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Emotional expression and coping style in predicting well-being after traumatic brain injury

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**EMOTIONAL EXPRESSION AND COPING STYLE IN PREDICTING
WELL-BEING AFTER TRAUMATIC BRAIN INJURY**

by

KAJA TELMET HARPER

DISSERTATION

Submitted to the Graduate School

of Wayne State University,

Detroit, Michigan

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Approved by:

Advisor

Date

DEDICATION

This manuscript is dedicated to my wonderful family. My parents, Diana Koczuk and Juhan Telmet, have supported me in more ways than I can name and have never stopped believing in me. From when I was little sitting at my desk doing schoolwork, you both instilled in me a commitment to learning and doing my best.

Keith Harper, my husband, has been a constant source of love, support and patience. You have made sacrifices that made my education and training possible. While I will be inspired to learn new things for the rest of my life, I promise you that I am done with school (at least for a while).

To my son, Eiven Harper, I thank you for your patient understanding when I had to stay inside to work when you wanted to go outside and play, usually with your trucks in the sand. Your sweet smile, contagious laugh, tight hugs and the funny things you say brighten each and every one of my days.

I have faith that those family members who are not here with me to celebrate this accomplishment are looking out for me in ways that I cannot comprehend: Papa Dan Blades, Vanaema Alice Telmet, Step-Dad Richard Koczuk, Grandma Wanda Watts, and Babcia Halina Koczuk.

I love you all.

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CHAPTER 1

INTRODUCTION

Background and Significance

More than 5 million Americans live with disabilities associated with traumatic brain injury (TBI; CDC Injury Center, 2006), including cognitive and physical impairments that decrease functional independence (Corrigan, Bogner, Mysiw, Clinchot, & Fugate, 2001). An additional burden faced by many individuals is the chronic stress of living with TBI and the toll this stress takes on subjective well-being; both survivors of TBI (Corrigan et al., 2001; Deb, Lyons, Koutzoukis, Ali, & McCarthy, 1999) and their significant others (Kreutzer et al., 2009; Marsh, Kersel, Havill, & Sleight, 2002) often show increased distress, including depression and anxiety, as well as diminished life satisfaction. Although adverse outcomes are well documented, research that examines the mechanisms of coping with the stress of TBI is sparse despite the scope and gravity of problems faced by these survivors and their significant others.

Outcomes after TBI: Survivors and Significant Others

Survivors of moderate to severe TBI have experienced an acute event that often results in drastic changes in their everyday living. Immediately following injury, these individuals are hospitalized in an acute care setting, then they often require inpatient and/or post-acute rehabilitation followed by ongoing outpatient rehabilitation aimed at addressing the cognitive, behavioral and physical changes that have occurred (Roebuck-Spencer & Sherer, 2008). Individuals with TBI show cognitive improvements over time, generally within the first 18 months; however, some research suggests that recovery continues to occur for years post injury for certain individuals (Dikmen, Machamer, Temkin, & McLean, 1990; Millis et al., 2001; Tabaddor, Mattis, & Zazula, 1984). TBI also greatly affects social functioning (Temkin,

Corrigan, Dikmen, & Machamer, 2009) with many experiencing unemployment (Dikmen, Ross, Machamer, & Temkin, 1995), lengthy time to return to work (Oddy, Humphrey, & Uttley, 1978), poor reported quality of life (Corrigan et al., 2001; Teasdale & Engberg, 2005), inability to live independently (Dikmen et al., 1995), disrupted leisure activities (Oddy et al., 1978), and difficulties with social relationships (Bond & Godfrey, 1997). In addition to the cognitive and social functioning difficulties these individuals face, many are struggling with symptoms of depression and anxiety. The most common psychiatric condition after TBI is Major Depression, and prevalence rates have ranged from 26% to 36% (Seel, Macciocchi, & Kreutzer, 2010). Approximately one-third of patients with TBI suffer from clinically significant depression and a substantial number have comorbid anxiety (Diaz et al., 2012; Jorge et al., 2004).

Although the survivor of a TBI is faced with numerous challenges and life stressors, many of the caregivers and significant others of these individuals are also confronted with changes associated with these new roles and relationships. The experience of caring for an individual with TBI is multifaceted and influenced by a host of factors, including the patient's functional outcomes (Hart et al., 2007), neurobehavioral problems (Anderson, Parmenter, & Mok, 2002; Ergh, Rapport, Coleman, & Hanks, 2002b), decreased social interactions for the significant other (Boyle & Haines, 2002), significant other depression, increased patient dependence on others (Machamer, Temkin, & Dikmen, 2002), community integration and social support (Ergh, Hanks, Rapport, & Coleman, 2003b; Winstanley, Simpson, Tate, & Myles, 2006). Depression, anxiety and general distress are common among caregivers of people with TBI (Kreutzer et al., 2009). About half of the caregivers in one study endorsed significant levels of general distress with one third endorsing symptoms of anxiety and one quarter endorsing symptoms of depression (Kreutzer, Gervasio, & Camplair, 1994); another study found similar

results in that clinically significant levels of depression and anxiety were observed in one third of that sample (Marsh, Kersel, Havill, & Sleigh, 1998). Overall, estimates of clinically significant emotional distress among caregivers range from 18% to 77% (Kreutzer et al., 2009). Yet, having financial resources, social support, and coping skills has been associated with adaptation to the role of caring for an individual after a brain injury (Carnes & Quinn, 2005; Ergh, Rapport, Coleman, & Hanks, 2002a; Hanks, Rapport, & Vangel, 2007).

Coping

Coping characterizes efforts to manage distressing problems and emotions, and it may be one of the most frequently studied topics within the field of psychology. This observation is not surprising, because coping represents the mechanism by which individuals deal with stressful life events, which in turn is important in maintaining a good quality of life. However, the study of coping is particularly challenging because the concept is so broadly defined and diversely studied in the literature; for example, the effectiveness of various coping strategies differs depending on the problem faced (e.g., temporary, specific, chronic, and/or multifaceted), outcome assessed (e.g., affect, social support, etcetera), time of measurement (e.g., proximal or distal from the stressor), or means of measurement (Christensen & Kessing, 2005; Somerfield & McCrae, 2000; Stanton, Danoff-Burg, Cameron, & Ellis, 1994).

Lazarus and Folkman (1984) postulated a theory encompassing stress, adjustment, and coping. In this theory, “psychological stress is a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being” (p. 19). Once a situation is perceived as stressful (*primary appraisal*), the individual can utilize coping as a means to manage these demands as well as the

emotions generated (*secondary appraisal*). One key aspect of this theory is that it is the individual's unique perception of the situation that determines whether or not an event is stressful, not just the objective characteristics of the situation; the perception of stress is a relationship that encompasses both the environment and the individual. Two primary forms of coping were identified in line with this theory: problem-focused and emotion-focused coping. Situations evaluated as changeable were associated with problem-focused coping and situations appraised as needing acceptance were associated with emotion-focused coping (also called the Goodness-of-Fit hypothesis). As stress in life is inevitable, it is thought that the process of coping with this stress is what makes the difference in outcome (e.g., health, well-being, etc.).

Coping style is closely linked to physical and mental health outcomes (Christensen & Kessing, 2005; Somerfield & McCrae, 2000). Currently, three coping styles are frequently discussed in the literature: task-oriented coping (also called problem-solving, approach, and active coping), emotion-oriented coping, and avoidant coping. Task-focused coping involves problem solving, seeking information and attempts to change the stressful situation. Emotion-oriented coping typically is defined as emotional reactions and ruminative behaviors in an attempt to decrease stress (e.g., blaming self, fantasizing, becoming angry). Lastly, avoidant coping involves efforts to avoid the situation through behaviors such as distraction and diversion, wishful thinking, and/or withdrawal. Avoidant coping is often separated into two subtypes, distraction and social diversion (Christensen & Kessing, 2005; Endler & Parker, 1999). Research has demonstrated that task-oriented coping, emotion-oriented coping and social diversion showed a modest degree of heritability, though distracting oneself shows little heritability (Jang, Thordarson, Stein, Cohan, & Taylor, 2007). Although three distinct types of coping are proposed, in everyday application it is likely that individuals utilize a combination of coping

approaches, though a particular strategy may dominate.

