized tests of cognitive function within a specific domain (e.g., memory) that is inconsistent with documented neurological or psychiatric history (e.g., a patient with no documented LOC or PTA, multiple negative neurological investigations, and no other history of CNS trauma or disease consistently obtains verbal memory scores in the severely impaired range after a motor vehicle accident)."

Criteria C: Evidence from Self-Report

"The following behaviors are indicators of possible malingering of cognitive deficits, but their presence is not sufficient for the diagnosis. However, presence of one or more of these criteria provides additional evidence in support of a diagnosis of malingering. These criteria involve significant inconsistencies or discrepancies in the patient's self-reported symptoms that suggest a deliberate attempt to exaggerate or fabricate cognitive deficits.

1. *Self-reported History is Discrepant with Documented History.* Reported history is markedly discrepant with documented medical or psychosocial history and suggests attempts to exaggerate injury severity or deny premorbid neuropsychological dysfunction (e.g., exaggerated severity of physical injury or length of LOC/PTA; exaggerated premorbid educational or occupational achievement; denial of previous head injury or previous psychiatric history).
2. *Self-reported Symptoms are Discrepant with Known Patterns of Brain Functioning.* Reported or endorsed symptoms are improbable in number, patterns, or severity; or markedly inconsistent with expectations for the type or severity of documented injury or pathology (e.g., claims of extended retrograde amnesia without loss of memory for the accident, or claims of loss of autobiographical information after mild head trauma without LOC).
3. *Self-reported Symptoms are Discrepant with Behavioral Observations.* Reported symptoms are markedly inconsistent with observed behavior (e.g., a patient complains of severe episodic memory deficits yet has little difficulty remembering names, events, or appointments; a patient complains of severe cognitive deficits yet has little difficulty driving independently and arrives on time for an appointment in an unfamiliar area; a patient complains of severely slowed mentation and concentration problems yet easily follows complex conversation).

- *Self-reported Symptoms are Discrepant with Information Obtained from Collateral Informants.* Reported symptoms, history, or observed behavior is inconsistent with information obtained from other informants judged to be adequately reliable. The discrepancy must be consistent with an attempt to exaggerate injury severity or deny premorbid neuropsychological dysfunction (e.g., a patient reports severe memory impairment and/or behaves as if severely memory-impaired, but their spouse reports that the patient has minimal memory dysfunction at home.

5. *Evidence of Exaggerated or Fabricated Psychological Dysfunction.* Self-reported symptoms of psychological dysfunction are substantially contradicted by behavioral observations and/or reliable collateral information. *Well-validated* validity scales or indices on self-report measures of psychological adjustment (e.g., MMPI-2) are strongly suggestive of exaggerated or fabricated distress or dysfunction."

Criteria D: Behaviors Meeting Necessary Criteria from Groups B or C are Not Fully Accounted for by Psychiatric, Neurological, or Developmental Factors.
"Behaviors meeting necessary criteria from groups B and C are the product of an informed, rational, and volitional effort aimed at least in part towards acquiring or achieving external incentives as described in Criteria A. As such, behaviors meeting criterion from groups B or C cannot be fully accounted for by psychiatric, developmental, or neurological disorders that result in significantly diminished capacity to appreciate laws or mores against malingering, or inability to conform to behavior to such standards (e.g., psychological need to "play the sick role", or in response to command hallucinations."

The article goes on to list some additional considerations that may play a role in the diagnosis of malingering. These include informed consent, such that in the process of obtaining the informed consent the patient should be assisted in understanding that a consistently high level of effort is required and told that any evidence of poor or inconsistent effort, or exaggeration or fabrication of dysfunction will be noted in resulting reports. Other items that should be considered are differential diagnoses, the concept of "ruling out" malingering, the reliability, validity, and standardized administration of the diagnostic measures utilized, individual differences, prior patient behavior, clinical judgment, and self-reported symptoms.

Finally, the Slick et al. (1999) point out contrasting points of view, caveats, recommendations, and conclusions. Throughout the years, the diagnosis of malingering has certainly not gone unquestioned. Erickson has stated that "the diagnosis of malingering is a weak diagnosis of exclusion that served to justify the denial of treatment and benefits," and that "were it not for some medicolegal expectations, we could do without the diagnosis entirely" (Pankratz & Erickson, 1990, p. 381). Rogers (1990) goes on to offer a counterpoint to the moralistic conceptualization of the diagnosis of malingering, an "adaptational model...in which the malingerer perceives an adversarial context and chooses feigning on the basis of likelihood and expected utility" (p. 182). These concerns are especially valid in cases where patients have comorbid malingered deficits with actual deficits that may be treatable. However, these cases do not eliminate the need for further clarification of the diagnostic criteria for malingering.

Slick et al. (1999) also consider the potential limitations of their diagnostic criteria, one being the role of clinical judgment. The authors feel that well-trained clinicians who utilize a variety of reliable and valid data to assist in their decision are certainly capable of making clinical judgments regarding volition and intent. Furthermore, the guidelines set forth in this article do provide substantial guidance for making these clinical inferences. These criteria were designed to "balance specificity with flexibility. (p. 558). The authors do acknowledge that no two cases are identical, or for that matter, even similar, and no one set of diagnostic criteria can cover every potential set of data and circumstances. Thus, these criteria are meant to guide clinicians in a flexible manner in making these diagnostic decisions. When diagnosing

malingering, it is crucial that a clinician rule out the alternatives; these criteria are meant to assist competent clinicians in this process.

Assessment of Malingering

After considering what malingering is, what disorders malingering must be differentiated from, and the obstacles associated with detecting malingering, the question arises, what measures and techniques can be utilized to accomplish this task? This question is not easily answered as there are in fact many measures and techniques that can be used. However, it then becomes a question of determining which measure or technique most frequently is able to accurately diagnose malingering, or perhaps, more specifically, which measure is most frequently able to accurately diagnose malingering in personal injury litigation cases.

Some methods for assessing malingering utilize a variety of response options. One alternative methodology is the use of the forced-choice technique. Examples of assessments that utilize the forced-choice technique are the Test of Memory Malingering (TOMM; Tombaugh, 2002) and the Minnesota Multiphasic Personality Inventory – 2 (MMPI-2; Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989). Both of these will be discussed in detail in subsequent segments of this review; however, these are examples of the forced-choice technique because they offer only two stimuli to a participant (pictures on the TOMM and true or false questions on the MMPI-2) and force the individual to make a choice between the two. According to Nies & Sweet (1994), the detection of malingering is not easy but it is possible with adequate effort. Gutierrez & Gur (1998) offer guidelines for the development of malingering screens. These

guidelines include a patient exhibiting near misses to simple questions (Pankratz, 1988), gross discrepancies from expected norms (Larrabee, 1990), inconsistency between diagnosis and neuropsychological findings, resistance, avoidance, bizarre responses, inconsistencies between reported and observed symptoms, marked discrepancies between measures that assess similar cognitive abilities, and failure on specific measures of neuropsychological malingering. These guidelines helped lead to the development of forced-choice techniques to assess malingering.

Forced-choice techniques were developed based upon the idea that misconceptions about head injuries among the general public can be helpful to neuropsychologists as they are the basis for symptom validity testing (Pankratz, 1988). Other researchers support symptom validity testing in the detection of malingering as being simple yet effective (Faust et al., 1991). Symptom validity testing is based on the binomial distribution theory, which helps to establish clinical procedures that produce below-chance levels of performance, which, in turn, can be indicative of malingering. For example, classic studies done using a "blind" patient who was suspected of malingering found that although this individual performed significantly below chance on assessments initially, after he was told that the expectation of a truly blind person was at least 50% correct (or chance) his responses improved to within the chance level (Brady & Lind, 1961; Grosz & Zimmerman, 1965).

The key feature of forced-choice techniques is that they are constructed precisely for the presenting complaint and to anticipate the responses of reluctant individuals. This method proves to be very challenging for those who are trying to malinger because they are either exposed as a fraud or it is found out that the deficit is not as serious as claimed.

Essentially, this method exploits the lack of knowledge of the general public regarding head injuries in order to determine exaggeration.

In what follows, multiple tests to diagnose malingering will be described in three categories. First, neuropsychological test batteries that are characterized by the use of multiple tests taken together, and that can be compared both on an intraindividual and an interindividual level will be considered. Second, tests of memory impairment that specifically assess for common misconceptions about the symptoms of head injury will be reviewed. Lastly, a personality inventory, the MMPI-2, will be analyzed for its ability to detect malingering.

Neuropsychological Test Batteries

Research on malingering has seldom utilized an entire test battery, but rather has more frequently utilized the administration of a single test or examined a single set of performances. Individual tests are typically interpreted in terms of how well they are performed, with scores lower than expected usually thought to indicate malingering. This method is difficult to apply with any degree of accuracy due to its simplicity. However, test batteries produce scores that allow for comparison of the individual's performance across a range of tests. These scores can be compared to each other (intraindividual) and with normative data (interindividual). If the test battery was specific and sensitive for brain injury, one may be able to separate legitimate indications of brain damage from feigned scores (Reitan & Wolfson, 1998). The Luria-Nebraska Neuropsychological Test Battery and the Halstead Reitan Neuropsychological Battery both fit into this category.

Luria-Nebraska Neuropsychological Battery

A commonly used neuropsychological measure in the detection of malingering is the Luria-Nebraska Neuropsychological Battery (LNNB; Golden & Grier, 1998). The LNNB was originally designed when malingering was not factored into test development, but it is still useful in the detection of malingering. There are three forms of the Luria-Nebraska Neuropsychological Battery. The first two are very similar, consisting of twelve basic clinical scales plus scales designed for specific additional purposes. The themes of these scales include: motor, tactile, rhythm, visual, receptive, expressive, reading, writing, arithmetic, memory, intelligence, intermediate memory, and pathognomonic. The pathognomonic scale was designed to measure acuteness and general functional seriousness of brain injuries. The scales are scored as 0 (normal), 1 (borderline), or 2 (abnormal), and are reported as T-scores with a mean of 50 and a standard deviation of 10 (Golden & Grier, 1998). Higher scores are indicative of greater dysfunction, and abnormal scores are determined by a critical level based upon age and educational level. The critical level can vary from 50 to 70. The third, and most recent, form of the Luria-Nebraska Neuropsychological Battery is a substantially revised version developed through the factor analysis of results from the original scales. The following scales were added: nonverbal sound interpretation, visual-intellectual skills, speeded repetition, reading comprehension, spelling, revised memory scales, and separate scales for visual and verbal memory. An additional alteration to this form is that lower scores are indicative of greater dysfunction.

There are six major approaches to using the Luria-Nebraska Neuropsychological Battery in the detection of malingering (Golden & Grier, 1998). The first approach

involves utilizing other tests specifically designed to detect malingering in addition to the LNNB. Symptom Validity Testing (SVT; Bernard, 1990) described above is one such addition. SVT consists of any multiple trial, forced choice activity designed to detect feigned cognitive or sensory impairment. A typical example is any task that asks subjects to recognize a previously presented stimulus from among two stimuli (Guilmette, Hart, & Giuliano, 1993). Performance below chance on such a measure is suggestive of malingering. The Portland Digit Recognition Test (PDRT; Binder, 1993), a forced choice recognition memory test, is a specific example of a symptom validity test. Binder and Willis (1991) found that individuals with brain damage who were not seeking financial compensation performed significantly better on the PDRT than mild head injury patients who were seeking compensation. Poor performance on the PDRT has also been found to be associated with a motivation to exaggerate impairment for financial gain (Binder, 1993). Furthermore, Hiscock and Hiscock (1989) and Binder (1993) found that patients seeking financial compensation performed worse on the PDRT items that seemed more difficult than patients not seeking financial compensation. It appears that increased perceived item difficulty may cause a person inclined to malinger to perform less well on tasks that appear hard than on tasks that appear easy.

