The Role of Helplessness and Hopelessness in Somatic and Cognitive Symptoms in Persistent Postconcussive Syndrome

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Abstract

Traumatic brain injuries typically involve various physical and psychological symptoms, which bidirectionally interact to impact brain recovery. Therefore, one may consider the impact these symptoms have on one's recovery from mild traumatic brain injuries, and how their interactions may affect persistent concussion symptoms. Thus, the goal of the present study was to determine if there was a relationship between a sense of helplessness and/or hopelessness and several somatic and cognitive complaints (as measured by various MMPI-2-RF scales) within a sample of individuals whose symptomatology was consistent with persistent postconcussive syndrome. Additionally, this study examined if assigned sex was a factor in these relationships. Results demonstrated a sense of helplessness and/or hopelessness was related to increased somatic and cognitive complaints. Alternately, assigned sex was not a significant moderating variable. These findings suggest future research and interventions focused on increasing an internal locus of control, positive coping, and hope may play an important role in recovery from mild traumatic brain injury.

Keywords: concussion, helplessness, hopelessness, somatic, cognitive, MTBI, PPCS, MMPI-2-RF

Chapter 1

A traumatic brain injury (TBI) comes with a variety of symptoms that can be both physical and psychological in nature. These symptoms are seen in the somatization of emotional distress and impairment in the recovery of preexisting mental health disorders (Golden & Golden, 2003; Outcalt et al., 2015; Vanderploeg et al., 2009). In a study performed by Bruffaerts et al. (2015), they found many mental health disorders were precursors to developing a pattern severe of headaches. It is reasonable to assert headaches may complicate recovery from brain injury and, in turn, elevate emotional distress. Thus, an examination of the somatic and emotional symptoms in individuals involved in long-term brain injury recovery was useful. In the context of mild traumatic brain injury (MTBI), preexisting mental health issues are not only related to poorer recovery and a diminished return to preinjury functioning but often result in slower recovery times (Cassidy et al., 2014).

When symptoms of a TBI last longer than 3 months, the TBI is consistent with persistent postconcussive syndrome (PPCS; Bigler, 2008; Permenter et al., 2022). The somatic and emotional aspects of PPCS can exacerbate one another over time as the physical and psychological pain are intertwined (Chaput et al., 2016; Hooten, 2016; Von Korff & Simon, 1996). Furthermore, unresolved symptomatology may lead to internalized helplessness or hopelessness regarding one's recovery expectations (Moore & Stambrook, 1992). Although an individual cannot prevent the TBI from happening, a variety of treatments can assist in long-term recovery.

Literature Review

The risk of TBI symptomatology persevering until the development of PPCS has been linked to several factors. These aspects include coping styles, helplessness and hopelessness, locus of control, and sex assigned at birth. TBI and PPCS are explored in this literature review in conjunction with these various factors.

Coping and Brain Injury

The link between emotional and physical well-being has been well documented (Hooten, 2016; Outcalt et al., 2015). Much like employment of effective coping strategies to positively impact psychological health, the same can be said for physical health and injury recovery. In a study performed by Anson and Ponsford (2006), coping styles of 33 patients (i.e., 27 men, 6 women) who experienced a TBI within the previous 7 years were examined. The researchers determined nonproductive coping (e.g., avoidance, substance use, and worry) was associated with lower self-esteem, and adaptive coping, characterized by engagement in pleasurable activities and constructively addressing issues was related to higher self-esteem. Anson and Ponsford also found coping style was not associated with the duration of time since the injury-event, injury severity, or assigned sex. Based on this research, employment of productive and active coping strategies is integral to better outcomes from TBI.

Similarly, Wolters et al. (2010) studied coping styles and quality of life for patients with brain injuries who participated in cognitive rehabilitation. Participants' coping styles were identified at the beginning of rehabilitation and at least 5 months following treatment. Their study found those who used active coping reported a higher quality of life than their passive coping counterparts.

Chaput et al. (2016) explored the relationship between one's ability to cope with pain following an MTBI and outcomes. The researchers measured the participants' experiences of pain compared to preinjury levels along with the magnification, rumination, and helplessness related to their injury. Additionally, they measured postconcussion symptoms to determine the impact of living with pain on their behavior, cognition, and emotional experiences. Chaput et al. found that pain-catastrophizing contributed to an increased experience of pain and psychological distress, and a higher number of symptoms. Their findings suggest developing better coping strategies results in better outcomes following an MTBI and stress the importance of early detection following the injury-event. Furthermore, they identified a relationship between catastrophizing of symptoms and impaired recovery from TBI.

TBI

TBI has been a growing concern in the United States with significant injuries increasing 53% from 2006 to 2014 (Centers of Disease Control and Prevention [CDC], 2014). This increase was likely due to increased awareness and mandatory reporting, thereby driving individuals with head injuries to seek medical help and providing physicians with greater confidence in providing an accurate diagnosis (Langer et al., 2020). The impact of brain injury can affect an individual's cognitive, emotional, and motor functioning with effects lasting anywhere from a few days to the remainder of their life (CDC, 2014). Increasing awareness of the nature of TBI, typical symptoms, and treatment may guide people to seek treatment when injured or initiate safety measures for prevention. TBI has been one of the most common acquired neurological conditions in

the United States, occurring in 824 per 100,000 persons in the United States (CDC, 2014).

Despite the increased prevalence of concussion in sports and modern media, there has been a lack of continuity in the definition of TBI for the average person and medical providers alike (Bodin et al., 2012; Carroll et al., 2014; McKinlay et al., 2011). The CDC (2019) and Stucky et al. (2014) defined TBI as the result of an impact to the head or penetrating head trauma causing an impairment in neurological functioning. Alternately, Lezak (2012) defined TBI as any injury to the brain resulting from an impact to the head and/or movement of the brain within the skull. Although these definitions attempted to clarify the nature of a TBI, they did not reflect injury severity. Furthermore, some clinicians have considered any injury to the brain, such as a stroke, to be a TBI.

Further confusion arose from the broad use of terms such "concussion," "head injury," and "TBI," as they have often been used synonymously. Furthermore, it has been common practice for medical professionals to use these words interchangeably (Lezak, 2012). Therefore, for the purposes of this research, when these terms were used, they were considered analogous to MTBI.

Concussion Grading Systems

Neuropsychological testing serves to measure various cognitive and motor functions to determine a diagnosis, and thereby treatment, of neurological impairments. Examples of impairments include injuries due to external forces such as an impact or penetration of the skull, and vascular issues or neurological degeneration (Levin, 1994). Specific to TBI, various grading systems have been developed to measure injury severity (Lezak, 2012).

For example, the Glasgow Coma Scale (GCS) is a generally accepted measure for initial assessment of TBI following an injury-event in which the clinician evaluates the individual's eye opening and verbal and motor responses to stimuli as able (Lezak, 2012; Teasdale & Jennett, 1974). It was developed in response to the need for triaging injured individuals relative to their treatment needs and expected outcome based on their degree of altered mental state, be that disorientation, confusion, or unconsciousness (Lezak, 2012).

Additionally, posttraumatic amnesia has been used by clinicians to determine injury severity based on the duration of retrograde, confusion, and anterograde amnesia symptoms (Lezak, 2012). Other grading systems consider posttraumatic amnesia in combination with any measured loss of consciousness and limitations in cognitive, emotional, and sleep functionality to determine injury severity.