Overall, task-oriented coping is associated with beneficial effects on well-being, whereas emotion-focused and avoidant styles are associated with adverse outcomes (Christensen & Kessing, 2005; McWilliams, Cox, & Enns, 2003). For example, research has suggested that the alleviation of depressive symptoms is associated with low use of emotion-oriented coping and relatively high use of task-oriented coping; relapse of depressive episodes is associated with use of avoidant or emotion-oriented coping (Christensen & Kessing, 2005). Research examining a five-factor model of personality and coping found that task-oriented coping was associated with conscientiousness whereas avoidant and emotion-oriented coping were associated with less desirable personality characteristics such as neuroticism (O'Brien & DeLongis, 1996; Shewchuk, Elliott, MacNair-Semands, & Harkins, 1999). In other research, task-oriented coping proved beneficial to grieving spouses whereas emotion-focused coping intensified grief reactions (Meuser & Marwit, 1999). Rosenberger, Ickovics, Epel, D'Entremont and Jokl (2004) found beneficial effects of physical functioning among people utilizing active coping strategies, but avoidant coping was associated with pain when recovering from surgery. Of note, emotion-oriented coping, as typically studied in the literature, tends to focus on negative emotionality. Although some scholars assert that it should play a prominent role in studies of coping, a relatively small literature has assessed an emotional focus in coping that may tap healthy processing. Constructs such as *emotional-approach coping* include emotional processing (e.g., "I take time to figure out what I'm really feeling") and emotional expression (e.g., "I let my feelings come out freely"); emotional-approach coping is thought to represent coping via healthy emotional expression (Stanton, Danoff-Burg, et al., 2000; Stanton et al., 1994; Stanton, Kirk, Cameron, & Danoff-Burg, 2000).

Among caregivers of individuals with TBI, positive associations have been found between well-being outcomes and use of active (i.e., task-oriented) coping styles. Hanks and colleagues (2007) found a benefit of task-oriented coping over emotion-focused coping among caregivers; task-oriented coping was positively associated with satisfaction in the caregiving relationship, indicating that caregiving satisfaction increased as a function of task-oriented coping. Additionally, an adverse relationship was found between caregiver relationship satisfaction and emotion-oriented coping. Similarly, Wells, Dywan and Dumas (2005) observed that utilization of active coping was inversely related to mood disturbance among caregivers.

Despite much research suggesting that task-oriented coping is the optimal coping strategy, the literature on coping style has yielded some mixed findings that pose potentially interesting paradoxes. For example, although an emotion-focused coping style has been associated with poor psychological and physical outcomes (McWilliams et al., 2003), a robust literature also indicates that sharing emotions is associated with reduced frequency of physical illness and enhanced subjective well-being (e.g., Pennebaker, 1999). It may be that adopting a balanced or flexible approach to coping is the key; having a broad range of coping strategies increases the likelihood of utilizing optimal coping for a particular situation (de Ridder & Schreurs, 2001). Although much research has focused on comparing coping strategies to discern which individual strategy produces optimal coping, coping theory would predict that examining coping as a multidimensional profile of strategies would be most fruitful. Thus, the most effective way to evaluate how individuals cope is to examine the profile of coping strategies as they relate to various adaptive outcomes (Lazarus, 2000). Furthermore, psychological flexibility has been found to be inversely related with emotional distress and strongly associated with measures of coping (Hayes et al., 2004; Masuda et al., 2011).

Emotional Expression and Well-Being Outcomes: Psychotherapy, Disclosure, and Expressiveness

Theorists, researchers, and practitioners have examined with fascination the connection between emotional expression and health (e.g., Alexander, 1950; Freud, 1895, 1921; Pennebaker, 1985). Dating back to the writings of Freud over a century ago (e.g., Freud, 1895; 1921), keeping emotions bottled up, inhibited, or repressed has been linked to psychological and physical symptoms. In describing the evolution of psychoanalysis, Alexander (1950) wrote about how repressed emotions will find an outlet in physical symptoms, and he stressed the value of the client's emotional experience during the psychotherapy process. Similarly, several theories have proposed that how the body responds to stress, whether it be physical or emotional in nature, can lead to disease, especially when the stress is significant and/or ongoing (e.g., Almeida, 2005; Beutler, Engle, Oro'-Beutler, Daldrup, & Meredith, 1986; Gouin, Glaser, Malarkey, Beversdorf, & Kiecolt-Glaser, 2012; Selye, 1956).

More recently, Pennebaker (1985) has theorized that chronic efforts exerted to inhibit negative emotions and thoughts increase the likelihood of developing stress-related physical and psychological problems. Also, the exposure model and reactivity models outlined by Almeida (2005) suggest that a large number daily stressors and chronic stressors are detrimental to health. Efforts to evaluate these relationships formally can be found in several bodies of literature. For example, research on self-concealment (e.g., Larson & Chastain, 1990), alexithymia (e.g., Lumley, 2004), and emotional suppression (e.g., Gross, 2002) has demonstrated that inhibiting emotions is adversely related to psychological and physical health. Conversely, expression of emotions through language is viewed as beneficial to physical and subjective well-being: Short-

term gains accrue in increased understanding, reduced intensity and relief of emotional upset as well as reduced physiological activity, whereas long-term gains accrue as a result of *not* experiencing chronic, enhanced physiological activity (e.g., heart rate, skin conductance, blood pressure; Pennebaker, 1985; Pennebaker, Mayne, & Francis, 1997; Zech, 2000). Additionally, gains result from enhanced interpersonal connectedness and social integration (Rimé, Finkenauer, Luminet, Zech, & Philippot, 1998).

Support for the positive effects of emotional expression is observed in research on *psychotherapy* (e.g., Barlow, Allen, & Choate, 2004; Greenberg & Safran, 1989), *emotional disclosure* (e.g., Pennebaker & Beall, 1986), and *emotional expressiveness* (e.g., Shaffer, Graves, Swank, & Pearson, 1987). A fundamental premise of psychotherapy is that “talking helps” to relieve distress after being confronted with difficult situations; encouraging verbalization of emotions remains a cornerstone of psychotherapeutic interventions. The importance of emotional expression in psychotherapy is a time worn concept and it remains a key element in understanding therapeutic change. One of the core components of many forms of psychotherapy is talking about thoughts and feelings in an effort to improve well-being and decrease distress (Smith & Glass, 1977). In describing a unified approach for treating emotional disorders from a cognitive behavioral perspective, Barlow, Allen and Choate (2004) describe how many emotional disorders have avoidance of emotions in common; thus, preventing emotional avoidance is a key step in psychotherapy treatment. In evaluating the process of psychotherapy, emotional experiencing, expressiveness, and active involvement generally have been found to be related to positive outcomes and client improvement (Elliott, Greenberg, & Lietaer, 2004; Greenberg & Safran, 1989) along with the expression of negative affect early in the course of psychotherapy (Orlinsky & Howard, 1986). Roughly three-quarters of clinical psychologists

practicing from psychoanalytic, humanistic-existential, eclectic, and cognitive perspectives acknowledge that emotional expression is encouraged in optimal psychotherapy (Mahoney, 1991).

Experimental examinations of the psychotherapy premise have included the systematic studies of *emotional disclosure* and well-being outcomes. This literature has been guided by a theory of inhibition outlined by James Pennebaker (e.g., Pennebaker, 1985; Pennebaker, Barger, & Tiebout, 1989; Pennebaker & Chew, 1985): Inhibiting thoughts, feelings or actions requires physiological work, and such stresses on the body increase the likelihood of developing both physical and psychological problems. A substantial literature on the beneficial effects of interventions involving emotional disclosure, verbal and written, has evolved to support this basic paradigm proposed by Pennebaker in patient and non-patient populations (Frattaroli, 2006; Frisina, Borod, & Lepore, 2004; Smyth, 1998). An exhaustive summary of the emotional disclosure literature is beyond the scope of this paper, yet it is important to acknowledge the contribution of the emotional disclosure paradigm to the body of literature that suggests that talking about your emotions is often beneficial to health and well-being. The effects of emotional disclosure interventions have been documented across a diverse range stressors and populations (e.g., education, socioeconomic status, ethnicity, age and gender). Moreover, the benefits to well-being are broad and diverse, including decreases in adverse health markers such as healthcare utilization (e.g., physician visits), symptom complaints, use of pain medication, and days missed from work, as well as improved health markers (e.g., immune functioning) and functional outcomes such as academic performance and working memory (for review, see Frattaroli, 2006; Frisina et al., 2004; Lepore & Smyth, 2002; Pennebaker, 1999; Smyth, 1998). However, at least one meta-analytic review has suggested that interventions involving emotional disclosure may

yield little benefit (Meads & Nouwen, 2005).

