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GENDER DIFFERENCES IN PSYCHOSOCIAL ADJUSTMENT POST-MILD TRAUMATIC BRAIN INJURY

By

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ABSTRACT

GENDER DIFFERENCES IN PSYCHOSOCIAL ADJUSTMENT POST-MILD TRAUMATIC BRAIN INJURY

By

Abby Danielle Howard

This study examined the psychosocial adjustment of men and women to mild traumatic brain injury. Severity of injury was controlled for in this study by only examining individuals who had been diagnosed with a mild traumatic brain injury according to the following criteria: a mild traumatic brain injury is a head trauma, without loss of consciousness, or with loss of consciousness lasting 20 minutes or less, a Glasgow Coma Scale score of 13 to 15, and a period of hospitalization for less than 48 hours (Uzzell, 1999).

Gender differences were reported regarding the rate at which men and women reported complications with psychological well-being post-mild traumatic brain injury; $F(1) = 6.475$, $p < .013$. Women reported getting impatient with themselves, feeling hopeless about their future, feeling lonely, and feeling worn out significantly more frequently than men did.

The present study did not support a relationship between gender and the emotional symptoms of anger or depression.

To my husband Mark, whose unwavering support, encouragement, and love makes all things possible and all dreams attainable.

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CHAPTER 1

RESEARCH PROBLEM

Introduction

Traumatic brain injury is an epidemic that impacts the lives of millions of Americans every year. This chapter contains an introduction to the topic of traumatic brain injury. This chapter is organized into eight sections. These eight sections address: 1) what a traumatic brain injury is; 2) the epidemiology of traumatic brain injury; 3) Post Concussion Syndrome; 4) psychosocial sequelae associated with traumatic brain injury; 5) gender differences post-mild traumatic brain injury; 6) the statement of the problem; 7) the research question; and 8) the research hypotheses.

Definition of Traumatic Brain injury

Traumatic brain injury (TBI) is a term that encompasses a variety of broad-based sequelae and subsequent conditions caused by an external impact to the head resulting in neurological damage (Levin et al., 1987; Alfano, Neilson, & Fink, 1993; Fabiano & Daugherty, 1998; McLean, Dikmen, & Temkin, 1993). Traumatic brain injuries occur from either a blunt or penetrating trauma or from acceleration-deceleration forces (Fabiano & Daugherty, 1998). Traumatic brain injury, head trauma, brain injury, closed head injury, and head injury are used interchangeably throughout the research to describe this phenomenon. For consistency, this paper will identify the phenomenon by utilizing the term traumatic brain injury.

Traumatic brain injury research investigates and identifies these injuries according to their severity from mild, to moderate, to severe (Busch & Alpern, 1998).

Mild traumatic brain injuries are the most prevalent of these three classes of head injury (McCullagh, Ouchterlony, Protzner, Blair, & Feinstein, 2001; Evans, 1996; Evans, 1992; Annegers, Grabow, Kurland, & Laws, 1980; Kraus & Nourjah, 1989; Rimel, Giordani, Barth, Boll, & Jane, 1981). According to Uzzell (1999) the predominant definition of mild traumatic brain injury is trauma to the brain, without loss of consciousness, or with loss of consciousness lasting 20 minutes or less, a Glasgow Coma Scale (GCS) score of 13 to 15, and a period of hospitalization for less than 48 hours. The GCS is a scale that ranges from 3 to 15 and assesses verbal, motor, and ocular responses to simple stimuli (Teasdale & Jennett, 1974; Ruff & Jurica, 1999).

Epidemiology

An estimated 1.5 million people experience a traumatic brain injury each year in the United States (Centers for Disease Control and Prevention [CDC], 1999). Varney & Shepherd (1991) calculated that a traumatic brain injury occurs every 16 seconds. The occurrence of traumatic brain injury is more than eight times the number of new cases of breast cancer in the United States within a given year (American Cancer Society, 2001). Traumatic brain injuries result in 230,000 hospitalizations, the onset of long-term disability for between 80,000-90,000 people, and 50,000 deaths (CDC, 1999). Not only is the prevalence staggering, but the enduring nature of its impact makes traumatic brain injury devastating on an individual level. An estimated 5.3 million Americans live with a disability resulting from a traumatic brain injury (Thurman, Alverson, Dunn, Guerrero, & Sniezek, 1999; CDC, 1999).

Traumatic brain injury is the leading cause of acquired neurological disability in persons under the age of 50 (Adams & Victor, 1989), and it is a leading cause of death

and disability among children and young adults in the United States (CDC, 1999). Guerrero, Thurman, and Sniezek (2000) analyzed data from the National Hospital Ambulatory Medical Care Surveys of 1995-1996, which indicated that hospital emergency departments have an average annual incidence of approximately one million non-fatal traumatic brain injuries that are treated and released. Of these non-fatal traumatic brain injuries, 40% of the patients are between the ages of 0 and 14, and almost two-thirds (60%) are male. The breakdown of causes of injury are as follows: 31% are due to falls, 22% motor-vehicle accidents, 20% being unintentionally struck, 15% being intentionally struck, and 11% are due to other or unknown causes (Guerrero et al., 2000).

Costs include short-term hospitalization and rehabilitation to long-term disability. When considering these costs it is crucial to consider that they apply to dependents of the brain-injured patient, and society as well. After all, if someone is unable to support him/herself, then he/she is also unable to provide for dependent family members' needs. This increases the potential costs to society. For example, individuals who are unable to pay for health care or return to work after a traumatic brain injury may need increased access to social programs, paid for by taxpayers, to survive and support themselves and their dependents.

After suffering a traumatic brain injury an individual is three times more likely to suffer a second one, and individuals who have incurred multiple traumatic brain injuries have an incidence rate of a subsequent traumatic brain injury that is eight times that of the general population (Rimel & Jane, 1983).

Mild traumatic brain injuries are the most prevalent class of traumatic brain injury (McCullagh, Ouchterlony, Protzner, Blair, & Feinstein, 2001; Evans, 1996; Evans, 1992;

Kraus & Nourjah, 1989; Rimel et al., 1981; Annegers et al., 1980). Individuals with mild traumatic brain injuries have fewer motor, language, and cognitive impairments than individuals with moderate or severe brain injuries, and have better predicted outcomes as well. Due to the prevalence of mild traumatic brain injury, the high economic costs to survivors, their families, and society, and the emotional costs to survivors and their families, mild traumatic brain injury is an epidemic in need of critical evaluation. To better understand the sequelae associated with mild traumatic brain injury the nature of Post Concussion Syndrome (PCS) will be discussed next.

Post Concussion Syndrome

Post Concussion Syndrome is the condition that occurs most frequently after mild traumatic brain injury (McAllister, 1992; Mittenberg, Zielinski, & Fichera, 1993). The most commonly reported symptoms of Post Concussion Syndrome fall into three major categories: 1) cognitive difficulties, 2) physical complications, and 3) psychological impediments. Cognitive difficulties include problems related to attention, concentration, memory, problem solving, information processing, and thinking deficits. Physical complications are symptoms including dizziness, fatigue, chronic headaches, sleep disturbances, hypersensitivity to light and noise, and decreased libido. Psychological impediments include complications such as depression, anxiety, irritability, frustration and anger, decreased confidence, and personality changes (McAllister, 1992; Mittenberg et al., 1993). Personality changes are also common post-mild traumatic brain injury (Prigatano, 1992; Goldstein & Levin, 1989). Goldstein and Levin (1989) contend that changes in mood, cognitive processes, behavior, and somatic complaints all comprise personality changes. Although these categories are the predominant areas investigated in

the current literature (Busch & Alpern, 1998), the literature needs to expand its investigation further to examine how these types of complications affect psychosocial functioning, since deficits in psychosocial functioning are the primary barrier to recovery and reintegration in to society (McLean et al., 1993).

Psychosocial Sequelae

There is increased recognition that even a mild head injury can seriously interfere with an individual's cognitive, physical, behavioral, emotional, interpersonal, and psychosocial functioning (McCullagh et al., 2001; Mathias & Coats, 1999; McLean et al., 1993; Mittenberg et al., 1993; McAllister, 1992). Physical and psychosocial complaints are both reported soon after injury, however, psychosocial complaints predominate both initially and one year post-injury (McLean et al., 1993). Thus, barriers to psychosocial functioning (e.g., reductions in socioeconomic status [SES] and employment status; significantly higher incidences of depression, fatigue, irritability, and anxiety; greater chronic tension, social alienation, moodiness, and interpersonal communication problems), are considered the most disabling symptoms post-traumatic brain injury because they interfere with an individual's ability to re-enter society as a productive member (Alfano et al., 1993; McLean et al., 1993). Psychosocial sequelae permeate a broad range of environments encompassing vocational, domestic, and social arenas (McLean et al., 1993). Significant dysfunction is reported by individuals with mild traumatic brain injury in their abilities to manage emotions, behavior, home life, social interactions, interpersonal relationships, and leisure activities (McLean et al., 1993).

In addition to obstacles in psychosocial functioning the sequelae associated with traumatic brain injury include long-term reductions in socioeconomic status (Alfano et

al., 1993). Individuals with mild traumatic brain injury show significantly higher incidence of post injury depression than control groups and the overall population (Mathias & Coats, 1999; Alfano et al., 1993; McLean, Dikmen, & Temkin, 1993; Stambrook, Moore, Peters, Zubek, McBeath, & Friesen, 1991). These findings "support the idea that different traumatic disorders, [such as mild traumatic brain injury and spinal cord injury] present unique psychological problems that correlate significantly and differentially with long-term psychosocial adjustment" (Alfano et al., 1993, 123). Furthermore, according to Alfano et al. (1993) depressive symptomology should be one of the focal points of intervention and rehabilitation in cases of traumatic brain injury.

While it is relatively simple to identify and assess some factors associated with mild traumatic brain injury, some issues associated with psychosocial functioning and adjustment are more subtle and difficult to ascertain (Szymanski & Linn, 1992; Alfano et al., 1993; Brooks, Lindstrom, McCray, & Whiteneck, 1995; Segalowitz & Lawson, 1995; Fabiano & Daugherty, 1998). Although deficits in psychosocial functioning after mild traumatic brain injury are apparent, few studies have looked at the interaction of psychological disorders with psychosocial functioning after a mild traumatic brain injury (Busch & Alpern, 1998). This is problematic because "it is generally accepted that [mild traumatic brain injury] accounts for 70% of all [traumatic brain injuries]" (Busch & Alpern, 1998, 95).

Gender Differences

Busch and Alpern (1998) reviewed the current research that examined depression post mild traumatic brain injury and noted "few of the studies reviewed reported gender effects of mild traumatic brain injury and depression" (106). This is problematic because

gender effects are significant in both depression and traumatic brain injury, with women being twice as likely to experience depression as men (Nolen-Hoeksema, 1990), and men outnumbering women two to one with regards to incidence of traumatic brain injury (Willer, Allen, Liss, & Zicht, 1991). Additionally, Willer et al. (1991), reporting on the problems and coping strategies of traumatically brain-injured individuals and their spouses, indicated that although gender is rarely investigated as a factor in identifying the psychosocial sequelae related to traumatic brain injury, and coping strategies for dealing with these sequelae, this is an area in need of further investigation. Willer et al. (1991) noted that gender differences do exist in the reactions of individuals with traumatic brain injuries and also their spouses. These findings highlight the importance of further exploration in to the relationship between gender and traumatic brain injury.

Statement of the Problem

The myriad of issues associated with traumatic brain injury is evident through the examination of this condition. An estimated 1.5 million people experience a traumatic brain injury each year in the United States (Centers for Disease Control and Prevention [CDC], 1999). Furthermore, the prevalence of disability resulting from traumatic brain injury is much higher than the annual incidence of traumatic brain injury. It has been estimated that 5.3 million people, or approximately 2% of the national population of the United States, have some disability due to a traumatic brain injury (Thurman, Alverson, Dunn, Guerrero, & Sniezek, 1999; CDC, 1999). A closer look at this epidemic revealed that it affects a disproportionate number of men, occurring at rates of two to one over women, and that it affects men and women differently (Willer et al., 1991). The majority of head injuries, between 70% and 90%, are classified as mild traumatic brain injuries

(Annegers, Grabow, Kurland, & Laws, 1980; Kraus & Nourjah, 1989; Rimel, Giordani, Barth et al., 1983) and mild traumatic brain injuries alone are occurring at epidemic rates. Although men and women both indicated that they were experiencing interpersonal problems and personality changes post-traumatic brain injury, men reported a higher incidence of anger, aggressiveness (Schopp, Shigaki, Johnstone, & Kirkpatrick, 2001; Hanks, Temkin, Machamer, & Dikmen, 1999; Willer et al., 1991), and general psychological distress (Marschark et al., 2000). However, women reported a higher incidence of depression (Schopp et al., 2001; Willer et al., 1991). Even though research indicates that differences exist between men and women's symptomology post-mild traumatic brain injury, a recent review of the literature by Busch and Alpern (1998) found that "few of the studies reviewed reported gender effects of mild traumatic brain injury and depression" (106). Although preliminary evidence indicates significant gender differences in response to traumatic brain injury, coping strategies, and psychosocial adjustment post-traumatic brain injury further investigation in warranted, both ethically and pragmatically in order to increase awareness and ensure effective diagnosis, treatment, and rehabilitation of patients.

The purpose of this study is to examine the role of gender in anger and depression post-mild traumatic brain injury and its impact on psychosocial adjustment, in order to better inform clinical intervention. Characteristics associated with mild traumatic brain injury will be analyzed to identify gender differences and their influence upon subsequent psychosocial adjustment. This study is unique in its contribution to the literature. Previous studies that have examined gender differences post-traumatic brain injury have not controlled for severity of injury. This study will control for severity of injury by only

examining individuals who have been diagnosed with a mild traumatic brain injury. Furthermore, this study is unique in its attempt to specifically tap in to the differences in psychosocial adjustment between men and women who have sustained a mild traumatic brain injury. In addition, the instrument used in this study to examine psychosocial adjustment to traumatic brain injury has not previously been used in a published study that focused on individuals with mild traumatic brain injury.

This study will contribute to the field of counseling psychology by remaining true to the five unifying themes of the field. The five unifying themes of counseling psychology are: 1) focus on career and educational development; 2) focus on normal people as opposed to severely disturbed; 3) focus on strengths and positive mental health; 4) emphasis on relatively brief interventions; and 5) emphasis on person-environment interactions (Gelso & Fretz, 1992). This study attempts to emphasize these themes by addressing issues of psychological and psychosocial adjustment, which impact career and educational development and performance. Also, in accordance with these unifying themes, this study focuses on individuals with mild traumatic brain injury, as opposed to moderate or severely impaired individuals. Finally, this study examines the relationship between individuals and their environment by analyzing psychosocial adjustment to mild traumatic brain injury.

Research Questions

To what degree do men and women differ in their responses of anger and depression to mild traumatic brain injury?

To what degree do men and women differ in their psychosocial adjustment post-mild traumatic brain injury?

Hypotheses

Within this investigation, the following hypotheses were tested:

Hypothesis 1:

Men will report a higher incidence of anger than women post-mild traumatic brain injury.

Hypothesis 2:

Women will report a higher incidence of depression than men post-mild traumatic brain injury.

Hypothesis 3:

Women will report better psychosocial adjustment than men post-mild traumatic brain injury.

a) Women will report fewer complications with personal care than men post-mild traumatic brain injury.

b) Women will report fewer complications with mobility than men post-mild traumatic brain injury.

c) Women will report fewer complications with self-organization than men post-mild traumatic brain injury.

d) Women will report fewer complications with socializing than men post-mild traumatic brain injury.

e) Women will report fewer complications with productive employment than men post-mild traumatic brain injury.

f) Women will report fewer complications with psychological well being than men post-mild traumatic brain injury.

Summary

This investigation aims to further our understanding of gender differences in psychosocial adjustment following mild traumatic brain injury and spark further interest and investigation regarding this topic. A broader body of knowledge in this area will benefit the development of more accurate and beneficial programs for the assessment, diagnosis, and treatment of patients recovering from mild traumatic brain injury.

CHAPTER TWO

LITERATURE REVIEW

Introduction

Mild traumatic brain injuries are the most prevalent form of head injury (Annegers et al., 1980; Kraus & Nourjah, 1989; Rimel et al., 1981). Approximately one million people with non-fatal traumatic brain injuries are treated and released by hospital emergency departments annually (Guerrero et al., 2000). In the United States, an estimated 1.5 million head injuries occur each year resulting in 230,000 hospitalizations, the onset of long-term disability for between 80,000-90,000 people, and 50,000 deaths (CDC, 1999).

This chapter contains a review of the literature and research related to the pathophysiology, sequelae, treatment, and gender differences of traumatic brain injury. The review of related literature is organized under nine major headings. These are: (1) pathophysiology; (2) mild traumatic brain injury; (3) treatment of mild traumatic brain injury; (4) post concussion syndrome; (5) cognitive sequelae; (6) somatic sequelae; (7) psychological sequelae; (8) psychosocial sequelae; and (9) gender differences. Research findings in these areas provide the basis for the research questions and hypotheses for this study.

Pathophysiology

Traumatic brain injuries result from an external impact to the head. The external mechanical catalyst to a traumatic brain injury can be a blunt trauma, penetrating trauma, or acceleration-deceleration forces (Fabiano and Daugherty, 1998). Traumatic brain injuries are classified as either open or closed head injuries. An external force to the head,

which results in the external object piercing the skull, characterizes open head injuries. Penetration of the brain by an external object, or by bone fragments, contributes to brain tissue damage (Levin, Benton, & Grossman, 1982). Focal lesions are common in open head injuries and are accompanied by functional impairment tied to the location and severity of the damage. Diffuse axonal damage may also occur, which is closely associated with attention and executive functioning deficits (Alexander, 1995).

Closed head injuries are characterized by a blunt trauma to the head in which an external object does not penetrate the skull, or by acceleration-deceleration forces. Acceleration-deceleration forces refers to an abrupt, rapid acceleration of the head, when a faster object-in-motion comes into contact with it, or the rapid deceleration of the head as it comes into contact with a stationary or slower moving object (Levin, Benton, & Grossman, 1982; Fabiano & Daugherty, 1998).

In the case of closed head injuries, the brain is thought to shift rapidly as a result of rapid acceleration-deceleration forces, often causing the brain to come in contact with the skull. The "cerebrum moves forward suddenly and the brunt of the pathology occurs in the anterior portions of the frontal and temporal lobes" (Duckett & Duckett, 1993, 6). The skull is hard and inflexible, with an irregular internal contour marked by a sharp bony surface, which is in distinct contrast to the brain, a soft and flexible mass (Reitan & Wolfson, 1985). Acceleration-deceleration forces cause the "undersurface of the frontal lobe, [to] glide along the bony surface of the anterior fossa, and the roof of the orbit, the crista galli, and capillaries in the crown of the cortex are shorn and result in a petechial hemorrhage" (Duckett & Duckett, 1993, 6-7).

Diffuse axonal damage is a common outcome in closed head injuries. Diffuse axonal damage occurs from sudden deceleration, which causes shearing forces in the brain due to the rapid, yet differential, movement of nerve fibers (Alexander, 1995). These shearing forces disrupt the functioning of structures along the axis of the brain such as axons, small veins, and capillaries (Alexander, 1995; Duckett & Duckett, 1993). As a result, broadly distributed swollen axons in cerebral white matter lead to the diffuse abnormalities seen after a closed head injury (Rosenthal, 1993; Alexander, 1995). An injury of this kind can lead to localized transport failures in the axon, axonal disconnection, axonal degeneration, vascular complications such as petechial hemorrhages, local edema, or focal edema, and the spreading of parasagittal white matter from the cortex to the brainstem (Rosenthal, 1993; Alexander, 1995).

Loss of consciousness is probably the best indirect indicator of the severity of diffuse axonal injury (Alexander, 1995). Loss of consciousness, depth of coma, duration of coma, and duration of post-traumatic amnesia are important variables in understanding the degree of permanent damage following a traumatic brain injury (Alexander, 1995; Uzzell, 1999; Parker, 1990). Axonal injury often results in permanent impairment and includes difficulties in somatic, cognitive, emotional, and behavioral domains. Severity of traumatic brain injury ranges from mild to severe, and corresponds with the severity of impairment post-injury. Although severe traumatic brain injury imparts greater disability to the individual, mild traumatic brain injury is worthy of further study because of its significant negative sequelae and prevalence.

Mild Traumatic Brain Injury

For the purposes of this study a mild traumatic brain injury is defined as a head trauma, without loss of consciousness, or with loss of consciousness lasting 20 minutes or less, a Glasgow Coma Scale score of 13 to 15, and a period of hospitalization for less than 48 hours (Uzzell, 1999).

Common symptoms of mild traumatic brain injury are somatic (e.g., headache, dizziness, nausea, blurred vision, sleep disturbance, fatigue), cognitive (e.g., attention, concentration, memory, executive functioning, mental slowness), and psychiatric (e.g., depression, irritability, anger, anxiety, disinhibition, emotional lability) (Gualtieri, 1999; Mateer & D'Arcy, 2000). Although there are various approaches to the management of these symptoms several studies conclude that treatments that include: an explanation of the disorder; information regarding potential difficulties; recommendations for the management of symptoms; encouragement; and an emphasis on the expectancy of a full recovery, are associated with significant reductions in the number and frequency of postconcussional sequelae (Lawler & Terregino, 1996; Mateer, 1992; Mittenberg, Digiulio, Perrin, & Babs, 1992; Minderhoud, Boelens, Huizenga, & Saan, 1980). In the first 6 months post-mild traumatic brain injury it is common for individuals to undergo physiotherapy for pain management and other physical injuries (Mateer & D'Arcy, 2000). Medication-assisted treatment is also commonly used for pain management, sleep difficulties, and depression (Mateer & D'Arcy, 2000; Gualtieri, 1999). In fact, in the early stages of recovery pharmacological intervention is a common treatment for most mild traumatic brain injury symptoms (Mateer & D'Arcy, 2000; Gualtieri, 1999). However, for individuals who struggle with resuming their daily routine due to cognitive, emotional

or behavioral complications further evaluation and interventions are warranted. Additional interventions typically include cognitive rehabilitation, psychological intervention, and vocational intervention.

Treatment of Mild Traumatic Brain Injury

Although pharmacological intervention is commonly used to address the varying symptoms of mild traumatic brain injury it is not indicated for some transient symptoms such as photosensitivity or sonosensitivity, which are amenable to temporary environmental modifications. Also, there are differing opinions as to whether pharmacological interventions are indicated for psychiatric symptoms within the first six months because these symptoms generally improve or cease within that time (Mateer & D'Arcy, 2000; Gualtieri, 1999). Although pharmacological interventions are commonly used for the treatment of mild traumatic brain injury, nonpharmacological approaches to treatment are also utilized.

Nonpharmacological treatments of traumatic brain injury include dietary modifications, cessation of substance abuse, proper hygiene, exercise, cognitive rehabilitation and psychological intervention (Mateer & D'Arcy, 2000; Sohlberg, 2000; Gualtieri, 1999; Neppe, 1999; Harrington, Malec, Cicerone, & Katz, 1993; Kay, 1993). A diet consisting of three regular meals a day that are high in vegetables, fruit, water and vitamins E, D, B6, and C and low in highly refined sugars is essential for physical and emotional wellness (Neppe, 1999). Reductions in the habitual consumption of caffeine and alcohol can diminish the presence of symptoms and decrease the risk of interactions with medications (Neppe, 1999). Avoiding drugs such as nicotine improves physical health and reduces chances of physical and emotional complications that may exacerbate

symptoms (Neppe, 1999). Proper hygiene includes allergy treatment, maintenance of self (e.g. shower regularly) and critical apparati (e.g. take care of and rotate your mattress), and adequate sleep. Treating allergies, not just pharmacologically, but by eliminating additional triggers by keeping air and furnace filters clean, vacuuming regularly and maintaining a clean house to minimize molds and excessive pet hair and dander is another important feature in traumatic brain injury treatment (Neppe, 1999). These common sense measures can diminish traumatic brain injury symptoms. Regular exercise is also important for treatment of traumatic brain injury. It facilitates physical and emotional well-being by reducing stress and decreasing psychiatric complications such as depression (Neppe, 1999). Finally, cognitive rehabilitation and psychotherapy, directed at support for current problems, are effective ways to improve levels of functioning and coping (Mateer & D'Arcy, 2000; Neppe, 1999).