Per Lezak (2012), neuroimaging is useful as an adjunct to neuropsychological testing because it can be helpful in evaluating patients whom, due to impaired consciousness, are unable to respond to stimuli. Similarly, when there is not an identifiable injury, event neuroimaging may assist clinicians in determining the etiology of acquired brain injuries for a more accurate diagnosis. Even with the breadth of tools available and multiple attempts in the medical field (Bigler, 2008), there has been no consensus in the classification of TBI. Fortunately, the World Health Organization Collaborating Centre for Neurotrauma Task Force on Mild Traumatic Brain Injury offered the following operational definition for MTBI:

> MTBI is an acute brain injury resulting from mechanical energy to the head from external physical forces. Operational criteria for clinical identification include: (i)

> 1 or more of the following: confusion or disorientation, loss of consciousness for 30 minutes or less, posttraumatic amnesia for less than 24 hours, and/or other transient neurological abnormalities such as focal signs, seizure, and intracranial lesion not requiring surgery; (ii) Glasgow Coma Scale score of 13–15 after 30 minutes postinjury or later upon presentation for healthcare. These manifestations of MTBI must not be due to drugs, alcohol, medications, caused by other injuries or treatment for other injuries (e.g., systemic injuries, facial injuries or intubation), caused by other problems (e.g., psychological trauma, language barrier or coexisting medical conditions) or caused by penetrating craniocerebral injury. (as cited in Carroll et al., 2004, p. 115)

Risk Factors for Poor Long-Term Recovery From TBI

Many preinjury factors can impact one's recovery from a TBI. Goldsworthy and Donders (2019) examined the Minnesota Multiphasic Personality Inventory-2-Restructured Form (MMPI-2-RF) restructured clinical (RC) scales in 201 individuals who had experienced TBI within the past 12 months. In particular, they examined how profile patterns differed based on injury severity, demographics, and premorbid history and identified four clusters of profiles. Characteristics for Cluster 1 included somatization, low life satisfaction, and emotional distress. For Cluster 2, patterns were indicative of low positive emotionality and somatization, although less than Cluster 1. Cluster 3 reported somatization, but less than Cluster 2, and an increased mistrust of others and a tendency to deviate for social norms. Cluster 4 included participants with collectively more severe injuries; yet, clinical scale scores did not reflect any clinically significant elevations. These findings indicate a notable relationship between the

preinjury mental health, substance abuse history, and passive coping strategies of individuals with head injuries and elevated MMPI-2-RF scores.

Preexisting mental health issues are a significant factor in recovery from brain injury. Broomhall et al. (2009) evaluated the impact of acute stress disorder (ASD) and posttraumatic stress disorder (PTSD) on trauma patients who were hospitalized with and without MTBI. They found the MTBI group with ASD was hospitalized for an average of 17.32 days compared to the other three groups of MTBI without ASD, non-MTBI with ASD, and non-MBTI without ASD, whose combined average hospital stay was 11–12 days. Furthermore, Broomhall et al. found MTBI patients experienced significantly higher levels of behavioral avoidance (i.e., injury-event processing) and subjective distress related to their perception of their symptoms than non-MTBI patients. These findings suggest psychological features, not just injury severity, are a factor in recovery time when comparing the MTBI with and without ASD groups. Although preexisting factors influence the healing process, symptoms remain well beyond what would be a typical recovery time in some cases.

PPCS

It is important to distinguish the term postconcussive syndrome (PCS)—injury symptomatology lasting more than 1 week—from PPCS—injury symptomatology lasting for more than 3 months (Bigler, 2008; Permenter et al., 2022). Furthermore, PPCS is not a specific diagnosis as it is meant to describe a constellation of long-lasting physical, emotional, behavioral, and cognitive symptoms (Permenter et al., 2022; Ryan & Warden, 2003). Rather, per the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM–5; American Psychiatric Association, 2013), PPCS would be encompassed in a

diagnosis of major or mild neurocognitive disorder due to traumatic brain injury. Although most patients fully recover within 3 months, approximately 15–25% meet the criteria for PPCS (American Psychiatric Association, 2013; Ponsford et al., 2012).

Effects of PPCS

In Hiploylee et al.'s (2017) study examining the recovery time of concussion patients suffering from symptoms lasting more than 3 months following a sport related injury, they found 27% of patients recovered. However, only 67% of those who recovered, did so in the 1st year, and no one recovered from symptoms beyond 3 years. These findings emphasize the importance of early treatment and suggest individuals may not recover if symptoms have not been resolved within 3 years. Similarly, the number of symptoms was strongly correlated to recovery time. Accordingly, accounting for all symptoms while exploring tendencies to under- or over-report is central to maximizing recovery.

It is also important to consider the effect of multiple head injuries. Spira et al. (2014) performed a study of 646 active-duty Marines with a history of concussion to determine if there was a relationship between TBI and increased levels of emotional distress, cognitive impairment, and/or PPCS. Although a singular concussion did not appear related to these conditions, having had multiple concussions was linked to increased emotional distress and potential for developing PPCS. Similarly, individuals who experienced three or more concussions demonstrated impaired neurocognitive functioning primarily in areas of attention and discrimination; however, there was no significant impairment in areas of memory. Additionally, the observed reduction in functionality was present regardless of combat exposure, deployment history, PTSD, and

depression. These findings suggest emotional well-being prior to injury is not the primary factor in recovery. Rather, the emotional and cognitive impact of multiple head injuries have a cumulative effect in developing persistent symptoms.

Risk Factors for Developing PPCS

In an attempt to develop a predictive model of recovery from MTBI, researchers compared cognitive, somatic, and emotional scales from the Rivermead Post Concussion Symptoms Questionnaire (RPQ) at baseline and 6 months postinjury to participants' demographic information. They determined the most prominent predictors of postconcussive symptoms were education level, preexisting mental health issues, and a previous TBI (Cnossen et al., 2017).

Insufficient coping skills regarding preexisting chronic pain has also shown to negatively impact recovery from and adaptability to TBI symptoms (Collins, 2013). Similarly, research has shown preexisting depressive or anxiety disorders and acute posttraumatic stress occurring approximately 5 days following the injury-event were predictive of enduring TBI symptoms at 3 months, thus reaching the threshold for PPCS (Meares et al., 2011). Along these lines, researchers have found preexisting depression and anxiety symptoms, as well as coping style, were significant indicators for the potential of persistent complaints (Scheenen et al., 2017).

Many experiences that result in MTBI are inherently violent and threatening (e.g., car accidents, military trauma); therefore, it is reasonable to expect one's development of posttraumatic symptoms. Unsurprisingly, a history of PTSD or presence of related symptoms following the event is predictive of developing PTSD during recovery (Harvey & Bryant, 1998). Preexisting and comorbid anxiety have also shown to be a prominent

risk factor for a more problematic recovery process (Ponsford et al., 2012). Similarly, the presence of depressive symptoms and avoidant coping have shown to be predictive of increased anxiety postinjury (Harvey & Bryant, 1998). Thus, the interplay of anxiety, depression, and posttraumatic symptoms further amplify psychological distress (Scheenen et al., 2017).

The Role of Assigned Sex in PPCS Recovery

Many factors influence outcomes following MTBI such as preexisting mental health, injury severity, and previous head injury history. Surprisingly, one's assigned sex has emerged as variable in recovery (Meltzer & Juengst, 2021; Ponsford et al., 2000). For the purposes of this research, the terms "women" and "men" were used for people whose sex assigned at birth was the same as their gender identity, unless otherwise specified. Similarly, the terms "sex," "assigned sex," and "biological sex" were used interchangeably (American Psychological Association, 2012, 2015). Fenton et al. (1993) found women 25 years and older represented the highest risk for developing persistent symptoms compared to women under 25 and all men, despite men under 25 years old being most at risk for incurring a head injury.

Preiss-Farzanegan et al. (2009) found that adult women were at greater risk for PPCS following a sport-related MTBI compared to young women. The most significant differences were their experiences of headaches, dizziness, fatigue, irritability, and concentration problems. Interestingly, the findings were consistent regardless of whether the injury occurred during a contact sport, no-contact sport, or if they were wearing a helmet.

Cogan et al. (2020) examined the role assigned sex played in recovery from MTBI among veterans and active-duty personnel and found that women experienced more head-injury-related symptoms. Additionally, they found women were more frequently diagnosed with depression, suggesting biological factors unique to women and mental health may play a role in their recovery.

Helplessness and Hopelessness

In describing learned helplessness, Maier and Seligman (1976) stated, "It argues that when events are uncontrollable the organism learns that its behavior and outcomes are independent, and that this learning produces the motivational, cognitive, and emotional effects of uncontrollability" (p. 3). Seligman (1972) found that animals, and by extension humans, responded to uncontrollable trauma (i.e., trauma beyond one's realm of control) similarly, as follows:

- They became less responsive to trauma and in some cases became completely unresponsive.
- Despite employing effective strategies for alleviating the effects of trauma, they experienced impairment in learning to use the strategies consistently.
- They had a greater stress response when they encountered trauma that could not be alleviated versus trauma that could be alleviated.

In the context of TBI, the uncontrollable nature of the cause of an injury, particularly when coupled with a person's existing sense of helplessness, can lead them to respond less effectively to recovery, encounter difficulty learning effective coping and management strategies, and experience elevated stress underlying the entire process.