Emotional Expressiveness

In addition to intervention paradigms, a growing body of naturalistic observational research examines links between well-being and the extent to which individuals' generally talk about their emotions. For example, contributing to the development of Pennebaker's theory of emotional inhibition and emotional disclosure was Pennebaker and O'Heeron's (1984) study of individuals who were unexpectedly widowed: Independent of social support, increases in health problems in the year after the death were observed among those who did not talk about their loss. Similarly, longitudinal research suggests that personality features involving emotional expressiveness may be associated with risk for cancer. For example, Shaffer, Graves, Swank and Pearson (1987) reported that physicians who exhibited the highest emotional expressions of anger when faced with symptoms of depression had the lowest incidence of cancer, whereas those with high emotional suppression were 16 times more likely to develop cancer. Similar findings have been reported among breast cancer patients, with long-term survival (i.e., greater than 1 year) linked to expressions of distress and comparatively higher rates of death among women who struggled with communicating their negative emotions (e.g., anger and hostility; Derogatis, Abeloff, & Melisaratos, 1979). These findings are consistent with studies of repressive coping after traumatic events, which found that avoidance of negative emotion words in recounting trauma was associated with increased incidence of long-term health problems as compared to some use of negative emotion words (Jamner, Schwartz, & Leigh, 1988).

Research has also shown that when people experience intense emotions associated with a significant event, positive *or* negative, they are likely to talk with others about how they are feeling. In their review of the literature, Rimé, Finkenauer, Luminet, Zech and Philippot (1998)

reported that approximately 90% of people shared their emotional experiences with others, usually close friends or family members, and this happened most frequently on the day in which the situation happened. When people do share their emotions, they subjectively feel that this experience is beneficial because it provides “emotional relief, better well-being (e.g., feeling better), cognitive benefits (e.g., it gives more insight, puts things into more order), and interpersonal benefits (e.g., feeling more comforted by others)” (p. 11, Zech, 2000).

Mixed findings with regard to the effects of expression of emotion on well-being may reflect that *few studies have accounted for the content of emotional sharing and how it relates to coping style*. Not surprisingly, people use positive emotion words (e.g., happy, love, joy) when sharing details about an amusing event and negative emotion words (e.g., hate, worthless, sad) for an upsetting event (Kahn, Tobin, Massey, & Anderson, 2007; Tausczik & Pennebaker, 2010). Research on rates of positive and negative emotion word usage and health has yielded variable findings. For example, Holmes and colleagues (2007) found that use of affective words with both negative *and* positive valences in the writings among women who experienced trauma was positively associated with reported pain. Similarly, Hunt (1998) observed that discussing emotions after a depressing mood induction improved the mood of undergraduates; they suggested that expression of negative affect is crucial to emotional processing that yields improved outcome. Yet, other research has shown that people who experienced trauma had fewer trauma-related symptoms when the number of positive words decreased over a series of emotional expression writing sessions, though this relationship was not found for negative word usage (Sloan, Marx, Epstein, & Lexington, 2007). Additionally, Pennebaker and colleagues (1997) found an interesting relationship between use of causal words (e.g., cause, because, hence) and insight words (e.g., realize, know, consider) and health improvements; these words

are often subsumed under a broader category of cognitive process words. These researchers suggest that the cognitive processing thought to be represented by the use of these types of words is the key to successful coping with traumatic experiences. Similar positive results were found among patients with rheumatoid arthritis; individuals who used more cognitive words (e.g., realize) and positive words (e.g., happy) when talking had improved self-reported well-being, but disease activity was unchanged (van Middendorp & Greenen, 2008). Of note, however, this line of research did not directly evaluate the relation between emotional expression and coping style. Much of the research has been conducted with relatively healthy populations of adults not in treatment. In this regard, Bootzin (1997) suggested that healthy individuals likely cannot benefit from any intervention to the same extent as individuals with serious problems; by definition they do not require assistance, which also likely reflects that they already possess the qualities improved by intervention (e.g., adaptive coping style, natural propensity toward emotional expressiveness, etc.). Furthermore, the study of healthy or mildly affected populations introduces statistical problems involving restriction of range. Hence, many meta-analytic and other reviews conclude that interventions to enhance emotional expression and disclosure show largest effects among people with serious problems and/or who have experienced significant traumas or intense acute stressors.

Although a considerable literature establishes a connection between emotional expression and health, the mechanisms and circumstances under which the relationships function are not well understood. Coping style may serve as a central characteristic in the relation between emotions and health, but few studies have examined these topics simultaneously. Research by Kraft and company (2008) suggests that trait propensity toward a specific coping style (emotion approach coping) is an important factor in the strength of the relationship between emotion and

health: health improvement following an intervention that required emotional disclosure was greatest among people who employed the coping style. However, much remains to be learned about the relationships among coping style, emotional expression, and well-being. Given the observed relationships between task-oriented coping and health, including a measure of task-focused coping is central in understanding the broader, dynamic concept of coping. Thus, continuing to evaluate the relationship between emotional expression and health in various populations remains an important research endeavor, especially within the context of coping.

Coping, Emotional Expression and Well-being after Traumatic Brain Injury

There is good reason to believe that people with TBI might show different patterns of relation than healthy adults between coping style, emotional expression, and health. In addition to the occurrence of a traumatic event that may have resulted in physical limitations or disabilities, most of these survivors with moderate to severe brain injuries also experience cognitive deficits that affect daily functioning. Although there is variability in the types of cognitive deficits observed following TBI, impairments in information processing speed, attention, executive functioning, and memory are common, and can undermine emotion perception and expression, as well as appraisal and coping response (Hanks, Ricker, & Millis, 2004; Roebuck-Spencer & Sherer, 2008). Although less common, language difficulties can occur, especially after severe TBI (Hanks et al., 2004). In narrative discourse, individuals with TBI tend to have less productive speech, convey less information despite longer utterances, and have more fragmented language than non-brain injured peers (Hartley & Jensen, 1991).

Two additional conditions commonly occurring after TBI, poor self-monitoring and poor motivation, may also negatively influence ability to accurately appraise a situation and develop an appropriate emotional or coping response. Korte, Wegener, and Chwalisz (2003) found that

denial of deficits was positively associated with avoidant coping but unrelated to problem-focused coping. As Marin and Wilkosz (2005) observe in their review of the motivation literature, lack of motivation associated with neurocognitive changes from the injury affects the TBI survivor's ability to manage daily responsibilities (e.g., follow through with appointments, take medications as prescribed, socialize with friends and family, manage their rehabilitation, and/or return to work); importantly, these researchers posit that poor motivation interferes with the individual's ability to cope. These constructs have not been extensively evaluated within the framework of coping. In the context of written emotional expression, Kraft and others (2008) question whether people with poor motivation and difficulty processing and expressing emotions are able to subsequently engage in demands of an emotional expression task and then reap the benefits. For example, these individuals may have difficulty generating stressful things to talk about and they may struggle with producing cognitive or affective change.

In addition to the influence of cognitive impairments and motivational issues, links between brain damage and emotional expression and perception should be considered. Bornhofen and McDonald (2008) define emotion perception as "the ability to accurately perceive and appreciate affective information from facial expressions, emotional prosody, body posture, and contextual parameters (such as the type of social occasion, the relationship between speakers, etc.)" (p. 512). Although the left hemisphere is responsible for many linguistic functions, Hughlings Jackson (1880) was one of the first to suggest a link between the right hemisphere and emotional speech when he observed preserved emotional words, like curses, being spared in patients with left brain damage and aphasia. Subsequently, emotional perception and changes in ability to process and express emotions have been observed after brain damage (e.g., stroke; Bloom, Borod, Obler, & Koff, 1990; Borod, Bloom, Brickman, Nakhutina, &

Curko, 2002). Within the TBI literature, it has been suggested that the difficulties TBI survivors have in identifying and describing their own emotions result in a form of acquired or organic alexithymia (Becerra, Amos, & Jongenelis, 2002; McDonald, Rosenfeld, et al., 2011). Bloom, Borod, Obler and Koff (1990) described that individuals with damage to the right hemisphere following stroke have variable expression depending on the emotional valence, characterized by greater difficulty with positive versus negative emotional expression than both individuals with left hemisphere damage and healthy controls. Moreover, intensity and pleasantness of expression are diminished following right-sided damage and increased following left-sided damage as compared to healthy adults. Although the type of disruption to emotional perception is dependent on the nature and location of brain damage, research clearly points to difficulties individuals with brain damage experience with regard to emotion.