Other tests that support these conclusions, and can be used in conjunction with the Luria-Nebraska Neuropsychological Battery, include the Hiscock Digit-Memory Test (HDMT; Slick, Hopp, Strauss, Hunter, & Pinch, 1994; Hiscock & Hiscock, 1989) and the Seashore Rhythm Test. The HDMT provides an alternative to more obvious measures of motivation that are disguised as memory tests. Slick et al. (1994) found that all subjects faking memory impairment performed significantly worse than brain injury patients,

especially on items that seemed more difficult. The Seashore Rhythm Test provides similar results. Gfeller, Cradock, and Falkenhain (1994) found that subjects faking cognitive impairments performed significantly worse than those instructed to perform optimally.

The second approach to using the LNNB to detect malingering involves the use of specific formulas or LNNB scores. Mensch and Woods (1986) studied people with average and above-average IQ's who were offered a small reward for faking brain injury. It was hypothesized that those with above-average IQ's would be more capable of faking than those with average IQ's. The analyses included sex, IQ, and whether or not the person was given instructions to fake symptoms; results indicated that only the instructions to fake were significant. Additionally, only 16% of those instructed to fake generated deficits on the Pathognomonic scale. Thus, it can be said that the Pathognomonic scale is sensitive to malingering.

Other methods for using the LNNB to assess for malingering involve the test items themselves. A forced-choice analysis of the LNNB is possible because many items on the measure are yes or no questions, which are essentially forced-choice. Therefore, the same chance analysis that can be used on the Portland Digit Recognition Test and others like it can be done on certain LNNB items (Golden & Grier, 1998). The internal consistency of the LNNB items can also be important in using this measure to detect malingering. The Luria Nebraska Neuropsychological Battery scales show high internal consistency, but measure a specific domain (e.g. motor skills) by combining those skills with a variety of other skills (Golden & Grier, 1998). Specific cross-scale item correlations are indicative of the presence of a basic deficit. However, malingerers will

not know that these relationships exist, so they will be likely to consistently show poor performance in one area but not on the other items that are on other scales that are highly correlated with the poor performance area. Consequently, this method serves as a very good check on an individual's overall profile.

Test-retest reliability and item consistency of the Luria Nebraska Neuropsychological Test Battery also serve a purpose when using this measure to detect malingering. With regard to test-retest reliability, the LNNB does not rely on novelty very much because it tests more basic skills (Golden & Grier, 1998). It has higher than average test-retest reliability and the test interval can be relatively short. Retest scores are expected to be within 10 T-score points of the prior testing. Malingerers tend to have much greater discrepancies, but the direction of the change is unpredictable. If an individual had two or more scales differ by more than ten points on retest, it should arouse suspicion in the clinician. Four or more scales that differ by more than ten points on retest without the client's condition changing would be indicative of malingering (Golden & Grier, 1998). Item consistency is similar to overall scale test-retest consistency, but looks at the item level. Across multiple test administrations, the level of agreement across items in both normal and brain-injured individuals whose conditions are stable is high. Golden, Berg, and Graber (1982) and Plaisted & Golden (1982) found perfect item agreement in at least 90% of retest clients who were not malingering. Therefore, retest agreements of less than 90% at the item level could be evidence of malingering.

The final method for utilizing the Luria Nebraska Neuropsychological Test Battery in the assessment of malingering is to examine the consistency of the test results with the individual's history and previous neuropsychological test results (Golden & Grier, 1998).

The relationship between neuropsychological findings and neurological and historical findings is not exactly one to one, but a well-documented relationship exists.

Halstead-Reitan Neuropsychological Battery

The Halstead-Reitan Neuropsychological Battery is a widely used measure for detecting traumatic brain injury. This measure can also be used to detect malingering and invalid test results. Most of the studies that have been conducted to develop a valid scale to detect malingering have utilized normal participants who were instructed to pretend that they had a brain injury while taking neuropsychological tests (Franzen, Iverson, & McCracken, 1990). There are two major problems with this research. The first is the assumption that normal subjects instructed to fake the types of deficits that would result from a head injury would actually be able to simulate the neuropsychological impairment caused by brain damage (Reitan & Wolfson, 1998). This is problematic because normal subjects that pretend to have brain damage experience none of the stresses, anxieties, depression, guilt, and desperation that are experienced by many litigants whose future financial situation could depend on the outcome of neuropsychological testing. The other problem with this approach is that the results are only able to obtain, at best, a certain level of statistical significance (Reitan & Wolfson, 1998). Current methods only give a probability statement about the likelihood that intergroup differences are the result of chance. The Halstead Reitan Neuropsychological Battery fits into this category of test.

There are multiple ways that the HRNB can be employed in the detection of malingering. The first is the use of intraindividual test scores to identify invalid test results. Psychologists usually depend on the level of performance when determining an individual's neuropsychological functioning (Reitan & Wolfson, 1998). Some

psychiatric and neurological conditions are thought to be associated with impaired performance, but many individuals with such conditions perform within the normal range. The fact that some test scores can fall into the normal range and some into the impaired range for the same individual leads to a second approach to evaluating test scores. To clarify, an individual with brain damage may perform poorly on tests that are sensitive to brain damage and well on tests that are not sensitive to brain damage. Therefore, a clinician should review a subject's test scores and determine whether there are inconsistencies in performance that exceed the limits of probability (Reitan & Wolfson, 1998).

Invalid test results on the HRNB can also be identified by comparing two or more test administrations. Most psychometric approaches to detect malingering have evaluated test scores based on a single examination or level of performance (Reitan & Wolfson, 1998). Because malingerers are not the only ones who perform poorly on neuropsychological tests, this method is flawed. Additionally, malingerers may earn relatively good scores on a test even though they are not giving their best effort and are performing below their optimal level. Comparing an individual's scores on the same test administered on two different occasions may be a better approach to detecting malingering (Reitan & Wolfson, 1998). This method uses the subject as his or her own control, and avoids the implicit problems of interindividual evaluations. Inconsistencies that are commonly observed by using this method indicate that those who are not putting forth their best possible effort respond less consistently than those who are not influenced by circumstantial factors such as litigation (Reitan & Wolfson, 1998).

Memory Impairment

The main reason for developing memory impairment malingering tests was the need for a specific test to detect the faking of memory impairment, and the fact that during the mid-1990's there was a failure of methods available to meet this need. Additionally, there was much debate in the late 1980's and early 1990's as to whether or not neuropsychologists were able to detect malingering based on neuropsychological test scores (Arkes, Faust, & Guilmette, 1990; Barth, Ryan, & Hawk, 1992; Bigler, 1990). This debate was not conclusive, but most involved thought that detecting malingering based only upon neuropsychological test scores was highly problematic. This is likely because inconsistency is the hallmark of malingering in that it can range from grossly exaggerated differences in scores between faked and legitimate symptoms to a pattern of scores that simply does not make "neurological sense". Thus, it is impractical to try to use these inconsistencies to identify malingering.

Tombaugh (2002) identified several qualitative signs of malingering on tests of cognitive ability. These qualitative signs include memory impairment that is disproportionate with the severity of the injury, discrepancies between scores on tests measuring similar abilities, inconsistencies between memory complaints and observed behavior, failing easy items on a test while passing more difficult ones, increased frequency of "I don't know" answers, increased frequency of near misses or approximate answers, pronounced decline in performance on delayed recognition tests, scores on recognition tests are relatively lower than scores on recall tests, and the profile of test scores not making "neurological sense". Tombaugh (2002) went on to utilize these qualitative signs to develop criteria for developing a test designed to detect memory

malingering. His criteria stated that the test should be sensitive to the faking of memory deficits, but should not be sensitive to any other factors that typically produce a memory deficit. Therefore, this test should be insensitive to the effects of demographic variables, traumatic brain injury, neuropsychological disorders, and affective disorders. Tombaugh (2002) also stated that these tests should have greater perceived difficulty than actual difficulty, high face validity as a test of memory, and universal application.

Test of Memory Malingering

The Test of Memory Malingering (TOMM) is yet another measure that can be used in the detection of malingering (Tombaugh, 2002). The TOMM was developed to provide an objective, criterion-based psychometric test that can differentiate between people with actual memory impairment and those who are faking the symptoms of memory impairment. The qualitative signs and criteria described above led to the development of the Test of Memory Malingering.

The TOMM consists of two learning trials and a retention trial (Tombaugh, 2002). It has been validated with both a clinical and non-elinieal sample. A clinical sample was used to determine if performance on the TOMM was affected by various types of neurological impairment, and to provide a set of clinically based norms that would allow for direct comparison between TOMM scores obtained from a person suspected of malingering and TOMM scores obtained from a person with similar levels of neurological damage/injury but not suspected of malingering (Tombaugh, 2002). Essentially, the clinically based norms provide a baseline where the performance of suspected malingerers could be compared to the performance of non-malingerers. The TOMM also has empirically based criterion scores. A person can get 50% correct on the

TOMM just by guessing. The range for chance performance is 18 to 32 (Tombaugh, 2002). Scores below 18 are unlikely to occur by chance, which implies that the person knew what the correct answer was but intentionally chose the incorrect answer.

Word Memory Test

The Word Memory Test (WMT) can also be used to determine whether or not an individual is feigning symptoms or is not performing optimally on neuropsychological tests (Green, Lees-Haley, & Allen, 2002). The WMT is made up of measures that are very sensitive to exaggeration or poor effort, but are very sensitive to all but the most extreme forms of cognitive impairment. This test, which has been extensively validated in clinical forensic settings, measures verbal learning and memory, and has been designed to allow for evaluation of a person's effort to do well. Thus, it can determine whether or not test scores are valid estimates of an individual's ability. The Word Memory Test assesses a person's ability to learn a list of 20 word pairs presented either orally or on a computer screen across multiple subtests. These subtests include Immediate Recall, Delayed Recognition, Multiple Choice, Paired Associates, Delayed Free Recall, and Long Delayed Free Recall; each subtest varies widely in its objective difficulty level (Green, Lees-Haley, & Allen, 2002). It is very difficult for a person who is not making a full effort to produce a valid profile on the WMT. Patients with moderate to severe brain injuries can obtain scores of about 95% (above 38 out of 40 correct) on the Immediate Recall and Delayed Recognition trials while healthy controls had mean scores above 97% (Green, Lees-Haley, & Allen, 2002). This indicates that these WMT scales are unrelated to major measures of head injury severity. Further support for this statement is found

when one considers that those with mild head injuries score, on average, significantly lower on the WMT with regard to effort than people with the most severe brain injuries.

Differentiating Between Head Injury, Somatization Disorder, & Malingering

Although all of the tests outlined above are able to detect malingering of traumatic brain injury to some degree, none of these measures is designed to differentiate between traumatic brain injury and a somatization disorder. Since it can be difficult to determine whether or not someone is malingering or suffering from a somatization disorder as reviewed above, these two possibilities need to be differentiated when conducting a neuropsychological assessment. Thus, there is a need for an additional means of detecting malingering that can effectively differentiate brain injury and somatization disorder. It is also critical that measures that are utilized to detect malingering not be too heavily skewed toward somatic complaints, which can result in individuals with somatization disorders being diagnosed as malingerers. A balance between detecting malingering and detecting somatization disorder must be achieved in order for proper diagnosis and treatment to occur. One measure that takes into account the possibility of somatization disorder in the detection of malingering is the forced-choice Minnesota Multiphasic Personality Inventory – 2 (MMPI-2). However, the empirical question remains, does this measure rely too heavily on somatic complaints to accurately differentiate between malingerers and those with a somatization disorder? It is to this and other considerations of the MMPI-2 that we turn next.