Indeed, research has shown there is a relationship between a sense of helplessness and impaired recovery from injury (Moore & Stambrook, 1992).

Coping Strategies

Matheny et al. (1986) defined coping as "any effort, healthy or unhealthy, conscious or unconscious, to prevent, eliminate, or weaken stressors, or to tolerate their effects in the least hurtful manner" (p. 509). This definition was particularly insightful as it recognized coping strategies were ultimately intended to alleviate pain, distress, or discomfort. Although immediately helpful, some coping devices may be ultimately more harmful (Matheny, 1986). For example, an alcoholic experiences short term relief, but the negative effects on areas of their life such as their physical health, social system, and career are likely to become progressively worse.

Despite the variety of coping methods, the body of research has typically categorized coping mechanisms as those that tend to be more helpful from those likely to be more harmful (Baqutayan, 2015; Carver et al., 1989; McCrae & Costa, 1986). Although this research was applicable to a breadth of human experience, for the purposes of this writing, the application of coping methods in recovery of brain injury needed to be explored.

Maestas et al. (2014) examined the relationship between preinjury coping styles of MTBI patients and their emotional functioning and quality of life immediately following the injury-event and at 3 months. In this study, coping styles were based on Lazarus and Folkman's (1984) theory that described coping responses as either problem-focused, which aims to address a stressor, or emotion-focused, which attempts to lessen the emotional impact of the stressor. Among the combination of coping styles, Maestas et

al. found individuals who relied most on problem-focused coping and avoidant strategies (i.e., an aspect of emotion-focused coping) also experienced significantly more depression and anxiety symptoms as well as lower levels of mental health quality of life. This finding was despite the fact these participants also rated highest on problem-focused coping. Taken together, these findings suggest emotional engagement, rather than avoidance, is integral to optimizing outcomes following MTBI. Furthermore, problem-focused coping by itself cannot compensate for emotional avoidance.

Spitz et al. (2013) examined the relationships between cognition, coping skills, and emotional adjustment for individuals who experienced mild to severe TBI. Participants were evaluated approximately 19 months post injury (on average) and were administered a battery of neuropsychological and psychological tests. Spitz et al. found demographics were unrelated to coping skills or emotional adjustment. Similarly, there was no significant relationship between cognition and coping skills. However, there was a greater reliance on passive coping strategies, rather than those that would be more useful following a TBI, over longer periods of time post injury. Unsurprisingly, nonproductive coping was predictive of higher rates of depression and anxiety. Likewise, impairments in cognition had a negative impact on emotional well-being with adaptive coping strategies serving as an insulator against diminished emotional adjustment. Results of this research suggest that a person's sense of personal agency may have a moderating effect on their cognitive skills following a TBI.

Other research has identified a relationship between active coping and recovery and injury recovery. Tomberg et al. (2007) aimed to identify relationships between coping skills, support structures, and optimism to long-term health-related quality of life

following a TBI. Participants were initially evaluated an average of 2.3 years post injury with a follow up 5–6 years later. The researchers did not identify any significant change in health-related quality of life between the first and second evaluation. Alternately, maladaptive coping strategies led to insufficient social support, which was related to decreased health and quality of life. Although participant optimism increased over time, there was no significant change in health status or social well-being. These findings indicate task-oriented coping skills are important in recovery from TBI as opposed to optimism without action. Furthermore, these results suggest an active role in one's recovery and implementing useful coping strategies to be integral to the recovery process.

The aforementioned research has shown coping strategies stemming from an internal locus of control (e.g., taking action, emotional engagement, and using social support) have shown to be more helpful, while diminished social support and passive coping are unhelpful and potentially harmful. Clearly, there is a notable relationship between the concepts of learned helplessness and locus of control (Hiroto, 1974). Moore and Stambrook (1992) examined quality of life following a TBI and found "self-controlling and positive reappraisal coping skills and lower external locus of control was associated with better outcomes (or vice versa)" (p. 91). Given the role locus of control plays in coping strategy use, a better understanding of the construct is prudent.

Locus of Control

Rooted in social learning theory, the concepts of internal and external locus of control are based on the expectation one has that their behavior will yield a reward. An individual who believes their behavior has influenced an event is said to have an internal locus of control; meanwhile, one who believes their behavior did not influence an event

is said to have an external locus of control (Rotter, 1966). Along these lines, individuals who suffer from chronic pain who hold an external locus of control are more prone to psychological distress (Crisson & Keefe, 1988). Similarly, Elfström and Kreuter (2006) found those who had a stronger internal locus of control used more helpful coping strategies and experience a greater sense of well-being (Crisson & Keefe).

Greater internal locus of control is a significant aspect of resiliency; a person's belief that one can exert control in a situation empowers them to take an active role in their circumstances and reduces stress (Cazan & Dumitrescu, 2016; Diehl & Hay, 2010). In support of this notion, Lukow et al. (2015) studied resilience for 96 individuals with mild to major TBI. They found a significant positive relationship between resilience and psychological health. This relationship is particularly important for individuals with brain injuries as cognitive impairments and emotional dysregulation are often present.

Hope and Returning to Normal Functioning

Although coping skills and locus of control are relevant to helplessness, hopelessness rests in the absent belief that recovery is possible. In a study by Franulic et al. (2004), 202 TBI patients were evaluated for their ability to return to work 2, 5, and 10 years following a workplace or motor vehicle related injury. Researchers found being older, less educated, and less qualified for jobs, and having increased cognitive impairments were predictive of poorer outcomes.

Conversely, these findings reflect a sense that being younger, more educated, and better qualified, and having minimal cognitive impairment leaves one feeling hopeful about their future. Along these lines, Peleg et al. (2009) examined the relationship between the concepts of hope and dispositional optimism against depression in

individuals following a TBI. Although hope and optimism seem synonymous, they are distinct constructs. Hope, based on Snyder et al.'s (2000) research, was described as an expectation of a more preferable outcome for a specific goal. Dispositional optimism, as depicted by Scheier and Carver (1985), was defined as a generalized expectation of desirable outcomes. Peleg et al. (2009) found lower levels of hope and dispositional optimism were correlated to higher levels of depression. Furthermore, these relationships were stronger for TBI individuals than for others with significant injuries or illnesses.

As psychological health and hope about the future have appeared fundamental in optimizing recovery from TBI, exploring elements related to these factors was appropriate. Williams et al. (2014) performed a longitudinal study of 253 individuals with TBI. The relationship between the concepts of life satisfaction, community integration, and emotional distress were examined. Williams et al. found life satisfaction and community integration were positively correlated with each other, and both were negatively correlated with emotional distress.

Similarly, Corrigan et al. (2001) studied life satisfaction for 218 individuals who had been diagnosed with TBI. Some participants were interviewed 1 year after their injury, others 2 years postinjury, and still others both 1 and 2 years postinjury. For all groups, being employed when interviewed was correlated to greater life satisfaction. Elevated life satisfaction was related to motor independence, social engagement, maintaining employment, and psychological health. These factors may provide a sense of hope and belief that one can return to their lifestyle prior to injury and are integral to the recovery process.

Somatization

Somatization "refers to experience and communication of psychological distress in the form of physical symptoms" (Lipowski, 1988, p. 1359) and can occur regardless of there being an observable organic cause. For example, a person who is feeling emotionally anxious may become physically nauseous, and although this example is somewhat common, when symptoms are more distressful and protracted, it becomes a clinical concern. In diagnostic terms, this example has been referred to as somatic symptom disorder and characterized by "excessive thoughts, feelings, or behaviors related to somatic symptoms or associated health concerns" (American Psychiatric Association, 2013, p. 311). Although physiological symptoms are genuine, the disproportionate worry about their physical condition, despite medical evidence, is at the core of this disorder and under the generalized term of somatization as a whole (Stubbs et al., 2020). Due to the bidirectional relationship between psychological and physiological wellness, it is important to understand how a preexisting tendency or postinjury development for somatization adversely effects recovery from TBI.

Studies have shown the existence of somatization prior to an injury-event indicated extended recovery times (Lee et al., 2015; Root et al., 2016). In related research, McLean et al. (2009) explored potential predictors of postconcussion syndrome for patients who appeared to a hospital emergency department following a minor injury-event. Participants initially filled out self-report measures regarding their symptoms in addition to participating in a structured interview to collect demographic information and injury history. At 1, 3, and 12 months, the subjects participated in a follow-up interview

and completed questionnaires. McLean et al. found an individual's preinjury physical and mental health were most predictive of persistent concussion symptomatology.