Several theories have been proposed about the hemispheric specialization of emotions, which Borod (1992) summarized. Briefly, the *right hemisphere hypothesis* suggests that positive and negative (valence) emotional expression and perception are seated in the right hemisphere; it is thought that the right hemisphere is better suited, both anatomically and physiologically, for the demands of emotional processing. The *valence hypothesis* proposes that hemispheric dominance is dependent on valence, with right hemisphere dominance for negative emotions and left hemisphere dominance for positive emotion. Theoretically, negative emotions have a connection with survival tactics or withdraw behaviors and require a system (right hemisphere) that is “sensitive to multimodal inputs and can quickly scan the environment and evaluate the situation” (p. 25, Borod et al., 2002). In contrast, positive emotions are more linguistic and communicative therefore dominated by left hemisphere functions. A third hypothesis, related to the valence hypothesis, suggests that *expression* is specialized to each of the hemispheres as just

described, but that emotional *perception*, both positive and negative, is specialized to the right hemisphere. Although the evidence from the research literature remains inconclusive regarding the hemispheric specialization of emotions, there tends to be greater support for the predominantly right hemispheric processing of emotions (Adolphs, 2002; Bornhofen & McDonald, 2008; Borod et al., 2002).

Beyond the broad, hemispheric specialization theories of emotion, there is an extensive literature on the specific neuroanatomical structures associated with the perception of emotion in various modalities (e.g., facial, vocal, etc.; for in-depth review, see Adolphs, 2002; Adolphs & Damasio, 2000). Briefly, it has been postulated that, due to their anatomical location, frontal and temporal regions that are associated with emotion perception are particularly vulnerable to the damage that can occur with TBI. For example, in an acceleration-deceleration injury like a motor vehicle accident that results in TBI, the frontal and temporal lobes can be subject to damage as they collide against the bony segments of the skull; additionally, the axonal connections can be disrupted with the force of acceleration and deceleration of the brain tissue within the skull. Aside from the neuroanatomy specific to the perception of emotions, deficits in emotional processing may also arise from impairments in cognition (e.g., attention, information processing, cognitive flexibility) that commonly occur after brain injury. In sum, it is likely a combination of damage to specific structures and connections as well as various cognitive deficits that undermine accurate perception of emotions (Bornhofen & McDonald, 2008). People with TBI seem to have greater difficulty with the perception of negative emotions (anger, sadness, fear) than positive emotions, like happiness and surprise, though abilities vary widely and directed attention to emotional stimuli may be helpful (Babbage et al., 2011; Bornhofen & McDonald, 2008; Croker & McDonald, 2005; McDonald, Rushby, et al., 2011).

Deficits in recognition of facial expressions of emotions after TBI have been consistently found, with at least one study showing that people with TBI have particular difficulty identifying negative emotions (e.g., fearful, disgusted and sad) as well as surprise (Callahan, Ueda, Sakata, Plamondon, & Murai, 2011; Croker & McDonald, 2005). Also, there is some research that individuals with TBI have lower emotional arousal to unpleasant stimuli than do healthy peers (Saunders, McDonald, & Richardson, 2006) as well as unawareness of the difficulties they have with recognizing emotional expressions in others (Hornak, Rolls, & Wade, 1996). It is likely that there are complicated and intertwined relationships among these variables (i.e., cognitive deficits, lack of motivation, and emotional perception) and each of these factors, alone or in combination, likely disrupt coping and emotional expression in individuals with TBI.

Within the literature on *coping after brain injury*, some research has suggested that emotion-focused coping may be beneficial in the acute phase and that task-focused coping may be optimal in later stages of recovery (Wolters, Stapert, Brands, & van Heugten, 2011). Yet, other research has not found a relationship between stage of recovery and appropriateness of various means of coping. Kendall and Terry (2008) sought to examine the Goodness-of-Fit coping hypothesis (Lazarus & Folkman, 1984) that suggests that the effectiveness of the coping strategy will depend on the extent to which the situation is perceived as controllable; these researchers did not find support for this hypothesis among those with brain injury at 2 and 8 months post injury. Rather, problem-solving coping was positively associated with role functioning (e.g., productivity, engagement, and satisfaction with functioning) and avoidant coping was adversely related to role functioning, regardless of perceived control or time since injury. Godfrey, Knight and Partridge (1996) proposed the stress-appraisal-coping (SAC) model in TBI to extend the work of Lazarus and Folkman (1984) to include the unique circumstances

that individuals with TBI face. These researchers suggest that an individual's coping abilities after injury are influenced by the coping skills they possessed prior to their injury as well as the nature of the neuropsychological deficits they experience. The conditions an individual faces (e.g., cognitive impairment and associated losses) as a result of TBI present new and unique challenges that the person has never needed, or had the opportunity, to cope with. They suggest that coping, insight, and social support all play important roles in the TBI survivor's response to stress and subsequent emotional adjustment.

Additionally, findings about the influence of cognitive impairment on coping have been variable (e.g., Curran, Ponsford, & Crowe, 2000; Krpan, Levine, Stuss, & Dawson, 2007). Some studies suggest that cognitive deficits interfere with task-focused coping, leaving the individual to utilize emotion-focused coping, while other studies have found no influence of cognitive deficits on coping style (Anson & Ponsford, 2006; Herrmann et al., 2000; Krpan et al., 2007; Wolters et al., 2011). For example, Curran and colleagues (2000) studied coping and psychological well-being outcomes in patients with severe TBI and individuals who sustained significant orthopedic injuries 1 to 5 years post injury. Contrary to expectations, they found equivalent levels of depression, anxiety, and self-esteem in the two groups; additionally, they found that the two groups reported similar levels of coping (i.e., dealing with problems, nonproductive coping, optimism, and sharing) despite greater self-reported cognitive deficits among those with TBI. Another study of patients with acquired brain injury did not find an influence of neuropsychological test impairment on adaptive, problem-solving coping (Wolters et al., 2011). In conflict with these findings, Krpan and colleagues (2007) found that among a diverse TBI sample including mild, moderate and severe injuries, impairment in executive functioning predicted low use of problem-solving coping and high use of avoidant coping. These

findings could not be accounted for by injury severity or premorbid intelligence, as executive functioning continued to contribute to the use of problem-solving coping beyond these characteristics. In explaining these results, the researchers suggest that deficits in executive functioning interfere with use of problem-solving coping and leave the individual to utilize emotion-focused coping, regardless of appropriateness to the situation, thereby resulting in negative outcomes. Such deficits in executive functioning, like attention, mental flexibility, inhibition, and perseveration, compromise an individual's ability to implement the problem solving required in this type of coping.

In other research, Krpan and colleagues (2011) studied coping via direct observation during a stressful situation as well as through self- and significant other report. TBI survivors more frequently engaged in avoidant coping than problem-solving coping, whereas significant others engaged in the opposite pattern of coping styles. Despite this difference in directly observed coping behavior, the groups were statistically equivalent with regard to self-reported coping behaviors. Interestingly, among significant others, observed coping behavior was positively related to self-reported coping behavior, but these relationships were not found among the TBI (i.e., self- and objective ratings of coping behavior did not converge). It was admirable that these researchers attempted to evaluate coping via direct observation. A weakness of the design is that categorization of coping style was based on a single behavioral observation (which of three behaviors was chosen during preparation for a speech task). The methods used in that study do not seem to capture coping behaviors that would naturally occur during everyday living. It is likely that people use an array of coping strategies in daily life and the strategies implemented may vary depending on the situation. Furthermore, associations between coping and psychological or physical well-being outcomes were not evaluated. Although research seems

to support that TBI and the associated cognitive deficits influences effective coping, it has not been definitively delineated in TBI, and specifically in those with moderate to severe brain injuries.