Cognitive rehabilitation strategies are aimed at remediating attention, concentration, memory, organizational, and executive functioning complications (Mateer & D'Arcy, 2000). There are four broad approaches to the treatment of cognitive disorders (Mateer & D'Arcy, 2000; Harrington, et al., 1993). The first approach focuses on changing the environment to increase the level of support for an individual and to create more reasonable expectations of the individual. This generally involves the participation of family members and co-workers (if appropriate). Communicating openly with others about an individual's limitations and establishing an understanding of acceptable expectations can decrease conflicts. The second approach focuses on developing compensatory strategies to address impaired abilities, for example utilizing lists, Post-its, and a planner to compensate for difficulties with memory and the

organization of information. The third approach involves direct treatment of impaired abilities to bring them closer to premorbid levels of functioning, for example utilizing memory and concentration games to re-build skills. Finally, the fourth approach focuses on modifying individuals' beliefs about and emotional responses to their cognitive difficulties. This is usually achieved through the use of cognitively based psychotherapy, for example, Beck's cognitive therapy of depression, which focuses directly on the cognitive distortions an individual may have. Throughout cognitive rehabilitation it is common for more than one of these approaches to be employed simultaneously (Mateer & D'Arcy, 2000).

The primary psychological factors stemming from mild traumatic brain injury, which are the internal responses that affect a person's ability to function after the injury, include; personality style, affective status, sense of self, social support, environmental support, and response to litigation (Kay, 1993). Approaches used to address these issues include cognitive therapy, behavioral therapy, cognitive-behavioral therapy, multimodal approaches, individual therapy, and group therapy (Sohlberg, 2000). Psychotherapy post-mild traumatic brain injury focuses on improving alterations in mood, affective response to the injury, and behavioral issues (Mateer & D'Arcy, 2000; Neppe, 1999).

Post Concussion Syndrome

Recent studies have identified a cluster of somatic, cognitive, and psychological symptoms that occur concurrently following mild traumatic brain injury (Cicerone & Kalmar, 1995; Gerber & Schraa, 1995; Klonoff & Lamb, 1998; Laforce, Jr. & Martin-MacLeod, 2001). Post Concussion Syndrome (PCS) is the concept used to characterize this cluster of symptoms, or sequela that occur most frequently after mild traumatic brain

injury (McAllister, 1992; Mittenberg et al., 1993; Cicerone & Kalmar, 1995; Gerber & Schraa, 1995). These sequelae are discussed in more detail in the next several sections of this chapter.

Studies yield inconsistent results regarding the duration of Post Concussion Syndrome symptoms. Symptoms have been reported to last anywhere from weeks (Cartlidge, 1977; Middelboe, Andersen, & Birket-Smith, & Friis, 1992), to months (Dikmen, McLean, & Temkin, 1986; Binder, Rohling, & Larrabee, 1997; Macciocchi, Barth, Alves, Rimel, & Jane, 1996; Ponsford et al., 2000) to years (Mazaux, Masson, & Levin, 1997; Masson, Maurette, & Salmi, 1996; Bohnen, Jolles, Twijnstra, Mellink, & Wijnen, 1995). Studies examining the risk factors for Post Concussion Syndrome also yield inconsistent results. A wide range of risk factors are identified in the literature, however advanced age (Fenton, McClelland, Montgomery, MacFlynn, & Rutherford, 1993; Dikmen, Temkin, & Armsden, 1989), pre-injury psychiatric disorders or psychological adjustment problems (Cicerone & Kalmar, 1997; Karzmark, Hall, & Englander, 1995; Fenton et al., 1993; Robertson, Rath, & Fournet, 1994; Pelco, Sawyer, Duffield, Prior, & Kinsella, 1992), female gender (Bazarian, Wong, Harris, Leahey, Mookerjee, & Dombovy, 1999; McClelland, Fenton, & Rutherford, 1994; Fenton et al., 1993), and psychosocial stress (Moss, Crawford, & Wade, 1994; Fenton et al., 1993; Radanov, di Stefano, Schnidrig, & Ballinari, 1991) are more consistently reported.

It is important to understand the cognitive, somatic, and psychological sequelae associated with mild traumatic brain injury because they are the impetus for psychosocial complications post-injury. Thus, they assist in facilitating our understanding of the psychosocial sequelae, which are the most pervasive and disabling consequences

associated with this disorder (McLean et al., 1993). Therefore, the next three sections of this chapter will address these sequelae in detail.

Cognitive Sequelae

Cognitive difficulties post-mild traumatic brain injury include problems related to attention, concentration, memory, mental slowness, and executive functioning (e.g., reasoning, planning, concept formation, problem solving, mental flexibility, organization of information, prioritizing, and executing plans) (Stuss et al., 1989; Gualtieri, 1999; Gerber & Schraa, 1995; Laforce, Jr. & Martin-MacLeod, 2001; Dikmen, McLean & Temkin, 1986; Ruff, Levin, Mattis, et al., 1989; Rosenthal, 1993; Szymanski & Linn, 1992; Cicerone & Kalmar, 1995). Stuss et al. (1989) concluded that individuals with a traumatic brain injury demonstrate impairments in divided attention, focused attention, information processing capacity, and consistency in performance over time. Alfano et al. (1993) found that memory dysfunction, in patients with a traumatic brain injury, was "the most significant correlate of the overall level of psychosocial adjustment for the patients"(123). Ruff et al. (1989), and Barth et al. (1983), reported that memory deficits were prevalent following mild traumatic brain injury. Also, Laforce, Jr. & Martin-MacLeod (2001), found that college students reported attention, thinking, and memory as the areas of greatest deficit within the domain of cognitive functioning post-mild traumatic brain injury.

Somatic Sequelae

Physical complications post-mild traumatic brain injury include; dizziness, fatigue, chronic headaches, sleep disturbances, and hypersensitivity to light and noise

(Szymanski & Linn, 1992; Rosenthal, 1993; Gerber & Schraa, 1995; Cicerone & Kalmar, 1995).

Disturbances to the senses vary in frequency and degree of impairment. Up to 40% of all cases of traumatic brain injury involve olfactory dysfunction (Contanzo & Zasler, 1991), which is caused by damage to the nasal passages, shearing of the olfactory nerve, or cortical contusions (Flanagan, 1999). Gustatory impairment or loss can also occur. Flanagan (1999) indicated that "true gustatory loss is rare, and when present, is most often due to olfactory injury" (156). One of the most common physical symptoms reported post-mild traumatic brain injury is visual impairment. "Visual impairments manifest as oculomotor and accommodative dysfunction as well as visual field loss. Individuals sustaining mild traumatic brain injury experience difficulty with refraction, near point convergence and stereo acuity" (Flanagan, 1999, 156).

The most common acute and chronic somatic symptom following mild traumatic brain injury is headache (Alves, Macciocchi, & Barth, 1993). Headaches are most frequently the result of musculoskeletal injuries, followed by entrapped or injured peripheral nerves, and vascular dilation, and less frequently they are attributable to autonomic dyscontrol (Simons & Wolff, 1946). Injuries to muscles in the neck, shoulders, and head are the impetus for the vast majority of post-traumatic headaches (Simons & Wolff, 1946). The second most common impetus is entrapped or injured peripheral nerves. "Pain arises from damage to a peripheral nerve either by entrapment in a scar formed at the site of impact or laceration, or in a nerve injured by excessive stretch during whiplash" (Flanagan, 1999, 157). The third most common impetus is vascular dilation, which is a catalyst for migraine headaches (Haas & Lourie, 1988).

These migraine headaches have diverse symptoms such as nausea, aura, tunnel vision, sensitivity to light and sound, throbbing and dull neck and head pain, and vomiting. Packard & Ham (1997) stated that evidence exists suggesting that alterations in electrolytes, release of excitatory amino acids, impaired glucose metabolism, and abnormalities in opioid and catecholaminergic function may also contribute to the occurrence of migraines post-mild traumatic brain injury.

The third most common somatic complaint following mild traumatic brain injury is dizziness (Alves, Macciocchi, & Barth, 1993). The spectrum of symptoms related to dizziness ranges from nondisabling lightheadedness to incapacitating vertigo (Flanagan, 1999). "Following TBI, dizziness is most often due to injury to the ear, although attention must be directed toward other causes, including peripheral neuropathies, complications from whiplash, musculoskeletal injuries, and vascular disorders" (Flanagan, 1999, 157).

Psychological/Emotional Sequelae

Psychological changes or alterations in emotion, mood, and behavior are prevalent post-traumatic brain injury. The term "personality changes" is used to describe alterations in emotions and motivations (Prigatano, 1992), and includes changes in the personalistic way that an individual interprets and expresses emotions and feelings (Goldstein & Levin, 1989). Furthermore, changes in cognitive processes and somatic complaints also comprise personality changes (Goldstein & Levin, 1989). Up to two-thirds of individuals recovering from a traumatic brain injury, irrespective of severity of injury, report significant changes in personality, which interfere with interpersonal relationships (Hawkins, 2000; Prigatano, 1992). These individuals also report vocational

and leisure activity complications as a result of these significant changes in personality (Hayden, 1997; Wrightson & Gronwall, 1981).

Psychological impediments associated with mild traumatic brain injury include 1) depression, 2) anxiety, 3) agitation, and 4) anger (McAllister, 1992; Szymanski & Linn, 1992; Mittenberg et al., 1993; Rosenthal, 1993; Gerber & Schraa, 1995; Cicerone & Kalmar, 1995). These behavioral and psychological symptoms are frequently reported as the most enduring and debilitating factors that individuals experience after a mild traumatic brain injury (Andrasik & Wincze, 1994; Lezak, 1995). This section of the literature review will address the prevalence of 1) depression, 2) anxiety, 3) agitation, and 4) anger post-traumatic brain injury.

Depressive symptoms are frequently reported following a traumatic brain injury. Brooks et al. (1987) noted that within the first seven years following a traumatic brain injury 63% of patients were classified as depressed. Alfano and colleagues (1993) compared patients with a moderate or severe traumatic brain injury to patients with a spinal cord injury (SCI) and found that patients with traumatic brain injury, irrespective of severity of injury, "reported significantly greater depressive symptomotology, and a pattern of psychological adjustment characterized by greater chronic tension, social alienation, and moodiness" (117). Similarly, O'Carroll et al. (1991) compared patients with brain injuries of different degrees of severity and found no significant differences in reported levels of anxiety and depression. Their research suggests that depression and anxiety are prevalent at the same rates post-mild traumatic brain injury as they are post-moderate or severe traumatic brain injury. There are also no significant differences in the prevalence of complaints of depressed mood, poor concentration, and poor memory,

based on severity of injury. However, individuals who sustain a mild traumatic brain injury are significantly more likely to receive a diagnosis of major depressive episode or Dysthymic Disorder than individuals who sustain a severe traumatic brain injury (Alexander, 1995). Gfeller, Chibnall, & Duckro (1994) evaluated depression among mild traumatic brain injured patients and found that 36% of these individuals were classified as depressed.

Ettlin et al. (1992) and Parker & Rosenblum (1996) examined mild traumatic brain injuries resulting from whiplash injuries. Ettlin et al. (1992) found that 42% of the subjects reported symptoms of depression. Parker & Rosenblum found that 36% of the subjects met the criteria for Major Depressive Disorder. Marschark, Richtsmeier, Richardson, Crovitz, & Henry (2000) found that college students with a history of mild traumatic brain injury in childhood or adolescence reported more severe distress in areas of general personal and emotional functioning than either of the two comparison groups. The first comparison group consisted of college students with no reported history of traumatic brain injury, but who had undergone general anesthesia at least once, and the second comparison group consisted of college students with no reported history of traumatic brain injury or instance of general anesthesia. Marschark et al. (2000) indicated that the distress reported by the mild-traumatic brain injured group was significantly higher than the distress reported by either of the two comparison groups on dimensions of depression, anxiety, hostility, interpersonal sensitivity, somatization, paranoid ideation, and psychoticism. These findings strengthen the contention that depression post-mild traumatic brain injury is a serious complication that can interfere with an individual's cognitive, emotional, and psychosocial functioning.

Traumatic brain-injured individuals struggle with many activities that were considered routine prior to their injury. For example, when attempting to interact with others in a purposeful manner, or cope with environmental demands these individuals often define themselves as impaired. These impairments make it difficult to problem solve and as a result these individuals often become overwhelmed. Depression and anxiety are generally the result of this condition (Segalowitz & Lawson, 1995; Prigatano, 1992; Levin, Eisenberg, & Benton, 1989). Psychological sequelae such as depression and anxiety are consistently correlated with cognitive variables among patients who have suffered a traumatic brain injury (Fann, Uomoto, & Katon, 2001; Sherman, Strauss, Slick, & Spellacy, 2000; Alfano et al., 1993). Sherman et al. (2000) reported that depression has a small effect on neuropsychological functioning, and Fann et al. (2001) showed that successful treatment of depression in mild traumatic brain-injured patients yielded significant improvements in their cognitive abilities.

The frequency of anxiety post-traumatic brain injury varies and, like depression, occurrence and prevalence of anxiety is not dependent upon severity of injury. Well-controlled studies indicate that Post-Traumatic Stress Disorder (PTSD); an anxiety disorder comprised of intrusive memories of a traumatic event, avoidance, and heightened arousal that persist for a duration of more than one month post-trauma (American Psychiatric Association, 1994), occurs at an incidence between 17 and 33% post-mild traumatic brain injury (Bryant & Harvey, 1998; Ohry, Solomon, & Rattock, 1996; Rattock & Rose, 1993). Similarly, Acute Stress Disorder (ASD); an acute anxiety disorder conceptually similar to PTSD, with more emphasis on dissociative symptoms, where persistence of symptoms only occurs for a duration of no more than four weeks

post-trauma (American Psychiatric Association, 1994), occurs at an incidence of 13 to 14% post-mild traumatic brain injury (Bryant & Harvey, 1999; Harvey & Bryant, 1998; Bryant & Harvey, 1998). In a study of mild traumatic brain-injured patients PTSD symptoms were present in 84% of patients in the sample (Feinstein, Hershkop, Jardine, & Ouchterlony, 2000). Patients with PTSD were significantly more anxious and depressed than patients without PTSD and Feinstein et al. (2000) claim that this study demonstrates that PTSD symptoms are associated with significant psychiatric comorbidity. It is noteworthy to discuss the prevalence of anxiety post-mild traumatic brain injury because it significantly interferes with an individual's interpersonal functioning, vocational functioning, cognitive functioning, and emotional functioning. Individuals diagnosed with ASD or PTSD suffer from difficulties such as: avoiding interaction and communication with other people; diminished interest or participation in significant activities, including vocational and leisure activities; difficulties with memory, attention, and concentration; sleep difficulties; increased irritability; increased anger; restricted range of affect; and hypervigilance (American Psychiatric Association, 1994).

Agitation, irritability, anger, aggression, and disinhibition syndromes are frequently reported following traumatic brain injuries (Kim, 2002; Prigatano, 1992). In the acute stage of recovery, agitated behavior may occur in 35-96% of patients (Levin & Grossman, 1978; Rao, Jellenik, & Woolston, 1985). Although agitation in the acute stage of recovery generally resolves prior to the resolution of post-traumatic amnesia (Corrigan & Mysiw, 1988; Van der Naalt, VanZomeren, Sluiter, & Minderhoud, 1999), more persistent, long-term changes in behavior also occur in a large percentage of patients. For example, studies have indicated that agitation occurs in the post-acute stage of recovery

in 5-71% of mild traumatic brain injury cases (Silver & Yudofsky, 1994). The term agitated was used by Reyes, Bhattacharyya, and Heller (1981) to depict post-traumatic brain injury patients who exhibited constant uninhibited movement. Reyes et al. (1981) indicated that agitated patients often became angry when restrictions to their uninhibited movements were imposed, and that post-traumatic agitation was a barrier to a patient's ability to return to work.

Irritability is "the single most common personality and behavioral complaint identified by both patient and spouse" (Prigatano, 1992, 363) post-traumatic brain injury. Irritability is defined as "a tendency to be annoyed or upset" (Prigatano, 1992, 363). Regardless of the severity of traumatic brain injury, self-reports of irritability are high. Studies indicate that irritability occurs in 38-71% of moderate to severe traumatic brain injury cases (Thomsen, 1989; Hinkeldey & Corrigan, 1990; McKinlay, Brooks, Bond, Martinage, & Marshall, 1981), and in up to 60% of mild traumatic brain injury cases (Dikmen, Temkin, & Armsden, 1989). Marschark et al. (2000) indicated that college students with a history of mild traumatic brain injury reported significantly more distress regarding their proneness to irritability than non-traumatically brain-injured college students. "Problems such as decreased memory capacity, decreased ability to rapidly shift cognitive set (as often occurs in conversations), and trouble habituating to noxious stimuli may make it more difficult for the patient to cope with environmental demands" (Prigatano, 1992, 363-364). When a patient fails to cope with environmental demands one of the most common outcomes is heightened irritability. Heightened irritability in turn makes it more difficult to cope with environmental demands and function psychosocially, and thus perpetuates this problem.

Anger is "a threatening, arousal-generating response that either signals physical aggression or is in itself a verbal attack on another" (Prigatano, 1992, 364). It is often also characterized by "an exaggerated or heightened irritability response that includes a lowered tolerance for frustration and possibly a heightened emotional lability" (Prigatano, 1992, 364). Anger is one of the most common emotional symptoms reported post-traumatic brain injury (Kim, 2002; Prigatano, 1992). Coolidge, Griego, Nathan, and Merwin (1995) found that personality changes that can occur after a traumatic brain injury and result in elevated irritability, anger, and aggression are not uncommon. In fact, these symptoms are reported post-traumatic brain injury irrespective of demographic information and severity of injury. College students with a history of mild traumatic brain injury report significantly more distress regarding their proneness to arguments and aggression than non-traumatically brain-injured college students (Marschark et al., 2000).

Symptoms such as increased impulsivity, hostility, and aggression are commonly associated with damage to the prefrontal cortex regardless of severity of injury (Kim, 2002; Grafman et al., 1996). Thus, perhaps localization of function is as critical an issue regarding this emotional response as severity of injury. Regardless, it is important to gain more understanding as to the role anger plays in psychosocial adjustment post-mild traumatic brain injury.

Psychosocial Sequelae

Although the literature has identified the most common symptoms of mild traumatic brain injury as somatic, cognitive, and psychological, it needs to expand investigations of how these symptoms affect psychosocial functioning. "The most consistent and, on a long-term basis, the most disabling consequences of head injury are

not the physical or neurological sequelae per se, but the impairments in cognition, emotions, and behavior that create barriers to successful psychosocial functioning" (McLean et al., 1993, 1041). Deficits in psychosocial functioning are the barrier to recovery and reintegration into society (McLean et al., 1993). Although there is an increased recognition that even minor head injury can have serious consequences on cognitive, physical, behavioral, emotional, and social well-being, more information is needed (McLean et al., 1993).

Psychosocial adjustment and functioning post mild-traumatic brain injury are directly correlated to somatic, cognitive, and psychological sequelae. Research findings indicate that an individual's ability to function within various psychosocial roles is impaired by complications such as depression, anxiety, cognitive dysfunction, memory problems, and level of confidence (Alfano et al., 1993). Life roles that may be impaired by these complications might include an individual's roles as a parent, spouse, worker, student, leisurite, homemaker, or citizen (Alfano et al., 1993).

Although both physical and psychosocial complaints are reported soon after injury, psychosocial sequelae predominate both initially and one year post-injury (McLean et al., 1993). Psychosocial sequelae such as reductions in socioeconomic status (SES) and employment status; greater chronic tension, social alienation, and moodiness; and an impaired ability to communicate resulting in problems in interpersonal relationships (Alfano et al., 1993), permeate a broad range of dimensions including vocational, domestic, and social environments. Significant dysfunction is reported in the areas of emotional behavior, home management, social interaction, communication,

recreation, and work. Level of dysfunction varies based on severity of traumatic brain injury (McLean et al., 1993).

Depressive symptomology is frequently reported following a traumatic brain injury and the presence of depression has short and long-term implications for psychosocial adjustment and functioning. Rates of depression range from 35%-82% (Gfeller et al., 1994; Rimel et al., 1981; Schoenhuber & Orlando, 1988; Alexander, 1992; Parker & Rosenblum, 1996; Ettlin et al., 1992). Brooks et al. (1987) noted that within the first seven years following a traumatic brain injury 63% of patients are classified as depressed. Of the 63% of patients who are classified as depressed, 78% of them are not working. Brooks et al. (1987) identified depression following a traumatic brain injury, irrespective of severity of injury, as a barrier to employment and return to work. Hayden (1997) concluded that the cognitive and emotional sequelae associated with mild traumatic brain injury have a significant impact on an employee's ability to return to work. Individuals often suffer from slower mental processing, increased incidence of errors, less effective problem solving abilities, lower stress tolerance, and an increase in lost work days (Hayden, 1997), which are a result of difficulties related to depression and anxiety post-mild traumatic brain injury. Families are also adversely impacted by these complications (McLean et al., 1993; Gleckman & Brill, 1995) when an individual is unable to work and provide for the needs (food, clothing, housing, educational expenses, etc.) of him/herself as well as dependent family members.

General sequelae associated with mild traumatic brain injury include: obstacles in cognitive functioning, psychological functioning, psychosocial functioning, and long-term reductions in socioeconomic status (Mathias & Coats, 1999; Alfano et al., 1993;

McLean et al., 1993). Individuals with mild traumatic brain injury show significantly higher incidence of post injury depression than control groups, the overall population, and patients with other traumatic disorders (Mathias & Coats, 1999; Alfano et al., 1993; McLean et al., 1993; Stambrook et al., 1991). For example, patients with traumatic brain injuries report significantly greater depressive symptomology than patients with spinal cord injury (Alfano et al., 1993; Stambrook et al., 1991). These findings indicate that different traumatic disorders, such as mild traumatic brain injury and spinal cord injury, manifest psychological problems that are unique to each disorder and differentially impact long-term psychosocial adjustment (Alfano et al., 1993). Thus, although there are similarities in the issues individuals face when dealing with one of these traumatic disorders it is important to consider the uniqueness of the symptoms and experiences involved when establishing appropriate interventions. Furthermore, depressive symptomology should be one of the focal points of intervention and rehabilitation in cases of traumatic brain injury (Alfano et al., 1993).

While some of the factors associated with mild traumatic brain injury are well identified and relatively easy to evaluate, subtle factors associated with psychosocial functioning such as: employment or school absenteeism; changes in employment or student status because of mild cognitive sequelae; disruption in interpersonal relationships and social functioning; personality changes; and emotional disruptions, such as depression, are more difficult to ascertain (Szymanski & Linn, 1992; Alfano et al., 1993; Brooks et al., 1995; Segalowitz & Lawson, 1995; Fabiano & Daugherty, 1998). Although deficits in psychosocial adjustment after a traumatic brain injury are apparent, few studies have looked at psychosocial adjustment after a mild traumatic brain injury

(Busch & Alpern, 1998). This is problematic because "it is generally accepted that [mild traumatic brain injury] accounts for 70% of all [traumatic brain injuries]" (Busch & Alpern, 1998, 95), and varying degrees of traumatic brain injury have varying symptoms and outcomes.

Gender Differences

Increasing evidence suggests differences between men and women in brain organization (Kimura, 1992), neurochemistry (Heninger, 1997), and the influence of hormones on brain functioning (Kimura, 1992). Additionally, many psychological investigations have found variation between males and females in cognitive and emotional functioning. For example, research indicates that males tend to perform at a higher level than females on tests of mathematical reasoning, formal manipulation of symbols, and spatial abilities (Kimura, 1992; Benbow & Benbow, 1984), whereas, females tend to perform at higher levels than males on tests of speech, reading comprehension, verbal fluency, and arithmetic calculation (Kimura, 1992; Maccoby & Jacklin, 1974). Males and females vary not only in verbal language skills, but also in nonverbal processes such as utilizing contextual information for interpreting facial expressions, social cues, and emotional cues with females excelling over males at these skills (Rosenthal, Hall, DiMatteo, Rogers, & Archer, 1979). With respect to differences in emotional functioning Crick et al. (1999) reviewed the current research on relational aggression and indicated that gender differences in emotional expression exist at various developmental stages and they exist in the type of aggression (physical or relational) individuals exhibit. These premorbid variances in neuropsychological, cognitive, and emotional functioning between males and females have implications for gender

differences in cognitive, behavioral, emotional, and social functioning. Thus, it follows that variances in behavioral, emotional, and psychosocial functioning pre-injury have implications for how males and females may be differentially impacted by mild traumatic brain injury and recover post-injury.