In an effort to understand the relationship between somatic symptoms and MTBI recovery time, researchers have studied participants who expressed symptoms atypical for MTBI, though typical for somatization, and recovery time (Stubbs et al., 2020). Stubbs et al.'s (2020) results suggested unrelated somatic symptoms can negatively impact the quality of MTBI recovery.

As PPCS symptoms are prolonged, by definition, it is worth considering that individuals who experience PPCS may over-identify with their condition over time. In a study that examined the relationship between patients' psychological factors as determined by scores from the MMPI-2-RF and postconcussion symptoms, Perrine and Gibaldi (2016) found 55% of patients were somaticizing their symptoms, and 78% of those individuals appeared to exaggerate their symptoms. Therefore, given the negative impact somatization can have on injury recovery, it is reasonable to consider useful coping skills can counter these effects.

MMPI-2-RF

The MMPI-2-RF is a self-report personality measure that has been widely considered a mainstay of psychological testing (Ben-Porath, 2012; Sellbom, 2019). The instrument is comprised of 338 true or false questions that provide clinicians and researchers with data to assist in compiling a personality profile (Sellbom, 2019). The MMPI-2-RF is the result of multiple revisions of the instrument since its creation based on peer-reviewed research and user feedback (Ben-Porath, 2012). Data are provided across 51 subscales organized into five primary scales of validity, higher-order, clinical,

specific problem, and personality psychopathology (Sellbom, 2019). The validity scales and specific problem scales were relevant to this study.

Validity Scales

Currently, there are nine validity scales intended to identify response issues that may prevent test results from being interpretable (Ben-Porath, 2012). Although these scales are intended to be sensitive to validity concerns, results ought to be examined within the context of the assessment (Ben-Porath, 2012; Ingram & Ternes, 2016). Nevertheless, these scales serve as the foundation for the reliability and interpretability of this measure (Sellbom, 2019). Per Ben-Porath (2012), the nine validity scales are described as follows:

- Variable response inconsistency (VRIN-r), which reflects the tendency for the test taker to respond to similar questions inconsistently.
- True response inconsistency (TRIN-r), which detects how frequently the test taker provided the same response to questions which are seemingly opposed (e.g., responded true for both questions in a pair).
- Infrequent responses (F-r), which indicates potential overreporting across a variety of symptoms.
- Infrequent psychopathology responses (Fp-r), which also serves as an indicator of overreporting but in populations with more significant psychopathology.
- Infrequent somatic responses (Fs), which was designed to identify exaggerated somatic complaints.

- Symptom validity (FBS-r), which indicates overreporting of symptoms particularly in forensic and litigation settings.
- Response bias scale (RBS), which is useful in detecting excessive memory issues.
- Uncommon virtues (L-r), which identifies a tendency for the test taker to minimize deficiencies to appear more favorably.
- Adjustment validity (K-r), which indicates the test taker appears psychologically well adjusted but this is due to underreporting.

Substantiating these scales is of particular importance as the archival data are from a forensic setting in which there may be additional incentives to malinger for financial gain.

Wygant et al. (2009) attempted to determine the quality of the F-r, Fp-r, Fs, and FBS-r validity scales from the MMPI-2-RF; in the context of litigation, they measured results from uninjured participants who were coached to exaggerate symptoms along with individuals who suffered genuine injuries. Participants were then separated into three groups. The head injury simulation group was comprised of two subgroups: (a) those who experienced genuine head injuries and (b) those who were coached to feign injuries. Similarly, the medical simulation group was split into the same subgroup structure. Lastly, the personal injury/disability sample was comprised of participants involved in some form of insurance or legal claim, thus potentially being motivated to exaggerate their symptoms for financial gain. Archival data and additional validity testing were used depending on the group. Wygant et al. found all four scales successfully identified validity threats.

In another study by Wygant et al. (2011), which examined the validity scales of the MMPI-2-RF, participants were administered multiple validity tests such as the Structured Inventory of Malingered Symptomatology, Miller Forensic Assessment of Symptoms Test, Structured Inventory of Reported Symptoms, Test of Memory Malingering, and Victoria Symptom Validity Test, in conjunction with the MMPI-2-RF. They found the validity scales were sensitive to malingering, particularly in the context of other supportive information. By themselves, there was a tendency for false positives. As awareness of potential malingering within the data set is necessary, understanding related nuances of validity scales is essential.

Peck et al. (2013) attempted to distinguish differences between malingering, which is intentional exaggeration of symptoms for gain, and conversion, which is elevations in symptomatology due to psychological rather than physiological reasons. They found that reducing cutoff scores for the FBS-r to more than 30 and RBS to more than 15 collectively distinguished between malingering and conversion disorder more effectively.

Youngjohn et al. (2011) examined the MMPI-2-RF somatic and cognitive scales to better understand the relationship between effort and reported symptomatology for individuals with TBI. They found the somatic and cognitive scales better indicated overreporting of symptoms than validity scales. In particular, the head pain complaints scale was inversely related to injury severity suggesting a tendency to exaggerate symptoms.

Gervais et al. (2010) examined the effectiveness of the MMPI-2-RF RBS in overreporting of memory complaints as compared to equivalent scales in the MMPI-2;

the previous version of the assessment. Additionally, the relationship of the RBS to the overreporting scales (i.e., F-r, Fp-r, Fs, and FBS-r) within the MMPI-2-RF were examined. Researchers found the MMPI-2-RF RBS was more sensitive to the exaggeration of memory issues than its predecessor. Furthermore, the validity scales were effective, particularly when coupled with RBS results, in identifying overreporting.

Sellbom et al. (2010) examined the MMPI-2-RF Validity Scales to determine their utility in detecting malingering in forensic settings. They administered the MMPI-2-RF and the Structured Interview of Reported Symptoms (SIRS) to 125 men who were criminal defendants to identify potential malingering. They found the F-r and Fp-r scales were the most effective in distinguishing malingering individuals from nonmalingering.

In a study by Sellbom and Bagby (2010), the MMPI-2 and MMPI-2-RF validity scores for inpatient psychiatric patients and students (some of whom were coached to feign mental illness) were examined to determine if the instruments could identify authentic psychopathology. The Fp-r scale was most effective in distinguishing inpatient psychiatric patients from coached students. Furthermore, results supported the cutoff scores in the MMPI-2-RF instruction manual.

Gervais et al. (2011) compared participants' failure rates on three different validity tests to scales on the MMPI-2-RF. They found increases in the number of validity measures failed were related to elevated validity and overreporting scales. These findings suggest failure on validity tests, particularly multiple tests, serve as a useful indicator of overreporting. This was especially true for those participants who would benefit from financial gain.

In all, the MMPI-2-RF Validity Scales were shown to be effective in detecting overreporting and malingering for a wide range of psychological conditions. For the purposes of this research, narrowing the field of validity measures relevant to TBI complaints was useful.

FBS-r. This scale was developed to identify overreporting in the context of litigation through identification of unusual responses related to somatic or cognitive symptomatology and has been effective in identifying malingering (Ben-Porath, 2012; Ingram & Ternes, 2016; Sellbom et al., 2012). Thus, per the criterion detailed by the MMPI-2-RF authors, *t*-scores less than 80 were interpretable and *t* scores greater than or equal to 100 were excluded from this study (Ben-Porath, 2012; Ben-Porath & Tellegen, 2008). Furthermore, using FBS-r score to distinguish between noncredible somatic complaints and those related to somatization has shown to be less clear, reiterating the importance of a comprehensive and contextual perspective of assessment (Ingram & Ternes, 2016; Sellbom et al., 2012). Therefore, *t* scores 80–99, which indicate inconsistent reporting, were to be compared to VRIN-r and TRIN-r scores to determine if the protocol was interpretable (Ben-Porath, 2012; Ben-Porath & Tellegen, 2008).

RBS. Per Ben-Porath (2012), the RBS was developed to identify biased responses particularly in forensic settings where there was the potential for secondary gain. *t* scores less than 80 were interpretable and *t* scores greater than or equal to 100 were excluded as elevations in this range suggest overreporting (Ben-Porath, 2012; Ben-Porath & Tellegen, 2008). *t* scores 80–99, which indicate inconsistent reporting, were compared to VRIN-r and TRIN-r validity scores to determine if the protocol was interpretable (Ben-Porath, 2012; Ben-Porath & Tellegen, 2008).