The little research that has evaluated *emotional expression in people with TBI* has focused on people with mild injuries and did not utilize a comparison or control group (Anderson, 2009). Additionally, although Anderson's (2009) results showed a trend for reduced depression among an emotional expression condition as compared to a neutral writing condition, the study lacked sufficient power to detect effects. Research has shown that people with TBI have greater difficulty than age-matched peers discriminating, producing in speech, and identifying in the speech of others various emotions (e.g., happy, surprised, sad, angry, afraid; Dimoska, McDonald, Pell, Tate, & James, 2010; Marquardt, Rios-Brown, Richburg, Seibert, & Cannito, 2001). Marquardt and company (2001) found that healthy adults almost perfectly identified the emotions portrayed in a linguistically neutral sentence and were able to produce the emotions themselves with remarkable accuracy (very near 100%). Yet, adults with brain injury had difficulty identifying the emotions portrayed and producing the affect themselves.

Conceptually it follows that the cognitive difficulties observed among individuals with moderate to severe TBI would interfere with the process of emotional expression, whether it be through slowed timing in formulating thoughts or ideas, difficulty organizing the information wished to be expressed, difficulty remembering situational or emotional details, or as a result of language deficits directly. There is some research to support that impairments in executive functioning, specifically dyscontrol, are associated with increases in angry responses and confusion in TBI survivors as compared to healthy adults (McDonald, Hunt, Henry, Dimoska, & Bornhofen, 2010). Alternatively, it may be that brain injury directly influences the experience or

perception of emotions; deficits in emotional perception could disrupt expression as these individuals may misinterpret aspects of the emotional experience leading to distorted reactions or inability to select appropriate coping behaviors.

Purpose and Aims of the Present Study

Overview

People with TBI and their significant others have experienced both an acute trauma associated with the initial injury (e.g., gunshot wound, motor vehicle accident, assault, etc.) and also the chronic stress of living with disability. Generally, previous research has shown health benefits of emotional expression and use of task-oriented coping. Research regarding factors that influence coping after TBI have been mixed. Thus, these individuals represent a unique population for study to evaluate the potential benefit of emotional expression after TBI. Of note, *no study has examined the potential influence of acquired cognitive impairment on the pattern of relationships between emotional expression, coping styles and health outcome.* This lack of knowledge is an important problem, because until more is known about coping and emotional expression in the context of well-being among survivors of TBI and significant others, interventions cannot be formulated on evidence-based research. Accordingly, this study will examine these phenomena among people with TBI and significant others.

Aim 1

Examine the relationship of emotional expression to current, functional and subjective well-being and coping among people with TBI and their significant others.

- Descriptive analyses examined emotional expression in linguistic characteristics and

behaviors of survivors and significant others associated with discussing stressful aspects of recovery from TBI. Linguistic features included word count, affect words (positive and negative emotion words), as well as words describing social processes, cognitive processes, and biological processes; observations of emotional expression included Happiness, Acceptance, Anxiety, Sadness, Anger, Helplessness, Insight, and Avoidance.

- Given prior research with TBI survivors that indicates these individuals may have impairments in emotional processing, group comparisons examined the magnitude of differences between TBI and Significant Other groups on linguistic and emotion observation characteristics.
- The relationships among emotional expression, coping, and the various well-being outcomes were examined among survivors and significant others, and the patterns of associations were compared between the groups.

Aim 2

A second objective of this study was to examine the role of coping in functional and subjective well-being, specifically accounting for profile or balance of coping strategies (e.g., dominant style).

Hypothesis 2a: It was predicted that individuals with TBI and significant others would have different patterns of coping style.

Hypothesis 2b: It was predicted that the TBI group and Significant Other group would have different profiles of predominant coping. For example, it was expected that the proportion of significant others who would adopt a predominantly task-oriented coping style would be greater than the proportion of individuals with TBI that would adopt a

predominantly task-oriented coping style. The opposite pattern was expected for emotion-oriented and avoidant coping.

Hypothesis 2c: It was predicted that individuals utilizing predominantly task-oriented coping would show better well-being outcomes than will individuals who did not.

Aim 3

Lastly, the third objective of this study was to examine emotional expression as a mediator between coping style and well-being.

Hypothesis 3: Coping style represents a typical way in which an individual handles various stressful situations; research has shown that coping has both positive and adverse relations with physical and psychological health outcomes, depending on the coping strategy utilized. How an individual expresses emotions during a stressful situation might explain this relationship between coping and outcome. It was expected that emotional expression as reflected in linguistic characteristics (e.g., positive emotion, negative emotions including anxiety, anger and sadness) as well as observations (e.g., happiness, acceptance, anxiety, sadness, anger, helplessness, insight, avoidance) of a speech sample would mediate the relationship between coping style (task, emotion, and avoidant) and well-being (i.e., distress, life satisfaction, and functional independence).

CHAPTER 2

METHOD

Participants and Setting

The sample included 60 individuals with TBI and 63 significant others of individuals who sustained a TBI. All of the participants for this study were recruited from the pool of individuals involved in the Southeastern Michigan Traumatic Brain Injury System (SEMTBIS) research project. Participation in for the present study occurred between July of 2008 and August of 2009. Participants in the SEMTBIS recruited for this study were community-dwelling adults, at least 18 years of age, who sustained moderate to severe brain injuries, had documented injuries severe enough to warrant an acute care hospitalization as well as inpatient rehabilitation, and were at least 1 year post injury. Exclusion criteria included: non-English speaking individuals, persons who sustained mild traumatic brain injuries who do not require inpatient rehabilitation services following discharge from the acute care hospital, individuals with primary injuries as a result of anoxic encephalopathy, and adults with injuries so severe that they are unable to tolerate or benefit from inpatient rehabilitation. Individuals with TBI identified all of the significant other participants. Significant others were relatives or close friends, provided support in the patient's recovery from TBI, and were familiar with the patient's daily functioning at the time of the study. The final sample (N = 123) excluded 4 participants due to level of cognitive impairments that precluded reliably completing the questionnaires. All participants were consented for this study specifically and were compensated monetarily for their time.

Descriptive statistics for the Total Sample as well as the TBI and Significant Other groups are summarized in Table 1. The Total Sample ranged in age from 21 to 82 years ($M = 47.8$, $SD = 13.4$) and level of education ranged from 7 to 19 years ($M = 12.2$, $SD = 2.2$). Ninety-

two individuals identified themselves as Black/African American (75.4%), 21.3% identified themselves as White/Caucasian, 0.8% as Hispanic/Latino(a), and 2.5% as from another racial background. Fifty-seven individuals had never been married (46.7%), 27.0% were married, 18.8% were divorced or separated, and 5.7% were widowed.

The participants with TBI were 46 men (76.7%) and 14 women (23.3%). Forty-three of these participants identified themselves as Black/African American (71.7%), 13 as White/Caucasian (21.7%), 1 as Hispanic (1.7%), and 3 as Other (5.0%). Most of the participants with TBI were single (61.7%) though 20.0% were married, 15.0% were divorced or separated, and 3.3% were widowed. Only 15.0% of the TBI sample reported full or part time employment whereas 53.3% described themselves as disabled, 18.3% as unemployed, 10.0% as retired, 1.7% as students and 1.7% as other. See Table 1 for demographic characteristics including age, level of education, gender, days to follow commands, days of post-traumatic confusion and time since injury. Participants sustained their TBIs in several ways: assault or other violence including gun shot wound (43.4%), motor vehicle accident including motorcycle and all-terrain vehicles (36.7%), fall or hit by falling object (11.7%), or pedestrian accident (8.3%). These participants experienced an average of 29.7 days of post-traumatic confusion (range = 0 to 76 days) and an average of 7.16 days until following commands (i.e., greater than or equal to 6 on the Glasgow Coma Scale motor score, range = 0.5 to 34.0 days).