Important investigations of noted differences between males and females have indicated that gender differences exist in neuropsychological functioning (Raskin, Mateer, & Tweeten, 1998), and emotional functioning (Willer et al., 1991) post-mild traumatic brain injury. Therefore, closely examining gender differences post-mild traumatic brain injury has implications for identifying the various strengths, weaknesses, and needs of men and women post-injury. According to Willer et al. (1991), women with mild traumatic brain injuries identified, in order of importance, 1) loss of autonomy, 2) loneliness and depression, 3) decreased interest in sexual activities, 4) chronic pain (headache and backache) and limitations in participating in activities associated with their family role within the home, 5) personality changes, and 6) reduced memory and cognitive abilities as their primary impediments. Men identified, in order of importance, 1) loss of or diminished independence, 2) changes in life roles as husband, parent, and provider (particularly loss of role as breadwinner), 3) difficulties associated with a lack of awareness of and adaptability to their limitations, 4) difficulties with memory and cognitive functions (reading, writing, comprehension, and expression of ideas), and 5) personality changes (identified primarily as major mood swings and reduced control of emotions) as their primary difficulties post-mild traumatic brain injury (Willer et al., 1991). Thus, although both men and women confirm the existence of and the severe impact of interpersonal problems and personality changes post-mild traumatic brain

injury, the characteristics of these broad categories are different. Men report higher incidence of anger and aggressiveness (Schopp et al., 2001; Hanks, Temkin, Machamer, & Dikmen, 1999; Willer et al., 1991), as well as, significantly greater general psychological distress (Schopp et al., 2001; Willer et al., 1991) post-traumatic brain injury, while women report a higher incidence of depression (Schopp et al., 2001; Willer et al., 1991). Marschark et al. (2000) reported results that support the contention that men report significantly greater general psychological distress post-mild traumatic brain injury. They found a significant difference between male and female college students on a self-report measure of symptoms frequently reported by medical and psychiatric patients. The measure assessed nine symptom dimensions. Males (regardless of whether they belonged to a group of mild-traumatic brain injured college students, a group of college students with no reported history of traumatic brain injury, but who had undergone general anesthesia at least once, or a group of college students with no reported history of traumatic brain injury or instance of general anesthesia) reported significantly more distress than females on all nine dimensions of the measure. Since psychological distress/ well being is one of the major mechanisms that characterizes psychosocial adjustment it is noteworthy that Schopp et al. (2001), Willer et al. (1991), and Marschark et al. (2000) all found men to exhibit greater psychological distress than women post-TBI. Further gender differences are reported in research that examines mild traumatic brain injury and depression. Although individuals who sustain a mild traumatic brain injury, regardless of gender, are significantly more likely to receive a diagnosis of major depressive episode or Dysthymic Disorder than individuals who sustain a severe traumatic brain injury (Alexander, 1992), females are more likely than males to endorse

depressive symptoms (Guth, 2000), and exhibit more severe depressive syndromes than men post-mild traumatic brain injury (Barnow, Linden, Lucht, & Freyberger, 2002). Females are also at greater risk than males of developing PCS following a mild traumatic brain injury (McCauley, Boake, Levin, Contant, & Song, 2001; Bazarian et al., 1999; McClelland et al., 1994; Fenton et al., 1993).

Coping strategies associated with mild traumatic brain injury also vary based on gender (Willer et al., 1991). Women value more emotional, interpersonal, and collaborative coping strategies such as the use of support groups, whereas men prefer "coping strategies that [are] highly individualistic, such as suppressing feelings... [and are] more likely to engage in problem-focused coping strategies, stressing reformulation of problems, than in coping strategies that involve emotion" (Willer et al., 1991, 464). Furthermore, gender differences exist in treatment of mild traumatic brain injury. Men and women are treated differently by medical professionals, which may result in differential responses to specific treatments and differential recovery rates (Fidell, 1980). In particular, women's symptoms are more likely to be attributed to psychogenic causes and malingering, and women are more likely to be prescribed mood-altering drugs than men (Lennane & Lennane, 1973). Men receive more aggressive treatment than women (Fidell, 1980) and men's problems are more likely to be attributed to external sources, whereas women's are more likely to be attributed to internal biological or psychological sources (Tavris, 1992).

Mild traumatic brain injury is a chronic disability whose side effects can be far-reaching and long lasting. Research on the significant differences between men and women with respect to their psychosocial adjustment to other chronic disabilities and

diseases helps to inform practice and improve the efficacy and quality of care these individuals receive for these chronic disabilities and illnesses. Examining related areas of research often generates pertinent research questions for investigators in the area of mild traumatic brain injury, which can improve knowledge in this area and lead to better treatment for brain-injured individuals. Thus, a review of related research is included in this section of the literature review.

Fife, Kennedy, & Robinson (1994) found gender differences in coping skills and psychosocial adjustment in cancer survivors. Baider, Perez, & De-Nour (1989) found gender differences in adjustment to chronic disease in colon cancer patients and their spouses, with male patients adjusting better than female patients, and male spouses adjusting far worse than female spouses and worse than male patients. Brown et al. (1988) indicated gender differences in psychosocial adjustment to burn injury. Tarter, Switala, Kabene, & Van Thiel (1990) found gender differences in psychosocial adjustment to liver transplant. These differences included generalized levels of psychopathology, stress level, family cohesion, and level of conflict in liver transplant patients and their spouses. Mcroberts (1999) found gender differences in psychosocial and emotional adjustment of adult children of depressed parents.

Research into cognitive functioning, emotional functioning, coping strategies, treatment recovery, and traumatic brain injury indicate that gender plays a role in how individuals think, behave, express themselves, deal with adversity, and respond to disability. This research suggests that the impact of gender on psychosocial adjustment is real and relevant, and is in need of further investigation. Furthermore, research in related

areas highlight gender differences in psychosocial adjustment and lend support to the premise that gender impacts psychosocial adjustment post-mild traumatic brain injury. Understanding the psychosocial differences between males and females is critical to the treatment of mild traumatic brain injury and rehabilitation strategies for traumatic brain-injured individuals, as well as many other dimensions of life such as: cognitive development, learning, emotional development, the development of positive coping strategies, and interpersonal relationships.

Methodological Concerns

One of the most widely identified problems associated with mild traumatic brain injury is the lack of a universal definition and classification schema (Busch & Alpern, 1998; Levin et al., 1987; Rosenthal, 1993; Uzzell, 1999; DeKruijk, Twijnstra, & Leffers, 2001). According to Kay et al. (1993), mild traumatic brain injury is defined as a physiological disruption in brain functioning due to a loss of consciousness, that does not exceed 30 minutes, any loss of memory for events at the time of the accident, any alteration in mental state at the time of the accident (e.g., feeling disoriented, or confused), and focal neurological deficits that may or may not be temporary. Although this definition appears to be comprehensive it is not universally accepted and it negates the possibility that a mild traumatic brain injury can be present without a loss of consciousness. The most widely accepted definition of mild traumatic brain injury stipulates that a mild traumatic brain injury is a head trauma, without loss of consciousness, or with loss of consciousness lasting 20 minutes or less, a Glasgow Coma Scale score of 13 to 15, and a period of hospitalization for less than 48 hours (Uzzell, 1999).

The diagnostic criteria for mild traumatic brain injury vary widely among clinicians. "The long-standing controversy surrounding research on outcome of minor head injury... reflects ambiguities in definition, inconsistencies in criteria for patient selection, variation in procedures for neurobehavioral assessment and difficulty in obtaining follow-up data" (Levin et al., 1987, 262). One of the most widely accepted diagnostic tools for traumatic brain injury is the Glasgow Coma Scale. The GCS assesses verbal, motor, and ocular responses to simple stimuli (Teasdale & Jennett, 1974; Ruff & Jurica, 1999). Although a GCS score of 13 to 15 is generally accepted as an indicator of a mild traumatic brain injury, this is problematic because an individual with normal brain functioning will also obtain a score of 15 on the GCS (Uzzell, 1999). Also, according to Alexander (1995), "only a score of 15 probably represents true mild traumatic brain injury. A score of 13 or 14 is due to confusion or disorientation and will be associated with a longer period of amnesia" (1253). Some authors contend that traumatic brain injury with a GCS of 13 or 14 could be classified as moderate (Alexander, 1995; Williams, Levin, & Eisenberg, 1990).

A second commonly utilized diagnostic tool in the diagnosis of mild traumatic brain injury, loss of consciousness (LOC), is an indicator of the degree of severity of a head injury. However, use of LOC as a diagnostic tool is controversial. Typically, mild traumatic brain injury is defined as a head injury with a LOC of less than 20 minutes (Rimel et al., 1981; Uzzell, 1999), yet, several studies indicate that a brain injury can occur without a loss of consciousness (Cantu, 1992; Evans, 1996; Hayes, Povlishock, & Singha, 1992; Rutherford, Merrett, & McDonald, 1977; Stauss and Savitsky, 1934).

A third commonly used diagnostic tool in the diagnosis of mild traumatic brain injury is the presence of post-traumatic amnesia (PTA). PTA is an inability to recall events, sequence time, or learn new information for a period of time following a mild traumatic brain injury, and is characterized by confusion and disorientation (McAllister, 1992). However, there is clinical evidence (Kelly et al., 1991; Borczuk, 1995) that traumatic brain injury can occur without a clearly identified period of post-traumatic amnesia or LOC.

The final, of the four most commonly utilized diagnostic tools, is the presence of Post Concussion Syndrome. Post Concussion Syndrome (PCS), also called Post Concussional Disorder (PCD), is defined in the DSM-IV (1994) as a syndrome, following a closed head injury with a significant cerebral concussion, that results in quantifiable deficits in memory or attention, and the onset, or substantial worsening of any three of the following preexisting symptoms: fatigue, disordered sleep, headaches, vertigo/dizziness, irritability/aggression, anxiety/depression/affective lability, changes in personality, or apathy. The disturbance resulting from this syndrome causes a substantial impairment in social, or occupational functioning, and the symptoms should not be better accounted for by other diagnostic categories (APA, 1994).

> Mild traumatic brain injury is not synonymous with terms such as the postconcussion syndrome. The former is simply the less severe end of the spectrum of brain injury; the latter is the cluster of signs and symptoms (usually including one or more difficulties from somatic, cognitive, and behavioral domains) that can be seen after traumatic brain injury of any severity (McAllister & Flashman, 1999, 356-357).

"Studies have shown that 50 to 80 percent of patients who are admitted to a hospital following closed head injury will subsequently complain of one or more PCD symptoms" (Szymanski & Linn, 1992, 358). Although mild traumatic brain injury and Post Concussion Disorder are not synonymous, they are highly correlated and "previous research into Post Concussion Disorder has been hampered by differing definitions of mild/minor head injury" (McCauley et al., 2001, 792). Definitions of post concussional symptoms also vary widely from study to study. This is a major methodological limitation in head injury research because current outcome studies on traumatic brain injury focus primarily on the type and number of post concussional symptoms present (Mittenberg et al., 1992; Marsh & Smith, 1995; Fox, Lees-Haley, Earnest, & Dolezal-Wood, 1995; Youngjohn, Burrowk, & Erdal, 1995; Wade, Crawford, Wenden, King, & Moss, 1997; Ingerbrigsten, Waterloo, Marup-Jensen, Attner, & Romner, 1998; Bryant & Harvey, 1999).

Further complicating research on PCS is the substantial dissension as to whether PCS develops as a result of neurological damage (Levin et al., 1987; Hayes, Povlishock, & Singha, 1992), psychological distress (Lishman, 1988), or a combination of both (Dikmen, Machamer, & Temkin, 2001; Dikmen, Machamer, Winn, & Temkin, 1995; Rutherford, 1989). Identified risk factors for PCD vary from study to study. Some identified risk factors are pre-injury psychiatric disorders, psychological maladjustment, older age, psychosocial stress, and social difficulties (McCauley et al., 2001). Also, studies have yielded inconsistent results regarding the duration of PCD symptoms, which have been reported to persist anywhere from several weeks (McLean et al., 1993; Middelboe et al., 1992) up to 5 years post-injury (Olver, Ponsford, & Curran, 1996).

With so many disparities in the literature it is difficult to state, with any confidence, what the definition of mild traumatic brain injury is, what the symptoms are, what diagnostic tools are useful, what the duration of the complications associated with mild traumatic brain injury is, or what guidelines should be adhered to in treatment planning.

Another prevalent methodological concern in traumatic brain injury research is sample representativeness. According to Busch & Alpern (1998) there is a paucity of research that examines psychological disorders post-mild traumatic brain injury, even though mild traumatic brain injury is the most commonly occurring form of traumatic brain injury. Most of the studies that examined psychological, cognitive, emotional, and psychosocial sequelae of traumatic brain injury had subjects in the moderate to severe traumatic brain injury range (Busch & Alpern, 1998; Alfano et al., 1993; McAllister, 1992; Merskey, 1996; Hendryx, 1989; Willer et al., 1991). Often research studies were comprised of samples where the degree of severity of traumatic brain injury was mixed or unspecified (Busch & Alpern, 1998; Fann, Katon, Uomoto, & Esselman, 1995; Aloia, Long, & Allen, 1995; Fedoroff et al., 1992; Novack, Daniel, & Long, C.J., 1984).

Time since injury (TSI) is another important factor to attend to when studying traumatic brain injury (Busch & Alpern, 1998). Since some of the literature indicates improvement of symptomology over time (Olver, Ponsford, & Curran, 1996; Gualtieri, 1999; McLean et al., 1993) studies should control for TSI in their analyses, but many do not. Busch & Alpern (1998) indicated that "TSI is highly variable in the literature" (p. 98) and in the studies they reviewed it was common for there to be high within sample variability in individual studies. For example, "of the studies reporting TSI, 7 reported a TSI of 3 months or less, 9 ranged from 4 months to two years, 6 reported TSI over two

years, and 1 study reported matching for TSI in a comparison group" (p. 98). Finally, in a review of the literature Busch & Alpern (1998) indicated that additional methodological concerns include: the type and number of assessment tools used; inclusion of comparison groups; premorbid factors; age; and cause of injury.

Summary

This chapter reviewed the literature and research related to the pathophysiology, sequelae, and treatment of traumatic brain injury. It also highlighted general gender differences, along with gender differences related to traumatic brain injury. The chapter wrapped-up with a discussion of the methodological concerns of existing research on traumatic brain injury. The research findings presented in this chapter provide the basis for the research questions and hypotheses for this study.

CHAPTER THREE

METHODOLOGY

Introduction

This study seeks to understand gender's impact on psychosocial adjustment following mild traumatic brain injury. Secondly, this study seeks to examine the role of gender as it relates to anger and depression post-mild traumatic brain injury.

This chapter begins by restating the research hypotheses. It then describes the methodology of this study including: selection criteria, demographics, data-collection procedures, instrumentation, and statistical analyses.

Research Hypotheses

Analysis of the data will be guided by the following hypotheses:

Hypothesis 1:

Men will report a higher incidence of anger than women post-mild traumatic brain injury.

Hypothesis 2:

Women will report a higher incidence of depression than men post-mild traumatic brain injury.

Hypothesis 3:

Women will report better psychosocial adjustment than men post-mild traumatic brain injury.

a) Women will report fewer complications with personal care than men post-mild traumatic brain injury.

b) Women will report fewer complications with mobility than men post-mild traumatic brain injury.

c) Women will report fewer complications with self-organization than men post-mild traumatic brain injury.

d) Women will report fewer complications with socializing than men post-mild traumatic brain injury.

e) Women will report fewer complications with productive employment than men post-mild traumatic brain injury.

f) Women will report fewer complications with psychological well-being than men post-mild traumatic brain injury.

Selection Criteria, Demographics, and Data-collection Procedures

Selection Criteria

Men and women, over the age of 18, were recruited from two multidisciplinary, private, rehabilitation practices, located in central Michigan, to participate in the study. Inclusion criteria for potential participants consisted of a diagnosis of mild traumatic brain injury. This classification was determined by a full neuropsychological evaluation by a psychologist. University Committee for Research Involving Human Subjects (UCRIHS) and appropriate Internal Review Board (IRB) approvals were obtained prior to starting data collection.

Demographics

The following demographic information was gathered from men and women, over the age of 18, who were diagnosed with a mild traumatic brain injury at one of the two

data collection sites: age, education level, sex, marital status, race/ethnicity, time since injury, and type of injury.

Data-collection Procedures

New patients were recruited to participate and established patients were recruited through patient records. New patients were provided with a letter of introduction (see Appendix A), which included the names of the researchers, the purpose of the study, and an overview of what was required of participants. An informed consent form (See Appendix B) was also included in this initial contact.

To recruit established patients an employee of each rehabilitation practice reviewed the patient files. Potential subjects meeting the inclusion criteria were contacted via mail. A letter of introduction (see Appendix A), which included the names of the researchers, the purpose of the study, and an overview of what was required of participants was sent to potential subjects. An informed consent form (see Appendix B), and a patient authorization for disclosure of health information for research form (Appendix G) were also included in this initial contact.

Once a signed informed consent form was received from new patients that were willing to participate in the study, those individuals were handed a research packet to complete on site. The research packet included: an informed consent form for the participant to keep, which included a description of the study, including contact information (in case a participant had questions for the author); a demographic questionnaire (See Appendix C); a post-injury BICRO-39 form (See Appendix D); the Coolidge Axis Two Inventory-Revised (CATI+) (See Appendix E); and a resource sheet (See Appendix F). Once a signed informed consent form and a patient authorization for

disclosure of health information for research form were received from established patients that were willing to participate in the study those individuals were mailed a research packet to complete. This research packet included the exact same materials as the research packet provided to new patients on site. With regard to the participants who were mailed survey packets, a reminder postcard was sent to them approximately two weeks after the original research packet was mailed. All research packets, whether distributed in person or via mail, had the presentation of the instruments counterbalanced.

Participation in the study was voluntary. The author solicited participation.

Patients were informed that their responses on the research questionnaires are confidential and that there are no treatment differences or preferences given to patients who participate in the study. Patients from one site were informed that each individual who returned a completed survey packet would be entered into a raffle for a $100.00 prize, to be drawn at the completion of data collection. Patients from the second site were paid $10.00 cash outright for completing the survey, and were not entered in the raffle. Once data collection was completed a random drawing was conducted and one participant received a $100.00 cash prize, which was mailed to the participant's home.

Patient confidentiality was protected. Identifying information was only included on the consent form and patient authorization for disclosure of health information for research form. The consent forms and patient authorization for disclosure of health information for research forms are kept in a locked file cabinet in a secure room. The remainder of the survey instruments from the research packet have identification numbers on them that can not be tied to any identifying information. These packets are being

maintained in their entirety and are stored in a separate locked file cabinet, in a secure room. Only the author has access to the research data.

Debriefing procedures consisted of providing each participant with a summary of his/her assessment results, along with a list of resources, so participants had access to service providers to discuss any issues that surfaced as a result of participating in the research. A letter thanking participants for their participation was included with their compensation.

An a priori power analysis for a multivariate analysis of variance (MANOVA) was conducted to determine the number of participants needed for a study with a large effect size, where power = .80, $\alpha = .05$, and there are 8 dependent variables. A large effect size was utilized because according to Bezeau & Graves (2001) it is "appropriate to assume Cohen's 'large' effect size (.8) for theoretically motivated clinical neuropsychological research. For applied clinical neuropsychological research... very large effect sizes might be appropriate" (403). This assumption is based on the statistical power analysis Bezeau &Graves (2001) conducted in their review of 66 clinical neuropsychological research articles from 3 clinical neuropsychology journals. Therefore, based on the clinical neuropsychology literature, it was appropriate to assume a large effect size in this study, and to utilize a large effect size in the a priori power analysis. Lauter (1978) conducted a study of power in MANOVA and constructed sample size tables. Lauter's (1979) sample size table indicated that for a large effect size, where power = .80, and $\alpha = .05$, nine participants are needed per dependent variable. There are eight dependent variables in this study, which brought the total number of participants

necessary to 72. The total number of participants in this study was 82. Ninety-one surveys were returned, however, nine surveys were omitted from analysis.

Instrumentation

A demographic questionnaire, a post-injury BICRO-39, and the Coolidge Axis II Inventory-Revised are the instruments that were utilized in this study. Six scales from the post-injury BICRO-39 were used to operationalize psychosocial adjustment to mild traumatic brain injury. The Coolidge Axis II Inventory-Revised (CATI+) was used to operationalize anger and depression.

Demographic Questionnaire

A demographic questionnaire was developed to provide information that describes the sample population (see Appendix C). Information was gathered on participant age, sex, education level, marital status, ethnicity, time since injury, and type of injury.

Coolidge Axis II Inventory-Revised (CATI+)

To assess anger and depression the Coolidge Axis II Inventory-Revised (CATI-+: Coolidge, 2004) was used (see Appendix E). The CATI+ was originally published as the Coolidge Axis II Inventory (CATI: Coolidge, 1984; Coolidge & Merwin, 1992). However, the name was changed to better reflect the instrument's threefold purpose: (1) to assess clinical syndromes on Axis I of the American Psychiatric Association's (APA) Diagnostic and Statistical Manual of Mental Disorders (DSM), such as Anxiety, Depression, Post-Traumatic Stress, Schizophrenia, and other psychopathological syndromes; (2) to evaluate neuropsychological functioning (including Language Functions, Memory and Concentration, and Neurosomatic Symptoms related to brain

dysfunction); and (3) to assess personality disorders according to the strict criteria for personality disorders on Axis II of the DSM. (Coolidge, 2004, 2).

The CATI+ is a 225-item, self-report inventory, designed for ages 15 and above. It consists of 42 scales which are organized into eight distinct sections: 1) DSM Axis I Disorders (e.g., Anxiety, Depression, Post-Traumatic Stress); 2) DSM-Based Personality Disorders (e.g., Antisocial, Avoidant, Borderline, Dependent); 3) Neuropsychological Dysfunctions (e.g., Language, Memory and Concentration, and Neurosomatic); 4) Executive Functions of the Frontal Lobes (e.g., Decision Difficulty, Planning Problems and Task Completion Difficulty); 5) Personality Change Due to a Medical Condition (e.g., Aggression, Apathy, Disinhibition); 6) Hostility Scales (e.g., Anger, Dangerousness, and Impulsiveness); 7) Normative Scales; and 8) Validity Scales (e.g., Answer Choice Frequency, Random Responding, Tendency to Look Good or Bad, and Tendency to Deny Blatant Pathology) (Coolidge, 2004). The CATI+ uses a 4-point Likert scale, and takes the average person approximately 30 to 45 minutes to complete (Coolidge, 2004). The Likert scale items are; strongly false, more false than true, more true than false, and strongly true. Although the CATI+ comes in two available forms (a self-report form and a significant-other report form), for the purposes of this study, only the self-report form will be used.

The CATI+ has two specific scales that are of interest in this study, the anger and depression scales. The depression scale consists of 24 items. The items correspond with the criteria presented in the DSM for a Major Depressive Episode. "The items deal with suicidal ideation, past suicide attempts, depressive thinking, pessimism, disappointments with people, and troubled dreams" (Coolidge, 2004, 10). The anger scale consists of 15

items. These items address issues of "anger control, temper tantrums, verbal hostility, and physical fights" (Coolidge, 2004, 17).

Coolidge indicated that through a series of pilot studies it was determined that the 24 items of the CATI+ have good face validity with the concept of depression (Coolidge, 2004). Furthermore, Coolidge and Merwin (1992) indicated that reliability and validity studies of the CATI+ lend support for its use as a measure of depression. Coolidge and Merwin (1992) explored convergent validity and stated that the depression scale of the CATI+ "correlated .68 with the T score of the MMPI depression scale and correlated .69 with the BDI Depression scale" (232). The correlation of all three of these measures, the Minnesota Multiphasic Personality Inventory (MMPI), Beck Depression Inventory (BDI), and CATI+ were significant at $p < .01$ (Coolidge & Merwin, 1992).

> As part of another study, the CATI+ Depression scores of a sample of 24 personality disordered patients in which 75% of the sample had an Axis I disorder involving some type of depressive symptomotology was compared to a control group of 24 individuals. The mean of the clinical group (53.0) was significantly greater than the mean of the control group (37.0; $t(46) = 5.29$, $p < .01$ (Coolidge, 2004, 33).

The depression scale on the CATI+ has high internal reliability. An alpha coefficient of .89 (Coolidge, 2004) was reported for the normative sample. The alpha coefficient for the sample population in this study is .79, which is also high.