Minnesota Multiphasic Personality Inventory - 2

Like the above neuropsychological and memory impairment methods, the Minnesota Multiphasic Personality Inventory – 2 (MMPI-2; Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989) can be used to detect the feigning of head injury symptoms (Berry & Butcher, 1998). The MMPI-2 is the most commonly used test of personality and psychopathology in general forensic evaluations and forensic neuropsychological evaluations (Lees-Haley, 1992; Lees-Haley, Smith, Williams, & Dunn, 1995). It consists of ten clinical scales, which include Hypochondriasis, Depression, Hysteria, Psychopathic Deviate, Masculinity-Femininity, Paranoia, Psychasthenia, Schizophrenia, Hypomania, and Social Introversion. This measure also has well-developed validity scales for assessing the possibility of response sets in answering test questions (Pope, Butcher, & Seelen, 1993) as well as seven standard scales for the assessment of possible invalid approaches to the test.

Psychopathology that can occur following a head injury that relates to the clinical scales of the MMPI-2 include the following: irritability, agitation, belligerence, anger, violence, impulsiveness, impatience, restlessness, social inappropriateness, lability, anxiety, sensitivity to noise, suspiciousness, delusions, paranoia, mania, spontaneity, sluggishness, loss of interest, loss of drive, fatigue, and depression. Gass and Ansley (1995) provide an overview of personality assessment of neurologically impaired patients, with findings that indicate a tendency toward elevations of scales 1, 2, 3, 7, and 8, or Hypochondriasis, Depression, Hysteria, Psychasthenia, and Schizophrenia, respectively. However, other evidence demonstrates that there is likely no consistent "head injury" profile on the MMPI-2. For example, Alfano et al (1992) found that a wide

variety of two-point codes, encompassing virtually all clinical scales, have been found for head injury patients, and Bornstein et al. (1988) reported that significant elevations can occur on virtually any clinical scale for various subgroups of head injury patients.

The MMPI-2 must also be considered in light of neurological content, such that accurate responses by neurological patients might make their MMPI-2 profile appear more psychopathological than is actually the case. Scales 1, 2, 3, 7, and 8 have the highest number of neurologically related items, but deleting these items would likely underestimate psychopathology (Gass & Russell, 1991). Additionally, correction for neurological content may obscure possible psychological issues in a patient group where such factors could be making an important contribution to the overall picture.

The possibility of response sets on the MMPI-2 is also important when assessing for malingering. Response sets are present when a test-taker produces answers that are not meaningfully related to questions or are distorted in some important way. Two major categories of response sets exist (Nichols, Greene, & Schmolck, 1989). Content nonresponsiveness (CNR) is present when answers bear no meaningful relationship to questions (e.g., omitted, double-marked, or random responses). Content responsive faking (CRF) occurs when a test-taker distorts responses based on the content of the questions (e.g., under- or overreporting of psychopathology).

There is significant empirical literature on the faking of head injury symptoms on the MMPI and MMPI-2 (e.g., Butcher, Arbisi, Atlis, & McNulty, 2003; Greiffenstein et al., 2004; Larrabee, 1998; Berry & Butcher, 1998). Basically, MMPI measures contain a number of scales that are sensitive to the overreporting of psychological symptoms. The F scale is considered to be the best, followed by the F-K, Ds/Ds2, and F(b) scales (Ben-

Porath, Graham, Hall, Hirschman, & Zaragoza, 1995). There is some support for the newer F(p) and FBS scales as well (Berry & Butcher, 1998). Analog studies suggest that those who are faking and/or potentially exaggerating the symptoms of head injury tend to show elevated MMPI-2 overreporting symptom scales (Berry & Butcher, 1998). For example, F scale t-scores in the 80's would raise concern about overreporting; t-scores in the 90's and above indicate the need for special attention to the possibility of overreported symptoms. Interestingly, studies of mild head injury patients with strong evidence of malingering cognitive deficits indicate that only a subset also overreports psychological symptoms; thus, the faking of cognitive deficits and psychological symptoms may be independent in those malingering head injury (Berry & Butcher, 1998).

The F scale, which was originally on the MMPI, consists of 64 items selected because of low endorsement rates among the normative sample (Berry & Butcher, 1998). This scale has remained mostly the same on the MMPI-2. These items were selected to represent a wide variety of problems and content areas so that those reporting actual psychological distress would be unlikely to endorse more than a few of these items (Dahlstrom, Welsh, & Dahlstrom, 1972). Most of the MMPI-2 validity scales, like the F scale, are sensitive to content nonresponsiveness and to random reporting.

Another index on the MMPI-2 that is used for detecting response sets is the F-K index. Rogers, Sewell, and Salekin (1994) conducted a meta-analysis of 15 studies investigating the detection of malingering on the MMPI-2 and found continued support for the F and F-K scales. Support was also found for the F(b) scale. These results

indicate that there is support for the use of the traditional scales, F and F-K, as well as promising support for the F(b) scale in the detection of malingering.

Since the MMPI-2 is the most widely utilized symptom report scale in forensic neuropsychology, there is utility in further examining the ability of its specific scales at detecting malingering. One of these scales is the Fake Bad Scale (FBS; Lee-Haley, English, & Glenn, 1991). As this is a newer scale on the MMPI-2, there is preliminary evidence, such as that described above, that this scale shows promising ability in the assessment of malingering. However, there is still much research to be done in determining the strengths and weaknesses of the Fake Bad Scale.

The Fake Bad Scale of the MMPI-2

Although the Fake Bad Scale was originally designed to detect malingering in personal injury cases, it appears to be better at indicating invalid response styles in somatic injury cases, including brain injury cases, without assuming we know why an individual is exaggerating (Lees-Haley, 1997). For example, Larrabee (1997) suggested that "somatic malingering should be considered whenever elevations on scales 1 and 3 [on the MMPI-2] exceed T=80, accompanied by a significant elevation on the FBS (p. 203)." The Fake Bad Scale consists of 43 items, which were selected on the basis of their content (Lees-Haley et al., 1991). This scale was constructed utilizing rational as well as empirical strategies, similarly to the way the MMPI-2 itself was constructed (Greiffenstein et al., 2002). The original validation sample consisted of individuals who were suspected of malingering, individuals who were instructed to feign symptoms, and individuals believed to be suffering from actual head injuries. In this study, Lees-Haley (1991) suggested a cutoff score of 20 to be indicative of malingering, and obtained

accurate classification of malingerers 96% of the time, for true patients 93% of the time, and for those instructed to feign symptoms 74% of the time. It was also found that malingerers and those instructed to fake usually answered the true-false items on the FBS in the opposite manner than those with actual head injuries, normal controls, and psychiatric controls. A later study done by Lees-Haley (1992) found that the FBS is also useful for detecting those who are malingering posttraumatic stress disorder, although it is necessary to utilize higher cutoff scores for this population. In fact, the cutoff scores found in this study of 24 for males and 26 for females are now widely accepted as the cutoff scores for malingering across populations (Larrabee, 1998).

As stated previously, the Fake Bad Scale was constructed in much the same way that the overall MMPI-2 was constructed. The development of this scale was based upon malingerer response patterns that include a tendency toward: "(1) appearing honest; (2) appearing psychologically normal except for the influence of the alleged cause of injury; (3) avoiding admitting preexisting psychopathology; (4) attempting to minimize the impact of previously disclosed preexisting complaints; (5) minimizing or hiding preinjury antisocial or illegal behavior; and (6) presenting a degree of injury or disability within the perceived limits of plausibility (Larrabee, 2003b, p. 55)."

The scoring of the Fake Bad Scale ranges from 0 to 43, with 18 items scored in the "True" direction and 25 items scored in the "False" direction (Larrabee, 2003b). The majority of the items on this scale are from the Hypochondriasis and Hysteria clinical scales. Additionally, there are six items from the Schizophrenia clinical scale, four items each from the F scale, the Depression clinical scale, and the Paranoia clinical scale, three items each from the Psychasthenia and Social Introversion clinical scales, two items from

the Psychopathic Deviate clinical scale, and one item each from the L and K scales (Larrabee, 2003b).

Martens, Donders, and Millis (2001) and Miller and Donders (2001) have also examined the accuracy of the Fake Bad Scale; however, this research was done in the context of determining the base rate of invalid response sets. According to Miller and Donders (2001), Fake Bad Scale scores were elevated in 4% of individuals with moderate to severe traumatic head injury, in 30% of those with mild traumatic head injuries without financial incentives, and in 50% of those with mild traumatic head injury who were either involved in personal injury litigation or had filed for permanent complete disability. Furthermore, Miller and Donders (2001) state "This subscale [FBS] consists of MMPI-2 items that were selected for content on the basis of frequent counts of endorsements in personal injury claimants. The FBS has demonstrated potential sensitivity to exaggerated cognitive, emotional, or somatic distress in several recent investigations with individuals in personal litigation..." (p.298). Martens and colleagues (2001) found similar evidence when using the FBS criteria in a clinical sample, with 22% of these individuals having invalid response sets. Both of these data are consistent with previously reported base rates of invalid response sets.

There have been numerous studies that compare the Fake Bad Scale of the MMPI-2 to other validity scales of this measure. Dearth et al. (2004) addressed this issue by comparing individuals with moderate to severe head injuries to community volunteers who were either instructed to fake symptoms or to answer honestly during an analog forensic neuropsychological evaluation. The intent was to determine the possible contribution of the MMPI-2 validity scales to identifying malingerers during

neuropsychological evaluations. Most of the validity scales were found to have perfect specificity rates, but low to moderate sensitivity. The Fake Bad Scale, however, had both moderate specificity and moderate sensitivity. While these authors did find the Fake Bad Scale to be superior over other scales at the detection of malingering in neuropsychological examination, this superiority was not as dramatic as in other studies. A potential explanation for this finding is the study design, which involved simulated malingering in an analog forensic neuropsychological evaluation rather than actual suspected malingerers in actual neuropsychological testing situations.

Fox, Gerson, and Lees-Haley (1995) also examined the various validity scales of the MMPI-2 in order to determine how well they fare in personal injury cases; in particular the purpose was to determine how sensitive the validity scales are in these cases. The authors found that the Fake Bad Scale may be sensitive to various aspects of malingering that are not measured by traditional MMPI-2 validity scales. Furthermore, the FBS may not measure malingering as it is traditionally defined by the DSM-IV, which only involves faking bad. It appears, based upon this study, that in personal injury cases malingering may involve a mixture of both faking bad and faking good. Thus, the authors make the argument that the Fake Bad Scale is particularly useful in the detection of malingering in personal injury claims, which is the original intent of the scale. Greiffenstein et al. (2002) concur with these findings by defining the purpose of the Fake Bad Scale as being to "detect the simulation of emotional distress in the context of compensation seeking (p.1591)" and by finding the Fake Bad Scale to be superior to traditional MMPI-2 scales in the detection of malingering.

Larrabee (2003a) examined the overall MMPI-2 profiles of individuals who were identified as meeting criteria for definite malingered neurocognitive dysfunction in comparison to the MMPI-2 profiles of individuals who suffered from either moderate or severe closed head injury. His findings indicated that the Fake Bad Scale was the most sensitive scale in differentiating those who were malingering from those who had suffered a head injury. Additionally, significant differences were found between these two groups on the Hypochondriasis, Depression, Hysteria, Psychasthenia, and Schizophrenia scales of the MMPI-2.