In summary, the aforementioned literature supported the effectiveness of the MMPI-2-RF Validity Scales in identifying invalid reporting. More specifically, FBS-r and RBS were shown to be particularly useful in forensic settings.

Specific Problem Scales

As described by Ben-Porath (2012), the specific problem scales were developed to provide a more focused description of reported complaints. Within the specific problem scales are five subsets: (a) somatic/cognitive scales, (b) internalizing scales, (c) externalizing scales, (d) internalizing scales, and (e) interest scales, all which include their own subscales. The somatic/cognitive subset includes malaise, gastrointestinal complaints, head pain complaints, neurological complaints, and cognitive complaints. The internalizing scales are comprised of suicidal/death ideation, helplessness/hopelessness, self-doubt, inefficacy, stress/worry, anxiety, anger proneness, behavior-restricting fears, and multiple specific fears.

Malaise (MLS). Malaise measures a general feeling of fatigue, impairment, or lack of well-being and reflects a wide range of medical conditions (Ben-Porath, 2012). *t* scores between 60–79 indicate one is feeling less healthy and *t* score greater than or equal to 80 indicate a more generalized sense of poor health (Ben-Porath, 2012).

Head Pain Complaints (HPC). Items that comprise this scale are keyed specifically to head and neck pain (Ben-Porath, 2012). *t* scores ranging 65–79 indicate the respondent experiences some head pain and scores greater than or equal to 80 suggest more expansive head and neck pain complaints (Ben-Porath, 2012).

Neurological Complaints (NUC). This scale consists of items describing assorted neurological symptoms such as numbness, tingling, and poor motor control

(Ben-Porath, 2012). *t* scores between 65–91 reflect some vague complaints with scores greater than or equal to 92 indicative of more pervasive symptomatology (Ben-Porath, 2012).

Cognitive Complaints (COG). This scale was created to identify self-reported cognitive concerns (Ben-Porath, 2012; Gervais et al., 2009). However, it can be difficult to account for psychological factors which may impair cognitive functioning. For instance, emotional distress and anxiety can adversely affect concentration, attention, and memory (Dux et al., 2008; Meyers et al., 2014). Due to the cooccurrence of physiological and psychological factors reflected in scores, validity scores ought to be considered to determine if the protocol is interpretable (Ben-Porath, 2012). Nevertheless, *t* scores greater than 65 indicate cognitive difficulties with increased scores reflecting greater complaints (Ben-Porath, 2012).

Helplessness/Hopelessness (HLP). Items reflected in this scale reflect negative beliefs about the future and one's ability to influence outcome (Ben-Porath, 2012). The relationship of this metric to the concepts of helplessness and hopelessness, locus of control, and coping strategies makes it appropriate for use in this study. *t* scores greater than 65 indicate feelings of helplessness and/or hopelessness while *t* scores greater than 79 signal belief that life goals are not only unachievable, but one is unable to change to overcome problems (Ben-Porath, 2012).

Purpose of the Study

Due to the bidirectional relationship between physical and emotional well-being, it was reasonable to consider if the interplay of these states had an impact on recovery from MTBI and contributed to elongated recovery time from persistent concussion

symptoms. Likewise, the literature has been replete with research of how biological sex is a component in physiological and psychological wellness. This was of particular importance as advancing understanding of how this factor in MTBI recovery may be fundamental in its treatment. Thus, the research question in this study asked: How does a sense of helplessness and hopelessness, somatic and cognitive symptoms, and assigned sex impact recovery of persistent postconcussive symptoms?

Hypotheses

In a sample of individuals who experienced head injury related symptoms consistent with PPCS, it was hypothesized:

- Hypothesis 1: HLP scores on the MMPI-2-RF would predict one's MLS scores. Specifically, individuals who receive clinically significant scores ($t \geq 65$) on the HLP would also have higher problematic MLS scores than those who scored below.
- Hypothesis 2: HLP scores on the MMPI-2-RF would predict one's HPC scores. Specifically, individuals who receive clinically significant scores ($t \geq 65$) on the HLP would also have higher problematic HPC scores than those who scored below.
- Hypothesis 3: HLP scores on the MMPI-2-RF would predict one's NUC scores. Specifically, individuals who receive clinically significant scores ($t \geq 65$) on the HLP would also have higher problematic NUC scores than those who scored below.
- Hypothesis 4: HLP scores on the MMPI-2-RF would predict one's COG scores. Specifically, individuals who receive clinically significant scores ($t \geq 65$) on the HLP would also have higher problematic COG scores than those who scored below.
- Hypothesis 5: Assigned sex would arise as a covariate with women exhibiting a stronger relationship between HLP scores and somatic/cognitive scores than men.

Chapter 2

The effects of traumatic brain injury (TBI) can have long-term neurological and psychological effects. Furthermore, psychological beliefs about one's condition can further exacerbate and prolong symptomatology. The goal of this study was to determine if there was a specific relationship to a sense of helplessness and/or hopelessness that contributed to this phenomenon and whether assigned sex was a factor. This was assessed through examination of archival data consisting of the Minnesota Multiphasic Personality Inventory-2-Restructured Form (MMPI-2-RF) somatic/cognitive scales, the helplessness/hopelessness (HLP) subscale, and a review of the neuropsychological report. A quantitative methodology was used with a multivariate analysis of covariance (MANCOVA) to examine the relationship between HLP scores and the four somatic/cognitive scale scores. Additionally, assigned sex was measured as a moderator between the HLP and the somatic/cognitive scores.

Participants

This study used archival data from individuals who previously participated in neuropsychology evaluations; data were limited to the forensic neuropsychological report and associated MMPI-2-RF scores. Medical records were not reviewed. These evaluations were conducted for civil litigation purposes by a licensed neuropsychologist. There was no contact with or recruitment of participants. Only files that met criteria for inclusion of the study were provided for this study and were deidentified prior to being made available to the researcher.

Study participants were selected from a pool of evaluations performed from 2016–2021 in sequential order. Once selected, the forensic neuropsychological report and

associated MMPI-2-RF scores were reviewed to verify the participant met criteria for inclusion in this study. Participants who experienced a mild traumatic brain injury (MTBI) and demonstrated symptomatology consistent with persistent postconcussive syndrome (PPCS) were included in the study. Participants between age 18–90 were included in the study. Participants under age 18 were excluded. Assigned sex was also measured as it has emerged as a relevant factor in recovery from head injury symptoms. Participants were excluded if their MMPI-2-RF validity scales, specifically the response bias scale and symptom validity, were invalid ($t \geq 100$). This process was repeated until the desired sample size was reached. A power analysis was then conducted to calculate the minimum number of participants required to complete this study ($N = 138$).

Materials or Measures

Data from the neuropsychological report and MMPI-2-RF were used to understand connections between helplessness, somatic and cognitive symptoms, sex assigned at birth, and PPCS. All relevant data were stored on a OneDrive password protected cloud server. Similarly, the server was only accessed with password protected computers on a private network.

Data sets that met criteria for inclusion were assigned a number, in numerical order starting at 1. This information was listed on a password-protected Microsoft Excel file and stored on the same OneDrive password-protected cloud server as the archival data. Then, data extracted from the forensic neuropsychological report and associated MMPI-2-RF generated report were added to the same password-protected Excel file with the associated numbered entry. Once the required sample size was met, data were exported to a password-protected SPSS spreadsheet file for analysis and stored on the

same password secured cloud server (i.e., OneDrive), thus providing a minimum of two layers of password protection in addition to participants being deidentified.

Data Analysis

Coded data were exported to an SPSS spreadsheet for analysis. To test the five hypotheses, MANCOVA were performed to determine effects of HLP on MLS, HPC, NUC, and COG with assigned sex run as a covariate for the relationship between somatic/cognitive and HLP scores. The four somatic/cognitive scores served as dependent variables, the HLP scores were the independent variable. Those whose *t* score was less than 65 were coded as Level 1 and those whose *t* score was greater than or equal to 65 were coded as Level 2. Assigned sex was a covariate.

Summary

In summary, this study aimed to determine if there was a relationship between a sense of helplessness and/or hopelessness, assigned sex, and prolonged symptoms of PPCS following a MTBI. Correlations were examined using archival demographic and MMPI-2-RF data processed through SPSS statistical analysis software.