There has been substantially less research on the anger scale of the CATI+, but normative data indicate that the anger scale on the CATI+ is also highly reliable. The anger scale has an alpha coefficient of .80 for the normative sample (Coolidge, 2004).

However, the reliability of the anger scale for the sample population in this study is low with an alpha coefficient of .37. This discrepancy was not attributable to differences in the means or standard deviations between the two populations, as they were similar when compared.

The CATI+ is computer scored and the scoring program provides the administrator with a brief report. This report provides: raw scores, percentiles, five administrative indices (Answer Choice Frequency, Unscorable Responses, Random Responding, Tendency to Look Good or Bad, and Tendency to Deny Blatant Pathology), T-scores for each CATI+ scale, and an indication of whether the respondent's scores on each scale fall within the normal range (Coolidge, 2004).

Brain Injury Community Rehabilitation Outcome-39 scales

The Brain Injury Community Rehabilitation Outcome-39 (BICRO-39) is an instrument designed to assess psychosocial complications experienced by patients recovering from a traumatic brain injury (Powell, Beckers, & Greenwood, 1998). Three different forms of the questionnaire have been generated so that a patient's retrospective pre-injury report, a patient's post-injury report, and a caregiver's post-injury report can all be assessed. It is intended for use "at an individual level, by requiring patients and/or their [care-givers] to evaluate their level of functioning on each item before and after the injury" (Powell et al., 1998, 1214). For the purposes of this study only the patient post-injury report form (See Appendix D) was used. This self-report inventory consists of 39-items that are used to assess psychosocial adjustment following a traumatic brain injury. It measures 8 distinct substrates of psychosocial adjustment (each substrate has its own scale: personal care, mobility, self-organization, contact with partner/own children,

contact with parents/siblings, socializing, productive employment, and psychological well-being), using a 6-point (0 to 5) Likert scale (Powell et al., 1998). For the purposes of this study only the results from 6 of the 8 scales (personal care, mobility, self-organization, socializing, productive employment, and psychological well-being) were utilized to assess psychosocial adjustment. The wording on each Likert scale is adjusted to specifically address the construct being measured on that specific instrument scale. For example, on the scale that measures personal care, which assesses how much help or assistance the individual needed from other people on tasks such as getting into and out of bed, and using the toilet, the Likert scale uses the identifiers 5) didn't do at all, 4) constant help, 3) a lot of help, 2) some help, 1) prompts only, and 0) no help/prompts (Powell et al., 1998). However, the scale that measures productive employment, which assesses how much time an individual spends participating in employment-related activities such as doing paid work, and studying, training, and doing courses, uses 5) didn't do at all, 4) less than an hour a week, 3) 1-4 hours a week, 2) 5-10 hours a week, and 1) 11-20 hours a week, and 0) more than 20 hours a week as Likert scale identifiers (Powell et al., 1998).

The BICRO-39 is hand scored and an average score is calculated for each scale. The average or mean score for each scale indicates the severity of impairment an individual experienced (pre form) or is currently experiencing (post form) within that particular psychosocial domain (e.g. mobility, psychological well-being, etc.).

The BICRO-39 has good internal consistency. In the normative sample alpha coefficients are very high for four of the scales, indicating that the items within the Psychological Well-Being (.95), Personal Care (.94), Self-Organization (.94), and

Mobility (.88) scales do a good job of distinguishing the level of an individual's impairment in each of these areas (Powell et al., 1998). The Parent/Sib Contact (.70), Socializing (.67), and Partner/Child Contact (.55) scales have items that moderately distinguish the level of an individual's impairment in each of these areas (Powell et al., 1998). Finally, the alpha coefficient for the Productive Employment scale is low (.30) (Powell et al., 1998), indicating that the items on this scale do not do a good job of distinguishing the level of an individual's impairment regarding productive employment. Also, "there are a number of significant correlations between the various scales, reflecting the fact that problems in one domain are likely to be associated with problems in others" (Powell et al., 1998, 1219). For example, intercorrelations between the Productive Employment scale and the Personal Care ($r = .35$) and Mobility ($r = .38$) scales are significant ($p < .001$), which makes sense conceptually since an individual who is unable to take care of his own basic personal needs, or who is not mobile, is unlikely to be able to maintain gainful employment (Powell et al., 1998).

Internal consistency for the six scales used on the sample population in this study was also good and comparable to the results reported by Powell et al. (1998). The alpha coefficients for the sample population are very high for three of the scales, indicating that the items within the Psychological Well-Being (.89), Personal Care (.90), and Self-Organization (.89) scales are highly correlated. The Mobility (.75) and Socializing (.72) scales have items that are moderately correlated. Finally, the alpha coefficient for the Productive Employment scale is low (.31).

To assess the construct validity of the BICRO-39 Powell et al. (1998) analyzed its similarity to the Functional Independence Measure and Functional Assessment Measure

(FIM+FAM), the Hospital Anxiety and Depression Scale (HADS), and the Community Integration Questionnaire (CIQ). Powell et al. (1998) argued that the overlap in item content between the BICRO-39 and these instruments indicated that if they all have reasonable construct validity then those subscales on the FIM+FAM, HADS, and CIQ should have correlations of moderate size with similar content subscales on the BICRO-39. Predicted correlations between the BICRO-39 and FIM+FAM were all significant at $p < .001$. "Personal Care with FIM+FAM Self-Care, $r = .60$; for Mobility with FIM+FAM Mobility, $r = .76$; for Self-Organization with FIM+FAM Cognitive, $r = .49$; and for Psychological with FIM+FAM Psychological Adjustment, $r = .49$" (Powell et al., 1219, 1998). Correlations between the BICRO-39 Psychological Scale and the HADS provided additional validation of the Psychological Scale. "BICRO Psychological scores correlated .68 with the HADS-Depression scale ($p < .01$) and .81 with HADS-Anxiety ($p < .001$)" (Powell et al., 1998, 1220). Spearman correlations between the BICRO-39 and CIQ confirmed most predicted associations. "CIQ Home Integration correlated -.54 ($p <. 02$) with Mobility; CIQ Social Integration correlated -.77 ($p <. 001$) with Mobility, and -.71 ($p < .005$) with Self-Organization; and CIQ Productive Activities correlated -.54 ($p < .02$) with Productive Employment" (Powell et al., 1998, 1220). The predicted correlation between the BICRO-39 Socializing Scale and the CIQ Social Integration scale was the only incorrect prediction when the correlation between these scales ($r = -.15$) was not significant (Powell et al., 1998, 1220).

Statistical Analyses

All data gathered and entered into the computer was discernable only by an identification number to protect confidentiality. Data entry was done solely by the author.

This study used an ex-post facto design to investigate sex differences in psychosocial adjustment post-mild traumatic brain injury. The independent variables are sex, age, education, and time since injury, and the dependent variables are ratings of anger, depression, and psychosocial adjustment post-mild traumatic brain injury. Seven main analyses were conducted on the data with descriptive statistics conducted first, followed by inferential statistics.

Step one consisted of calculating descriptive statistics to define the sample. Descriptive statistics were calculated for age, sex, education level, ethnicity, time since injury, and type of injury, and are reported in chapter four.

In step two reliability analyses were conducted on the scales of the BICRO-39, and the CATI+, to compare the alpha coefficients of the sample population with the alpha coefficients reported by the instruments' authors. These results were reported in the instrumentation section of this chapter.

In step three the sample was divided into two subgroups, males and females. Independent ANOVAs were run to assess any differences between the two subgroups on the independent variables of age, and education, while a χ^2 was run to assess any differences between the two subgroups and the independent variable of time since injury. No significant differences were found between the two subgroups (male and female) on any of the independent variables. These results are further highlighted in chapter four.

Since there were no significant differences found between the two subgroups on any of the independent variables it was not necessary to examine any of the variables as possible covariates (to remove their effect) by conducting an analysis of covariance (ANCOVA).

In step four a multivariate analysis of variance (MANOVA) was conducted. A MANOVA is the statistical technique appropriate for use with this design because it "is a procedure used to test the [statistical] significance of the effects of one or more categorical independent variables on two or more continuous dependent variables" (Weinfurt, 2000, 253). In this analysis (MANOVA) the independent variable was sex, and the dependent variables were psychosocial adjustment (operationalized by the six scales of the BICRO-39), depression, and anger. A multivariate approach accomplished two goals: first, it controlled for Type I error, and second, it provided "a multivariate analysis of effects by taking into account the correlations between dependent measures" (Weinfurt, 2000, 251). These results are reported in chapter four.

In step five, after conducting a multivariate analysis in step four, univariate analyses of variance (ANOVAs) were conducted for each of the dependent measures to identify what dependent variables were significantly different by sex group. According to Hummel and Sligo (1971) ANOVAs should be conducted for each of the dependent measures if the multivariate test is significant because the chance of committing a Type I error has already been guarded against by performing an overall omnibus test of significance first. These results are reported in chapter four.

In step six an item analysis was conducted on the six items of the BICRO-39 psychological well-being scale. Univariate ANOVAs were run to better specify the

gender differences that were detected in psychological well being post-mild TBI. These results are reported in chapter four.

Finally, in step seven, an analysis of sex and the usefulness of services was conducted to provide a deeper understanding of the participants. Univariate ANOVAs were run to analyze any differences between men and women on their ratings of the usefulness of the services they have received post-mild TBI. These results are reported in chapter four.

Summary

The primary purpose of this study is to examine the impact of gender on anger and depression post-mild traumatic brain injury, as well as its role in psychosocial adjustment following mild traumatic brain injury. In this chapter the research hypotheses were stated, followed by a discussion of the methodology. Selection criteria, demographics, data-collection procedures, and measures were also discussed. Finally, statistical analyses were presented, and the results of these analyses will be discussed in chapter four.

CHAPTER FOUR

ANALYSIS OF RESULTS

Introduction

This chapter presents the findings of this study using the order of the hypotheses for organization. First, characteristics of the sample population are discussed, followed by tables that report the reliability of the BICRO-39 and CATI+ scales. Next, a discrete demographic variable (i.e., time since injury) and two continuous variables (i.e., age, and education) were examined to see if differences existed between the subgroups based on these factors. After this comparison of the subgroups on potential confounding variables, sex and emotional factors (depression and anger) were examined for significant differences. Next, analyses of sex and psychosocial adjustment were conducted. Finally, a discussion of the relationship between sex and the usefulness of services utilized post-mild TBI is discussed.

Participants

A total of 324 contact letters were distributed, via mail, to established clients between March 15 and November 15, 2005. Forty-seven percent (153 individuals) of the established clients who were sent a contact letter were men. Sixty-two HIPAA and informed consent forms were returned by established clients, for a return rate of 19%. These individuals were then mailed survey packets. Sixty survey packets were returned for a return rate of 97%. Of the 60 packets that were returned 1 survey packet was omitted from analysis because it was incomplete. Thirty-one survey packets were distributed on-site and completed by new clients. One survey packet was omitted from

analysis because it was a duplicate subject. Seven survey packets were omitted because they were incomplete. Therefore, Ninety-one surveys were returned, however, nine surveys were omitted from analysis. Thus, the total number of participants was 82. Data was entered solely by the author and inspected to insure accuracy.

The age range was from 18 to 81 with a mean of 43.72 (SD = 15.02). The education range was from 8th grade to a professional degree (i.e., Ph.D. and J.D.) with a mean of 13.46 years of education (SD = 2.32). In the sample, 41% of the participants were male, which was representative of the solicited group, which was 47% male. Marital status was 20.5% single, 43% married, 16% divorced, and 20.5% of the data was missing. Race/Ethnicity status was 3.7% African American, 3.7% Asian American, 4.9% Native American/Pacific Islander, 75.6% European American/Caucasian, 3.7% Hispanic, 4.9% other, and 3.7% of the data was missing. The range of time since injury is from less than one month to over 5 years, with 5% reporting time since injury as less than one month, 12% reporting time since injury as 1-3 months, 8.5% reporting time since injury as 4-6 months, 5% reporting time since injury as 7-9 months, 2% reporting time since injury as 10-12 months, 18% reporting time since injury as 1-2 years, 17% reporting time since injury as 3-5 years, 29% reporting time since injury as over 5 years, and 2% of the data was missing. The type of injury reported was 78% car accident, 4.9% sports injury, 8.5% fall, 1.2% tumor, 1.2% illness, 4.9% other, and 1.2% of the data was missing.

Reliability Analyses

Reliability analyses were conducted on the scales of the BICRO-39, and the CATI+, to compare the alpha coefficients of the sample population with the alpha coefficients reported by the instruments' authors. Reliabilities were reported in the

instrumentation section of chapter three. Also, the reliabilities, means, and standard deviations for the normative sample and the current sample from this study are presented in Tables 4.1, and 4.2.

Table 4.1

Comparisons of Means, Standard Deviations, and Reliabilities from the BICRO-39

Scale	k[a]	Mean	SD	Reliability[b]
1. Personal Care	6	.16 (.62)[c]	.48 (1.07)[c]	.90 (.94)[c]
2. Mobility	6	1.08 (2.67)	1.07 (1.59)	.75 (.88)
3. Self-organization	6	1.21 (2.24)	1.27 (1.68)	.89 (.94)
4. Socializing	6	2.93 (3.00)	1.02 (1.05)	.72 (.67)
5. Productive Employment	4	3.52 (4.65)	1.05 (.69)	.31 (.30)
6. Psychological Well-being	6	2.53 (2.24)	1.20 (1.18)	.89 (.95)

a = Total items in scale
b = Cronbach's alpha
c = Numbers in parentheses are from Powell, Beckers, & Greenwood (1998)

Scale scores on the BICRO-39 range from 0 to 5. Higher scores indicate a higher degree of impairment within that particular domain. Thus, on scales that address participation in specific events or activities, higher scores indicate infrequent or no participation in the identified events or activities. Higher scores on scales that address the degree of independence in relation to participation in or completion of specific activities or tasks indicate more dependence upon others to complete those tasks or participate in those activities. Higher scores on scales that address subjective distress indicate higher levels of subjective distress experienced by/reported by the individual.

The normative sample population for the BICRO-39 Patient-Post Form consisted of 223 patients with acquired brain injury (ABI) from four centers in London, England who voluntarily completed the instrument. Traumatic brain injury was the form of ABI in approximately 127 patients. Cerebral vascular accident was the form of ABI in approximately 72 patients. Multiple sclerosis was the form of ABI in approximately 15 patients. The remaining patients were categorized as "other" and included ABI due to brain tumor or encephalitis.

Table 4.2

Comparisons of Means, Standard Deviations, and Reliabilities from the CATI+

Scale	k[a]	Mean	SD	Reliability[b]
1. Depression Scale	24	52.67 (41.90)[c]	16.84 (9.80)[c]	.79 (.89)[c]
2. Anger Scale	15	28.74 (30.00)	5.79 (6.50)	.37 (.80)

a = Total items in scale
b = Cronbach's alpha
c = Numbers in parentheses are from Coolidge (2004)

Higher scores on the CATI+ indicate a higher degree of impairment within that particular domain. Raw scores are converted into T-scores by the computer scoring program so level of functioning can be ascertained.

The normative sample population for the CATI+ was a non-clinical group of participants.

> The subjects were recruited through college students and consisted of their friends, relatives and acquaintances. The college students were asked to recruit people whom they deemed normal or psychologically healthy. Specifically they were told not to test anyone who had previously been in jail or prison, anyone previously committed to a mental hospital, or anyone mentally retarded (Coolidge, 2004, 29).

Comparison of Subgroups on Potential Confounding Variables

An underlying goal of sample selection was to obtain a sample that was relatively homogeneous in nature. The ex-post facto design of this study prevented the random assignment of subjects, increasing the potential for confounding variables to influence the findings. Therefore, the sample was divided into two subgroups, males and females, and the two subgroups were compared on variables thought to have a potential impact on the results of statistical testing. A Chi-square test of association was used to analyze any differences between males and females on the discrete demographic characteristic of time since injury, with no significant association; χ^2 (7, N = 80) = 13.045 ($p < .071$). In other words no significant differences were found between men (male $\bar{x}$ = 3.70 SD = 2.49), and women (female $\bar{x}$ = 5.30, SD = 2.04) on the time that had elapsed since their injuries.

Independent ANOVAs were run to analyze any differences between the two subgroups (males and females) on the continuous demographic characteristics of age, and education. The characteristics of age and educational level both demonstrated no

significant differences between the subgroups; F (1, 81) = .007, p < .933 and F (1, 82) = .166, p < .685. In the current study no significant differences were found between men (male $\bar{x}$ = 43.55, SD = 17.86) and women (female $\bar{x}$ = 43.83, SD = 12.91) on their age. Also, no significant differences were found between men (male $\bar{x}$ = 13.59, SD = 2.73) and women (female $\bar{x}$ = 13.38, SD = 2.01) on their educational level.

Since no significant differences were found between the two subgroups (male and female) on any of the demographic characteristics it was not necessary to examine any of these variables as possible covariates.

Sex and Emotional/Psychological Symptoms Post-Mild Traumatic Brain Injury

The research question asking, "To what degree do men and women differ in their responses of anger and depression to mild traumatic brain injury?" was addressed with the following hypotheses.

Hypothesis 1:

> Men will report a higher incidence of anger than women post-mild traumatic brain injury.

Hypothesis 2:

> Women will report a higher incidence of depression than men post-mild traumatic brain injury.

A multivariate analysis of variance (MANOVA) was conducted and the results are presented in Table 4.3. In the MANOVA, sex was the independent variable, and psychosocial adjustment, depression, and anger were the dependent variables. Six scales from the post-injury BICRO-39 (i.e., personal care, mobility, self-organization, socializing, productive employment, and psychological well-being) were used to

operationalize psychosocial adjustment to mild traumatic brain injury. The depression scale from the CATI+ was used to operationalize depression post-mild TBI, and the anger scale from the CATI+ was used to operationalize anger post-mild TBI. The MANOVA was significant ($F = 2.901$, $p < .007$), which indicates that sex has a significant effect on response to mild traumatic brain injury. However, the nature of this effect is not clear from the multivariate test statistic. Therefore, to determine the nature of the effect, univariate ANOVAs were conducted. The results of the univariate ANOVAs, which address the research question and hypotheses from this section, are discussed, in detail, below.

Table 4.3

Mutivariate Tests

Effect	Test	Value	F	Sig.
SEX	Pillai's Trace	.246	2.901	.007
SEX	Wilk's Lambda	.754	2.901	.007
SEX	Hotelling's Trace	.327	2.901	.007
SEX	Largest Root	.327	2.901	.007

A univariate ANOVA was conducted to assess whether sex has a significant effect on incidence of anger post-mild TBI. No significant difference was found between men (male $\bar{x} = 47.79$, $SD = 9.95$) and women (female $\bar{x} = 45.61$, $SD = 7.15$) on the rate

at which they reported incidences of anger post-mild TBI; F (1) = 1.578, p < .213. Therefore, due to no significant findings, hypothesis number one was rejected. However, it is noteworthy that previous studies have reported differences between men and women on the rates at which they report incidences of anger post-TBI (Schopp et al., 2001; Willer et al., 1991).

A univariate ANOVA was conducted to assess whether sex has a significant effect on incidence of depression post-mild TBI. No significant difference was found between men (male $\bar{x}$ = 53.29, SD = 11.56) and women (female $\bar{x}$ = 59.42, SD = 16.71) on the rate at which they reported incidences of depression post-mild TBI; F (1) = 3.405, p < .069. Therefore, due to no significant findings, hypothesis number two was also rejected. However, it is noteworthy that the difference between men and women was near statistical significance in this study and is perhaps clinically significant. Women had higher depression scale T-scores (Female $\bar{x}$ = 59.42; Male $\bar{x}$ = 53.29) than men, which indicates that women did endorse more depressive symptoms than men. Future studies with a larger population sample may better explain this relationship.

Sex and Psychosocial Adjustment Post-Mild Traumatic Brain Injury

The research question asking, "To what degree do men and women differ in their psychosocial adjustment post-mild traumatic brain injury?" was addressed with the following hypothesis.

Hypothesis 3:

Women will report better psychosocial adjustment than men post-mild traumatic brain injury.

a) Women will report fewer complications with personal care than men post-mild traumatic brain injury.

b) Women will report fewer complications with mobility than men post-mild traumatic brain injury.

c) Women will report fewer complications with self-organization than men post-mild traumatic brain injury.

d) Women will report fewer complications with socializing than men post-mild traumatic brain injury.

e) Women will report fewer complications with productive employment than men post-mild traumatic brain injury.

f) Women will report fewer complications with psychological well-being than men post-mild traumatic brain injury.

The MANOVA described in the previous section of this chapter was significant ($F = 2.901$, $p < .007$), which indicated that sex has a significant effect on response to mild traumatic brain injury. However, since the nature of this effect was not clear from the multivariate test statistic, univariate ANOVAs were conducted to determine the nature of the effect. The results of the univariate ANOVAs, which address the research question and hypotheses from this section, are discussed, in detail, below, and are presented in Tables 4.4 and 4.5.

Subsections "a" through "e" of this hypothesis were rejected with no differences found between men and women on the rate at which they reported complications with personal care, mobility, self-organization, socializing, or productive employment post-mild TBI; $F(1) = .084$, $p < .773$; $F(1) = .356$, $p < .552$; $F(1) = 1.010$, $p < .318$; $F(1) =$

.274, $p < .602$; and $F(1) = .033$, $p < .857$. However, differences were reported between men and women regarding the rate at which they reported complications with psychological well-being; $F(1) = 6.475$, $p < .013$. Females had higher scores overall than males on the psychological well-being scale. Higher scores indicate lower psychological well-being as represented by the presence of either "dependency on others, infrequent engagement in a socially normal/desirable activity, or subjective distress" (Powell et al., 1215, 1998). This finding is counter to hypothesis 3, part F.

Table 4.4

Univariate Analyses of Variance (where sex is the independent variable)

Dependent Variable	df	F	Sig.	$\bar{x}$	SD
1. Personal Care Scale	1	.086	.771	.14 (.17)*	.47 (.49)*
2. Mobility Scale	1	.472	.494	.98 (1.14)	1.13 (1.03)
3. Self-organization Scale	1	.457	.501	1.32 (1.13)	1.38 (1.19)
4. Socializing Scale	1	.441	.509	2.84 (3)	1.10 (.97)
5. Productive Employment Scale	1	.060	.807	3.49 (3.54)	1.15 (.99)
6. Psychological Well-being Scale	1	6.696	.011	2.14 (2.81)	1.18 (1.14)

* Means and standard deviations for men and women are reported separately (women's means and standard deviations are in parentheses)

**Number of participants for each scale (men = 34, women = 48)

Differences were reported between men and women regarding the rate at which they reported complications with psychological well-being; $F(1) = 6.475$, $p < .013$. To

better understand the differences reported between men and women an item analysis was completed on the BICRO-39 psychological well-being scale. Univariate ANOVAs were conducted on each item to better specify the detected differences. The results of the univariate ANOVAs are presented in Table 4.5.

Table 4.5

Univariate Analyses of Variance of BICRO-39 Psychological Well-Being Scale Items (where sex is the independent variable)

Dependent Variable How often do you...	df	F	Sig.	$\bar{x}$	SD
34. get impatient with yourself?	1	6.194	.015	2.53 (3.25)*	1.31 (1.28)*
35. get angry with other people?	1	.872	.353	2.09 (2.30)	1.14 (.88)
36. feel hopeless about your future life?	1	6.161	.015	1.71 (2.60)	1.53 (1.67)
37. feel lonely?	1	7.067	.009	1.68 (2.62)	1.63 (1.57)
38. feel worn out?	1	15.511	.000	2.62 (3.77)	1.39 (1.24)
39. feel bored?	1	.498	.482	2.21 (2.44)	1.49 (1.44)

* Means and standard deviations for men and women are reported separately (women's means and standard deviations are in parentheses)

**Number of participants for each item on this scale (men = 34, women = 48)

After examining each item on the psychological well-being scale significant differences were found between men and women on items 34, 36, 37, and 38. Women reported getting impatient with themselves (Female $\bar{x} = 3.25$; Male $\bar{x} = 2.53$), feeling hopeless about their future (Female $\bar{x} = 2.60$; Male $\bar{x} = 1.71$), feeling lonely (Female $\bar{x}$

= 2.62; Male $\bar{x}$ = 1.68), and feeling worn out (Female $\bar{x}$ = 3.77; Male $\bar{x}$ = 2.62) significantly more frequently than men did. However, there were no significant differences found between men and women regarding how frequently they reported getting angry with other people, or how frequently they reported feeling bored.