Tsushima and Tsushima (2001) also found support for the Fake Bad Scale in comparison to other MMPI-2 validity scales in terms of its discriminatory power. The authors found that the FBA had significantly better discriminatory power with regard to differentiating between personal injury litigants, clinical patients, and normal controls than the other MMPI-2 validity scales. More specifically, it was determined that the litigants and clinical patients had higher Fake Bad Scale scores than the normal controls. Additionally, the FBS may be able to detect somatic overreporting more accurately because it is sensitive to symptom exaggeration.

In comparison to the F scale, the Fake Bad Scale has been found in at least one study done by Larrabee (1998) to be superior at detecting malingering of head injuries. This study found that only 3 out of 12 litigating participants who were also suspected of malingering had elevations on the F scale while 11 of 12 of these individuals had elevations of the Fake Bad Scale. However, Larrabee (1998) utilized the higher cutoff scores of 24 for males and 26 for females based upon the earlier suggestion of these cutoffs by Lees-Haley (1992) for the detection of malingered PTSD. The use of these

higher cutoff scores was a response to the fact that there is considerable overlap between the Fake Bad Scale, the Hypochondriasis scale, and the Hysteria scale of the MMPI-2.

Larrabee (2003b) also examined the accuracy of the Fake Bad Scale in comparison to other standard neuropsychological tests in terms of detecting malingering. He identified cut-off scores that defined clinically atypical patterns of performance on five standard neuropsychological tests, including the Benton Visual Form Discrimination Test, Fingertapping, the Wechsler Adult Intelligence Scale-Revised Reliable Digit Span, the Wisconsin Card Sorting Failure-to-Maintain Set, and the Lees-Haley Fake Bad Scale from the MMPI-2. All possible pair-wise combinations of scores beyond the cut-off scores were considered. These pair-wise combinations correctly identified 87.5% of those meeting criteria for definite malingered neurocognitive dysfunction and 88.9% of those with moderate to severe closed head injury. Furthermore, on cross-validation 88.2% of those meeting criteria for probably malingered neurocognitive dysfunction were correctly identified, with 13 of 13 non-litigating neurologic patients and 14 of 14 non-litigating psychiatric patients correctly identified as having motivationally-preserved performance. Taken together, the samples result in a sensitivity of 87.8%, a specificity of 94.4%, and a combined 'hit-rate' of 91.6%. Slick, Hopp, Strauss, and Spellacy (1996) also compared the Fake Bad Scale of the MMPI-2 to other neuropsychological tests and other MMPI-2 validity scales. These authors found that the FBS correlates with other tests of malingering, such as the Portland Digit Recognition Test and the Victoria Symptom Validity Test. Specifically, it was indicated that the FBS correlated higher with the Victoria Symptom Validity Test than did other MMPI-2 scales, including the F, F-K, F(p), and O-S indices.

Ross, Millis, Krukowski, Putnam, and Adams (2004) also found support for the use of the Fake Bad Scale to detect malingering of head injuries. These investigators utilized a cutoff score of 21 and successfully identified 90% of litigating mild head injury cases and 90% of actual head injury patients. Ross et al. (2004) also examined the overlap of the Fake Bad Scale and the Hysteria and Hypochondriasis Scales. They found that although the Fake Bad, the Hysteria, and the Hypochondriasis Scales were related, the FBS carried the majority of the variance in detecting malingering. Thus, "these results suggest that the FBS, and the construct that it represents, are more indicative of invalid responding rather than somatoform disorder (Ross et al., 2004, p. 122)."

Taken together these data indicate that the Fake Bad Scale of the MMPI-2 is potentially effective at detecting somatic malingering. However, there is little evidence that the Fake Bad Scale is successful at differentiating between an actual head injury, a somatization disorder, and malingering. Several studies stated that the Fake Bad Scale is weighted heavily in the direction of somatic complaints leaving it open to the criticism that it may not be an accurate tool for making the differentiation between these possibilities. Thus, further research must be done in this area in order to determine the ability of the FBS to make these differentiations, particularly among personal injury litigants.

Present Research

The present study will expand upon previous research regarding the efficacy of the Fake Bad Scale for detecting the malingering of head injuries. In particular, this study will focus on a similar question to that addressed by Ross et al. (2004) regarding the

efficacy of the FBS in differentiating malingering and somatization disorders. Specifically, the research aims to use established comprehensive medical and neuropsychological records to differentiate between individuals who actually have sustained a head injury from those who have been determined to have a somatoform disorder or individuals who have been determined to be malingering as indicated by these comprehensive medical and neuropsychological records. In so doing, special attention will be given to the items contributing to the FBS for those diagnosed as having a somatization disorder.

The research is guided by the following hypotheses:

1. That the FBS will successfully differentiate between individuals who have a traumatic brain injury and individuals who are malingering as well as between individuals who have a traumatic brain injury and those with a somatoform disorder, but will less successfully differentiate between individuals who have a somatoform disorder and those who are malingering.
2. The FBS will be comparable to other MMPI-2 validity scales and to the Portland Digit Recognition Test and the Test of Memory Malingering in its ability to differentiate between individuals who have a traumatic brain injury and those who are malingering as well as between those with a traumatic brain injury and individuals with a somatoform disorder, but will be less successful than these other measures at differentiating between individuals with a somatoform disorder and those who are malingering.

3. That there will not be gender differences in the Fake Bad Scale's ability to differentiate between individuals with traumatic brain injury, individuals with a somatoform disorder, and individuals who are malingering.

CHAPTER 3

METHOD

Participant Data Set

The participant sample consisted of the neuropsychological records of 283 individuals who were involved in either a personal injury or workman's compensation lawsuit who were diagnosed by a licensed psychologist in a private neuropsychology practice. Each participant had been administered a combination of the following psychological and neuropsychological assessments as was deemed appropriate by their presenting complaint: Millon Clinical Multiaxial Inventory-III, Minnesota Multiphasic Personality Inventory-2, Wechsler Adult Intelligence Scale-Revised, Wechsler Adult Intelligence Scale-III, Wechsler Memory Scale-III, Wide Range Achievement Test-3, Grip Strength, Manual Finger Tapping Test, Grooved Pegboard Test, Reitan Klove Sensory Perceptual Examination, Tactile Finger Recognition, Tactile Form Recognition, Fingertip Number Writing, Tactual Performance Test, Trails A and B, Short Category Test, Boston Naming Test, Stroop Color Word Test, Letter and Category Fluency tests, Test of Memory Malingering, Beck Anxiety Inventory, Portland Digit Recognition, Adult DSM-IV Symptom Checklist, Significant Life Events Questionnaire, California Verbal Learning Test, and Lateral Dominance Examination.

Each participant had also undergone an extensive clinical interview, the notes from which were contained in their records. Additionally, complete medical records were also

available for these participants and were reviewed by the investigator for those individual participants with presenting complaints that warranted such a review.

The diagnoses represented in this participant sample included the following: Major Depressive Disorder, Posttraumatic Stress Disorder, Panic Disorder, Substance Dependence, Pain Disorder, Avoidant Personality Disorder, Borderline Personality Disorder, Generalized Anxiety Disorder, Conversion Disorder, Hypochondriasis, Schizoid Personality Disorder, Histrionic Personality Disorder, Adjustment Disorders with Mixed Anxiety and Depressive Mood, Undifferentiated Somatoform Disorder, Dementia due to Closed Head Injury, Personality Change due to Closed Head Injury, Dysthymic Disorder, Traumatic Brain Injury, and Malingering. The diagnosis of malingering was made utilizing the Slick, Sherman, and Iverson (1999) criteria previously described. For the purposes of this research, only individuals who received a diagnosis of definite malingering were included in the sample.

Of the 283 participant records in this sample, 30 had a diagnosis of definite malingering, 31 had a diagnosis of a pure somatoform disorder, and 21 had a diagnosis of a traumatic brain injury for a total of 82 participant records whose diagnoses were pertinent to the present research. A power analysis conducted utilizing F-power from SAS indicated that, for a moderate effect size of .75 utilizing a one-way ANOVA, a sample of 30 participants in each of the three groups of interest would provide a power of .726.

The remaining 201 participants in the overall record sample had either a diagnosis that was not pertinent to this study or had multiple "rule out" diagnoses that may have included the three of interest in this study. Individuals who did not have a pure diagnosis

of malingering, a somatoform diagnosis, or traumatic brain injury were not considered in the final analyses. There were 12 additional individuals who were diagnosed with traumatic brain injury who were not actually tested in the private practice where the data were collected; these individuals' medical and psychological records were simply submitted for a record review. None of these cases was considered in the final participant sample of 82 participants. Lastly, there were 7 records from the overall participant sample that fit the diagnostic criteria for this study but were missing pertinent information (e.g., MMPI-2 answers were missing preventing a Fake Bad Scale score from being calculated). These records were also not considered in the final participant sample.

Of the 82 participants whose records were considered further in the research, 38 were female and 44 were male. The age range for the research sample was 18 to 71 years of age, with a mean age of 42.48 and a standard deviation of 10.56. The ethnic breakdown of the sample was as follows: 8 African American (9.75%), 2 Asian/Pacific Islander (2.43%), 62 Caucasian (75.60%), 7 Hispanic (8.53%), and 3 Other (3.65%). The ethnic breakdown was determined by patient self-report. The category of Other included individuals who identified themselves by specific country of origin; one individual in that group self-identified as Lebanese, another self-identified as Iranian, and the third self-identified as Hungarian.

Procedure

The study evaluated and compared the Fake Bad Scale scores of the MMPI-2 for the research sample of 82 individuals in order to determine whether the Fake Bad Scale

accurately differentiated among traumatic brain injury (N= 21), somatoform disorder (N=31), and malingering patients (N=30). It was of particular interest to examine the Fake Bad Scale Scores of those individuals diagnosed with a somatoform disorder since prior research indicated that the Fake Bad Scale may be heavily weighted toward somatic complaints.

This study further compared the Fake Bad Scale to measures of infrequent responding on the MMPI-2, as well as to the Portland Digit Recognition Test (Binder, 1993), and the Test of Memory Malingering (Tombaugh, 2002). The power of the Fake Bad Scale to differentiate among traumatic brain injury, somatoform disorder and malingering was also examined with regard to gender differences.

Each of the 82 individual records were examined by the researcher and summarized in a written report that included demographic information, background information regarding the participant's circumstances, including medical evidence, neuropsychological and psychological test results, and diagnosis. Redacted examples of these reports can be found in Appendix A. Any data that were not already numeric was coded by the researcher for purposes of further statistical analyses.

The coding system for gender was 1 for male and 2 for female. The coding system for ethnicity was 1 for African American, 2 for Asian/Pacific Islander, 3 for Caucasian, 4 for Hispanic, and 5 for Other. Medical evidence was coded as 0 if there was little to no medical evidence to support a claim of injury by the participant; this included negative neuroimaging (e.g., no positive CT Scans, no positive MRIs) and a normal Glasgow Coma Scale Score. Medical evidence was coded as 1 if there was substantial medical evidence to support a participant's injury claim; this included positive neuroimaging

(e.g., one or more positive CT Scans, one or more positive MRIs) and an impaired Glasgow Coma Scale Score.