Demographic characteristics of the Significant Other group, including age, education, gender, and caregiving characteristics, also are reported in Table 1. In the Significant Other group, 77.8% described themselves as Black/African American and 20.6% as White/Caucasian. Significant others who reported on TBI participants' level of functioning were spouses and romantic partners (21.7%), parents (28.3%), siblings (16.7%), adult children (8.3%), other

relatives (8.3%), and other friends (16.7%) of the person with TBI as well as predominantly women (74.1%). Thirty-five of the significant others (55.6%) indicated that they were living with the individual with TBI; on average, significant others reported spending 2.5 hours per week caring for, supervising or helping the person with TBI and spent an average of 4.8 days per week with the person with TBI.

Measures

Emotional Expression

Linguistic Inquiry and Word Count (LIWC; Pennebaker, Chung, Ireland, Gonzales, & Booth, 2007). The LIWC is a computer program that analyzes text in order to determine the frequency of various words that represent different content categories of emotional, cognitive, structural and process aspects of language within a provided sample. Narratives from the videotapes of the participant's 3-minute speeches were transcribed according to the guidelines outlined within the manual (Pennebaker et al., 2007; Pennebaker, Francis, & Booth, 2001), including how to properly document nonfluencies (e.g., hmmm, uh-uh, uh-huh, etc.) and fillers (e.g., you know, I mean, like, etc.). The data represent the proportion of words and word stems participants used in various predetermined lexical categories derived from the dictionary contained within the program. For example, the proportion of positive emotion words used by an individual was determined by dividing the number of positive words that participant used in the speech (number of words classified as positive emotion words) by the total number of words used in the entire speech. Analyses in this study utilized the following linguistic categories: social processes (e.g., they, talk, child, friend, parent, neighbor), positive emotion (e.g., happy, joy, love, nice, sweet), negative emotion (e.g., hurt, ugly, nasty), anxiety (e.g., worried, fearful,

nervous), anger (e.g., hate, kill, annoy), sadness (e.g., crying, grief, sad), cognitive processes (e.g., cause, know, think, always, never), and biological processes (e.g., head, hands, flu, blood, pain). The LIWC has been shown to be a valid method for measuring emotional expression (e.g., Kahn et al., 2007; Pennebaker & Francis, 1996; Tausczik & Pennebaker, 2010). In the present study, the proportions of words classified into the various linguistic categories using the LIWC were converted to z scores using the normative data (i.e., means and standard deviations) provided by the test manual for a large, diverse sample of individuals (Pennebaker et al., 2007).

Emotion Expression Observation Rating Form (see Appendix C for copy of rating form).

The form was developed for this study to capture various emotions outwardly exhibited during the videotaped speeches given by the participants. Two observers utilized this form after independently watching the videotaped speeches; the specific scoring process is outlined in the Procedure. Thirteen categories were identified, described (i.e., attributes and physical cues), and rated on a scale of 0 to 3 in which *0 = None*, *1 = Low*, *2 = Medium* and *3 = High*; however, three categories were excluded (i.e., excitement, fear, and guilt) because they occurred with very low frequencies. The remaining categories in the analyses included the following: happiness, acceptance, anxiety, sadness, anger, insight, and avoidance. Appendix C includes a copy of the rating form that also provides a detailed description, including physical cues, of each of the observed emotion categories.

Coping

Coping Inventory for Stressful Situations – Short Form (CISS-SF; Endler & Parker, 1999). The CISS-SF has 21 items designed to assess three types of coping (i.e., task, emotion, and avoidant). This scale was adapted from the original 48-item CISS (Cohan, Jang, & Stein, 2006). Participants rated, on a 5-point Likert scale ranging from *1 = Not at All* to *5 = Very*

Much, the extent to which they engaged in various types of coping activities when confronted with a difficult or stressful situation. The task-oriented coping dimension taps purposeful, task-oriented efforts aimed at solving problems (e.g., consider similar problems, take corrective action immediately). The emotion-oriented coping dimension aims to reduce stress, but the focus is directed inward to the person (e.g., blame myself, become very upset, wish I could change things). The avoidant coping dimension assesses the degree to which the individual avoids the stressful situation through activities such as distraction (e.g., buy myself something) or social diversion (e.g., visit a friend). The factor structure of the CISS supports dividing the avoidant coping scale into the two dimensions of distraction and social diversion. Internal consistency for the three subscales included in the original 48-item measure have been reported from .78 to .87 for task-oriented coping, .78 to .87 for emotion-oriented coping, and .70 to .80 for avoidant coping. In the present study, raw scores on the CISS were converted to gender-adjusted z scores using the normative data (i.e., means and standard deviations) provided by the test manual for community-dwelling men and women (Endler & Parker, 1999).

Well-being Outcome Measures

Brief Symptom Inventory – 18 (BSI-18, Derogatis, 2000). The BSI-18 is a widely used measure of psychological and emotional functioning. The scale contains 18 items of the Symptom Checklist-90-Revised (SCL-90-R; Derogatis, 1977), and it correlates strongly with the full version of the scale, as well as the 53-item BSI ($r = .84$; Zabora et al., 2001). Respondents rate the extent to which each symptom bothered them in the past 2 weeks using a 5-point Likert scale ($0 = \text{Not at all to } 4 = \text{Extremely}$). The BSI-18 yields a global severity index and three

subscales: depression, anxiety, and somatization. Internal consistency of the BSI-18 was .89 in a sample of patients with cancer (Zabora et al., 2001).

Satisfaction with Life Scale (SWLS, Diener, Emmons, Larsen, & Griffin, 1985). The SWLS is 5-item scale that is commonly used to assess global life satisfaction. Respondents are asked to rate items on a 7-point Likert scale (*1 = Strongly disagree to 7 = Strongly agree*). Examples of items on the SWLS include “In most ways my life is close to my ideal” and “If I could live my life over, I would change almost nothing.”

Patient Competency Rating Scale (PCRS; Prigatano & Fordyce, 1986). The PCRS is a 30-item survey that was completed by both the patients and significant others. The significant others reported on the patient’s functional abilities whereas the patient’s reported on their own functional abilities. A 5-point Likert scale ranging from *1 = Can’t Do to 5 = Can do with Ease* is used with high scores reflecting functioning/competence and low scores indicating impairment. Good test-retest reliability has been reported for patients ($r = .97$) and for relatives ($r = .92$, Prigatano, Altman, & O'Brien, 1990). Internal consistency is also strong for both patient and relatives’ ratings (Cronbach's alpha = .91 and .95, respectively; Fleming, Strong, & Ashton, 1998).

Procedure

Participants and their significant others were recruited for this study from the larger SEMTBIS research study. Evaluations, including the videotaped 3-minute speech and completion of questionnaires, were conducted primarily at the Rehabilitation Institute of Michigan, but alternative arrangements were made for approximately 15% of the sample to minimize selection bias due to transportation issues; these individuals were seen at one of the

affiliated urban clinics or at their home. Informed consent was obtained from each participant according to Wayne State University Human Investigation Committee guidelines.

As part of the evaluation, participants were videotaped giving a 3-minute speech in which they talked about the most stressful aspects of recovery from brain injury. Note that patients with TBI discussed their stress in dealing with their own difficulties following the brain injury whereas significant others discussed *their own stress* in dealing with *the patient's* difficulties as a result of the brain injury. The following instructions were given to the participants:

“For this study, we are interested in seeing how you handle stress. In order to find out, we’re going to ask you to do something that many people find somewhat stressful: write and deliver a speech. We are going to give you 5 minutes to prepare a 3-minute speech. The topic of the speech should be about the most stressful part of your recovery (or caring for your loved one during recovery), as identified on the form you just filled out. You should start by talking about the most stressful aspect of recovery, then, if you have time, move to the next aspect, until the 3 minutes have elapsed. Things you could talk about include some of the experiences you had, and why they were stressful, what kinds of emotions you had during that time, what the hardest challenges were, etc. You may use this paper to make notes that will help you organize your thoughts. However, you may not use any notes when you give the speech. If you run out of things to say, please try to keep talking for the entire 3 minutes. The speech will be videotaped so that later I can view the tape and judge the quality and content of your speech, so please make sure to try your best. I will also give you immediate feedback about how well you did your speech. Do you have any questions?”

Two observers independently watched each of the videotaped speeches three times and then completed the Emotion Expression Observation Form. Following independent completion of the Emotion Expression Observation Form, the ratings of the two observers were compared and discrepancies were reviewed. When discrepancies were found, the videotapes were jointly viewed for a fourth time and the two observers agreed upon a rating for the discrepant items. Thus, one set of ratings for each of the videos was utilized in the analyses.