Women reported getting impatient with themselves significantly more frequently than men did on the psychological well-being scale of the BICRO-39. Impatience is a symptom associated with irritability and increased self-criticalness. Irritability and self-criticalness are concepts used on the Beck Depression Inventory-II (BDI-II) (Beck, Steer, Ball & Ranieri, 1996), one of the most widely used depression inventories, to assess depression. Therefore the relationship between sex and impatience post-TBI is not surprising when you consider the relationship between sex and depression post-TBI where women report higher rates of depression than men (Schopp et al., 2001; Willer et al., 1991).

Women reported feelings of hopelessness about their future significantly more frequently than men did on the psychological well-being scale of the BICRO-39. Items addressing feelings of hopelessness are common on scales and inventories that are used to assess depression. For example, the BDI-II utilizes hopelessness as an indicator of depression on its pessimism scale. The Centre for Epidemiologic Studies Depression Scale (CESD) (Radloff, 1977) also utilizes hopelessness as an indicator of depression. Items on this scale cover areas such as depressed mood, and feelings of hopelessness, helplessness, and worthlessness. Considering the concept of hopelessness within the larger construct of depression we would anticipate that women would report feelings of

hopelessness more frequently than men, since past published research found higher rates of depression reported by women post-TBI (Schopp et al., 2001; Willer et al., 1991).

Women reported feelings of loneliness significantly more frequently than men did on the psychological well-being scale of the BICRO-39. Items addressing loneliness are used to assess depression on inventories such as the CATI+. Items on the CATI+ that assess the respondent's feelings of distance from other people, and emptiness tap into the concept of loneliness. Loneliness is yet another concept within the larger construct of depression, and thus it is not surprising that women reported feelings of loneliness more frequently than men on the psychological well-being scale of the BICRO-39 since past published research found higher rates of depression reported by women post-TBI (Schopp et al., 2001; Willer et al., 1991).

Women reported feeling "worn out" significantly more frequently than men did on the psychological well-being scale of the BICRO-39. Scales addressing loss of energy and tiredness or fatigue on the BDI-II are comprised of items that also assess this concept of feeling worn out. Feeling "worn out," or more tired and fatigued than usual is another concept used to assess the construct of depression. Since feeling "worn out" or fatigued are symptoms associated with depression we would anticipate that women would report feeling "worn out" more frequently than men, because women report higher rates of depression than men post-TBI (Schopp et al., 2001; Willer et al., 1991).

Sex and Usefulness of Services

Participants were asked to evaluate the usefulness of the services they have received post-mild TBI. Individual ANOVAs were run to analyze any differences between men and women on their ratings of the usefulness of the services they have

received post-mild TBI. No significant differences were found between men and women on their ratings of the usefulness of individual counseling, group counseling, same sex group counseling (in which all members of the group were the same sex as the participant), or family counseling post-mild traumatic brain injury. The results of the univariate ANOVAs, which address differences between men and women with regard to the usefulness of services received post-mild TBI, are presented in Table 4.6.

Table 4.6

Univariate Analyses of Variance (where sex is the independent variable)

Dependent Variable	df	F	Sig.	$\bar{x}$	SD	N
1. Individual Counseling	1	2.868	.096	1.71 (1.30)*	.99 (.74)*	17 (37)*
2. Group Counseling	1	1.183	.288	2.00 (2.63)	.87 (1.59)	9 (16)
3. Same Sex Group Counseling	1	.196	.664	2.60 (3.00)	1.34 (1.79)	5 (11)
4. Family Counseling	1	.101	.754	2.55 (2.36)	1.21 (1.65)	11 (14)

* Means, standard deviations, and number of people who responded are reported separately (women's means, standard deviations, and numbers are in parentheses)

Summary

This study did not find support for differences between men and women on their reports of depression, anger, and overall psychosocial adjustment post-mild TBI. However, a relationship was found between sex and psychological well-being, one of the fundamental factors that comprises psychosocial adjustment. Also, no differences were found between men and women on their ratings of individual counseling, group

counseling, same sex group counseling, or family counseling as a useful service post-mild TBI. Chapter five discusses the implications of the present study's findings.

CHAPTER FIVE

DISCUSSION AND CONCLUSION

Introduction

This chapter begins with an overview of this research, and is then organized around the hypotheses put forth in the current study. Next, conclusions are presented based on the data analyses, along with a section that integrates the findings of the current study with previous studies. Considerations for this study are presented, followed by recommendations for future research. Finally, thoughts regarding the importance of the contributions of this study to the field of counseling psychology are addressed.

Overview

Considerable progress has been made toward understanding the variables that impact adjustment post-traumatic brain injury. Research has examined factors such as psychological/emotional sequelae (Willer et al., 1991; McAllister, 1992; Mittenberg et al., 1993; Powell et al., 1998; Mathias & Coats, 1999; Alfano et al., 1993; McLean, Dikmen, & Temkin, 1993; Stambrook et al., 1991), somatic sequelae (Powell et al., 1998; McAllister, 1992; Mittenberg et al., 1993), and cognitive sequelae (Stuss et al., 1989; Alfano et al., 1993; Ruff et al., 1989; Barth et al., 1983; Laforce, Jr. & Martin-MacLeod, 2001).

Researchers have advanced this line of investigation by dividing traumatic brain injury patients into subgroups, based upon the severity of their injury, to better ascertain the issues faced by these individuals. Furthering this area of inquiry has also included the examination of psychosocial sequelae post-traumatic brain injury (Mathias & Coats,

1999; Hayden, 1997; McLean et al., 1993; Alfano et al., 1993). Overall, although deficits in psychosocial adjustment post-traumatic brain injury are apparent, few studies have examined psychosocial adjustment following a mild traumatic brain injury (Busch & Alpern, 1998). Also, although increasing evidence suggests general gender differences in brain organization (Kimura, 1992), neurochemistry (Heninger, 1997), cognitive functioning (Kimura, 1992; Benbow & Benbow, 1984), and emotional functioning (Crick et al., 1999), as well as gender differences in neuropsychological functioning post mild-traumatic brain injury (Raskin et al., 1998), and emotional functioning post mild-traumatic brain injury (Willer et al., 1991), few studies have investigated gender as a factor in psychosocial sequelae (Willer et al., 1991), or emotional sequelae (Busch & Alpern, 1998) post-mild traumatic brain injury. Thus, further information regarding these areas is warranted and would improve the understanding of the fundamental differences between these groups, and potentially lead to tailored treatment interventions based on patient needs.

Extrapolating from the direction of published research, the current study attempted to provide information on the relationships between gender and psychological/emotional symptoms post-mild traumatic brain injury, as well as gender and psychosocial sequelae post-mild traumatic brain injury. Analysis examined the relationships between gender and depression, anger, and psychosocial adjustment. Furthermore, to create a deeper understanding of the participants, this research examined gender differences in the ratings of the usefulness of the services participants received post-mild traumatic brain injury. For clarity, the presentation of this discussion is organized in the order of the hypotheses tested.

Sex and Emotional/Psychological Symptoms Post-Mild Traumatic Brain Injury

The research question asking, "To what degree do men and women differ in their responses of anger and depression to mild traumatic brain injury?" was addressed with the two following hypotheses:

Hypothesis 1:

Men will report a higher incidence of anger than women post-mild traumatic brain injury.

Hypothesis 2:

Women will report a higher incidence of depression than men post-mild traumatic brain injury.

Depression and anger are among the most frequently reported emotional symptoms associated with mild traumatic brain injury (McAllister, 1992; Szymanski & Linn, 1992; Mittenberg et al., 1993; Rosenthal, 1993; Gerber & Schraa, 1995; Cicerone & Kalmar, 1995). Depression and anger are also frequently reported as the most enduring and debilitating factors following a mild traumatic brain injury (Andrasik & Wincze, 1994; Lezak, 1995). Survivors of TBI show significantly higher incidence of post-injury depression than control groups and the overall population (Mathias & Coats, 1999; Alfano et al., 1993; McLean et al., 1993; Stambrook et al., 1991), with women being twice as likely to experience depression as men (Nolen-Hoeksema, 1990). Male survivors of TBI show significantly higher rates of anger, aggressiveness, and general psychological distress than women (Schopp et al., 2001; Willer et al., 1991). Anger causes significant dolor for survivors (Marschark et al., 2000). Mild traumatic brain injury survivors report higher rates of anger post-injury (Hanks et al., 1999), as well as,

significant distress regarding their increased levels of anger post-mild traumatic brain injury (Marschark et al., 2000). Extrapolating from this, it seems plausible that differences would exist between men and women with regard to the emotional symptoms they experience post-mild traumatic brain injury. Mainly, it would stand to argue that male survivors would report higher rates of anger than female survivors, and female survivors would report higher rates of depression than male survivors. However, the current research did not support a relationship between sex and reported depression or anger.

The findings of the present study appear to contradict past research, which found that gender was related to emotional symptoms reported post-traumatic brain injury (Schopp et al., 2001; Marschark et al., 2000; Hanks et al., 1999; Willer et al., 1991; Nolen-Hoeksema, 1990). The findings of the present research differ from the findings of Nolen-Hoeksema (1990) who reported that women were twice as likely as men to experience depression post-TBI. The present research also appears to differ from the findings of Schopp et al. (2001) and Willer et al. (1991) who reported that men have significantly higher rates of anger than women post-TBI. More carefully comparing the findings of this present study with the findings of other studies it is possible to see that, although there are similarities between components of the earlier studies and this study, none of them are direct comparisons. For example, the comparison studies are examining a broader construct than the current study. Several studies reported on the relationships between gender and anger, and gender and depression post-TBI (Schopp et al., 2001; Willer et al., 1991; Nolen-Hoeksema, 1990), without examining the subgroups of traumatic brain injury; mild, moderate, and severe, independently. Essentially, their

inclusion criteria required that all the subjects be TBI survivors, however the much narrower inclusion criteria in the present study required subjects to have a diagnosis of mild traumatic brain injury. Another distinction between the present study and the other studies is the diagnostic criteria used to define mild traumatic brain injury. The diagnostic criteria for mild traumatic brain injury vary widely among clinicians, and there is a "long-standing concern surrounding research on outcome of minor head injury... [due to] ambiguities in definition, inconsistencies in criteria for patient selection, variation in procedures for neurobehavioral assessment and difficulty in obtaining follow-up data" (Levin et al., 1987, 262). For example, mild traumatic brain injury, in the present study, is defined as a head trauma, without loss of consciousness, or with loss of consciousness lasting 20 minutes or less, a Glasgow Coma Scale score of 13 to 15, and a period of hospitalization for less than 48 hours (Uzzell, 1999). However, in the other studies discussed it is either not clearly stated how the authors defined mild traumatic brain injury, or the criteria used were different than those used in the present study. Therefore, it may be the case that although the related research's findings suggest a relationship between gender and emotional/psychological symptoms post-traumatic brain injury, the essence of what makes these other relationships significant is the use of a different definition of mild traumatic brain injury and different inclusion criteria. Furthermore, since some of the literature indicates improvement of symptomology over time (Olver et al., 1996; Gualtieri, 1999; McLean et al., 1993) studies should control for time since injury in their analyses, but many do not. In fact, although this study ensured that there were no significant differences in time since injury between men and women, the other studies either did not ensure this, or did not report that this was done. Thus, it

may also be the case that although the related research's findings suggest a relationship between gender and emotional/psychological symptoms post-traumatic brain injury, these results may exist due to significant differences in time since injury that were not controlled for.

While it is possible that the findings of the current research are reflective of the true nature of the relationship between gender and emotional/psychological symptoms post-mild traumatic brain injury, it is recommended that future studies utilize the same inclusion criteria, definition of mild traumatic brain injury, and controls for time since injury as the present study to corroborate these findings. Future studies using the same inclusion criteria, definition of mild traumatic brain injury, and controls for time since injury as the present study will be more comparable to this study, and will also be better able to assist in deciphering what the true relationship is between gender and emotional/psychological symptoms post-mild traumatic brain injury.

This study's population sample was collected from two clinics. However, the same psychologist conducted the neuropsychological assessments and determined the diagnoses of mild traumatic brain injury at both sites. This introduces the possibility that the care that these subjects received, although qualitatively similar to each other, may have been qualitatively different from what is typical at other clinics. It is also possible that the relationship between the psychologist and these subjects influenced the rate at which subjects reported negative emotional/psychological symptoms. It is recommended that future research, examining gender differences in emotional/psychological symptoms post-mild traumatic brain injury, be conducted in multiple settings, with multiple psychologists conducting the assessments.

Another consideration is that only self-report instruments were utilized in the current study. In a study of adult survivors of traumatic brain injury and their families between-group differences were reported in perceptions of emotional changes post-traumatic brain injury, whereas family members reported more extreme emotional changes in the TBI survivors than the TBI survivors reported in themselves (Hendryx, 1989). Thus, it is possible that survivors underreport symptoms post-TBI, and it is recommended that future research, examining gender differences in emotional/psychological symptoms post-mild traumatic brain injury, be conducted using both self-report and observer/caregiver-report instruments.

Thus, it is recommended that future research, examining gender differences in emotional/psychological symptoms post-mild traumatic brain injury, be conducted using both self-report and observer/caregiver-report instruments.

Sex and Psychosocial Adjustment Post-Mild Traumatic Brain Injury

The research question asking, " To what degree do men and women differ in their psychosocial adjustment post-mild traumatic brain injury?" was addressed with the following hypothesis.

Hypothesis 3:

Women will report better psychosocial adjustment than men post-mild traumatic brain injury.

a) Women will report fewer complications with personal care than men post-mild traumatic brain injury.

b) Women will report fewer complications with mobility than men post-mild traumatic brain injury.

c) Women will report fewer complications with self-organization than men post-mild traumatic brain injury.

d) Women will report fewer complications with socializing than men post-mild traumatic brain injury.

e) Women will report fewer complications with productive employment than men post-mild traumatic brain injury.

f) Women will report fewer complications with psychological well-being than men post-mild traumatic brain injury.

Mild traumatic brain injury is a chronic disability with far-reaching and long lasting side effects. Research on other chronic disabilities and diseases indicates that significant gender differences exist in psychosocial adjustment to cancer (Kennedy & Robinson, 1994), colon cancer (Baider et al., 1989), burn injuries (Brown et al., 1988), liver transplant (Tarter et al., 1990), and depression (Mcroberts, 1999). Also, three published studies on adjustment to traumatic brain injury indicated that post-injury men reported significantly greater distress than women in general psychological functioning, one of the two major factors that characterizes psychosocial adjustment (Schopp et al., 2001; Marschark et al., 2000; Willer et al., 1991). Extrapolating from this, it seems plausible that men and women with mild traumatic brain injury would also report differences in their psychosocial adjustment to their chronic disability. Mainly, it would stand to argue that post-mild traumatic brain injury women would report fewer complications with personal care, mobility, self-organization, socializing, productive employment, and psychological well-being, all characteristics of psychosocial adjustment, than men would. However, the current research did not find a significant

difference between men and women on reported complications with personal care, mobility, self-organization, socializing, or productive employment post-mild TBI, but it did find a significant difference between men and women regarding complications with psychological well-being.

The findings of the present study conflict with past research. No differences were found between men and women on any of the characteristics of psychosocial adjustment, with the exception of psychological well-being. However, contrary to past research findings, women actually reported significantly more complications with psychological well-being than men did. Women had higher overall scores than men on the psychological well-being scale of the BICRO-39. Higher scores indicate lower psychological well-being and according to Powell et al. (1998) the presence of either "dependency on others, infrequent engagement in a socially normal/desirable activity, subjective distress (1215)," or some combination of these factors. In the current study an item analysis revealed that women reported more impatience with themselves, more hopelessness about their future, more feelings of loneliness, and less energy (i.e., "feel worn out") than their male counterparts. The findings of the present study differ from the findings of Kennedy & Robinson (1994), Baider et al. (1989), Brown et al. (1988), Tarter et al. (1990), and Mcroberts (1999), who all found differences between men and women in overall psychosocial adjustment to various chronic disabilities and diseases. The findings of the present study also differ from the findings of Schopp et al. (2001), Marschark et al. (2000), and Willer et al. (1991), who found that men report significantly greater distress in psychological functioning post-TBI than women do. However, more carefully comparing the findings of this present study with the findings of other studies it

is possible to see that, although there are similarities between components of the earlier studies and this study, none of them are direct comparisons. For example, the comparison studies examining psychosocial adjustment are examining a variety of different chronic disabilities and diseases, but not mild traumatic brain injury specifically. Also, although two of the comparison studies that examined psychological well-being indicated that men reported significantly greater distress in general psychological functioning than women post-TBI, the subgroups of traumatic brain injury; mild, moderate, and severe, were not examined independently. Essentially, Schopp et al. (2001), and Willer et al. (1991) had broader inclusion criteria that only necessitated that their subjects be TBI survivors, as opposed to the much narrower inclusion criteria in the present research, which required subjects to carry a diagnosis of mild traumatic brain injury. Also, the inclusion criteria and definition of mild traumatic brain injury established in this study are not consistent with those established by Marschark et al. (2000). Therefore, it may be the case that although the related research's findings suggest a relationship between gender and psychosocial adjustment post-chronic disability, and a relationship between gender and psychological well-being, the essence of what makes these other relationships significant is their examination of chronic disabilities and diseases other than traumatic brain injury, as well as their different inclusion criteria.

While it is possible that the findings of the current research are reflective of the true nature of the relationship between gender and psychosocial adjustment post-mild traumatic brain injury, it is recommended that future studies examine the chronic disability of traumatic brain injury specifically, and also use the same inclusion criteria as the present study to corroborate these findings. Future studies that examine the same

chronic disability, and use the same inclusion criteria, will be more comparable to this study, and will be better able to assist in deciphering the true relationship that exists between gender and psychosocial adjustment post-mild traumatic brain injury.

Since the sample in the present study (adult men and women diagnosed with a mild-TBI) was collected from two clinics, where the same psychologist conducted the neuropsychological assessments and determined the diagnoses of mild traumatic brain injury, it is possible that the care that these subjects received, although qualitatively similar to each other, may have been qualitatively different from what is typical at other clinics. It is also possible that the relationship between the psychologist and these subjects influenced the way subjects reported psychosocial adjustment. Subjects may have been more apt to report fewer psychosocial symptoms due to their desire to please the practitioner, whose assistance with their recovery was greatly valued. It is recommended that future research, examining gender differences in psychosocial adjustment post-mild traumatic brain injury, be conducted in multiple settings, with multiple psychologists conducting the assessments.

Another possible consideration is that only self-report instruments were utilized in the current study. In a study of adult survivors of traumatic brain injury, and their families, between-group differences were reported in perceptions of changes post-traumatic brain injury (Hendryx, 1989). Thus, it is possible that survivors underreport symptoms post-TBI, and it is recommended that future research, examining gender differences in psychosocial adjustment post-mild traumatic brain injury, be conducted using both self-report and observer/caregiver-report instruments.

Finally, the influence that the demographic variables race/ethnicity, and type of injury reported may have had on the outcome of the current study should be considered. In the current study 75.6% of the subjects were European American/Caucasian, and 78% of the subjects indicated that their injury was due to a car accident. Therefore, it is possible that a more diverse sample population that was more representative of the general population would have reported differences in psychosocial adjustment post-mild traumatic brain injury. It is recommended that future research, examining gender differences in psychosocial adjustment post-mild traumatic brain injury, be conducted on a more diverse sample population.

Sex and Usefulness of Services

The characteristics of the interpersonal problems and personality changes that men and women experience post-traumatic brain injury are different (Schopp et al., 2001; Marschark et al., 2000; Hanks et al., 1999; Willer et al., 1991). Research into cognitive functioning, emotional functioning, coping strategies, treatment recovery, and traumatic brain injury indicate that gender plays a role in how individuals think, behave, express themselves, deal with adversity, and respond to disability. These differences between men and women are important to understand, as they are critical to the development of appropriate and successful treatment and rehabilitation interventions. For example, Willer et al. (1991), indicated that women with mild traumatic brain injuries identified, in order of importance, 1) loss of autonomy, 2) loneliness and depression, 3) decreased interest in sexual activities, 4) chronic pain (headache and backache) and limitations in participating in activities associated with their family role within the home, 5) personality changes, and 6) reduced memory and cognitive abilities as their primary impediments, whereas men

identified, in order of importance, 1) loss of or diminished independence, 2) changes in life roles as husband, parent, and provider (particularly loss of role as breadwinner), 3) difficulties associated with a lack of awareness of and adaptability to their limitations, 4) difficulties with memory and cognitive functions (reading, writing, comprehension, and expression of ideas), and 5) personality changes (identified primarily as major mood swings and reduced control of emotions) as their primary difficulties post-mild traumatic brain injury. Thus, it stands to reason that if the issues men and women are identifying as important post-mild traumatic brain injury vary, than their rehabilitation needs will also vary. Therefore, closely examining gender differences in the usefulness of the various rehabilitation services received post-mild traumatic brain injury has implications for identifying the various strengths and weaknesses of current interventions, as well as directions for future interventions.

In the present study participants were asked to evaluate the usefulness of the services they have received post-mild TBI so that we might gain a deeper understanding of the differences between men and women in this area. It seems plausible that differences would exist between men and women with regard to how useful they find different services post-mild traumatic brain injury. Conversely, the current research did not find any significant differences between men and women on their ratings of the usefulness of individual counseling, group counseling, same sex group counseling, or family counseling post-mild TBI. However, it is noteworthy that the number of individuals in the sample population who had received the services examined was very small. For example, only 17 men and 37 women in the sample population reported that they had received individual counseling post-injury. It is also noteworthy that even

though there were no significant differences found between men and women on their ratings of the usefulness of these types of counseling, both men and women did report that they found the services useful.

Considerations

The ex-post facto design examines the association between two or more variables after the fact. In this study, the independent variable was genetically intrinsic to the individual, and unlike an experimental design, where the independent variable can be controlled, and subjects can be randomly assigned, the ex-post facto design does not lend itself to random assignment. Analyses under this design may be able to suggest relationships between sex and the emotional/psychological symptoms of mild traumatic brain injury, or sex and psychosocial adjustment post-mild TBI, but they are not able to prove a cause-effect relationship between variables.

The internal reliability of the anger scale for the sample population was low, with an alpha coefficient of .37. Thus, the reliability for this scale in the current study was substantially lower than the anticipated $\alpha = .80$ Coolidge (2004) reported for the normative sample. This discrepancy was not attributable to differences in the means or standard deviations between the two populations, as they were similar when compared. Also, when the reliability coefficients for men and women were examined separately there were no significant differences that could account for this discrepancy. It is possible that the sample population in the current study and the normative sample population are not representative of the same population. This explanation appears to be very likely since the normative sample was a non-clinical group of people who were acquaintances, friends, and family members of the group of college students who

collected the normative data, and this sample population is representative of a clinical population where the individuals have been diagnosed with a mild traumatic brain injury.

The demographic questionnaire in this study asked specific questions to identify the sample population. However, it is possible that important demographic factors, which affect the variables being analyzed in the present study, were omitted. For example, neither the social nor economic status of the subjects was established in the present study because very little has been written about them in relation to traumatic brain injury. However, they have been studied in other chronic disorders and were found to influence risk factors and outcomes (Gallo & Matthews, 2003; Whitefield, Weidner, Clark, & Anderson, 2002). Cultural context, which has been shown to affect the treatment of and response to chronic disorders (Bates, Rankin-Hill, & Sanchez-Ayendez, 1997) is another demographic variable that was not examined in the current study. Measurement of these variables was outside the scope of this study. Finally, there are undoubtedly demographic factors that are yet to be uncovered that impact the dependent variables in the current study.

Over 75% of the subjects in the current study were European American/Caucasian. This disproportionate focus on European American/Caucasian individuals is a limitation to the generalizability of these findings. Furthermore, over 75% of the subjects in the current study indicated that their injury was due to a car accident. This disproportionate representation of car accidents as the cause of injury is another limitation to the generalizability of these findings.

Selection bias in the sample population is another consideration in the current study. Participants were selected from two clinics, which are both located in central

Michigan. Also, participants were volunteers, who received some form of reimbursement for their participation in the current study. Any or all of these factors could have influenced the selection of participants and the generalizability of these findings.