Chapter 3

To test the aforementioned hypotheses, data were extracted from the participant pool and correlation analyses and multivariate analyses of covariance (MANCOVA) were run. Specifics of the analytic strategy, results, and implications for the hypotheses are examined in this chapter.

Analytic Strategy

The sample was drawn from a pool of deidentified individuals who previously participated in neuropsychological evaluations, including the Minnesota Multiphasic Personality Inventory-2-Restructured Form (MMPI-2-RF). Participants who did not meet inclusion criteria or whose records did not include all of the data measured in this study were excluded. Participants were included in this study, which met the threshold per power analysis. For each participant, extracted data included helplessness/hopelessness (HLP), malaise (MLS), head pain complaints (HPC), neurological complaints (NUC), and cognitive complaints (COG) scale scores derived from their MMPI-2-RF report, as well as their assigned sex from the neuropsychological report.

Scores for the HLP with a *t* score below 65 were coded as Level 1 and those who *t* score was greater than or equal to 65 were coded as Level 2. A MANCOVA was used to evaluate relationships between HLP scores and scores for MLS, HPC, NUC, and COG with assigned sex as a covariate. Analyses were performed using SPSS ($\alpha = .05$).

Results

Following the data extractions, correlation analyses and MANCOVA were run to test the hypotheses of this study.

Descriptive Analyses

One hundred and thirty-eight individuals participated in the study, of which 80 reported their sex as female and 58 reported their sex as male. No other demographic information was collected. Sample sizes and associated HLP scores are shown in Table 1.

Table 1

Assigned Sex and HLP Scores

	HLP scores $t < 65$		HLP scores $t \geq 65$	
Assigned sex	n [a]	%	n [b]	%
Female	71	88.8	9	79.3
Male	46	11.3	12	20.7

Note. $N = 138$. [a] $n = 117$. [b] $n = 21$.

Hypotheses Testing of Somatic/Cognitive Scales

The first four hypotheses projected clinically significant levels of HLP would be predictive of higher problematic MLS, HPC, NUC, and COG scores. As a preliminary exploration, a correlation analysis was performed between the HLP and the four somatic/cognitive scales. These results are presented in Table 2.

Table 2

Correlations Between the HLP Scale and Somatic/Cognitive Scales

Variable	Pearson correlation	Sig. (2-tailed)	95% CI (2-tailed) [a]	
			Lower	*Upper*
MLS	.46 [b]	<.001	0.32	0.58
HPC	.37 [b]	<.001	0.21	0.50
NUC	.40 [b]	<.001	0.25	0.53
COG	.51 [b]	<.001	0.37	0.62

Note. [a] Estimation is based on Fisher's r-to-z transformation. [b] Correlation is significant at the 0.01 level (2-tailed).

A one-way MANCOVA was conducted to test these hypotheses. Additionally, to further understand the strength of relationship between the independent and dependent variables, a one-way MANCOVA was conducted with HLP as a continuous variable. Both analyses are shown in Table 3.

Table 3

Effect of HLP Scores and Assigned Sex on Somatic/Cognitive Scores

Pillai's trace	*F* [a]	Hypothesis *df*	Error *df*	*p*	η^2	Observed power[b]
Dichotomous						
Intercept	1105.57	4.00	131.00	<.001	.97	1.00
HLP	6.06	4.00	131.00	<.001	.16	0.98
Assigned sex	0.17	4.00	131.00	.95	.01	0.09
Continuous						
Intercept	64.25	4.00	132.00	<.001	.66	1.00
HLP	14.85	4.00	132.00	<.001	.31	1.00
Assigned sex	0.21	4.00	132.00	.93	.01	0.09

Note. Pillai's Trace was run with HLP as a categorial variable (dichotomously) and continuous variable (continuously). [a] Exact statistic. [b] Computed using $\alpha = .05$.

The MANCOVA was separated into outcome specific ANCOVA that aligned with Hypotheses 1–4, as seen in Table 4. Hypothesis 1 (i.e., clinically significant HLP scores would result in higher MLS scores) was supported, $F(1, 134) = 10.38$, $p = .002$, $\eta^2 = .07$. Hypothesis 2 (i.e., higher HLP scores would result in higher HPC scores) was noted as significant, $F(1, 134) = 8.42$, $p = .004$, $\eta^2 = .06$. Hypothesis 3 (i.e., elevated HLP scores would indicate higher NUC scores) was supported $F(1, 134) = 11.24$, $p = .001$, $\eta^2 = .08$. Hypothesis 4 (i.e., higher HLP scores would result in elevated COG scores) was also supported $F(1, 134) = 23.12$, $p < .001$, $\eta^2 = .15$.

Table 4

Effect of HLP Scores and Assigned Sex on Individual Somatic/Cognitive Scores

Source	*SS*	*df*	*MS*	*F*	*p*	η^2
HLP						
MLS	1453.24	1	1453.24	10.38	.002	.07
HPC	1219.92	1	1219.92	8.42	.004	.06
NUC	2442.54	1	2442.54	11.24	.001	.08
COG	2611.76	1	2611.76	23.12	<.001	.15
Assigned sex						
MLS	4.44	1	4.442	0.03	.859	<.001
HPC	6.52	1	6.518	0.05	.832	<.001
NUC	8.00	1	7.99	0.04	.848	<.001
COG	31.26	1	31.26	0.28	.600	.002
HLP and assigned sex						
MLS	17.18	1	17.18	0.12	.727	.001
HPC	113.39	1	113.32	0.78	.378	.01
NUC	52.49	1	52.49	0.24	.624	.002
COG	107.86	1	107.86	0.96	.330	.01

Hypotheses Testing of Assigned Sex

To test Hypothesis 5, a one-way MANCOVA was performed with assigned sex as a covariate. However, there was no significant indication that assigned sex was a confounding factor between HLP and any of the four outcome variables, $F(4, 131) = 0.17$, $p = .472$, $\Lambda = .97$, $\eta^2 = .03$.

Chapter 4

The purpose of this study was to examine the relationship between a sense of helplessness and/or hopeless and recovery from prolonged symptomatology of persistent postconcussive syndrome (PPCS) following a mild traumatic brain injury (MBTI) and whether assigned sex was a factor. To answer to this question, research was conducted to understand connections between the Minnesota Multiphasic Personality Inventory-2-Restructured Form (MMPI-2-RF) helplessness/hopelessness (HLP) scales, somatic/cognitive scales, and assigned sex.

Discussion

Within this participant pool, Hypothesis 1 was supported, as the HLP had a significant effect on malaise (MLS) scores. This means individuals who felt powerless to overcome their problems and make changes to reach life goals also reported more physical debilitation and poor health (Ben-Porath, 2012). Hypothesis 2 was supported as well, with HLP predicting head pain complaints (HPC). Essentially, holding the belief one could not overcome challenges and solve problems predicted more head and neck pain (Ben-Porath, 2012). Similarly, Hypothesis 3 (i.e., HLP would predict neurological complaints [NUC]) was also supported. Believing one cannot overcome life challenges and solve their problems was predictive of neurological complaints such as dizziness, weakness, and loss of balance. Evidence also supported Hypothesis 4 indicating HLP scores would predict cognitive complaints (COG) scores. This means those who reported feeling helpless to overcome challenges and hopeless about meeting life goals also described memory problems and difficulties with concentration. Lastly, Hypothesis 5 was not supported by the data. Women did not demonstrate a stronger relationship between

the HLP scores and somatic/cognitive scores than men. In other words, women who reported feeling helpless and/or hopeless about their life and goals were no more likely to experience somatic and cognitive complaints than men.

Integration

The results of this study demonstrate clear patterns between a sense of helplessness and/or hopelessness and somatic/cognitive symptoms within this PPCS sample. Specifically, when participants in the present study reported hopelessness and helplessness about making important life changes and meeting life goals, they also reported increased MLS, HPC, NUC, and COG. These patterns and related subjects are explored in this chapter in the context of existing literature on PPCS.

MLS

The findings regarding Hypothesis 1 were consistent with current literature. Taken together, existing research demonstrated helplessness may result in physical debilitation and poor health. Studies have shown reporting poor health prior to an injury-event was correlated with extended recovery times (Lee et al., 2015; Root et al., 2016). Likewise, individual's preinjury physical health was predictive of persistent concussion symptomatology (McLean et al., 2009). Furthermore, those who reported increased physical debilitation also experienced longer recovery times (Stubbs et al., 2020).