A priori assignment of individuals to their predominant coping style was based on theory within the literature: People whose predominant coping style is active tend to have better well-

being outcomes than do people whose predominant coping style is emotion-focused. Individuals were classified as using predominantly task-oriented coping (i.e., raw score on task scale of CISS > raw CISS scores for emotion and avoidant coping), predominantly emotion-oriented coping (i.e., raw score on emotion scale of CISS > raw CISS scores for task and avoidant coping, and predominantly avoidant (i.e., raw score on avoidant scale of CISS > raw CISS scores for task and emotion coping).

Statistical Analyses

Aim 1

The relationship of coping and emotional expression to various outcomes was investigated by examining descriptive statistics of the LIWC Indices as well as the ratings obtained from the Emotion Expression Observation Form.

To compare the patients with TBI and the significant others t tests for independent samples were used to compare differences between the groups on CISS scales, LIWC indices, Emotion Observations, BSI indices and the SWLS. Effects sizes were calculated using Cohen's d (Cohen, 1965).

Correlation analyses were performed to evaluate the relationships between emotional expression, coping, and the various outcome measures (i.e., BSI-18, SWLS, and PCRS) among survivors and caregivers.

Aim 2

Hypothesis 2a: To examine the role of coping in well-being, while specifically accounting for the profile or balance of coping strategies (e.g., dominant style), a mixed-model analysis of variance (ANOVA) was used. This analysis assessed whether individuals with TBI

and significant others have different profiles of coping style. Post hoc contrasts were conducted to explicate the specific nature of interactions. Between-group, independent-samples t tests examined differences between participants with TBI and their significant others. Within-group, paired contrasts were evaluated to examine the different levels of coping within each of the groups, TBI Survivors and Significant Others.

Hypothesis 2b: Participants were classified by their predominant coping style yielding three groups: predominantly task-oriented coping (i.e., utilized greater task coping as compared to both emotion and avoidant coping), predominantly emotion-oriented coping (i.e., utilized greater emotion-oriented coping as compared to both task and avoidant coping) and avoidant coping (i.e., utilized greater avoidant coping than both task or emotion coping). As so few participants utilized avoidant coping, a predominantly avoidant coping group was not evaluated. Chi-square analyses tested whether individuals with TBI or significant others were more likely to utilize one type of predominant coping style versus the other.

Hypothesis 2c: In order to test the theoretical assumption that people using task-oriented coping fair better than those who use emotion-oriented or avoidant coping, the role of predominant coping style with each of the outcome variables (i.e., BSI indices and SWLS for both groups as well as PCRS for the TBI group only) was examined with univariate ANOVAs. This will extend the literature to include the single-case, multidimensional profile rather than examination of only single coping scales (rather than a multidimensional profile) or comparison of group mean levels (rather than individual profiles) as has been done previously in the literature.

Hypothesis 3: To examine emotional expression (i.e., LIWC indices or Emotion Observation ratings) as a mediator between coping (i.e., task, emotion, or avoidant) and well-

being, a series of analyses were performed to examine whether each of the requirements for mediation were met using the guidelines provided by Baron and Kenny (1986).

- Requirement 1: Coping style must predict emotional expression
- Requirement 2: Emotional expression must predict well being
- Requirement 3: Coping style must predict well being
- Requirement 4: Addition of the mediating variable (i.e., emotional expression) must cause a decrease in the contribution of coping style to the total variance accounted for in well-being.

CHAPTER 3

RESULTS

Prior to analyses, the data were screened for violations of assumptions of the parametric model associated with univariate and multivariate tests. Among the emotion observation data, three categories (i.e., excitement, fear, and guilt) were endorsed with extremely low frequency and were therefore dropped from the analyses. Table 2 presents descriptive statistics and group comparisons of coping style, emotional expression, and outcome characteristics for the TBI and Significant Other groups.

Predictor and Outcome Variables

Coping Inventory for Stressful Situations. The TBI group had an average item score of 3.3 ($SD = 0.7$) for task-oriented coping, which was significantly less than the average item score of 3.7 ($SD = 0.6$) endorsed by the significant others (see Table 2). The average item scores for both groups indicate endorsement greater than “somewhat” for items on the Task scale. Normative data based on a large sample of community-dwelling adults (Cohan, Jang, & Stein, 2006) indicate endorsement of Task coping by participants in this study was at the 50th percentile overall (average); for the TBI group, $Z = -0.23$ (41st percentile) and for the Significant Other group, $Z = 0.32$ (62nd percentile, see Table 2).

For emotion-oriented coping, the TBI group had an average item score of 2.8 ($SD = 0.9$) and Significant Others had an average score of 2.6 ($SD = 0.8$). Compared to normative data, the TBI group scored above average on emotion-focused coping (78th percentile), whereas the Significant Other group scored in the average range (65th percentile).

The TBI group had an average item score of 2.4 ($SD = 0.7$) for avoidant coping whereas significant others had an average score of 2.6 ($SD = 0.6$). Examination of gender-adjusted normative z scores indicated that both groups scored in the low-average range (21st percentile) for Distraction and in the average range (46th percentile) for Social Diversion.

Linguistic Inquiry and Word Count (LIWC). Table 2 also presents group comparisons of the LIWC variables. Compared to normative data (Pennebaker et al., 2007), the TBI group used an average proportion of social process words (30th percentile), affective process words (59th percentile), and biological process words (60th percentile); however, their use of positive emotion words (28th percentile) was below average, but both negative emotion words (89th percentile) and cognitive process words (77th percentile) were above average. For the Significant Other group, the proportions of several categories of words were above average: social processes (99th percentile), negative emotion (83rd percentile), and cognitive processes (89th percentile). The use of affective process, positive emotion, and biological process words was average for significant others (59th, 34th, 52nd percentiles, respectively). In their speeches, the TBI group used significantly fewer words than did the Significant Others. Cohen's d for this group difference was 0.62 representing a medium effect size. The TBI group also used significantly fewer social process words (e.g., talk, share, mom, brother, etc.) than did the significant others; Cohen's d for this group difference was 2.2, which is a very large effect. Also, the TBI group used significantly fewer cognitive process words (e.g., know, think, cause, consider) than did the significant others; Cohen's d for this group difference was .6, which is a medium effect. There were no significant group differences between the TBI and Significant Other groups on use of words categorized as affective processes (e.g., happy, ugly, bitter), positive emotions (e.g., happy, joy, love), negative emotions (e.g., hate, worthless, enemy) or biological processes (e.g., eat, blood, pain).

Observations of Expressed Emotion. The TBI group was rated as exhibiting significantly greater happiness than significant others (see Table 2). Cohen's d for this group difference was 0.62, which is a medium effect. The TBI group was also rated as exhibiting significantly lower anxiety than were significant others. Cohen's d for this group difference was 0.46, which is a medium effect. Significant group differences between the TBI and Significant Other groups were not found on observational ratings of expressed acceptance, sadness, anger, helplessness, insight or avoidance.

Psychological Distress (BSI – 18). On the Depression subscale, the TBI group endorsed a mean gender-corrected T score of 56.2 ($SD = 10.9$), which corresponds to above-average level of distress (73rd percentile) and was significantly greater than the significant others' mean score of 51.1 ($SD = 11.0$). Cohen's d for this group difference was 0.46, which is a medium effect. Driven largely by the difference on BSI Depression, on the Global Severity Index, the TBI group endorsed a mean gender-corrected T score of 56.7 ($SD = 10.6$), which corresponds to high-average level of distress (75th percentile) and was significantly greater than the significant others' mean score ($M = 52.2$, $SD = 12.0$), an average level of endorsement (59th percentile). Cohen's d for this group difference was 0.40, which is a small to medium effect. The TBI and Significant Other groups did not endorse different levels of psychological distress on the Somatization or Anxiety subscales of the BSI-18.

BSI Caseness describes the frequency of respondents who meet criteria for "psychologically distressed," which reflects respondents with BSI GSI T scores > 62 , two BSI subscales T > 60 , or who endorse thoughts of suicide. Chi-square analysis indicated that the TBI group (43.3%) more frequently met criteria for caseness than did the Significant Other group (25.4%), $X^2(1, N = 123) = 4.40$, $p = .036$.