Instrument selection is another consideration in the current study, since self-report instruments were exclusively utilized to examine the variables in the current study. In a study of adult survivors of traumatic brain injury, and their families, between-group differences were reported in perceptions of changes post-traumatic brain injury (Hendryx, 1989). Thus, perhaps the use of both self-report instruments and observer/caregiver-report instruments would have provided more reliable information regarding the relationships between sex and; 1) the emotional/psychological symptoms of mild traumatic brain injury, and 2) psychosocial adjustment post-mild TBI.

Finally, an additional analysis, which was conducted after the initial study was completed, revealed significant differences on time since injury between men and women when the groups established for this study were combined into three larger groups. The TSI groups were collapsed from the 7 groups used in this study to 3 larger groups, to try to even out the number of participants in each group. Thus, the first group had participants whose TSI was less than one month to 9 months. The second group had participants whose TSI was 10 months to 5 years, and the third group had participants whose TSI was over 5 years. After collapsing the groups into these smaller groups a Chi-square test of association was used to analyze any differences between males and females on the discrete demographic characteristic of time since injury. The Chi-square indicated a significant association; χ^2 (2, N = 80) = 8.38 ($p < .015$). More women than men were present in each group. These results may be indicative of differences between men and

women on the rates at which they are willing to seek assistance post-injury, or their willingness to participate in research post-injury. Thus, future studies should examine time since injury post-mild TBI more closely to increase our understanding of what these differences may mean particularly as they apply to treatment.

Clinical Implications

These findings raise important considerations regarding clinical interventions post-mild TBI. In the current study women more readily reported factors associated with depression than factors associated with anger or irritability. Therefore, it is important for clinicians to investigate further what symptoms women may not be readily reporting. Underlying issues that go under-reported are as important, if not more important for clinicians to investigate than the surface issues, which clients readily admit exist. Although men more readily report experiencing features of anger and women more readily report experiencing features of depression (Schopp et al., 2001; Willer et al., 1991; Nolen-Hoeksema, 1990) clinicians need to consider how gender socialization impacts what information clients are willing to report. Thus, not only is it important to treat the symptoms clients are reporting, but it is also crucial to investigate what underlying issues impacting clients are not being reported, and what their roles are in an individual's existing psychological problem. Clinical interventions need to build from the information clients report, while looking for diagnostic clues in clients' omissions. This study raises the issue of investigating the symptoms clients readily report post-mild TBI, as well as the symptoms they aren't readily admitting exist. Furthermore, looking at gender differences in the way clients communicate their problems is critical. Perhaps a male client is reporting what he identifies as increased anger post-mild TBI, however a

trained clinician might identify the symptoms reported as depressive symptoms. It is imperative that when treating survivors of mild-TBI clinicians remain patient and supportive with clients while also challenging clients to explore the meanings of their symptoms. Socialization and gender norms may make it difficult for clients to find ways to appropriately express their feelings, however it is the clinician's responsibility to assist the client with appropriately identifying and labeling their feelings and experiences.

Recommendations for Future Research

An abundance of research has been conducted that has examined the issues concomitant with traumatic brain injury, as well as, mild traumatic brain injury specifically. However, one of the most widely identified problems associated with mild traumatic brain injury is the lack of a universal definition and classification schema (Busch & Alpern, 1998; Levin et al., 1987; Rosenthal, 1993; Uzzell, 1999; DeKruijk, Twijnstra, & Leffers, 2001). The diagnostic criteria for mild traumatic brain injury vary widely among clinicians, and the lack of a universal definition of or classification schema for mild traumatic brain injury creates inconsistency in the research, which results in ambiguities regarding the applicability of the research findings. Researchers can not be certain that the same construct is actually being measured if the definition of the construct is vague or plagued with inconsistencies. Therefore, it is recommended that additional research examining mild traumatic brain injury use what is currently the most widely accepted definition of mild traumatic brain injury: a head trauma, without loss of consciousness, or with loss of consciousness lasting 20 minutes or less, a Glasgow Coma Scale score of 13 to 15, and a period of hospitalization for less than 48 hours (Uzzell, 1999).

It is also necessary to understand differences relative to race/ethnicity, social context, and type of injury. Therefore, it is recommended that additional research focus on underserved and understudied populations, such as people of color, individuals with low socioeconomic status, and people with mild traumatic brain injuries that resulted from incidents besides car accidents.

Given what is known regarding the lack of a universal classification schema for mild traumatic brain injury, treatment outcome studies should be examined more carefully before results are applied to clinical interventions. Future research that examines survivors' evaluations of the usefulness of the services they have received post-mild TBI should have a larger sample size, and should use the aforementioned definition of mild traumatic brain injury from Uzzell (1999) to ensure that the same construct is consistently examined.

Importance to Counseling Psychology

This study contributes to the field of counseling psychology by remaining true to the five unifying themes of the field. These five unifying themes are: 1) focus on career and educational development; 2) focus on normal people as opposed to severely disturbed; 3) focus on strengths and positive mental health; 4) emphasize relatively brief interventions; and 5) emphasize person-environment interactions (Gelso & Fretz, 1992). This study attempted to emphasize these themes by addressing issues of psychological and psychosocial adjustment, which impact career and educational development and performance. Also, in accordance with these unifying themes, this study focused on individuals with mild traumatic brain injury, as opposed to moderate or severely impaired individuals. Finally, this study examined the relationship between individuals and their

environment by analyzing psychosocial adjustment to mild traumatic brain injury. By focusing on psychosocial adjustment this study emphasizes the importance of person-environment interactions.

APPENDICES

APPENDIX A

LETTER OF INTRODUCTION TO STUDY

Dear Sir or Ma'am,

Our records indicate that in the past you have undergone a neuropsychological examination with PAR Rehab Services. We are presently contacting you to inform you of a research study for which you may be eligible. The study, "Psychosocial Adjustment Post-Mild Traumatic Brain Injury", is being led by Robert J. Fabiano, Ph.D. and Abby Howard, MA, of Michigan State University, College of Education. This study will investigate adjustment following mild traumatic brain injury. We believe this research will help by both gaining knowledge of former patients long-term, but also provide better treatment interventions in the future. As a former patient of PAR Rehab services we are asking your permission to give information to MSU researchers so that they may contact you for participation in the study. In compliance with Federal privacy regulations we must have your expressed written authorization before giving the researchers your personal information. Your participation is voluntary, and your decision to participate or not participate will have no impact on your continued access to treatment. Should you decide to participate now, and at some time in the future decide to terminate participation, you can do so without any impact or influence over treatment services you are receiving.

Enclosed in this mailing are two forms. The first is an authorization form. By signing this form, you are permitting us to give the study researchers information in your medical file for the purposes of this study. The authorization form specifies what information you are allowing us to give to the researchers, and when this permission ends.

The second enclosed form is a consent form for the study that explains the purpose of the study, the risks and benefits of your participation, how the researchers will protect your confidentiality, your rights as a participant, and who to contact for questions about the study and your rights as a participant. If you are willing to participate after reading the enclosed forms, please sign both forms and mail them back using the self-addressed stamped envelop included.

Thank you for your time.

Sincerely,

Robert Fabiano, Ph.D.
Director PAR Rehab Services/Licensed Psychologist

APPENDIX B

INFORMED CONSENT FORM

Psychosocial Adjustment Post-Mild Traumatic Brain Injury Study
Consent Form

My name is Abby Howard, and I am currently in a Ph.D. program at Michigan State University. As part of my program I am given the opportunity to contribute to current understandings of mild traumatic brain injury through a research project. The purpose of this letter is to ask for your participation in a study being conducted by researchers at Michigan State University in conjunction with PAR Rehab Services. The goal of this research is to examine individuals' psychosocial adjustment following mild traumatic brain injury. It is believed that the project will assist in developing a better understanding of the events that aid in a person's adaptation following mild traumatic brain injury.

Who may Participate? I am seeking volunteers of either sex, who are at least 18 years old, and who have been diagnosed with a mild traumatic brain injury.

What will you be asked to do? If you are willing to participate in this study, a researcher will supply you with a research packet via mail, or in person at PAR Rehab Services. Participants will be asked to complete three survey instruments that will ask a series of questions about your health, and adjustment to your mild traumatic brain injury. It takes approximately 40 minutes to complete the entire survey packet. We ask that if you complete the survey in person you turn it back in to the individual who provided it to you. However, if you complete the form via mail, we ask that you return it in the stamped envelope provided.

What about Privacy? Your privacy will be protected to the maximum extent allowable by law. Identification numbers rather than names will be used on all of the surveys and no identifying information will be used when describing our research findings.

As a thank you... To show appreciation for your time and completion of the survey packet you will be entered in a $100.00 raffle, to be drawn at the completion of data collection.

Your participation in the study would be greatly appreciated. Your participation is voluntary; you may decline to answer particular questions, or participate without penalty, and if you decide to participate, you may withdraw from the study at anytime without penalty. If you have any questions concerning this study, please contact: Robert J. Fabiano, Ph.D. (517-887-9801) at PAR Rehab Services, 3960 Patient Care Drive, Suite 104, Lansing, MI 48911, or Abby D. Howard, M.A. (howardab@msu.edu or 517-355-8508) at 401C Erickson Hall, East Lansing, MI 48824, or Nancy Crewe, Ph.D. (517-432-0606) at Michigan State University, Office of Rehabilitation and Disability Studies, 459 Erickson Hall, East Lansing, MI 48824-1034. If you have questions or concerns regarding your rights as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact - anonymously, if you wish - Peter Vasilenko, Ph.D., Chair of the University Committee on Research Involving Human Subjects (UCRIHS) by phone: (517) 355-2180, fax: (517) 432-4503, email: ucrihs@msu.edu, or regular mail: 202 Olds Hall, East Lansing, MI 48824.

I have been informed about the nature of the study. My signature below indicates my willingness to voluntarily participate in the study.

Signed _____ Date_____

APPENDIX C

DEMOGRAPHIC QUESTIONNAIRE

Psychosocial Adjustment Post-Mild Traumatic Brain Injury Study

DEMOGRAPHIC QUESTIONNAIRE

PARTICIPANT IDENTIFICATION NUMBER_____

Current Age: _____ Sex: Male / Female (Circle one)

Age at time of injury: _____ Marital Status: Married / Single / Divorced (Circle one)

Date of Injury: _____

Highest Grade Completed: 8 9 10 11 12 13 14 15 16

Associates Degree Bachelors Degree Masters Degree

Other_____

(Circle all that apply regarding your education)

Ethnicity:

____ African American ____ European American

____ Asian American ____ Hispanic

____ Native American/Pacific Islander

____ Other (_____)
Please specify

Type of Injury:

____ Car accident ____ Fall

____ Sports injury ____ Tumor

____ Stroke ____ Illness

____ Overdose ____ Other (_____)
Please Specify

(Please go to next page)

Please rate the following services on their usefulness in assisting you with your adjustment to your mild traumatic brain injury. Use the following rating scale:
1 = Extremely useful, 2 = Somewhat Useful, 3 = Not Applicable, 4 = Minimally Useful, 5 = Not Useful at all. Please write in the scale number on the line provided.

_____ Individual counseling

_____ Group counseling

_____ Group counseling in which all the group participants were the same sex as you (male or female)

_____ Family counseling

_____ Other (_____)
Please Specify

Please identify any other services, which you did not receive, but believe you might find helpful in the space below.

APPENDIX D

BRAIN INJURY COMMUNITY REHABILITATION OUTCOME SCALES
(BICRO-39)
Patient Post-injury (P-POST) Form

This questionnaire helps us understand how much your life has changed as a result of your brain injury. The questionnaire has eight sections that ask about your independence in personal care, mobility, self-organization, contact with your partner and your own children, contact with your parents and siblings, socializing, productive employment, and psychological well-being.

Please go through the questionnaire and answer all questions according to how you are NOW.

PERSONAL CARE

How much help or assistance from other people do you need with...

	didn't do at all	constant help	a lot of help	some help	prompts only	no help/ prompts
1) getting into and out of bed	5	4	3	2	1	0
2) moving from room to room	5	4	3	2	1	0
3) getting to the toilet	5	4	3	2	1	0
4) using the toilet	5	4	3	2	1	0
5) reaching and using the phone	5	4	3	2	1	0
6) reaching and using TV or radio	5	4	3	2	1	0

MOBILITY

How much help or assistance from other people do you need with...

	didn't do at all	constant help	a lot of help	some help	prompts only	no help/ prompts
7) using public transportation	5	4	3	2	1	0
8) going to local shops	5	4	3	2	1	0
9) doing laundry (washing, drying, ironing)	5	4	3	2	1	0
10) cleaning the home (inc. vacuuming)	5	4	3	2	1	0
11) shopping (for food, household needs)	5	4	3	2	1	0

How often do you...

	didn't do at all	once or twice a year	several times a year	about once a month	several times a month	once a week or more
12) go out for a walk or to a park	5	4	3	2	1	0

SELF-ORGANIZATION

How much help or assistance do you need from other people with...

	didn't do at all	constant help	a lot of help	some help	prompts only	no help/ prompts
13) keeping track of money	5	4	3	2	1	0
14) dealing with your own bank account	5	4	3	2	1	0
15) paying household bills	5	4	3	2	1	0
16) writing official letters (e.g. bank)	5	4	3	2	1	0
17) writing private letters	5	4	3	2	1	0
18) managing appointments	5	4	3	2	1	0

CONTACT WITH PARTNER/OWN CHILDREN

How often do you spend some time with...

	not applicable or never	once or twice a year	several times a year	once or twice a month	once or twice a week	most or all days
19) your partner or spouse	5	4	3	2	1	0
20) your children	5	4	3	2	1	0

CONTACT WITH PARENTS/SIBLINGS

How often do you spend some time with...

	not applicable or never	once or twice a year	several times a year	once or twice a month	once or twice a week	most or all days
21) your mother	5	4	3	2	1	0
22) your father	5	4	3	2	1	0
23) a sister or brother	5	4	3	2	1	0

SOCIALIZING

How often do you spend time...

	didn't do at all	less than once a week	once or twice a week	several times a week	an hour or so most days	several hours a day
24) socializing with people/ family at home	5	4	3	2	1	0

How often do you spend some time with...

	not applicable or never	once or twice a year	several times a year	once or twice a month	once or twice a week	most or all days
25) relatives other than immediate family (i.e. not parents, brothers, sisters, partner, own children)	5	4	3	2	1	0
26) your closest friend	5	4	3	2	1	0
27) another long-standing friend	5	4	3	2	1	0
28) a colleague (outside work time)	5	4	3	2	1	0
29) a new acquaintance (made since brain injury)	5	4	3	2	1	0

PRODUCTIVE EMPLOYMENT

How much time do you spend...

	didn't do at all	less than an hour a week	1-4 hours a week	5-10 hours a week	11-20 hours a week	more than 20 hours a week
30) doing paid work	5	4	3	2	1	0
31) doing unpaid or voluntary work	5	4	3	2	1	0
32) studying, training, doing courses	5	4	3	2	1	0
33) looking after children	5	4	3	2	1	0

PSYCHOLOGICAL WELL-BEING

How often do you...

	almost always	very often	often	some-times	hardly ever	never
34) get impatient with yourself	5	4	3	2	1	0
35) get angry with other people	5	4	3	2	1	0
36) feel hopeless about your future life	5	4	3	2	1	0
37) feel lonely	5	4	3	2	1	0
38) feel worn out	5	4	3	2	1	0
39) feel bored	5	4	3	2	1	0

THANK YOU - YOU HAVE NOW FINISHED THIS QUESTIONNAIRE

APPENDIX E

COOLIDGE AXIS II INVENTORY-PLUS (CATI+)

A=Strongly False (SF) B=More False (MF) C=More True (MT) D=Strongly True (ST)

Coolidge Axis II Inventory - Plus
CATI+

Frederick L. Coolidge, Ph.D.
University of Colorado
Colorado Springs

Instructions

The things written in this book ask you to answer as you see yourself. Some sentences will seem strongly false, and some sentences will seem strongly true. Other sentences will seem somewhere in between the strongly false and strongly true. You are to choose if they are more false than true, or more true than false.

It is important that you try not to leave out any answers. If the sentence does not exactly describe you, do your best to find the answer that most closely is like you.

Read each sentence carefully. After each sentence, you will find four possible answers: **A** for "Strongly False," **B** for "More False than True," **C** for "More True than False," and **D** for "Strongly True." Put a circle around the answer that is most like you.

Coolidge Axis II Inventory+

A=Strongly False (SF) B=More False (MF) C=More True (MT) D=Strongly True (ST)

1.	I like to go where I can talk to a lot of people.	SF	MF	MT	ST	1
2.	I have had a lot of different jobs in the last few years.	SF	MF	MT	ST	2
3.	People find me to be a nice person.	SF	MF	MT	ST	3
4.	I like to look sexy or act sexy.	SF	MF	MT	ST	4
5.	Before the age of 15, I was a big liar.	SF	MF	MT	ST	5
6.	My feelings don't change a lot.	SF	MF	MT	ST	6
7.	I am quiet with people because I may not be able to answer a question they ask.	SF	MF	MT	ST	7
8.	I am afraid to do things that might get me arrested.	SF	MF	MT	ST	8
9.	I feel relaxed most of the time.	SF	MF	MT	ST	9
10.	I have gotten into at least one hitting fight in the past few years.	SF	MF	MT	ST	10
11.	I don't want to get close to people unless I am certain that they will like me.	SF	MF	MT	ST	11
12.	I am easily hurt by being criticized or by someone not liking me.	SF	MF	MT	ST	12
13.	I usually have heavy and up and down relationships.	SF	MF	MT	ST	13
14.	I think my memory has gotten worse in the past few years.	SF	MF	MT	ST	14
15.	I usually hold back my emotions and kind feelings.	SF	MF	MT	ST	15
16.	I get advice or the O.K. from others before I make small decisions.	SF	MF	MT	ST	16
17.	Someone I know thinks I have an alcohol or drug problem.	SF	MF	MT	ST	17

18.	Before the age of 5, I used a weapon in more than one fight.	SF	MF	MT	ST	18
19.	I get by in my life without help from others.	SF	MF	MT	ST	19
20.	Some people say that I take too many chances.	SF	MF	MT	ST	20
21.	I have trouble deciding things everyday.	SF	MF	MT	ST	21
22.	When people criticize me, I almost never get angry.	SF	MF	MT	ST	22
23.	I don't want and don't like people to be close to me (including my family).	SF	MF	MT	ST	23
24.	My need to be perfect stops me from finishing a job on time.	SF	MF	MT	ST	24
25.	I don't usually think people will use or harm me.	SF	MF	MT	ST	25
26.	I find life exciting.	SF	MF	MT	ST	26
27.	People make me angry.	SF	MF	MT	ST	27
28.	I do not waste time; that is, I do not put off things that need to be done.	SF	MF	MT	ST	28
29.	When I fall in love, I'm usually the one who ends up hurt.	SF	MF	MT	ST	29
30.	I have never hit anyone in any of my relationships.	SF	MF	MT	ST	30
31.	I feel like people are talking right at me or about me on the TV or radio.	SF	MF	MT	ST	31
32.	Other people make most of my important decisions.	SF	MF	MT	ST	32
33.	I have chosen people or places that have led to bad feelings, failure, or abuse.	SF	MF	MT	ST	33
34.	People think I am too tied to my job or work.	SF	MF	MT	ST	34
35.	I pay back all my loans and debts.	SF	MF	MT	ST	35

36.	I think I depend too much on others.	SF	MF	MT	ST	36
37.	I like doing things that take in being with a lot of people.	SF	MF	MT	ST	37
38.	I fail to finish jobs even when I have the skill to do them.	SF	MF	MT	ST	38
39.	I played quarterback for the Denver Broncos football team.	SF	MF	MT	ST	39
40.	Before the age of 15, I ran away from home overnight more than once.	SF	MF	MT	ST	40
41.	I like to make full plans for my time off or rest time.	SF	MF	MT	ST	41
42.	Before the age of 15, I often started fist fights.	SF	MF	MT	ST	42
43.	People are not as loyal to me as I would like them to be.	SF	MF	MT	ST	43
44.	I wonder who I am most of the time.	SF	MF	MT	ST	44
45.	People see me as a forceful person.	SF	MF	MT	ST	45
46.	Before the age of 15, I stole from others more than once (shoplifting, forgery, etc.).	SF	MF	MT	ST	46
47.	I have trouble understanding what I read.	SF	MF	MT	ST	47
48.	I get enough "thank you's" when I work (home or at a job).	SF	MF	MT	ST	48
49.	I hardly ever let others make big decisions in my life, like where to live or what job to take, etc.	SF	MF	MT	ST	49
50.	I think that there are people who are out to get me or harm me or ruin me in some way.	SF	MF	MT	ST	50
51.	I have quit more than one job without having plans for my next job.	SF	MF	MT	ST	51
52.	People talk about me behind my back.	SF	MF	MT	ST	52

53.	I am very worried about small things, lists, or schedules before I begin a job.	SF	MF	MT	ST	53
54.	I think I was born with more skills and talents than the average person.	SF	MF	MT	ST	54
55.	I can get sad pretty quickly.	SF	MF	MT	ST	55
56.	I try hard to not be alone.	SF	MF	MT	ST	56
57.	I almost always trust friends or co-workers.	SF	MF	MT	ST	57
58.	I become sulky or touchy if I am asked to do things that I do not want to do.	SF	MF	MT	ST	58
59.	I never destroyed other people's property on purpose (like vandalism or setting fires).	SF	MF	MT	ST	59
60.	Often, I cannot finish a job because I set my goals too high.	SF	MF	MT	ST	60
61.	I am a jealous person.	SF	MF	MT	ST	61
62.	I am a person who has to do things right away.	SF	MF	MT	ST	62
63.	I would never put down or shame someone in public even if they deserved it.	SF	MF	MT	ST	63
64.	I feel strong emotional feelings.	SF	MF	MT	ST	64
65.	I am very relaxed with people even if I do not know the people.	SF	MF	MT	ST	65
66.	I like to be silly and laugh.	SF	MF	MT	ST	66
67.	I am up tight when people find me sexually attractive.	SF	MF	MT	ST	67
68.	I feel useless and helpless a lot of the time.	SF	MF	MT	ST	68
69.	I am very bothered if people don't like me.	SF	MF	MT	ST	69
70.	Before the age of 15, I was mean and hurt people or animals.	SF	MF	MT	ST	70

71.	I have traveled around without a job, a clear goal, or a travel plan.	SF	MF	MT	ST	71
72.	I am quiet with people because I might say the wrong thing and seem foolish.	SF	MF	MT	ST	72
73.	I have been very thoughtless in my spending money, or sex, drug use, shoplifting, reckless driving, or binge eating.	SF	MF	MT	ST	73
74.	I enjoy deciding things myself without help from others.	SF	MF	MT	ST	74
75.	I think people don't rate looking good high enough.	SF	MF	MT	ST	75
76.	I guess you could say I was a juvenile delinquent.	SF	MF	MT	ST	76
77.	I am more calm than other people.	SF	MF	MT	ST	77
78.	When I'm alone, I feel helpless and uptight.	SF	MF	MT	ST	78
79.	When people talk to me, it sounds like they are mumbling.	SF	MF	MT	ST	79
80.	It really bothers me when I'm not the center of attention.	SF	MF	MT	ST	80
81.	I agree with other people, even if I know that they are wrong, because I'm afraid they won't like me.	SF	MF	MT	ST	81
82.	It takes a lot to make me uptight.	SF	MF	MT	ST	82
83.	Being good looking is unimportant to me.	SF	MF	MT	ST	83
84.	I was a member of the French Foreign Legion.	SF	MF	MT	ST	84
85.	It is a fact of life that sometimes you have to step on people or hurt people to get what you really want.	SF	MF	MT	ST	85
86.	I am not very sure of myself.	SF	MF	MT	ST	86
87.	I usually tell others to do things the way I want them to be done.	SF	MF	MT	ST	87