Similarly, Peleg et al. (2009) found lower levels of hope and dispositional optimism were correlated to higher levels of depression. These relationships were stronger for individuals who had experienced TBI compared to those with other significant injuries or illnesses. The present study builds on the notion that those with

more hopelessness also experience increased depression and adds to the possibility that they may experience increased somatic and cognitive problems as well.

It is likely this current study supported current literature because of the potentially cyclical nature of physical and mental health. Research has demonstrated physical and mental health tend to be correlated (Hays et al., 1994), and results of this study built on those findings. This finding means it is essential for counseling psychologists and other treatment providers to assess, and treat where possible, physical health problems to potentially positively treat prolonged TBI symptomatology.

HPC

The findings regarding Hypothesis 2 were consistent with current literature as well. Current studies have suggested helplessness was related to head and neck complaints within TBI populations. For example, Chaput et al. (2016) explored the relationship between the ability to cope with TBI pain and outcomes. The researchers measured participants' experiences of pain compared to preinjury levels along with other psychological factors, including helplessness related to their injury. They found both increased levels of pain and helplessness were related to poorer recovery outcomes.

It is likely this study's findings supported current literature because helplessness may exasperate pain experiences. For instance, Chaput et al. (2016) identified a relationship between catastrophizing of symptoms and impaired recovery from TBI. It seems catastrophizing symptoms is one factor involved in feelings of helplessness and increased pain levels, although further research on this concept may be necessary. Regardless, counseling psychologists working with individuals with TBI should understand the nature of helplessness and/or hopelessness in the context of neck and head

pain. Using interventions to target helplessness and/or hopelessness may be an effective strategy for alleviating pain.

NUC

Regarding Hypothesis 3, this study's findings were supported within the context of current literature. Helplessness appears to be predictive of neurological complaints for individuals with TBI. For example, Corrigan et al. (2001) found within a similar population sample, poorer motor functioning (one factor of neurological complaints) was predictive of poorer life satisfaction, social engagement, maintaining employment, and psychological health. Similarly, Williams et al. (2014) found life satisfaction and community integration were positively correlated with each other and both were negatively correlated with emotional distress. This finding makes sense, as factors that provide a sense of hope and belief that one can return to preinjury life may be cyclically reinforcing. Indeed, current results, along with Corrigan et al.'s findings, may show how factors that provide hope decrease neurological complaints, and vice versa.

These findings suggest individuals who have experienced TBI may recover best when they are able to access a sense of hope regarding their neurological symptomatology. Counseling psychologists working with individuals with TBI should understand how these two factors impact one another and provide interventions such as psychoeducation about how to best cope with and mediate neurological complaints.

COG

The findings regarding Hypothesis 3 were also consistent with current research. This study demonstrated helplessness and/or hopelessness predicted cognitive complaints, including memory problems and difficulties with concentration. These results

were consistent with Chaput et al.'s (2014) findings that pain catastrophizing, which was conceptualized as playing a primary role in catastrophizing, was strongly linked to increased post concussive concentration issues.

It is likely these findings were supported and are consistent with current literature because pain catastrophizing, as a function of helplessness, may in and of itself be distracting due to impairment of concentration and memory. Counseling psychologists should be aware of this relationship and use interventions that help clients to manage catastrophizing behavior and focus their attention, to potentially decrease both helplessness and cognitive symptoms.

Assigned Sex

Another important factor of recovery from MTBI that was explored in previous literature was the role of assigned sex. As discussed, one's assigned sex has emerged as a variable in recovery from TBI (Meltzer & Juengst, 2021; Ponsford et al., 2000). For instance, Fenton et al. (1993) found women 25 years and older represented the highest risk for developing persistent symptoms, and Cogan et al. (2020) discovered women veterans and active-duty personnel experienced more head injury related symptoms than men. Additionally, Cogan et al. found women veterans were more frequently diagnosed with depression and they hypothesized that biological factors unique to women's mental health may play a role in their recovery.

Based on this literature, this study hypothesized that women would exhibit a stronger influence on the relationship between helplessness and/or hopelessness and somatic/cognitive symptoms. However, Hypothesis 5 was not supported and these results were not consistent with current literature. This suggests there must be other mediating

variables that contribute to increased symptoms in women beyond helplessness and/or hopelessness.

For example, one meta-analysis discovered female individuals with TBI reported significantly more trauma symptoms than men did (Farace & Alves, 2000). Thus, one potential explanation could be women who experience TBI are also experiencing higher levels of traumatic stress, which may be conceptualized separately from helplessness and/or hopelessness.

These findings are important for the TBI population because it means it is necessary to consider additional factors when treating women with TBI. Counseling psychologists should provide thorough assessments to understand what is contributing to their increased symptomatology, including taking into account factors that may impact women separately from men.

Coping Strategies

In addition to these specific hypotheses addressed, this research also provides input regarding how related factors, including use of effective coping strategies, may impact TBI recovery. Specifically, a person's sense of hope and agency may be reflected in the ways they choose to navigate challenges. As previously noted, Matheny et al. (1986) explained all coping strategies are intended to alleviate distress; however, some are ultimately helpful in the long term, whereas others perpetuate or contribute to further problems and pain.

In the context of brain injury survivors, Maestas et al. (2014) demonstrated individuals who relied on emotionally avoidant coping strategies (i.e., coping designed to avoid uncomfortable or painful emotions) experienced significantly more depression and

anxiety symptoms and lower levels of mental health quality of life. This finding remained true even with a willingness to solve problems in their lives. This research found that experiencing rather than avoiding one's emotions was essential in enhancing outcomes following MTBI.

Taking this information into consideration, it is unsurprising the current study found helplessness and/or hopelessness was also related to poorer somatic and cognitive outcomes. The present study's findings were consistent with this literature. Indeed, it makes logical sense those who feel incapable of overcoming life's challenges and solving problems would seek to avoid accompanying painful emotions.

Parallel to avoidant coping, Spitz et al. (2013) examined the impact of passive coping on injury recovery and resultant symptomatology. They found reliance on passive coping strategies, rather than active coping strategies, was predictive of higher rates of depression and anxiety, and served as an insulator against diminished emotional adjustment. Similarly, Tomber et al. (2007) found task-oriented coping skills were essential in recovery from TBI. This literature was also consistent with the present findings, as it was self-evident that those who felt helpless and hopeless also felt less personal agency. Therefore, it is logical that those with higher levels of helplessness and/or hopelessness would engage in more passive coping and less active coping or task-oriented coping and experience greater issues with emotional adjustment, depression, and anxiety.

Taken together, existing literature and the current study suggest that those with passive coping strategies likely experience increase somatic and cognitive symptoms as well. Thus, it is important for counseling psychologists who are working with a TBI

population to understand their patients who use unhelpful coping mechanism—and most specifically, passive coping strategies—carry an increased risk for developing somatic and cognitive symptoms as well.

Counseling psychologists can then use treatment protocols that target coping strategies to potentially improve overall somatic and cognitive outcomes. For example, Backhaus et al. (2010) offered a 12-session, manualized, cognitive-behavioral therapy group focused on psychoeducation and training participants with TBI. In particular, participants were taught effective active coping mechanisms to deal with many of the emotions that arise following brain injury, such as anger, hostility, grief, depression, irritability, and anxiety. Participants experienced less helplessness compared with the control group immediately following treatment and at a 3-month follow-up. When considered in light of the current study, counseling psychologists could use similar treatment protocols and expect to see decreases in both somatic and cognitive symptoms for TBI populations.

Locus of Control

As previously discussed, another element of helplessness and/or hopelessness involves an individual's locus of control. A person who believes their behavior has more influence over events and outcomes is said to have an internal locus of control, whereas a person who believes their behavior does not have such an influence has an external locus of control (Rotter, 1966).

When faced with adverse medical conditions, individuals with an external locus of control have been more prone to psychological distress (Crisson & Keefe, 1988; Elfström & Kreuter, 2006). Conversely, those with a stronger internal locus of control

experienced a greater sense of well-being (Crisson & Keefe, 1988; Elfström & Kreuter, 2006). Similarly, greater internal locus of control empowered people to take an active role in their circumstances and reduces stress (Cazan & Dumitrescu, 2016; Diehl & Hay, 2010). Additionally, Lukow et al. (2015) found, for individuals with mild to major TBI, there was a significant and positive relationship between resilience and psychological health.