The coding of medical evidence, as well as the inclusion of only those individuals with a diagnosis of definite malingering or a pure somatoform disorder, were utilized as a means of establishing a level of inter-rater reliability. There were no discrepancies between the present investigator's coding of medical evidence and that of the clinician who initially assigned the diagnoses to the participants. Similarly, a Glasgow Coma Scale Score of 12 or lower (Bigler & Clement, 1997) was considered to be impaired by the present investigator. Again, based upon this there were no discrepancies between the present investigator and the clinician who initially assigned the diagnoses to the participants.

Lastly, in terms of coding, scores on the Portland Digit Recognition Test were coded as 1 or 0. A code of 1 indicated that the participant fell below the cut-off score for malingering, which indicated suboptimal effort. A code of 0 indicated that the participant fell above the cut-off score for malingering, which indicated that the participant put forth optimal effort on that particular measure. This latter coding was necessitated because some participants were given an abbreviated version of the Portland Digit Recognition Test while others were given the full version, resulting in different cut-off scores. The cut-off score for malingering for the 27-item version of the Portland Digit Recognition Test is 15 and the cut-off score for malingering for the 72-item version of the Portland Digit Recognition Test is 39.

Each of the previously articulated hypotheses was considered using the data extracted from the records and analyzed statistically using SPSS. A consideration of the

approaches used to address these hypotheses is given next. The FBS was primarily examined in order to determine how well it differentiated among participants with a traumatic brain injury, with a somatoform or other psychological disorder, and participants who were malingering. It was hypothesized that the Fake Bad Scale would successfully differentiate between participants with traumatic brain injuries and those who were malingering and between participants with traumatic brain injury and those who had a somatoform disorder, but that the FBS would be less successful in differentiating between participants who were malingering and those who had a somatoform disorder. In order to address these hypotheses, the sensitivity and specificity of the Fake Bad Scale were evaluated. Sensitivity indicated the proportion of confirmed malingering participants, or those who were above the established cut-off scores for malingering, that were correctly identified by the Fake Bad Scale. Specificity indicated the proportion of non-malingering participants, or those who were below the established cut-off scores for malingering, that were correctly identified by the Fake Bad Scale. A one-way ANOVA was conducted to evaluate the differences among these three groups. A Bonferroni Comparison was made post hoc.

Next, the Fake Bad Scale of the MMPI-2 was compared to the F scale, the F-K index, and the F(b) scales of the MMPI as well as to the Test of Memory Malingering and the Portland Digit Recognition Test in order to determine how well each of these scales differentiated among those with traumatic brain injuries, those with somatoform disorders, and those who were malingering. The relevant hypothesis here was that the Fake Bad Scale would be comparable to other MMPI-2 validity scales, and to the other measures of malingering used, when differentiating between TBI and malingering as well

as between TBI and somatoform disorders. On the other hand, it was hypothesized that the FBS would be less successful than the other MMPI-2 validity scales, and the other measures of malingering used, at differentiating between somatoform disorders and malingering. These hypotheses were statistically analyzed using a one-way ANOVA and posthoc Bonferroni comparisons. Additionally, correlations between the obtained Fake Bad Scale, the F scale, the F-K index, and the F(b) scale score were examined, as was the percentage of item overlap that occurred between each validity scale, in order to address the issue of colinearity. Statistical comparisons were not conducted for the Test of Memory Malingering or for the Portland Digit Recognition Test due to the unexpectedly small numbers of participants who were administered these measures.

The final research question considered was whether there were gender differences with respect to how well the Fake Bad Scale of the MMPI-2 differentiated among those participants who had a traumatic brain injury, a somatoform disorder, or were malingering. This was evaluated statistically utilizing a one-way ANOVA. Significant differences were not hypothesized to occur due to the fact that the Fake Bad Scale utilizes gender specific cut-off scores of 24 for men and 26 for women.

CHAPTER 4

RESULTS

Prior to beginning the statistical analyses of the MMPI-2 validity scales, the scales were examined to determine the degree to which the items of each scale overlapped with the items of each other scale that was used in this research. This was done since if there were considerable overlap in items on the validity scales, one would necessarily expect that the individual scales would not show differences in the differential diagnosis of malingering simply due to item duplication on each scale.

The K Scale was considered, rather than the F-K Index, in analyzing item overlap because the F-K Index is a score that is obtained by subtracting the obtained raw score on the K Scale from the obtained raw score on the F Scale. Thus, there are no specific items on the F-K Index; it is the difference of the scores obtained on two separate scales.

Table 1 presents the percentage of item overlap that occurs between each of the MMPI-2 validity scales, that is the percentage of items that appeared on multiple scales. As can be seen, there is minimal item overlap between the MMPI-2 validity scales that were considered in this study. All of the scales have fewer than six per cent shared items. The greatest item overlap occurs between the Fake Bad Scale and the F and K scales, which themselves have an item overlap of slightly more than one per cent. The F(b) scale has zero item overlap with the F and K scales. Since the validity scales of the MMPI-2

generally have so few items in common with each other, the issue of collinearity among the scales compared herein was not considered as a factor of importance in this research.

Table 1: Percent Item Overlap Between MMPI-2 Validity Scales

	Fake Bad Scale	F Scale	K Scale	F(b) Scale
Fake Bad Scale	100%	4.85%	5.48%	1.20%
F Scale		100%	1.11%	0%
K Scale			100%	0%
F(b) Scale				100%

Inasmuch as each of the MMPI-2 scales considered in this research were constructed as validity scales, there was an a priori assumption made by the investigator that individuals' scores on one validity scale would be predictive of their scores on the other validity scales. Said otherwise, if an individual produced an invalid profile on one validity scale, it was assumed that the other validity scales would reflect this type of performance as well.

So as to test this assumption, and as a preliminary manipulation check on the data to be used in the subsequent analyses, correlations among the obtained scores on the MMPI-2 validity scales were computed and are presented in Table 2.

Table 2: Pearson Correlations between MMPI-2 Validity Scale Scores

	Fake Bad Scale	F Scale	F-K Index	F(b) Scale
Fake Bad Scale	1.000	.540**	.350**	.515**
F Scale		1.000	.741**	.809**
F-K Index			1.000	.714**
F(b) Scale				1.000

**. Correlation is significant at the .01 level (2-tailed).

As assumed, all of these correlations proved to be significant. However, the strongest correlations were obtained among the F Scale, F(b) Scale and K Scale. Significant but less robust correlations were obtained between these three validity scales and the Fake Bad Scale. This may be due to the fact that both the F Scale and the F(b) Scale consist of items that are not typically endorsed in normative samples, but are not necessarily associated with faking bad, while the K Scale tends to evaluate an individual's level of defensiveness and ego strength rather than faking bad per se.(Steh, 2007).

Turning next to the analyses of the actual scores obtained from the validity scales, starting with the FBS, Table 3 presents the mean, range, and standard deviation for the Fake Bad Scale scores obtained from the traumatic brain injury group, the somatoform disorder group, and the malingering group. As can be seen therein, the mean FBS scores were highest for the malingering group and lowest for the TBI group.

Table 3: Descriptive Statistics for Fake Bad Scale Score

	Mean	Minimum	Maximum	Standard Deviation
TBI	17.95	8	23	4.53
Somatoform	24.74	18	34	4.40
Malingering	28.23	15	43	5.83

Differences among these groups were relevant to the first research question of how well the Fake Bad Scale of the MMPI-2 differentiates among those with a traumatic brain injury, those with a somatoform disorder, and those who are malingering. Recall that it was expected that the Fake Bad Scale would successfully differentiate between those

with traumatic brain injuries and those with somatoform disorders or those who were malingering. However, the FBS was not expected to differentiate well between those who had a somatoform disorder and those who were malingering.

Once again, these expectations were based upon the working assumption that the general public is typically quite misinformed regarding the sequelae of traumatic brain injury, and often believe that physical complaints are more common than psychological or cognitive complaints, particularly in cases of mild head injury. Thus, it follows that many malingerers would report more physical complaints than psychological, emotional, or cognitive complaints. The Fake Bad Scale of the MMPI-2 is heavily weighted with somatic complaints. While this may help to identify malingerers, it was thought that it may also increase the risk of falsely identifying those with a somatoform disorder as malingering.

In order to determine whether there was an overall statistically significant difference among the group means for the Fake Bad Scale score, and in order to determine if further, pairwise comparisons were warranted, a one-way ANOVA was performed. This analysis yielded the following results: $F(df = 2) = 26.177$ ($p < .001$), which indicated that the mean differences in FBS score shown in Table 1 among the three groups were significantly different.

A post hoc Bonferroni comparison was subsequently used to further explore where between the groups significant score differences were obtained. All of the individual group comparisons were significantly different as may be seen in Table 4.

Table 4: Bonferroni Comparison for MMPI-2 Fake Bad Scale Scores Between Groups

	Mean Difference	SE	Sig.
FBS Malingering & Somatoform	3.49	1.28	.024
FBS Malingering & TBI	10.28	1.43	<.001
FBS Somatoform & TBI	6.79	1.42	<.001

As hypothesized, the Fake Bad Scale readily and powerfully ($p < .001$) differentiated between the traumatic brain injury group and the malingering and somatoform groups. However, contrary to expectation, the Fake Bad Scale also significantly differentiated, although less decisively ($p=.024$), between the malingering group and the somatoform group. This would suggest, then, that the Fake Bad Scale has utility in differentiating between malingerers and those with traumatic brain injury or somatoform disorder.

To explore further the differential diagnostic effectiveness of the Fake Bad Scale, the sensitivity and specificity of the Fake Bad Scale were calculated. Sensitivity is the percentage of malingerers that were correctly identified by the scale (that is, fell above the scale cut off for malingering). A scale is said to be sensitive to the extent that it correctly measures the construct it was designed to measure. On the other hand, a scale is said to have specificity to the extent that it differentiates between the construct intended for measure and other constructs. In other words, the Fake Bad Scale would be said to have specificity to the extent that nonmalingerers are correctly identified by the scale (that is, fell below the scale cut off for malingering). The sensitivity of the Fake Bad Scale was 76.67%, with 23 of 30 individuals diagnosed with malingering falling above the cut-off score for this scale.

The overall specificity for the Fake Bad Scale, when considering individuals in both the somatoform disorder group and the traumatic brain injury group, was 69.23%, with 36 of 52 non-malingerers falling below the cut-off score for this measure. However, when these two groups were considered separately, the specificity for the traumatic brain injury group was 100%, while for the somatoform disorder group the specificity of the scale was 48.38%. In this somatoform disorder group, 15 of 31 individuals obtained Fake Bad Scale scores that fell below the cut-off for malingering, which means that 16 of 31 somatoform disordered individuals were diagnosed as malingering based upon their Fake Bad Scale scores.

Taken together the data obtained for the Fake Bad Scale suggested that based on group mean scores, the Fake Bad Scale appeared to be successful in differentiating among individuals who were malingering, had a somatoform disorder, or had a traumatic brain injury, while based on individual scores, the scale seems to effectively differentiate between malingerers and those with traumatic brain injury but falsely classifies individuals with somatoform disorders as malingering approximately 50 percent of the time.

The second research question examined how well the Fake Bad Scale of the MMPI-2 differentiated among traumatic brain injury patients, those with somatoform disorders, and malingerers compared to other MMPI-2 validity scales, namely the F Scale, the F-K Index, and the F(b) Scale. Table 5 presents descriptive statistics for the MMPI-2 validity scales along with the data for the Fake Bad Scale previously presented in Table 3.