88.	I think that people go out of their way just to bug me.	SF	MF	MT	ST 88
89.	People consider me to be a rebel.	SF	MF	MT	ST 89
90.	I will sometimes work slowly or do a bad job if it is something I did not want to do.	SF	MF	MT	ST 90
91.	I always say nice things freely to my family and coworkers.	SF	MF	MT	ST 91
92.	I have been mean in order to control someone in my care.	SF	MF	MT	ST 92
93.	I have little or no desire to have sex with another person.	SF	MF	MT	ST 93
94.	I have a lot of friends.	SF	MF	MT	ST 94
95.	Before the age of 15, I often skipped school.	SF	MF	MT	ST 95
96.	When I go out, I like to look exotic, wild, or dramatic.	SF	MF	MT	ST 96
97.	I have never forced anyone to have sex with me.	SF	MF	MT	ST 97
98.	I usually feel bad or guilty after something really good happens to me.	SF	MF	MT	ST 98
99.	I have felt the presence of a force or person who was actually not there.	SF	MF	MT	ST 99
100.	I think of myself as a loner.	SF	MF	MT	ST 100
101.	I have lived without a mailing address for more than a month.	SF	MF	MT	ST 101
102.	Most of the time, I trust people more than I distrust them.	SF	MF	MT	ST 102
103.	I have never stolen from someone face-to-face (like mugging or robbing someone).	SF	MF	MT	ST 103
104.	I fear being embarrassed in front of other people by getting red, crying, or being nervous in front of them.	SF	MF	MT	ST 104

105.	My moods change quite fast.	SF	MF	MT	ST 105
106.	I slur my words or I find everyday words hard to say right.	SF	MF	MT	ST 106
107.	I have no problem starting jobs on my own.	SF	MF	MT	ST 107
108.	People tell me that I am a cold person.	SF	MF	MT	ST 108
109.	I feel like I am a special person and I deserve to be noticed for it.	SF	MF	MT	ST 109
110.	I am very afraid of being left alone by someone.	SF	MF	MT	ST 110
111.	I do not like to let others do things, because they won't do them right.	SF	MF	MT	ST 111
112.	I forgive people quickly for bad words or hurts to me.	SF	MF	MT	ST 112
113.	I hardly ever feel like people want too much out of me.	SF	MF	MT	ST 113
114.	Sometimes, the suffering of animals or people makes me smile.	SF	MF	MT	ST 114
115.	Neither good things nor bad things people say about me bothers me.	SF	MF	MT	ST 115
116.	People may think what I do or say (or how I look) is odd, unusual, or weird.	SF	MF	MT	ST 116
117.	I have a way to get people really angry or upset at me and then afterwards, I feel really bad or shameful about it.	SF	MF	MT	ST 117
118.	I tell lies a lot.	SF	MF	MT	ST 118
119.	I like new and risky things.	SF	MF	MT	ST 119
120.	It takes a lot to bug me.	SF	MF	MT	ST 120
121.	I have trouble trying to remember the names of everyday things.	SF	MF	MT	ST 121

122.	I have done ugly things or put myself down in order to get people to like me.	SF	MF	MT	ST 122
123.	When I greet people, I like to give them a hug.	SF	MF	MT	ST 123
124.	I feel like my problems are special, and they could only be understood by someone else who is "really special."	SF	MF	MT	ST 124
125.	I am nervous to confide in others, because I fear that what I say may be used against me.	SF	MF	MT	ST 125
126.	I often forget to do things I am supposed to do.	SF	MF	MT	ST 126
127.	I would lie to hurt someone if I felt that they deserved it.	SF	MF	MT	ST 127
128.	I have no close friends outside of my family.	SF	MF	MT	ST 128
129.	People do not understand what I am trying to say.	SF	MF	MT	ST 129
130.	I have turned down a lot of chances to have a good time (like vacation).	SF	MF	MT	ST 130
131.	I have said I would kill myself, or tried to, more than once in my life.	SF	MF	MT	ST 131
132.	I find it hard to remember anything like a new phone number.	SF	MF	MT	ST 132
133.	I've had a lot of temper tantrums.	SF	MF	MT	ST 133
134.	I dream a lot about being really successful, powerful, or smart.	SF	MF	MT	ST 134
135.	People have told me that I am too picky.	SF	MF	MT	ST 135
136.	When I am put down or insulted by someone, I am quick to attack them or show my anger.	SF	MF	MT	ST 136
137.	Other people tell me that I have done a bad job when I think I did something well.	SF	MF	MT	ST 137

138.	I would never frighten others to get them to do things I want them to do.	SF	MF	MT	ST 138
139.	I find myself feeling not part of, or distant from, other people.	SF	MF	MT	ST 139
140.	When I am having a good time, I like to show it.	SF	MF	MT	ST 140
141.	I have been sexually faithful to one person for more than one year.	SF	MF	MT	ST 141
142.	I am brave.	SF	MF	MT	ST 142
143.	My anger gets out of control easily.	SF	MF	MT	ST 143
144.	I have never been accused of hurting, neglecting, or mistreating a child.	SF	MF	MT	ST 144
145.	I have never been a bad parent.	SF	MF	MT	ST 45
146.	I dream a lot about being beautiful, having a great body, or finding perfect love.	SF	MF	MT	ST 146
147.	When I try to go somewhere, I get lost easily.	SF	MF	MT	ST 147
148.	When I lose a close friend, I feel finished or helpless.	SF	MF	MT	ST 148
149.	I deserve or have earned special and good treatment from others.	SF	MF	MT	ST 149
150.	I see myself as a person whose feelings are well controlled.	SF	MF	MT	ST 150
151.	I question the faithfulness of my spouse or sexual partner.	SF	MF	MT	ST 151
152.	I don't like others telling me how I could do more.	SF	MF	MT	ST 152
153.	In a close relationship (wife/husband, older son or daughter), I like that person to have a lot of freedom from me.	SF	MF	MT	ST 153
154.	I suspect that some people think that I act too different. For example, they may think I am weird, strange, or silly.	SF	MF	MT	ST 154

155.	In the past, I have only liked people who treated me well or cared about me.	SF	MF	MT	ST 155
156.	I often forget what I am about to say.	SF	MF	MT	ST 156
157.	I seem able to change my feelings quickly.	SF	MF	MT	ST 157
158.	I like to get a lot of pats on the back, good words, or praise from others.	SF	MF	MT	ST 158
159.	I really enjoy giving money or gifts to others, even if I won't get anything back.	SF	MF	MT	ST 159
160.	People rarely tell me that I have not done my share of the work.	SF	MF	MT	ST 160
161.	I like stories or movies of violence, weapons, martial arts, injury, or torture.	SF	MF	MT	ST 161
162.	I have tried very hard for people who didn't ask me to.	SF	MF	MT	ST 162
163.	I have trouble thinking straight.	SF	MF	MT	ST 163
164.	People have accused me of being self-centered.	SF	MF	MT	ST 164
165.	I get really annoyed or surprised when a person cancels an appointment with me for any reason.	SF	MF	MT	ST 165
166.	I keep worn-out or worthless things even when they do not have any memory value.	SF	MF	MT	ST 166
167.	I tend to criticize people in positions of authority like bosses.	SF	MF	MT	ST 167
168.	I help others get ahead at the cost of my own getting ahead.	SF	MF	MT	ST 168
169.	I have noticed a change in my sense of taste or smell.	SF	MF	MT	ST 169
170.	I have been told that the way I speak is strange or unclear.	SF	MF	MT	ST 170
171.	I am very jealous of successful people.	SF	MF	MT	ST 171

172.	I am very proud of what I have done in life.	SF	MF	MT	ST 172
173.	I have problems with my balance. (I fall down frequently, I trip easily, I am clumsy, I drop things easily)	SF	MF	MT	ST 173
174.	I get very frustrated if I do not get what I want right away.	SF	MF	MT	ST 174
175.	I do not often feel empty or bad.	SF	MF	MT	ST 175
176.	I enjoy getting a lot of positive words and special attention from other people.	SF	MF	MT	ST 176
177.	I have gotten into trouble because of my drinking or drug problem.	SF	MF	MT	ST 177
178.	I hear voices or see things that are not really there.	SF	MF	MT	ST 178
179.	I try not to get into physical fights.	SF	MF	MT	ST 179
180.	I think there is something wrong with my mind.	SF	MF	MT	ST 180
181.	I tend to refuse help or advice from others even if I need it.	SF	MF	MT	ST 181
182.	I feel just fine if I hurt or treat someone badly.	SF	MF	MT	ST 182
183.	I am superstitious (believe in black cats, the number 13, etc.).	SF	MF	MT	ST 183
184.	I think I have special powers like clairvoyance, mental telepathy, or ESP are real.	SF	MF	MT	ST 184
185.	I wish I had the successes that other people have.	SF	MF	MT	ST 185
186.	I have used scams or conned people for money or pleasure.	SF	MF	MT	ST 186
187.	I worry a lot about the problems I might have before doing something new.	SF	MF	MT	ST 187

188.	More than once, I have hurt myself badly on purpose, like cutting my wrists or smashing my fist against a wall, and so on.	SF	MF	MT	ST 188
189.	I like to be really together and have everything in order before I get ready to do something.	SF	MF	MT	ST 189
190.	I put off or delay making decisions.	SF	MF	MT	ST 190
191.	I have trouble finishing things on time because I spend too much time getting ready.	SF	MF	MT	ST 191
192.	I set very high morals and the right way to do things for myself and others.	SF	MF	MT	ST 192
193.	When I go out, I like people to notice me.	SF	MF	MT	ST 193
194.	I tend to not trust people.	SF	MF	MT	ST 194
195.	I often talk out loud to myself.	SF	MF	MT	ST 195
196.	I swam the English Channel.	SF	MF	MT	ST 196
197.	People often disappoint me.	SF	MF	MT	ST 197
198.	Recently, I have felt like killing myself.	SF	MF	MT	ST 198
199.	I have headaches.	SF	MF	MT	ST 199
200.	I am troubled by my dreams (sleep or daydreams).	SF	MF	MT	ST 200
201.	I feel clumsy when I'm around other people.	SF	MF	MT	ST 201
202.	I am unhappy most of the time.	SF	MF	MT	ST 202
203.	I immediately look for another friend when I lose one.	SF	MF	MT	ST 203
204.	I have been told that I can't change or I am stubborn.	SF	MF	MT	ST 204
205.	I feel worthless.	SF	MF	MT	ST 205
206.	I have been told that I act like I am better than other people.	SF	MF	MT	ST 206

207.	I put myself down a lot.	SF	MF	MT	ST 207
208.	I easily follow others.	SF	MF	MT	ST 208
209.	I worry a lot.	SF	MF	MT	ST 209
210.	I have many close friends.	SF	MF	MT	ST 210
211.	I have a problem with food.	SF	MF	MT	ST 211
212.	I have a memory that bothers me.	SF	MF	MT	ST 212
213.	Sometimes I feel unreal or as if I am in a dream.	SF	MF	MT	ST 213
214.	I have many physical body problems.	SF	MF	MT	ST 214
215.	I tend to judge others badly.	SF	MF	MT	ST 215
216.	I forget things I have just learned.	SF	MF	MT	ST 216
217.	I feel guilty a lot of the time.	SF	MF	MT	ST 217
218.	I have dizzy spells.	SF	MF	MT	ST 218
219.	I've had more than my fair share of trouble in life.	SF	MF	MT	ST 219
220.	When I get stressed, I start to feel unreal, weird, or strange.	SF	MF	MT	ST 220
221.	I think everything will turn out badly.	SF	MF	MT	ST 221
222.	After I'm angry at someone, I am sorry and ask for forgiveness.	SF	MF	MT	ST 222
223.	I believe in the saying, "Good things don't last."	SF	MF	MT	ST 223
224.	I don't find much pleasure in life.	SF	MF	MT	ST 224
225.	I am not as good as other people.	SF	MF	MT	ST 225

APPENDIX F

RESOURCE GUIDE

Resource Guide

Brain Injury Association of Michigan
8137 West Grand River, Suite A
Brighton, MI 48114
(810) 229-5880
(800) 772-HEAD

PAR Rehab Services
3960 Patient Care Drive, Suite 104
Lansing, MI 48911
(517) 887-9801

Rehabilitation Institute of Michigan
261 Mack
Detroit, MI 48201
(866) SCI-CENTER
www.rimrehab.org

APPENDIX G

PATIENT AUTHORIZATION FOR DISCLOSURE

OF HEALTH INFORMATION FOR RESEARCH

PATIENT AUTHORIZATION FOR DISCLOSURE

OF HEALTH INFORMATION FOR RESEARCH

Patient Name:_____

Address:_____

Date of Birth: _____ **SS#:** _____

I AUTHORIZE THE DISCLOSURE OF MY HEALTH INFORMATION

FROM: PAR Rehab Services
Name of hospital/ health care system or provider
3960 Patient Care Drive
Address
Lansing, MI 48911

Phone (517) 887-9801
Phone/Fax Number

TO: Abby D. Howard, M.A.
Name of researcher
401C Erickson Hall
Address
East Lasing, MI 48824

Phone (517) 355-8508
Phone/Fax Number

DESCRIPTION OF INFORMATION TO BE DISCLOSED (select one of the following):

___ALL information contained in my medical record.

OR

_X_ ONLY disclose the following information: Relevant Contact Information, severity of traumatic brain injury.

RESEARCH STUDY FOR THIS DISCLOSURE:

Title of Study: Psychosocial Adjustment Post- Mild Traumatic Brain Injury
Name of Research Leader: Robert J. Fabiano, Ph.D.
Affiliation of Researcher: Michigan State University
IRB# 05-088
Name of IRB Michigan State University UCRIHS

EXPIRATION (fill in one of the following):

Your Authorization to disclose the above information expires on December 31, 2005

REVOCATION, REFUSAL, REDISCLOSURE:

You may revoke this Authorization in writing at any time by contacting PAR Rehab Services (e.g., the healthcare system or provider or hospital named above), but it will not affect any information already released to the researcher(s).

You may refuse to sign this authorization and your refusal will not affect your ability to obtain treatment, however, it may affect your ability to participate in this research study.

Your information that is disclosed to the researcher(s) may no longer be protected by Federal privacy regulations if the researcher(s) is not a health care provider covered by the regulations, however the researcher(s) agrees to protect your information as required by law.

_____ _____

Signature of Patient or Personal Representative Date

_____

Name of Personal Representative and Relationship to Patient
(or description of authority to act on behalf of the patient)

REFERENCES

REFERENCES

Adams, R.D., & Victor, M. (1989). *Principles of neurology*; 4th ed. New York, NY:McGraw-Hill.

Alexander, M. (1992). Neuropsychiatric correlates of persistent postconcussive syndrome. *Journal of Head Trauma Rehabilitation, 7*, 60-69.

Alexander, M. (1995). Mild traumatic brain injury: pathophysiology, natural history, and clinical management. *Neurology, 45*, 1253-1260.

Alfano, D.P., Neilson, P.M., & Fink, M.P. (1993). Long-term psychosocial adjustment following head or spinal cord injury. *Neuropsychiatry, Neuropsychology, and Behavioral Neurology, 6*, 117-125.

Aloia, M.S., Long, C.J., & Allen, J.B. (1995). Depression among the head-injured and non-head-injured: A discriminant analysis. *Brain Injury, 9*, 575-583.

Alves, W., Macciocchi, S.N., & Barth, J.T. (1993). Postconcussive symptoms after uncomplicated mild head injury. *Journal of Head Trauma Rehabilitation, 8*, 48-59.

American Cancer Society (1999). *Cancer facts and figures, 1999, selected cancers.* WWW: American Cancer Society. (retrieved February 13, 2003).

American Psychiatric Association (1994). *Diagnostic and Statistical Manual of Mental Disorders (*4th ed.). Washington, DC: Author.

Andrasik, F., & Wincze, J. (1994). Emotional and psychosocial aspects of mild head injury. *Seminars in Neurology, 14*, 60-66.

Annegars, J.F., Grabow, J.D., Kurland, L.T., & Laws, E.R. (1980). The incidence, causes, and secular trends of head trauma in Olmstead County, Minnesota, 1935-1974. *Neurology, 30*, 912-919.

Baider, L., Perez, T., & De-Nour, A.K. (1989). Gender and adjustment to chronic disease: A study of couples with colon cancer. *General Hospital Psychiatry 11*, 1-8.

Barnow, S., Linden, M., Lucht, M., & Freyberger, H-J. (2002). The importance of psychosocial factors, gender and severity of depression in distinguishing between adjustment and depressive disorders. *Journal of Affective Disorders 72*, 71-78.

Barth, J.T., Maccoicchi, S.N., Giordani, B., Rimel, R., Jane, J.A., & Boll, T.J. (1983). Neuropsychological sequelae of minor head injury. *Neurosurgery, 13*, 529-533.

Bates, M.S., Rankin-Hill, L., & Sanchez-Ayendez, M. (1997). The effects of the cultural context of health care on treatment of and response to chronic pain and illness. *Social Science and Medicine, 45*, 1433-1447.

Bazarian, J.J., Wong, T., Harris, M., Leahey, N., Mookerjee, S., & Dombovy, M. (1999). Epidemiology and predictors of post-concussive syndrome after minor head injury in an emergency population. *Brain Injury, 13*, 173-189.

Beck, A.T., Steer, R.A., Ball, R., & Ranieri, W.F. (1996). Comparison of Beck Depression Inventories-IA and -II in psychiatric outpatients. *Journal of Personality Assessment, 67*, 588-597.

Benbow, C.M., & Benbow, R.M. (1984). Biological correlates of high mathematical reasoning ability. In G.J. DeVries, J.P.C. DeBruin, H.B.M. Uylings, & M.A. Corner (Eds.), *Sex differences in the brain: The relation between structure and function, vol.61, progress in brain research* (pp. 469-490). Amsterdam: Elsevier.

Bezeau, S. & Graves, R. (2001). Statistical power and effect sizes of clinical neuropsychology research. *Journal of Clinical and Experimental Neuropsychology, 23*, 399-406.

Binder, L.M., Rohling, M.L., & Larrabee, J. (1997). A review of mild head trauma. Part I: Meta-analytic review of neuropsychological studies. *Journal of Clinical and Experimental Neuropsychology, 19*, 421-431.

Bohnen, N.I., Jolles, J., Twijnstra, A., Mellink, R., & Wijnen, G. (1995). Late neurobehavioral symptoms after mild head injury. *Brain Injury, 9*, 27-33.

Borczuk, P. (1995). Predictors of intracranial injury in patients with mild head trauma. *Annals of Emergency Medicine, 25*, 731-736.

Brooks, N., Campise, L., Symington, C., Beattie, A., Bryden, J., & McKinlay, W. (1987). The effects of severe head injury on patient and relative within seven years of injury. *Journal of Head Trauma Rehabilitation, 2*, 1-13.

Brooks, C.A., Lindstrom, J., McCray, J., & Whiteneck, G.G. (1995). Cost of medical care from a population-based sample of persons surviving traumatic brain injury. *The Journal of Head Trauma Rehabilitation, 10*, 1-13.

Brown, B., Roberts, J., Browne, G., Byrne, C., Love, B., & Streiner, D. (1988). Gender differences in variables associated with psychosocial adjustment to a burn injury. *Research in Nursing & Health 11*, 23-30.

Bryant, R.A., & Harvey, A. (1998). The relationship between acute stress disorder and posttraumatic stress disorder following mild traumatic brain injury. *American Journal of Psychiatry, 155*, 625-629.

Bryant, R.A., & Harvey, A. (1999). Postconcussive symptoms and posttraumatic stress disorder after mild traumatic brain injury. *The Journal of Nervous and Mental Disease, 187(5)*, 302-305.

Busch, C.R., & Alpern, H.P. (1998). Depression after mild traumatic brain injury: A review of current research. *Neuropsychology Review, 8*, 95-108.

Cantu, R.C. (1992). Cerebral concussion in sport. *Sports Medicine, 14*, 64-74.

Cartlidge, N.E.F. (1977). Post-concussional syndrome. *Scottish Medical Journal, 23*, 103.

Centers for Disease Control and Prevention (1999). Traumatic Brain Injury in the United States: A report to Congress. Atlanta: U.S. Department of Health and Human Services.

Cicerone, K.D. & Kalmar, K. (1995). Persistent postconcussion syndrome: The structure of subjective complaints after mild traumatic brain injury. *Journal of Head Trauma Rehabilitation, 10(3)*, 1-17.

Cicerone, K.D., & Kalmar, K. (1997). Does premorbid depression influence post-concussive symptoms and neuropsychological functioning? *Brain Injury, 11*, 643-648.

Contanzo, R.M. & Zasler, N.D. (1991). Head trauma: Sensorineural disorders. Diagnosis and management. In T.V. Getchell, R.L. Doty, L.M. Bartoshuk, & J.B. Snow (Eds.), *Smell and taste in health and disease* (pp. 711-730). New York: Raven Press.

Coolidge, F. L. (1984). *Coolidge Axis II Inventory*. U.S. Copyright TXU-026, Washington, D.C.

Coolidge, F.L. (2004). *Coolidge Axis II Inventory - Plus (CATI+)*. Colorado Springs, CO: Author.

Coolidge, F.L. & Griego, J.A. (1995). Executive functions of the frontal lobes: Psychometric properties of a self-rating scale. *Psychological Reports, 77*, 24-26.

Coolidge, F.L., Greigo, J.A., Nathan, J., & Merwin, M.A. (1995). *DSM-IV diagnoses of personality change after a major medical condition: An investigation with three closed-head injured samples*. A paper presented to the American Psychological Association, annual convention, New York, August 1995.

Coolidge, F.L. & Merwin, M.A. (1992). Reliability and validity of the Coolidge Axis II Inventory: A new inventory for the assessment of personality disorders. *Journal of Personality Assessment, 59*, 223-238.

Corrigan, J.D., & Mysiw, W.J. (1988). Agitation following head injury: Equivocal evidence for a discrete stage of cognitive recovery. *Archives of Physical Medicine and Rehabilitation, 69*, 487-492.

Crick, N.R., Werner, N.E., Casas, J.F., O'Brien, K.M., Nelson, D.A., Grotpeter, J.K., et al. (1999). Childhood aggression and gender: A new look at an old problem. In D. Bernstein (Ed.), *Gender and motivation* (pp. 75-141). Lincoln; University of Nebraska Press.

DeKruijk, J.R., Twijnstra, A., & Leffers, P. (2001). Diagnostic criteria and differential diagnosis of mild traumatic brain injury. *Brain Injury, 15*, 99-106.

Dikmen, S., Machamer, J., & Temkin, N. (2001). Mild head injury: Facts and artifacts. *Journal of Clinical and Experimental Neuropsychology, 23*, 729-738.

Dikmen, S., Machamer, J., Winn, H.R., & Temkin, N. (1995). Neuropsychological outcome at 1-year post head injury. *Neuropsychology, 9*, 80-90.

Dikmen, S., McLean, A., & Temkin, N. (1986). Neuropsychological and psychological consequences of minor head injury. *Journal of Neurology, Neurosurgery, and Psychiatry, 49*, 1227-1232.

Dikmen, S.S., Temkin, N., & Armsden, G. (1989). Neuropsychological recovery: Relationship to psychosocial functioning and postconcussional complaints. In H.S. Levin, H.M. Eisenberg & A.L. Benton (eds.) *Mild head injury*, (pp. 229-241). New York; Oxford University Press.

Ettlin, T.M., Kischka, U., Reichmann, S., Radii, E.W., Heim, S., a Wengen, D., et al. (1992). Cerebral symptoms after whiplash injury of the neck: A prospective clinical and neuropsychological study of whiplash injury. *Journal of Neurology, Neurosurgery, and Psychiatry, 55*, 943-948.

Evans, R.W. (1992). The postconcussion syndrome and the sequelae of mild head injury. *Neurology Clinics of North America, 10*, 815-847.

Evans, R.W. (1996). The postconcussion syndrome and the sequelae of mild head injury. In R.W. Evans (Ed.), *Neurology and trauma*, (pp. 91-116). Philadelphia; W.B. Saunders & Co.

Fabiano, R.J., & Daugherty, J. (1998). Rehabilitation considerations following mild traumatic brain injury. *Brain Injury, 14*, 10-15.

Fann, J.R., Katon, W.J., Uomoto, J.M., & Esselman, P.C. (1995). Psychiatric disorders and functional disability in outpatients with traumatic brain injuries. *American Journal of Psychiatry, 152*, 1493-1499.

Fann, J. R., Uomoto, J.M., & Katon, W.J. (2001). Cognitive improvement with treatment of depression following mild traumatic brain injury. *Psychosomatics, 42*, 48-54.

Fedoroff, J.P., Starkstein, S.E., Forrester, A.W., Geisler, F.H., Jorge, R.E., Arndt, S.V., et al. (1992). Depression in patients with acute traumatic brain injury. *American Journal of Psychiatry, 49*, 918-923.

Feinstein, A., Hershkop, S., Jardine, A., & Ouchterlony, D. (2000). The prevalence and neuropsychiatric correlates of posttraumatic stress symptoms following mild traumatic brain injury. *Brain and Cognition, 44*, 78-82.