The results of the present study were consistent with these findings. Those with a stronger internal locus of control likely experienced less helplessness in their lives, which was consistent with existing research that those with a stronger internal locus of control would have less stress, more resilience, and greater positive psychological health. The results complemented existing literature; internal locus of control likely also decreased cognitive and somatic issues.

In terms of treatment, counseling psychologists may combine current literature and results of this study to target developing an internal locus of control in TBI patients. For instance, a systematic review of treatments for individuals with TBI found the best psychological treatment for overall symptomatology was psychoeducation (Nygren-de Boussard et al., 2014). Explaining to patients how symptoms occur and progress may help them to conceptualize their symptoms appropriately and perceive them less negatively, and thereby feel more of a sense of control over their situation (Nygren-de Boussard et al., 2014). Counseling psychologists can use similar treatment protocols to instill a higher level of internal locus of control leading to more positive treatment outcomes.

Exploration

This research aimed to advance recovery from prolonged MTBI symptoms by understanding the relationship between the psychological condition of helplessness and or hopelessness and physiological cognitive and/or somatic symptoms. However, there were several limitations that could be addressed in further research. Furthermore, findings of this study also open doors for future exploration.

Nonrepresentative Sample

First, it must be noted this sample was likely not a representative sample of all people who have experienced PPCS. The individuals examined in this study were involved in litigation and therefore had, at the least, the financial ability, or other levels of privilege and access (e.g., insurance, time, or legal resources) to be able to participate in litigation procedures and receive quality treatment for their TBI early and regularly. Similarly, those who participated may have had some degree of cultural familiarity with or confidence in neuropsychology or the justice system. Therefore, this study may not represent patterns that may be seen in individuals with less familiarity or cultural comfort with related professions or the legal system.

Additionally, all participants included in this study had a good grasp of the English language to the extent that the board-certified neuropsychologist administering the evaluations felt confident they would have no issue being able to read and comprehend the MMPI-2-RF independently. Consequently, this study was also not necessarily representative of non-English speakers or individuals learning English as a second language.

Unknown Demographic Data

In terms of diversity within the sample population, it is also essential to understand that only one demographic variable was collected for this study, assigned sex. Of the 138 participants, 80 reported their assigned sex as women, 58 reported their assigned sex as men, and no other assignments were represented

Thus, one must be cautious in generalizing these findings. For example, it was impossible to note if these results could be normed for various ethnic groups, cultural groups, education levels, and socioeconomic statuses. Likewise, holding multiple marginalized identities may even serve as a covariate to explain elements of helplessness and/or hopelessness due to impact of minority stress, trauma, or discrimination.

Litigation Sample

A final limitation to this study lies in the nature of the context in which this neuropsychological data were collected. Study participants were involved in litigation at the time of their evaluations. Civil litigation can be extremely conflictual and the possibility for monetary awards can be an incentive to embellish symptoms. Regardless of motivation, rates of overreporting are relatively high when individuals are undergoing evaluations for civil litigation purposes compared to evaluations completed for other purposes. For example, Sharland and Gfeller (2007) found the median percentage of cases who engaged in feigning or exaggeration was 20% in forensic neuropsychological settings for individuals engaged in civil litigation or compensation cases. Similarly, Mittenberg et al. (2002) reported malingering and/or symptom exaggeration were found in 29% of personal injury and 30% of disability cases.

The MMPI-2-RF does have sophisticated measures for identifying both over reporting and underreporting symptomatology. Although invalid evaluations were not included in this study, MMPI-2-RF results from those participants who may have engaged in some exaggeration or minimizing were included. Although no individuals whose scores exceeded the threshold of validity were included, some protocols indicated results should be "interpreted with caution;" thus, results of this study should be interpreted with caution as well.

Expand Demographics of Sample

Based on these limitations, it would be useful to expand demographic data to include underrepresented populations from more diverse cultural backgrounds in future studies. This expansion may lead researchers to identify whether nuanced cultural factors (e.g., beliefs about hope) or systemic influences (e.g., stereotype threat) influence MTBI recovery outcomes. Additionally, it would be important to ensure the data set includes participants from a variety of socioeconomic statuses and education levels.

Examine Nonlitigation Sample

Expanding the data pool to include participants who experienced prolonged brain injury symptoms from nonlitigation contexts would be useful. Doing so would serve to reduce or at least identify whether secondary gain was a significant covariate in this study's design, even with participants who produced valid protocols.

Explore Impact of Cognitive Impairment

On a different note, this study determined helplessness and/or hopelessness was predictive of a variety of somatic and cognitive complaints. Due to the bidirectional relationship between psychological and neurological functioning, future research should

explore if certain cognitive impairments following MTBI have a negative and detrimental effect on helplessness and/or hopelessness. This may inform whether there is a level of causation in either direction rather than a degree of predictability.

Treatment Potential

This research highlights the importance of how psychological factors influence one's recovery from MTBI. To this end, this study may be useful in the treatment of this population. In particular, these results suggest interventions focused on establishing a belief in one's ability to influence their treatment outcome is valuable. Future research could also explore how interventions aimed at cultivating internal locus of control impact MBTI recovery.

Along these lines, helping individuals with brain injuries develop a sense of confidence during cognitive rehabilitation, such as implementing small yet achievable goals, may foster personal agency. In addition, educating individuals about MTBI recovery, the value of maintaining a hopeful attitude, and taking proactive ownership of their recovery may encourage buy-in. The community would benefit from further researchers systematically documenting the impact of such interventions.

Conversely, interventions aimed at interrupting negative thought patterns may help individuals remain positive throughout the treatment process. Medication targeted at alleviating depression and/or anxiety may be another effective measure for preventing negative cognitive loops and despondency. Researchers could explore the efficacy of such treatment.

Regardless of which of the aforementioned interventions are used, the importance of implementing them proactively and early has been emphasized (Snell et al., 2009).

Indeed, future research could explore outcomes of individuals who received early and proactive psychological treatment following an MBTI versus those who did not receive any or delayed psychological treatment.

Conclusion

A TBI often presents with various physical and psychological symptoms. For example, those with TBI may experience somatization of emotional distress and diminishing recovery from preexisting mental health conditions (Golden & Golden, 2003; Outcalt et al., 2015; Vanderploeg et al., 2009). It is easy to understand how headaches may complicate recovery from brain injury and, in turn, elevate emotional distress. Alternately, it is reasonable that those who experience emotional distress and are predisposed to helplessness and/or hopelessness may experience prolonged recoveries from brain injury.

Due to the bidirectional relationship between physical and emotional well-being, it is necessary to consider the effect these states have on recovery from MTBI and how their interaction may contribute to the elongated recovery time from persistent concussion symptoms. Thus, the research question in present study asked: How do a sense of helplessness and/or hopelessness, somatic and cognitive symptoms, and assigned sex impact recovery of persistent postconcussive symptoms?

The results demonstrated that when participants reported helplessness and/or hopelessness about making important life changes and meeting life goals, they also reported more physical debilitation, poor health, head and neck pain, neurological issues, and cognitive difficulties. Assigned sex was not a significant moderating variable between the HLP and these somatic and cognitive concerns.

These results are consistent with previous literature regarding the effect of various coping strategies, locus of control, and hope on recovery from head injuries and other chronic conditions. The current study adds to the literature by suggesting (a) people with passive coping likely experience an increase of somatic and cognitive symptoms, (b) those with internal locus of control likely also decreases cognitive and somatic symptoms, and (c) individuals with more helplessness and/or hopelessness may experience increased somatic and cognitive symptoms.

Present findings were not consistent with previous literature that suggested assigned sex at birth may be a variable in recovery. More specifically, female sex did not predict worse cognitive and somatic outcomes. Rather, there may be other mediating variables that contribute to increased symptoms in women beyond helplessness and/or hopelessness.

To summarize, this research presents several possibilities for future exploration as discussed previously. Furthermore, results of the current study provide psychologists and other professionals with essential takeaways for helping patients effectively heal from TBI. Counseling psychologists treating TBI patients may build on this research by focusing on interventions that foster an internal locus of control, effective coping strategies, and the development of hope. Doing so may play an important role in decreasing somatic and cognitive symptoms within the context of brain injury recovery.

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