Table 5: Descriptive Statistics for MMPI-2 Validity Scales

	F Scale Mean	F Scale Std. Deviation	F-K Index Mean	F-K Std. Deviation	F(b) Scale Mean	F(b) Std. Deviation	Fake Bad Scale Mean	Fake Bad Scale Std. Deviation
TBI	56.76	10.93	-9.19	11.92	56.86	16.22	17.95	4.53
Somatoform	60.35	15.13	-9.19	11.17	56.55	15.81	24.74	4.40
Malingering	71.67	18.07	3.33 e-02	11.87	77.93	22.48	28.23	5.83

As can be seen from the table, on all four scales that were considered, the malingering groups had more elevated mean scores than either the somatoform or traumatic brain injury groups. Also of note is that for the F Scale, F-K Index and F(b) scales, the mean scores for the TBI and Somatoform groups were reasonably similar whereas for the Fake Bad Scale the malingering and somatoform group scores were more comparable than for the TBI group.

In order to determine whether any of these observed mean differences among the groups were significant for each scale, a separate one-way ANOVA was used to analyze each MMPI-2 validity scale. The results of these analyses are shown in Table 6 where it can be seen that the group differences for each validity scale were in fact significant. Thus, these results indicate that the MMPI-2 validity scales, like the Fake Bad Scale, successfully differentiated among the three diagnostic groups in terms of mean scores.

Table 6: One-Way ANOVAs for MMPI-2 Validity Scales

	F(df=2)	Significance Level
Fake Bad Scale	26.177	<.001
F Scale	6.881	.002
F-K Index	5.993	.004
F(b) Scale	12.390	<.001

A subsequent Bonferroni Comparison was conducted as the results from the one-way ANOVAs were statistically significant. These results are presented in Table 7.

Table 7: Bonferroni Comparisons for MMPI-2 Validity Scales

	Mean Difference	Sig.
FBS Malingering & Somatoform	3.49	.024
FBS Malingering & TBI	10.28	<.001
FBS Somatoform & TBI	6.79	<.001
F Malingering & Somatoform	11.31	.016
F Malingering & TBI	14.90	.003
F Somatoform & TBI	3.59	1.00
F-K Malingering & Somatoform	9.23	.008
F-K Malingering & TBI	9.22	.020
F-K Somatoform & TBI	3.07 e-03	1.00
F(b) Malingering & Somatoform	21.38	<.001
F(b) Malingering & TBI	21.088	<.001
F(b) Somatoform & TBI	.31	1.00

As discussed previously (cf. Table 2) the Bonferroni Comparison indicated that the Fake Bad Scale significantly differentiated among individuals who were malingering, individuals with somatoform disorders, and individuals who had incurred a traumatic brain injury.

In contrast, the MMPI-2 F Scale, F-K Index and F(b) Scale differentiated significantly between individuals who were malingering and individuals with a

somatoform disorder as well as between individuals who were malingering and those with a traumatic brain injury but did not significantly differentiate between individuals with a somatoform disorder and individuals with a traumatic brain injury.

Sensitivity and specificity was calculated for each of the MMPI-2 validity scales. This information is presented in Table 8.

Table 8: Sensitivity & Specificity for MMPI-2 Validity Scales.

	Sensitivity (Malingerers)	Specificity (Somatoform D/O)	Specificity (TBI)
FBS	76.67%	48.38%	100%
F Scale	63.33%	67.74%	80.95%
F-K Index	16.67%	93.55%	95.24%
F(b) Scale	73.33%	70.97%	71.43%

Again, sensitivity represents the number of malingerers who were correctly classified by the scale based upon clinical cut-off scores for malingering while specificity represents the number of non-malingerers who fell below the clinical cut-off scores for malingering for each validity scale. As was the case above for the Fake Bad Score, these data again demonstrate that significant differences in mean scores on a particular scale do not necessarily indicate that a particular scale has classified an individual correctly by diagnosis.

The data in Table 8 indicate that, in terms of simple percentages of correct classifications, the Fake Bad Scale successfully classified individuals who were malingering and individuals with traumatic brain injuries more frequently than the other three validity scales. However, again in terms of simple percentage of correct classifications, the Fake Bad Scale successfully classified individuals with somatoform

disorders less frequently than the other MMPI-2 validity scales. Thus, while the Fake Bad Scale may be effective in differentiating between individuals who are malingering and those with a traumatic brain injury as well as between those with a somatoform disorder and those with a traumatic brain injury, when there is a question of whether an individual is malingering or has a somatoform disorder the Fake Bad Scale may not be specific in making this distinction.

The F Scale of the MMPI-2 successfully classified those who were malingering 63.33% of the time, those with a somatoform disorder 67.74% of the time, and those with a traumatic brain injury 80.95% of the time. Combined with the results from the Bonferroni comparison, which demonstrated that the F Scale does not successfully differentiate between the mean scores of individuals with a traumatic brain injury and those with a somatoform disorder, these percentages likely indicate that, at least some of the time, individuals with a somatoform disorder are being falsely classified as having a traumatic brain injury and vice versa. It appears less likely that this scale is falsely classifying individuals who have a somatoform disorder or a traumatic brain injury as malingering or that those who are malingering are being classified as having a somatoform disorder or traumatic brain injury, but this is still a possibility with the F Scale given the modest nature of the percentages of correct classifications.

The F-K Index of the MMPI-2 correctly classified individuals diagnosed as malingering only 16.67% of the time. However, it correctly classified those with somatoform disorders 93.55% of the time and those with a traumatic brain injury 95.24% of the time. This indicates that this particular scale may be falsely classifying malingerers as having either a somatoform disorder or a traumatic brain injury such that

they do not show significant differences in their mean scores. However, it is unlikely that the F-K Index is falsely classifying those with a somatoform disorder or a traumatic brain injury.

Lastly, the F(b) Scale correctly identified individuals who were malingering 73.33% of the time, individuals with a somatoform disorder 70.97% of the time, and individuals with a traumatic brain injury 71.43% of the time. Like all of the MMPI-2 validity scales examined, with the exception of the Fake Bad Scale, this scale found overall differences in the mean scores of malingerers and those with a somatoform disorder and in the scores of malingerers and those with a traumatic brain injury but did not find overall differences in the scores of individuals with a somatoform disorder compared to those with a traumatic brain injury. Thus, it is possible that this validity scale could also incorrectly classify those with a somatoform disorder as having a traumatic brain injury and vice versa, but it is unlikely that this validity scale classifies either of these groups as malingerers or classifies malingerers as either of the other two diagnostic groups.

Another aspect of the second research question concerned the TOMM. When compared to the TOMM, the Fake Bad Scale of the MMPI-2 was thought likely to do at least as well at detecting malingering and likely to be less successful at differentiating among those with somatoform disorders and malingerers. This was predicted because the TOMM specifically tests for memory, not somatic, malingering. Thus, the TOMM would likely not produce false positives for those with somatoform disorders. Unfortunately, an unexpectedly small number of participants (N = 18) were administered the TOMM. This number was even smaller when only pure somatic and pure memory

malingerers were considered (N = 2) rather than individuals who had a combined malingering diagnosis. Therefore, meaningful statistics could not be calculated for this measure.

The final aspect of the second research question concerned the Portland Digit Recognition Test (PDRT). With regard to this measure, which like the TOMM is not specific to somatic malingering, it was hypothesized that the Fake Bad Scale of the MMPI-2 would be likely to perform at least as well as the Portland Digit Recognition Test at detecting malingering and likely to be less successful at differentiating between those with somatoform disorders and malingerers. Again, it would be unlikely that the PDRT would produce false positives for those with somatoform disorders.

As was the case for the TOMM, a very small number of the participants were administered the PDRT (N = 28). This small number of participants was further complicated by the fact that two-different versions (Short and Long) of the PDRT were utilized by the clinician who administered the assessment batteries. Therefore, means and standard deviations were not calculated for the PDRT but instead, these data were coded for either being suggestive or not suggestive of malingering.

Of the 28 participants who were administered this measure, 16 were diagnosed as malingerers. All 16 participants scored above the respective cut-off scores for malingering on either the short or the long version of the PDRT. There were seven individuals in the somatoform disorder group who were administered the Portland Digit Recognition Test, with one individual scoring above the cut-off for malingering. Lastly, in the traumatic brain injury group, five individuals were administered this measure, and two fell above the cut-off score for malingering. While no statistical analyses were

performed on these data, and any generalizations made from them are tenuous at best, the number of individuals falling above the cut-off score for malingering in each group suggested that the PDRT may be unlikely to falsely classify individuals with somatoform disorders as malingering. However, the PDRT may not be useful in detecting traumatic brain injury given that nearly half of the TBI patients who were administered this measure fell above the cut-off score for malingering.

With regard to the final research question of whether there were gender differences in how well the Fake Bad Scale of the MMPI-2 differentiates among those with traumatic brain injuries, those with somatoform disorders, and those who are malingering; it was thought to be unlikely that gender differences would be found. There are different accepted cut-off scores for this scale for men and women based upon the fact that there are gender differences in the experience and prevalence of many of the somatoform disorders. However, since the comparison of the three groups in question had not been previously made, the possibility of gender differences was examined. Gender differences were calculated for the overall sample as well as for each of the three groups of interest utilizing ANOVA. As expected, there were no significant differences with regard to gender for the overall sample or for any of the individual groups of interest as is shown in Table 9.

Table 9: Gender Comparisons for Fake Bad Scale

	F	Significance
Fake Bad Scale for All Groups	.281	.598
Fake Bad Scale for Malingering Group	.114	.738
Fake Bad Scale for Somatoform Group	.547	.466
Fake Bad Scale for Traumatic Brain Injury Group	.107	.747

CHAPTER 5

DISCUSSION

The impetus for this research lies in the fact that the diagnosis of malingering can be a complex and difficult process. While nearly any psychological, neurological, or physical complaint can be malingered, the present research focused on the malingering of somatic complaints. Malingering of somatic complaints is specifically relevant to the malingering of traumatic brain injuries inasmuch as most traumatic brain injury malingerers are typically not well educated regarding the actual sequelae of traumatic brain injury and frequently incorrectly assume that multiple somatic complaints are associated with a traumatic brain injury (Gouvier, Prestholdt, & Warner, 1988; Willer, Johnson, Rempel, & Linn, 1993).

One measure that has been designed specifically to assess the presence of somatic malingering, particularly among personal injury litigants, is the Fake Bad Scale of the MMPI-2. The present research was designed to examine the power of the Fake Bad Scale in terms of differentiating between individuals who had been previously diagnosed with malingering, those who had been previously diagnosed with a somatoform disorder, and individuals who had previously been diagnosed as having incurred a traumatic brain injury.

By way of overall summary of the obtained results, the present research found that the Fake Bad Scale successfully differentiated between individuals who were malingering, those who had a diagnosed somatoform disorder, and those who had incurred a traumatic brain injury. In fact, the Fake Bad Scale also successfully differentiated among all possible paired comparisons of these three groups. However, when sensitivity and specificity were considered, it became clear that Fake Bad Scale scores should be interpreted with care when it is a possibility that an individual may have a somatoform disorder as individuals with this disorder were actually correctly classified less than 50 percent of the time.

Furthermore, it was found that the Fake Bad Scale is comparable to other MMPI-2 validity scales when differentiating among individuals who are malingering, individuals with a somatoform disorder, and individuals with a traumatic brain injury. The F Scale, the F-K Index, and the F(b) Scale were considered along with the Fake Bad Scale, and it was found that all of these scales successfully differentiated among the three groups of interest. However, when individual paired comparisons were made, only the Fake Bad Scale successfully differentiated between individuals with a somatoform disorder and individuals with a traumatic brain injury.