Fenton, G., McClelland, R., Montgomery, A., MacFlynn, G., & Rutherford, W. (1993). The postconcussional syndrome: Social antecedents and psychological sequelae. *British Journal of Psychiatry, 162*, 493-497.

Fidell, L. (1980). Sex role stereotypes and the American physician. *Psychology of Women Quarterly, 4*, 313-330.

Fife, B.L., Kennedy, V.N., & Robinson, L. (1994). Gender and adjustment to cancer: Clinical implications. *Journal of Psychosocial Oncology 12 (1-2),* 1-21.

Flanagan, S. (1999). Physiatric management of mild traumatic brain injury. *The Mount Sinai Journal of Medicine, 66(3)*, 152-159.

Fox, D.D., Lees-Haley, P.R., Earnest, K., & Dolezal-Wood, S. (1995). Post-concussive symptoms: Base rates and etiology in psychiatric patients. *The Clinical Neuropsychologist, 9*, 89-92.

Gallo, L.C., & Matthews, K.A. (2003). Understanding the association between socioeconomic status and physical health: Do negative emotions play a role? *Psychological Bulletin, 129*, 10-51.

Gelso, C., & Fretz, B. (1992). *Counseling Psychology*. Fort Worth: Harcourt Brace.

Gerber, D.J., & Schraa, J.C. (1995). Mild traumatic brain injury: Searching for the syndrome. *Journal of Head Trauma Rehabilitation, 10(4)*, 28-40.

Gfeller, J.D., Chibnall, J.T., & Duckro, P.N. (1994). Postconcussion symptoms and cognitive functioning in post-traumatic headache patients. *Headache, 34*, 503-507.

Gleckman, A.D., & Brill, S. (1995). The impact of brain injury on family functioning: Implications for subacute rehabilitation programmes, *Brain Injury, 9*, 385-393.

Goldstein, F.C., & Levin, H.S. (1989). Manifestations of personality change after closed-head injury. In E. Perceman (Ed.), *Integrating theory and practice in clinical neuropsychology* (pp. 217-243). Hillsdale: Lawrence Earlbaum Associates, Inc.

Grafman, J., Schwab, K., Warden, D., Pridgen, A., Brown, H.R., & Salazar, A.M. (1996). Frontal lobe injuries, violence, and aggression: A report of the Vietnam Head Injury Study. *Neurology, 46*, 1231-1238.

Gualtieri, C.T. (1999). The pharmacologic treatment of mild brain injury. In N.R. Varney & R.J. Roberts (Eds.), *The evaluation and treatment of mild traumatic brain injury* (pp. 411-420). Mahwah: Lawrence Erlbaum Associates, Inc.

Guerrero, J., Thurman, D.J., & Sniezek J.E. (2000). Emergency department visits associated with traumatic brain injury: United States, 1995-1996. *Brain Injury, 14*, 181-186.

Guth, P.E. (2000). The effects of depression in head injured adults as related to educational level, gender, and activity level. *Dissertation Abstracts International, 61*,1803. (UMI No. AA19968463)

Haas, D.C., & Lourie, H. (1988). Trauma-triggered migraine: An explanation for common neurological attacks after mild head injury. Review of the literature. *Journal of Neurosurgery, 68*, 181-188.

Hanks, R.A., Temkin, N., Machamer, J. & Dikmen, S.S. (1999). Emotional and behavioral adjustment after traumatic brain injury. *Archives of Physical Medicine and Rehabilitation, 80*, 991-997.

Harrington, D.E., Malec, J., Cicerone, K., & Katz, H.T. (1993). Current perceptions of rehabilitation professionals towards mild traumatic brain injury. *Archives of Physical Medicine and Rehabilitation, 74*, 579-586.

Harvey, A.G., & Bryant, R.A. (1998). Acute stress disorder following mild traumatic brain injury. *Journal of Nervous Mental Disorders, 186*, 333-397.

Hawkins, K.A. (2000). Novel antipsychotics and the neuropsychological deficiencies of schizophrenia. *Journal of Psychiatry and Neuroscience, 25*, 105-107.

Hayden, M.E. (1997). Mild traumatic brain injury: A primer for understanding its impact on employee return to work. *AAOHN Journal, 45*, 635-643.

Hayes, A.L., Povlishock, J.T., & Singha, B. (1992). Pathophysiology of mild head injury. *State Art Rev Phys Med Rehab, 6*, 9-20.

Hendryx, P.M. (1989). Psychosocial changes perceived by closed-head-injured adults and their families. *Archives of Physical Medicine and Rehabilitation, 70*,526-530.

Heninger, G. (1997). Serotonin, sex and psychiatric illness. *Proceedings of the National Academy of Sciences, 94*, 4823-4824.

Hinkeldey, N.S., & Corrigan, J.D. (1990). The structure of head-injured patients' neurobehavioural complaints: A preliminary study. *Brain Injury, 4*, 115-133.

Hummel, T.J., & Sligo, J.R. (1971). Empirical comparison of univariate and multivariate analysis of variance procedures. *Psychological Bulletin, 76*, 49-57.

Ingerbrigsten, T., Waterloo, K., Marup-Jensen, S., Attner, E., & Romner, B. (1998). Quantification of post-concussion symptoms 3 months after minor head injury in 100 consecutive patients. *Journal of Neurology, 245*, 609-612.

Karzmark, P., Hall, K., & Englander, J. (1995). Late-onset post-concussion symptoms after mild brain injury: The role of premorbid, injury-related, environmental, and personality factors. *Brain Injury, 9*, 21-26.

Kay, T. (1993). Neuropsychological treatment of mild traumatic brain injury. *Journal of Head Trauma Rehabilitation, 8(3)*, 74-85.

Kay, T., Harrington, D., Adams, R., Anderson, T., Berrol, S., Cicerone, K., et al. (1993). Definition of mild traumatic brain injury. *Journal of Head Trauma Rehabilitation, 8*, 86-87.

Kelly, J.P., Nichols, J.S., Filley, C.M., Lillehei, K. O., Rubinstein, D., & Kleinschmidt-DeMasters, B.K. (1991). Concussion in sports. *JAMA, 266*, 2867-2869.

Kim, E. (2002). Agitation, aggression, and disinhibition syndromes after traumatic brain injury. *NeuroRehabilitation, 17*, 297-310.

Kimura, D. (1992). Sex differences in the brain. *Scientific American, 267*, 119-125.

Klonoff, P.S., & Lamb, D.G. (1998). Mild head injury, significant impairment on neuropsychological test scores, and psychiatric disability. *The Clinical Neuropsychologist, 12*, 31-42.

Kraus, J.F., & Nourjah, P. (1988). The epidemiology of mild uncomplicated brain injury. *Journal of Trauma, 28*, 1637-1643.

Laforce Jr., R., & Martin-MacLeod, L. (2001). Symptom cluster associated with mild traumatic brain injury in university students. *Perceptual and Motor Skills, 93*, 281-288.

Lauter, J. (1978). Sample size requirements for the T^2 test of MANOVA (tables for one-way classification). *Biometrical Journal, 20*, 389-406.

Lawler, K.A., & Terregino, C.A. (1996). Guidelines for the evaluation and education of adult patients with mild traumatic brain injuries in an acute care setting. *Journal of Head Trauma Rehabilitation, 11(6)*, 18-28.

Lennane, K., & Lennane, R. (1973). Alleged psychogenic disorders in women: A possible manifestation of sexual prejudice. *New England Journal of Medicine, 288(6)*, 288-292.

Levin, H.S., Benton, A.L.,& Grossman, R.G. (1982). *Neuro-behavioral consequences of closed head injury*. New York: Oxford University Press.

Levin, H.S., Gary, H. E., High, W.M., Mattis, S., Ruff, R.M., Eisenberg, H.M., et al. (1987). Minor head injury and the postconcussional syndrome: Methodological issues in outcome studies. In H.S. Levin, J. Grafman, & H.M. Eisenberg (Eds.), *Neurobehavioral recovery from head injury*. New York: Oxford University Press.

Levin, H.S., Eisenberg, H.M. & Benton, A.L. (1989). *Mild head injury*. New York: Oxford University Press.

Levin, H.S., & Grossman, R.G. (1978). Behavioral sequelae of closed head injury: A quantitative study. *Archives of Neurology, 35*, 720-727.

Lezak, M.D. (1995). *Neuropsychological assessment* (3rd Ed). New York: Oxford University Press.

Lishman, W.A. (1988). Physiogenesis and psychogenesis in the "post concussional syndrome." *British Journal of Psychiatry, 153*, 460-469.

Macciocchi, S.N., Barth, J.T., Alves, W., Rimel, R.W., & Jane, J.A. (1996). Neuropsychological functioning and recovery after mild head injury in collegiate athletes. *Neurosurgery, 39*, 510-514.

Maccoby, E.E., & Jacklin, C.N. (1974). *The psychology of sex differences*. Stanford: Stanford University Press.

Marschark, M., Richtsmeier, L.M., Richardson, J.T.E., Crovitz, H.F., & Henry, J. (2000). Intellectual and emotional functioning in college students following mild traumatic brain injury in childhood and adolescence. *Journal of Head Trauma Rehabilitation, 15*, 1227-1245.

Marsh, N.V., & Smith, M.D. (1995). Post-concussion syndrome and the coping hypothesis. *Brain Injury, 9*, 553-562.

Masson, F., Maurette, P, & Salmi, L.R. (1996). Prevalence of impairments 5 years after a head injury, and their relationship with disabilities and outcome. *Brain Injury, 10*, 487-497.

Mazaux, J.M., Masson, F., & Levin, H.S. (1997). Long-term neuropsychological outcome and loss of social autonomy after traumatic brain injury. *Archives of Physical Medicine and Rehabilitation, 79*, 1316-1320.

Mateer, C.A. (1992). Systems of care for post-concussive syndrome. *Physical Medicine and Rehabilitation, 6*, 143-155.

Mateer, C.A., & D'Arcy, R.C.N. (2000). Current concepts and approaches to management. In S.A. Raskin & C.A. Mateer (Eds.), *Neuropsychological management of mild traumatic brain injury* (pp. 3-22). New York: Oxford University Press.

Mathias, J.L., & Coats, J.L. (1999). Emotional and cognitive sequelae to mild traumatic brain injury. *Journal of Clinical and Experimental Neuropsychology, 21*, 200-215.

McAllister, T.W. (1992). Neuropsychiatric sequelae of head injuries. *The Psychiatric Clinics of North America, 15*, 395-413.

McAllister, T.W & Flashman, L.A. (1999). Mild brain injury and mood disorders: Causal connections, assessment, and treatment. In N.R. Varney & R.J. Roberts (Eds.), *The evaluation and treatment of mild traumatic brain injury* (pp. 347-373). Mahwah: Lawrence Erlbaum Associates, Inc.

McCauley, S.R., Boake, C., Levin, H.S., Contant, C.F., & Song, J.X. (2001). Postconcussional disorder following mild to moderate traumatic brain injury: Anxiety, depression, and social support as risk factors and comorbidities. *Journal of Clinical and Experimental Neuropsychology, 23*, 792-808.

McClelland, R.J., Fenton, G.W., & Rutherford, W. (1994). The post-concussional syndrome revisited. *Journal of the Royal Society of Medicine, 87*, 508-510.

McCullagh, S., Ouchterlony, D., Protzner, A., Blair, N., & Feinstein, A. (2001). Prediction of neuropsychiatric outcome following mild traumatic brain injury: an examination of the Glasgow Coma Scale. *Brain Injury, 15*, 489-497.

McKinlay, W.W., Brooks, D.N., Bond, M.R., Martinage, D.P. & Marshall, M.M. (1981). The short-term outcome of severe blunt head injury as reported by relatives of the injured persons. *Journal of Neurology, Neurosurgery, and Psychiatry, 48*, 527-533.

McLean Jr., A., Dikmen, S.S., & Temkin, N.R. (1993). Psychosocial recovery after head injury. *Archives of Physical Medicine and Rehabilitation, 74*, 1041-1046.

Mcroberts, L.A. (1999). Psychosocial and emotional adjustment of adult children of depressed parents: A gender comparison. *Dissertation Abstracts International, 59(9-B)*, 5099. (UMI No. AAM9906248)

Merskey, H. (1996). Psychiatric aspects of the neurology trauma. In R.W. Evans (Ed.), *Neurology and trauma*. Philadelphia: W.B. Saunders and Co.

Middelboe, T., Andersen, H.S., Birket-Smith, M., & Friis, M.L. (1992). Minor head injury: Impact on general health after 1 year. A prospective follow-up study. *Acta Neurologica Scandinavica, 85*, 5-9.

Minderhoud, J.M., Boelens, M.E., Huizenga, J., & Saan, R.J. (1980). Treatment of minor head injuries. *Clinical Neurology and Neurosurgery, 82(2)*, 127-140.

Mittenberg, W., Digiulio, D.V., Perrin, S., & Babs, A.E. (1992). Symptoms following mild head injury: Expectation as etiology. *Journal of Neurology, Neurosurgery and Psychiatry, 55*, 200-204.

Mittenberg, W., Zielinski, R., & Fichera, S. (1993). Recovery from mild head injury: A treatment manual for patients. *Psychotherapy in Private Practice, 12*, 37-52.

Moss, N.E., Crawford, S., & Wade, D.T. (1994). Post-concussion symptoms: Is stress a mediating factor? *Clinical Rehabilitation, 8*, 149-156.

National Head Injury Foundation (1993). *Interagency Head Injury Task Force Reports.* Washington, DC: National Institute of Neurologic Disorders and Stroke, National Institutes of Health.

Neppe, V.M. (1999). Integration of the evaluation and management of the transient closed head injury patient: Some directions. In N.R. Varney & R.J. Roberts (Eds.), *The evaluation and treatment of mild traumatic brain injury* (pp. 421-450). Mahwah: Lawrence Erlbaum Associates, Inc.

Nolen-Hoeksma, S. (1990). *Sex differences in depression.* Stanford: Stanford University Press.

Novack, T.A., Daniel, M.S., & Long, C.J. (1984). Factors related to emotional adjustment following head injury. *International Journal of Clinical Neuropsychology, 6*, 139-142.

O'Carroll, R.E., Woodrow, J., & Maroun, F. (1991). Psychosexual and psychosocial sequelae of closed head injury. *Brain Injury, 5*, 303-313.

Ohry, A., Solomon, Z., & Rattock, J. (1996). Post traumatic stress disorder in traumatic brain injury. *Brain Injury, 10*, 687-695.

Olver, J.H., Ponsford, J.L., & Curran, C.A. (1996). Outcome following traumatic brain injury: A Comparison between 2 and 5 years after injury. *Brain Injury, 10*, 841-848.

Packard, R.C., & Ham, L.P. (1997). Pathogenesis of posttraumatic headache and migraine: A common headache pathway? *Headache, 37*, 142-152.

Parker, R.S. (1990). *Traumatic brain injury and neuropsychological impairment.* New York: Springer-Verlag.

Parker, R.S., & Rosenblum, A. (1996). IQ loss and emotional dysfunctions after mild traumatic brain injury incurred in a motor vehicle accident. *Journal of Clinical Psychology, 52*, 32-43.

Pelco, L., Sawyer, M., Duffield, G., Prior, M., & Kinsella, G. (1992). Premorbid emotional and behavioural adjustment in children with mild head injuries. *Brain Injury, 6*, 29-37.

Ponsford, J., Willmott, C., Rothwell, A., Cameron, P., Kelly, A.M., Nelms, R., et al. (2000). Factors influencing outcome following mild traumatic brain injury in adults. *Journal of the International Neuropsychological Society, 6*, 568-579.

Powell, J.H., Beckers, K., & Greenwood, R. (1998). The measurement of progress and outcome in community rehabilitation after brain injury: A new assessment measure, the BICRO-39 scales. *Archives of Physical Medicine and Rehabilitation, 79*, 1213-1225.

Prigatano, G.P. (1992). Personality disturbances associated with traumatic brain injury. *Journal of Consulting and Clinical Psychology, 60*, 360-368.

Radanov, B.P., di Stefano, G., Schnidrig, A., & Ballinari, P. (1991). Role of psychosocial stress in recovery from common whiplash. *Lancet, 338*, 712-715.

Radloff, L.S. (1977). The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1(3)*, 385-401.

Rao, N., Jellenik, H.M., & Woolston, D.C. (1985). Agitation in closed head injury: Haloperidol effects on rehabilitation outcome. *Archives of Physical Medicine and Rehabilitation, 66*, 30-34.

Raskin, S., Mateer, C., & Tweeten, R. (1998). Neuropsychological assessment of individuals with mild traumatic brain injury. *The Clinical Neuropsychologist, 12*, 21-30.

Rattock, J., & Rose, B. (1993). Post traumatic stress disorder in traumatically head injured. *Journal of Clinical and Experimental Neuropsychology, 6*, 243.

Reitan, R.M., & Wolfson, D. (1985). *Neuroanatomy and neuropathology: A clinical guide for neuropsychologists.* Tucson: Neuropsychology Press.

Reyes, R.L., Bhattacharyya, A.K., & Heller, D. (1981). Traumatic head injury: Restlessness and agitation as prognosticators of physical and psychological improvement in patients. *Archives of Physical Medicine Rehabilitation, 62*, 20-23.

Rimel, R.W., Giordani, B., Barth, J.T., Boll, T.J., & Jane, I.A. (1981). Disability caused by minor head injury. *Neurosurgery, 9*, 221-228.

Rimel, R.W., & Jane, J.A. (1983). Characteristics of the head-injured patient. In M. Rosenthal, E. Griffith, M. Bond, & J. Miller (Eds.), *Rehabilitation of the head injured adult.* Philadelphia: F.A. Davis.

Robertson, E., Rath, B., & Fournet, G. (1994). Assessment of mild brain trauma: A preliminary study of the influence of premorbid factors. *The Clinical Neuropsychologist, 8*, 69-74.

Rosenthal, M. (1993). Mild traumatic brain injury syndrome. *Annals of Emergency Medicine, 22*, 1048-1051.

Rosenthal, R., Hall, J.A., DiMatteo, M.R., Rogers, P.L., & Archer, D. (1979). *Sensitivity to nonverbal communication.* Baltimore: The Johns Hopkins University Press.

Ruff, R.M., & Jurica, P. (1999). In search of a unified definition for mild traumatic brain injury. *Brain Injury, 13*, 943-952.

Ruff, R.M., Levin, H.S., Mattis, S., High, W.M., Jr., Marshall, L.F., Eisenberg, H.M., et al. (1989). Recovery of memory after mild head injury: A three-center study. In H.S. Levin, H.M. Eisenberg, & A.L. Benton (Eds.), *Mild head injury* (pp. 176-188). New York: Oxford University Press.

Rutherford, W.H. (1989). Postconcussive symptoms: Relationship to acute neurological indices, individual differences, and circumstances of injury. In H.S. Levin, J. Grafman, H.M. Eisenberg (Eds.), *Neurobehavioral recovery from head injury* (pp. 217-228). New York: Oxford University Press.

Rutherford, W.H., Merrett, J.D., & McDonald, J.R. (1977). Sequelae of concussion caused by minor head injuries. *Lancet, 1*, 1-4.

Schoenhuber, R.M.G., & Orlando, A. (1988). Prognostic value of auditory brainstem responses for late postconcussion symptoms following minor head injury. *Journal of Neurosurgery, 68*, 742-744.

Schopp, L.H., Shigaki, C.L., Johnstone, B., & Kirkpatrick, H.A. (2001). Gender differences in cognitive and emotional adjustment to traumatic brain injury. *Journal of Clinical Psychology in Medical Settings 8(3)*, 181-188.

Segalowitz, S.J., & Lawson, S. (1995). Subtle symptoms associated with self-reported mild head injury. *Journal of Learning Disabilities, 28*, 309-319.

Sherman, E.M., Strauss, E., Slick, D.J., & Spellacy, F. (2000). Effect of depression on neuropsychological functioning in head injury: Measurable but minimal. *Brain Injury, 14*, 621-632.

Silver, J.M., & Yudofsky, S.C. (1994). Aggressive Disorders. In J.M. Silver, S.C. Yudofsky, & R.E. Hales (Eds.), *Neuropsychiatry of traumatic brain injury* (pp. 313-353). Washington D.C.: American Psychiatric Press.

Simons, P. & Wolff, H. (1946). Studies on headache mechanisms of chronic post traumatic headache. *Psychosomatic Medicine, 8*, 227-242.

Sohlberg, M.M. (2000). Psychotherapy approaches. In S.A. Raskin & C.A. Mateer (Eds.), *Neuropsychological management of mild traumatic brain injury* (pp. 137-156). New York: Oxford University Press.

Stambrook, M., Moore, A.D., Peters, L.C., Zubek, E., McBeath, S., & Friesen, I.C. (1991). Head injury and spinal cord injury: Differential effects on psychosocial functioning. *Journal of Clinical Experimental Neuropsychology, 13*, 521-530.

Stauss, I., & Savitsky, N. (1934). Head injury: Neurologic and psychiatric aspects. *Archives of Neurological Psychology, 31*, 893-955.

Stuss, D.T., Stethem, L.L., Hugenholtz, H., Picton, T., Pivik, J., & Richard, M.T. (1989). Reaction time after head injury: Fatigue, Divided and focused attention, and consistency of performance. *Journal of Neurology, Neurosurgery, and Psychiatry, 52*, 742-748.

Syzmanski, H.V., & Linn, R. (1992). A review of the postconcussion syndrome. *International Journal of Psychiatry in Medicine, 22*, 357-375.

Tarter, R.E., Switala, J., Kabene, M., & Van Thiel, D.H. (1990). Long-term psychosocial adjustment following liver transplantation: Gender comparisons of patients and their spouses. *Family Systems Medicine 8*, 359-364.

Tavris, C. (1992). *The mismeasure of woman.* New York: Simon & Schuster.

Teasdale, G. & Jennett, B. (1974). Assessment of coma and impaired consciousness. *Lancet, ii*, 81-84.

Thomsen, I.V. (1989). Do young patients have worse outcomes after severe blunt head trauma? *Brain Injury, 3*, 157-162.

Thurman, D.J., Alverson, C., Dunn, K.A., Guerrero, J., & Sniezek, J.E. (1999). Traumatic brain injury in the United States: A public health perspective. *Journal of Head Trauma Rehabilitation, 14*, 602-615.

Uzzell, B.P. (1999). Mild head injury: Much ado about something. In N.R. Varney & R.J. Roberts (Eds.), *The evaluation and treatment of mild traumatic brain injury* (pp. 1-13). Mahwah: Lawrence Erlbaum Associates, Publishers.

Van der Naalt, J., VanZomeren, A.H., Sluiter, W.J. & Minderhoud, J.M. (1999). Acute behavioural disturbances related to imaging studies and outcome in mild-to-moderate head injury. *Brain Injury, 14*, 781-788.

Varney, N.R., & Shepherd, J.S. (1991). Minor head injury and the post-concussive syndrome. In J. Dywan, R. Kaplan, & F. Pirozzolo (Eds.), *Neuropsychology and the law* (pp. 24-38). New York: Springer-Verlag.

Wade, D.T., Crawford, S., Wenden, F.J., King, N.S., & Moss, N.E.G. (1997). Does routine follow up after head injury help? A randomized controlled trial. *Journal of Neurology, Neurosurgery and Psychiatry, 62*, 478-484.

Weinfurt, K.P. (2000). Multivariate analysis of variance. In L.G. Grimm & P.R. Yarnold (Eds.), *Reading and understanding multivariate statistics* (pp. 245-276). Washington D.C.: American Psychological Association.

Whitefield, K.E., Weidner, G., Clark, R., & Anderson, N.B. (2002). Sociodemographic diversity and behavioral medicine. *Journal of Consulting and Clinical Psychology, 70*, 463-481.

Willer, B.S., Allen, K.M., Liss, M. & Zicht, M.S. (1991). Problems and coping strategies of individuals with traumatic brain injury and their spouses. *Archives of Physical Medicine and Rehabilitation, 72*, 460-464.

Williams, D.H., Levin, H.S. & Eisenberg, H.M. (1990). Mild head injury classification. *Neurosurgery, 27*, 422-428.

Wrightson, P. & Gronwall, D. (1981). Time off work and symptoms after minor head injury. *Injury, 12*, 445-454.

Youngjohn, J.R., Burrows, L., & Erdal, K. (1995). Brain damage or compensation neurosis? The controversial post-concussion syndrome. *The Clinical Neuropsychologist, 9*, 112-123.