It was hypothesized that the Fake Bad Scale would successfully differentiate between individuals who were malingering and individuals with a traumatic brain injury as well as between individuals who had a somatoform disorder and those with a traumatic brain injury but that the Fake Bad Scale would be less successful at differentiating between individuals who were malingering and individuals diagnosed with a somatoform disorder. This hypothesis was based upon the afore mentioned research that indicates

that individuals frequently incorrectly assume that multiple somatic complaints are associated with a traumatic brain injury (Gouvier, Prestholdt, & Warner, 1988; Willer, Johnson, Rempel, & Linn, 1993) and the fact that the Fake Bad Sale is heavily weighted with somatic complaints because it is comprised of mainly items from the Hypochondriasis and Hysteria clinical scales of the MMPI-2 (Groth-Marnat, 1999).

Contrary to prediction, the data obtained in this research indicated that the Fake Bad Scale successfully differentiated among all three diagnostic groups both in terms of overall mean scores and pairwise comparisons among the groups.

However, in terms of sensitivity and specificity, the Fake Bad Scale for the most part correctly classified malingerers, correctly classified those with traumatic brain injuries 100 percent of the time but correctly classified those with a somatoform disorder less than 50 percent of the time. Obviously, when the Fake Bad Scale is utilized in clinical practice to diagnose malingering, clinicians should carefully consider that this scale has the potential to falsely classify somatoform disorders as malingerers approximately 50 percent of the time.

The present research is only somewhat consistent with prior research regarding the sensitivity and specificity of the Fake Bad Scale, and, in general, provided less support for the utility of the Fake Bad Scale in the detection of malingering versus traumatic brain injury. For example, Lees-Haley (1991) found that the Fake Bad Scale correctly classified individuals as malingering 96 percent of the time and correctly identified those with a traumatic brain injury 93 percent of the time. Prior research done by Miller and Donders (2001) and Martens et al. (2001) found lower rates of specificity for the Fake Bad Scale. Miller and Donders (2001) found that 50 percent of individuals

with mild traumatic brain injury who were also involved in litigation or had filed for complete permanent disability had elevated FBS scores, while Martens et al. found that 22 percent of these individuals had elevated scores on this scale. Taken together, the present research found greater specificity with regard to traumatic brain injury classifications and lower sensitivity with regard to the classification of malingering than prior research has indicated. Unfortunately, these studies did not consider individuals with somatoform disorders.

Ross et al. (2004) examined the Fake Bad Scale with regard to its ability to detect somatoform disorders and found that this particular scale may, in fact, be more successful at detecting invalid response sets than somatoform disorders. This is consistent with the current findings, which indicated that the Fake Bad Scale falsely classified individuals with somatoform disorders approximately 50 percent of the time.

The next hypothesis of the present research was based upon the fact that existing research had previously examined other MMPI-2 validity scales with regard to their utility in the detection of feigning symptoms, including the faking of head injury symptoms. This research indicated that several MMPI-2 validity scales, including the F Scale, the F-K Index, and the F(b) Scale were sensitive to overreporting of symptoms (e.g., Butcher, Arbisi, Atlis, & McNulty, 2003; Greiffenstein et al., 2004; Larrabee, 1998; Berry & Butcher, 1998). It was, therefore, thought appropriate to discern the relative efficacy of these validity scales vis a vis the Fake Bad Scale by assessing how well each scale differentiated between malingerers and other diagnostic groups.

Specifically, the second hypothesis of this study was that the Fake Bad Scale would be comparable to the MMPI-2 F Scale, MMPI-2 F-K Index, and MMPI-2 F(b)

Scale in terms of differentiating between individuals who are malingering and those with a traumatic brain injury as well as between those who have a somatoform disorder and those with a traumatic brain injury but would be less successful than the other MMPI-2 validity scales when differentiating between individuals who are malingering and those with a somatoform disorder.

The data obtained indicated that each of the MMPI-2 validity scales, including the Fake Bad Scale, successfully differentiated among the three groups of interest. When individual pairwise comparisons were considered, the data demonstrated that all of the MMPI-2 validity scales successfully differentiated between individuals who were malingering and those with a somatoform disorder as well as between those who were malingering and individuals with a traumatic brain injury. However, only the Fake Bad Scale also significantly differentiated between individuals who had a diagnosed somatoform disorder and individuals who had incurred a traumatic brain injury. This indicated that the Fake Bad Scale, as opposed to the F Scale, the F-K Index, and the F(b) Scale would be the scale of choice when differentiating between individuals previously diagnosed with a somatoform disorder and those who had incurred a traumatic brain injury.

However, as noted above when the sensitivity and specificity for each MMPI-2 validity scale was considered, the Fake Bad Scale demonstrated less utility in the differential diagnosis of malingering and somatoform disorders. These findings are inconsistent with prior research by Dearth et al. (2004), which found that most of the MMPI-2 validity scales had perfect specificity rates but low to moderate sensitivity while the Fake Bad Scale had both moderate sensitivity and specificity. It is important to note,

however, that Dearth et al. (2004) compared individuals with moderate to severe brain injuries to individuals who were either instructed to fake symptoms or to answer honestly in an analog setting. Thus, genuine malingerers were not included in this particular study.

Several other studies also compared various MMPI-2 validity scales to the Fake Bad Scale in terms of sensitivity and specificity. For example, Larrabee (1998) found the Fake Bad Scale to be superior to the F Scale in the detection of malingered head injuries. Several other studies also found the Fake Bad Scale to be sensitive in this area (e.g., Larrabee, 2003a; Tsushima and Tsushima, 2001; Ross et al., 2004). Each of these studies found the Fake Bad Scale to be superior to other MMPI-2 validity scales in the detection of somatic malingering. These findings are quite consistent with the current research in that the Fake Bad Scale was found to have the greatest specificity in the detection of malingering.

However, the present research also examined the specificity of the MMPI-2 validity scales with regard to somatoform disorder and traumatic brain injury classification. Prior research by Ross et al. (2004) found that the Fake Bad Scale may not be successful in the detection of somatoform disorders. The current research supported this finding based upon the Fake Bad Scale's specificity in the detection of somatoform disorders. With regard to the other MMPI-2 validity scales that were considered, there was, in general, variability in the sensitivity and specificity. For example, the F-K Index exhibited extremely low sensitivity but very high specificity for both somatoform disorders and traumatic brain injuries while the F(b) Scale was more consistent in terms of moderate sensitivity and specificity across the diagnostic groups.

Taken together, these data indicated that no one MMPI-2 validity scale perfectly predicted diagnostic group membership; rather, each appears to have strengths and weaknesses in this arena. In general, the F(b) Scale appeared to be the most consistent in its differential diagnosis across the three groups of interest. However, these findings indicate that, clinically, it is important not to base a diagnostic decision on any one measure. Additionally, these findings are inconsistent with prior research that suggested that the F Scale had the greatest sensitivity in detecting overreporting of symptoms, followed by the F-K Index and the F(b) Scale in that order (Ben-Porath, Graham, Hall, Hirschman, & Zaragoza, 1995).

As far as the present attempt to compare the Fake Bad Scale of the MMPI-2 to the Test of Memory Malingering (Tombaugh, 2002) and to the Portland Digit Recognition Test (Binder, 1993) there were insufficient numbers of participants who were actually administered these measures to allow meaningful comparisons. In future research it would be useful to pursue a comparison of the FBS and these scales. However, these measures were not specifically designed to detect somatic malingering as the Fake Bad Scale was. Rather, these measures were designed to measure aspects of cognitive and memory malingering. Thus, these measures may not compare to the other MMPI-2 validity scales in the same manner as the Fake Bad Scale.

Lastly, it was posited that there would not be gender differences in Fake Bad Scale scores among the three groups of interest. The data did, in fact, bear this hypothesis out. This was expected due to the fact that the cutoff scores for this measure are gender based (Lees-Haley, 1992; Larrabee, 1998).

Limitations of the Present Study

The present study produced mixed results in support of the Fake Bad Scale's utility in the detection of malingering in that it did produce significantly different mean scores for each of the three groups of interest as well as the highest rate of sensitivity and specificity for traumatic brain injuries, but it's specificity with regard to somatoform disorders was well below that of other MMPI-2 validity scales. Thus, there should be significant clinical caution in the use of the Fake Bad Scale in the differential diagnosis of malingering and somatoform disorders. In general, the F(b) Scale of the MMPI-2 may be more consistent in its utility in this setting as its sensitivity was similar to the Fake Bad Scale and it had higher specificity in terms of somatoform disorders.

It should be noted that the strength of the above conclusions is mitigated somewhat since there were multiple limitations to the present study. The primary limitation was that, due to the archival nature of the data, it was impossible to control for which measures were administered to the participants, which resulted in some measures having too small of a sample size to report meaningful statistics. Additionally, some records were missing minor pieces of information that were critical to their being included in the study. For example, not every record had the participant's MMPI-2 answer form, which is required for calculating the Fake Bad Scale score. Thus, these participants had to be excluded from the study reducing the overall sample size.

Another limitation was that the diagnoses were made by only one rater. Although the clinician who made the diagnoses utilized accepted diagnostic criteria (e.g., DSM-IV; Slick et al. criteria, 1999), it would still be more desirable to have multiple raters examine the same data in order to establish interrater reliability.

Lastly, many participants had been assigned multiple diagnoses. For example, it was possible for participants to be assigned a diagnosis of a somatoform disorder while also being diagnosed with malingering of a cognitive deficit. These participants could have fallen into Slick et al's (1999) categories of Probable or Possible Malingering. However, the present research only considered individuals with a pure diagnosis of malingering, somatoform disorder, or traumatic brain injury.

The limitations of this study certainly pave the way for future research to be conducted in this area. It would be of particular interest to establish interrater reliability for the participants' diagnoses. Additionally, one could conduct this study over a period of time sufficient to allow for administration of selected measures to ensure that each participant was administered each measure of interest as well as the same form of each measure. However, this would be quite time consuming, and perhaps even impractical, as it could take many years to diagnose a sufficient number of individuals in each of the three categories. Another area of future research would be to include individuals with Probable or Possible Malingering (Slick et al, 1999), or to include those with multiple overlapping diagnoses of interest, to determine how the validity scales, and the FBS in particular, differentiate among these diagnoses.

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APPENDIX A

REDACTED CASE SAMPLES

Gender: Male

Age: 22

Diagnosis: Somatoform Disorder

Tests Administered: Lateral Dominance Examination, Grip Strength Examination, Manual Finger Tapping Test, Grooved Pegboard Test, Trail Making Test Parts A & B, Reitan-Klove Sensory Perceptual Examination, Tactile Finger Recognition Test, Wechsler Memory Scale-Revised (Logical Memory Subtests I & II, Visual Reproduction Subtests I & II), Wechsler Adult Intelligence Scale-Revised (Abbreviated Battery), Wide Range Achievement Test-3, MMPI-2, MCMI-III, Bender Gestalt Visual-Motor Test, Clinical Interview

Background Information: An object the size of a small forklift fell onto subjects head in occipital area. Mental status alert and oriented. Possible fractures of cervical and thoracic spine. Laceration to scalp in occipital area (3 cm on left parietal region). Glasgow Coma Scale = 15. No loss of consciousness in accident. X-Rays showed a "gaping at approximately C6 on the left with a questionable facet fracture or locked facet on the right...Computerized tomography...[revealed] a facet fracture on the right, possible ligamentous injury on the left at the level of C6." All other x-rays normal. Neurological examination showed "motor and sensory present in all four extremities; however, he did complain of pain radiating down to the chest and down between his scapulae."

Patient Interview: Trouble reading, speech difficulties in elementary school. Some experimentation with drugs as a teen, but denies using drugs currently or having difficulties with alcohol. Asthma as a child. Paranoid thoughts and one-time psychotic symptom (hearing voice of uncle). Post-accident symptoms: neck pain, back pain, wearing a soft collar, numbness in right side of body, headaches, significant sleep disturbance, sharp or throbbing pain in neck and back, depressed, ruminations about unfairness of work situation, anxiety about going to work, suicidal thoughts.

Test Results: Tests from Halstead-Reitan Battery scored using Heaton, Grant, & Matthews Comprehensive Norms for an Expanded Halstead-Reitan Battery (1991).

SUBTEST	RAW SCORE	T-SCORE	IMPAIRMENT
Grip Strength			
Right	23.5 kg	13	Severe
Left	25.5 kg	23	Moderate to Severe
Finger-Tapping Test			
Right	51 taps	44	Below Avg./Normal
Left	49.5 taps	51	Average

Grooved Pegboard			
Right	65 sec.	47	Average
Left	67 sec.	46	Average
Trail Making Test			
Part A	33 sec.	39	Mild
Part B	74 sec.	44	Below Avg./Normal

WECHSLER ADULT INTELLIGENCE SCALE-REVISED

SUBTEST	AGE-COHORT SCALED SCORE	A-C %ILE
Information	8	25
Digit Span	8	25
Arithmetic	6	9
Similarities	9	37
Picture Completion	10	50
Block Design	8	25
Digit Symbol	6	9

Prorated Verbal IQ = 88 (low average)
Prorated Performance IQ = 86 (low average)
Prorated Full Scale IQ = 86 (low average)

WECHSLER MEMORY SCALE – REVISED

SUBTEST	PERCENTILE
Logical Memory I	34
Logical Memory II	53
Visual Reproduction I	86
Visual Reproduction II	93

MINNESOTA MULTIPHASIC PERSONALITY INVENTORY -2

Welsh Code New 8**2716*340'''+9-5/F***'''+L/:K#
Fake Bad Scale Score = 30 (Above Cut-Off Score for Malingering)
F = 23 (T = 107)
F-K = 14 (Raw)
F(b) = 12 (T = 92)

WIDE RANGE ACHIEVEMENT TEST -3

SUBTEST	STANDARD SCORE	%ILE	GRADE
Reading	84	14	7
Spelling	75	5	5
Arithmetic	82	12	6

MILLON CLINICAL MULTIAXIAL INVENTORY – III

SCALE	BASE RATE
Schizoid	79
Avoidant	78
Depressive	77
Negativistic	82
Masochistic	75
Anxiety Disorder	88
Somatoform Disorder	95
Dysthymic Disorder	82
Major Depression	75

DIAGNOSTIC IMPRESSIONS: (DSM-IV)

AXIS I:	(296.23)	MAJOR DEPRESSIVE DISORDER, SINGLE EPISODE, SEVERE WITHOUT PSYCHOTIC FEATURES
	(307.89)	PAIN DISORDER ASSOCIATED WITH BOTH PSYCHOLOGICAL FACTORS AND A GENERAL MEDICAL CONDITION
	(316.0)	PSYCHOLOGICAL FACTORS (PERSONALITY TRAITS AND COPING STYLE) AFFECTING MEDICAL CONDITION
	(315)	READING AND SPELLING DISORDERS (PRE-EXISTING)

AXIS II: AVOIDANT, PARANOID, AND PASSIVE/AGGRESSIVE FEATURES (PREEXISTING)

AXIS III: PER PHYSICIANS

AXIS IV: PSYCHOLOGICAL AND ENVIRONMENTAL STRESSORS: WORK-RELATED STRESS AND MARITAL STRESS

AXIS V: GLOBAL ASSESSMENT OF FUNCTIONING: MODERATE SYMPTOMS

Accident did not cause abnormal brain functioning according to medical records, no neuropsychological dysfunction, placed enough stress on already weak personality structure to cause a major depressive episode and a pain disorder, his experience of pain is greater than objective symptoms would suggest

Gender: Female

Age: 71

Diagnosis: Malingering

Tests Administered: Record Review, Clinical Interview of Patient and Collateral, Portland Digit Recognition Test, Seashore Rhythm Test, Speech Sounds Perception Test, Reitan-Klove Sensory Perceptual Examination, Tactile Finger Recognition Test, Finger-Tip Number Writing Perception Test, Tactile Form Recognition Test, Tactual Performance Test, Grip Strength Examination, Manual Finger Tapping Test, Grooved Pegboard Test, Bender Visual-Motor Gestalt: 5-Second Delay, Copy, and 30-Minute Delay Components, Trails A & B, Short Category Test Booklet Format, WMS-R, WAIS-R, WRAT-3, MCMI-II, MMPI-2, BAI, BDI

Background Information: Prior history of heart problems; has a pacemaker. Incident in question involved patient being "shocked" by a videogame machine. Patient reported being shocked in the right hand and feeling it go into her pacemaker. Had an episode of "violent shaking" and went unconscious. Later regained consciousness. Hospital reports indicated that patient had spilled liquid while playing the videogame machine. ER diagnosis = pacemaker malfunction, rule out myocardial infarct. No entrance or exit wound from electric shock present. Reports indicate that patient "fell about two feet off the ground [after shock] and later went into ventricular fibrillation." One doctor noted that she is "confused all the time with a lack of concentration and forgetfulness." Patient reported "it is as if there is pressure all over the head and into the ears, and this is constant all the time."

One doctor reported that it was difficult for patient to recall her home address, she did not know her date of birth, her telephone number, or zip code, she could only remember the most recent two presidents, could only remember the month due to a holiday, knew the year but could not recall the day or date. Patient could not recall important historical facts (i.e., Kennedy's assassination, Pearl Harbor) and could not subtract 7 from 100. Diagnosis = "Post-electrical shock with impairment of memory and confusion, etiology to be discussed." Suggested CT Scan to rule out subdural hematoma.

Patient Interview: Patient unable to or was purposely not answering very simple questions concerning personal information, so clinician's ability to gather a valid and reliable developmental, educational, and family history was affected. Patient could not state her correct age. Patient reported that she has had a profound memory loss since the accident. Patient very clearly remembered the day of the accident, including nearly every activity she engaged in on that day in a very specific manner. Patient also had slip-ups in her description of her problems, which she would try to cover in up in a very unsophisticated manner (e.g., "I

remember...well, I don't really remember but so many people have told me that I did [whatever activity she was discussing].").
An interview with a collateral source that is very close to the patient was also conducted. He stated that the patient's biggest problem since the accident is "loss of memory", which he described as "She cannot remember certain things of the past and other things she can remember." Stated that these problems began right after the accident. Also stated that the memory disturbance has been gradually getting worse since the accident. Other complaints: no longer spells as well, lost a lot of hair, bowel obstructions, further heart problems, cataracts, collapsing veins all over patient's body.

Test Results:

HALSTEAD-REITAN TEST BATTERY

TEST	RAW SCORE	T-SCORE	IMPAIRMENT RATING
TFR-R	18.27 sec.	43	Below Avg.
TFR-L	31.08 sec.	26	Moderate
TPT-R	8 min. 48 sec.	49	Average
TPT-L	18 min. 5 sec.	40	Below Avg.
TPT-B	6 min. 6 sec.	47	Average
TPT-Tot. Time	32 min. 59 sec.	43	Below Avg.
TPT-Mem.	4	39	Mild
TPT- Local.	1	48	Average
Grip – R	27.5 kg.	55	Above Avg.
Grip – L	16 kg.	40	Below Avg.
Tap – R	40.8 taps	48	Average
Tap – L	26 taps	30	Mild to Mod.
Peg – R	86 sec.	42	Below Avg.
Peg – L	180 sec.	24	Mod. to Severe
Trails A	26 sec.	63	Above Avg.
Trails B	374 sec.	24	Mod. to Severe
S. Rhythm	24 Correct	48	Average
SSPT	8 errors	44	Below Avg.
Category	102 errors	38	Mild
Halstead Impair	1.0	25	Moderate

WAIS-R

SUBTEST	AGE-CORRECTED SCALED	AGE-CORR.%ILE
Information	8	25
Digit Span	8	25
Vocabulary	10	50
Arithmetic	7	16
Comprehension	9	37
Similarities	12	75
Picture Completion	8	25
Picture Arrangement	9	37
Block Design	13	84
Object Assembly	9	37
Digit Symbol	11	63
Verbal IQ	93	32
Performance IQ	97	42
Full Scale IQ	93	32

WMS-R

INDEX	STANDARD SCORE	%ILE
Verbal Mem.	81	10
Visual Mem.	122	93
General Mem.	96	39
Attention/Concentration	87	19
Delayed Recall	103	58

PORTLAND DIGIT RECOGNITION TESTU

Easy Correct = 14 (Below cut-off of 19)
Hard Correct = 13 (Below cut-off of 18)
Total Correct = 27 (Below cut-off of 39)
Present performance falls below 1st percentile

WRAT-3

SUBTEST	RAW	STANDARD	%ILE	GRADE
Reading	42	96	39	HS
Spelling	36	94	34	7
Arithmetic	INVALID	INVALID	INVALID	INVALID

BECK ANXIETY INVENTORY: Raw Score = 8, within normal limits

BECK DEPRESSION INVENTORY: Raw Score = 16; Mild subjective depressive symptoms.

MMPI-2

- Fake Bad Scale = 25
- F = 55
- K = 65
- F-K = -10
- F(b) = 46
- Code Type = 3-0
    - Very rare code type; usually describe self as very conventional and law-abiding; few, vague physical ailments; fearful and frequently phobic; unlikely to be psychotic

DIAGNOSTIC IMPRESSIONS: (DSM-IV)

AXIS I:	V65.2	MALINGERING (OF CURRENT MEMORY DISTURBANCE)
	293.89	ANXIETY D/O DUE TO MULT. MED. COND.
	293.83	MOOD D/O W/DEP. FEAT. DUE TO MULT. MED. COND.
	316	PSYCHOLOGICAL SYMPT. AFFECTING MULT. MED. COND.
	293.0	DELIRIUM DUE TO ACUTE CARDIAC ABNORMALITY, RESOLVED

AXIS II: HISTRIONIC PERSONALITY FEATURES

AXIS III: SEVERAL PRE- AND POST-ACCIDENT PHYSICAL PROBLEMS

PSYCHOLOGICAL PROBLEMS PRE-ACCIDENT:

- MENTAL REACTION TO A RASH OUT OF PROPORTION TO SYMPTOMS
- VALIUM PRESCRIPTION ACCOMPANIED BY CHEST PAIN
- PATIENT EXTREMELY NERVOUS; GIVEN VALIUM

PSYCHOLOGICAL PROBLEMS POST-ACCIDENT:

- CONFUSION, EVEN ON VERY BASIC INFO., LACK OF CONCENTRATION
- "POSSIBILITY OF FUNCTIONAL OVERLAY"

- CHEST PAIN, UNUSUAL, DON'T MATCH CLASSIC PATTERN EXPECTATION
- ANXIOUS, TEARFUL, DEMANDING
- SEVERE ANXIETY?
- VIOLENT MOOD SWINGS
- HEADACHE, SHAKY, NERVOUS
- PROZAC FOR DEPRESSION
- "MULTIPLE PSYCHOSOMATIC SYMPTOMS, PERIODS OF DEPRESSION AND MOOD SWINGS

AXIS IV: PSYCHOSOCIAL AND ENVIRONMENTAL PROBLEMS: HEALTH

PROBLEMS IN FAMILY

AXIS V: GAF: 63