Subjective Life Satisfaction (SWLS). The TBI group ($M = 16.9$, $SD = 7.7$) endorsed significantly lower levels of general life satisfaction than did the Significant Other group ($M = 20.2$, $SD = 7.0$). Cohen's d for this group difference was 0.45, which indicates a medium effect. The mean SWLS item endorsement in the TBI group ($M = 3.4$) corresponds to "slightly disagree," which indicates that the TBI group is less than satisfied with life. Clinical significance of the score can be assessed by comparison to normative data (Pavot & Diener, 1993) reported for college students ($M = 23.7$, $SD = 6.4$) and health workers ($M = 23.6$, $SD = 6.1$), which indicate that the TBI group endorsed below-average life satisfaction (14th percentile). The mean SWLS item endorsement for the Significant Other group corresponds to a "neutral" rating of life satisfaction indicating they are neither satisfied nor dissatisfied with life, and comparison to normative data indicate life satisfaction in the average range (29th percentile).

Functional Well-Being (PCRS). When asked to rate their own functional abilities, the average score for the TBI group was 111.8 ($SD = 18.4$). The average item rating of 3.7 for the TBI group corresponds to a score between 3 = "Can do with some difficulty" and 4 = "Fairly easy to do." When Significant Others were rating the functional abilities of individuals with TBI, the average score was 105.2 ($SD = 25.0$). The average item rating for the Significant Other group was 3.5. The PCRS is scored such that high scores represent functioning/competence and low scores reflect disability. Therefore, the TBI group rated themselves as functioning better than did the Significant Others.

Aim 1: Examine the relationship of emotional expression to current, functional and subjective well-being and coping.

Correlational Analyses

Intercorrelations of coping variables and emotional expression variables are provided in Table 3. Pearson product-moment correlations between CISS and LIWC predictors with the outcome variables (i.e., BSI-18, SWLS, PCRS) are shown in Tables 4a through 4c (Total Sample, TBI and Significant Other groups, respectively). Correlations between Emotion Observation predictor variables and the outcome variables are shown in Tables 5a through 5c (Total Sample, TBI and Significant Other groups, respectively).

Coping. In the Total Sample, the three coping styles (task, emotion, and avoidant) showed small to modest intercorrelations ($r_s = .16$ to $.27$), indicating some overlap among the coping scales, but they are not redundant. Additionally, education showed small to medium relationships with task (positive) and emotion-oriented (inverse) coping; age was largely unrelated to coping style.

The relationship between coping styles and the various outcome measures (BSI-18 indices, SWLS, and PCRS) was examined using bivariate Pearson correlations. As can be seen in Table 4a (Total Sample), task-oriented coping showed significant favorable relations with all of the outcomes, showing small (BSI Somatization $r = -.16$, PCRS SO-informant $r = .20$) to medium (BSI Anxiety $r = -.25$, BSI GSI $r = -.28$, SWLS $r = .28$) effects. The largest effects were observed for BSI Depression ($r = -.35$) and PCRS Patient report ($r = .33$). In contrast, emotion-oriented coping showed generally medium to large adverse relationships with the outcomes (BSI Somatization $r = .35$, SWLS $r = -.35$, and PCRS Patient report $r = -.29$, PCRS SO-informant $r = -.23$); the largest effects were observed for BSI Depression ($r = .60$), BSI Anxiety ($r = .56$), BSI GSI ($r = .59$). Avoidant coping was generally unrelated to the outcomes, showing few and small significant correlations (BSI Anxiety $r = .17$ and SWLS $r = .18$). However, when the two subscales of Avoidant coping were evaluated, Distraction showed unfavorable relationships with

depression, anxiety, and general distress ($r_s = .21$ to $.28$) and Social Diversion showed favorable relationships with depression ($r = -.23$) and life satisfaction ($r = .27$). The pattern of relationships observed for the Total Sample was generally similar within the TBI and Significant Other groups for task, emotion and avoidant coping, with the exception of a medium adverse relationship between Avoidant coping and BSI Anxiety among the TBI group (not observed for significant others). In evaluating the two subscales of Avoidant coping, the correlations seem to be driven by the relationships between the variables for the TBI group. The TBI group showed adverse relationships between Distraction and several measures of distress ($r_s = .30$ to $.39$), but there were no significant relationships among these variables in the Significant Other group. Also, for the TBI group a significant inverse relationship (PCRS – SO informant $r = -.22$) emerged between Distraction and significant other's ratings of patient functioning. Again, for Social Diversion, the significant favorable correlations observed for the Total Sample (BSI Depression $r = -.23$ and SWLS $r = .27$) were observed for the TBI group (BSI Depression $r = -.27$ and SWLS $r = .32$) but not the Significant Other group.

LIWC Indices. The relationship between LIWC indices (Social Processes, Positive Emotion, Negative Emotion, Biological Processes, and Cognitive Processes) and the various outcome measures (i.e., BSI-18 indices, SWLS, PCRS) was examined using bivariate correlations. As can be seen in Table 4a (Total Sample), Social Processes showed significant, favorable relations with most of the outcome variables although most of the effects were small to medium (BSI Somatization $r = -.15$, BSI Depression $r = -.27$, BSI Anxiety $r = -.19$, BSI GSI $r = -.26$, and SWLS $r = .24$). Fewer significant relationships were observed with Positive Emotion and those relationships were small (BSI Depression $r = -.20$, and BSI GSI $r = -.15$). Negative Emotion showed significant, adverse relations with many of the outcome variables although the

effects were generally small (BSI Somatization $r = .21$, BSI Depression $r = .18$, BSI GSI $r = .19$, and PCRS Patient report $r = -.18$). Cognitive Processes and Biological Processes did not reveal any significant correlations with outcome variables.

The TBI and Significant Other groups showed some different patterns of relation between the LIWC indices and outcomes (See Tables 4b and 4c). Of note, among the TBI participants, Negative Emotion words were adversely related to BSI Somatization ($r = .26$) and inversely related to TBI severity ($r = -.33$); Positive Emotion words and words describing Social Processes were inversely associated with distress ($r_s = -.23$ to $-.32$). In contrast, Positive Emotion, Negative Emotion and Social Process words were largely unrelated to outcome among the Significant Other group. Also of note, among the TBI group, words describing Biological Processes were *favorably* related to BSI (Somatization and Depression $r = -.24$ for both scales) and functional independence PCRS self-report ($r = .26$), indicating that talking about physical issues associated with recovery from TBI had beneficial relation to outcome. In contrast, among the Significant Other group, words describing Biological Processes were *adversely* associated with BSI (e.g., Depression $r = .36$, Anxiety $r = .27$) and functional independence (PCRS $r = -.25$), indicating that talking about stress related to physical issues in the TBI patient's recovery was unfavorably associated with outcome. Cognitive Processes were inversely associated with SWLS for the TBI group ($r = -.26$), but this relationship was not observed for the Significant Other group.

Observations of Expressed Emotion. The relationship between Emotion Observations (Happiness, Acceptance, Anxiety, Sadness, Anger, Helplessness, Insight, and Avoidance) and the various well-being outcomes (i.e., BSI-18 indices, SWLS, and PCRS) was examined using bivariate correlations. As can be seen in Table 5a, Acceptance showed small, favorable relationships with BSI Depression ($r = -.19$) and BSI GSI ($r = -.19$). Sadness showed a small,

adverse relationship with BSI Depression ($r = .17$). Anger showed small, adverse relationships with both BSI GSI ($r = .16$) and SWLS ($r = -.16$). Two interesting relationships were observed with insight; as insight increases so does anxiety ($r = .18$) and general distress (BSI GSI $r = .18$). Avoidance showed small, favorable relationships with most of the outcome variables (BSI Somatization $r = -.18$, BSI Depression $r = -.17$, BSI GSI $r = -.19$, and SWLS $r = .19$). The remaining Emotion Observations (i.e., Happiness, Anxiety, and Helplessness) did not show significant relationships with the outcome variables.

Among the TBI participants (see Table 5b), Insight showed medium adverse relation to distress, life satisfaction, and functional independence (r s .27 to -.33), whereas Avoidance and Acceptance showed medium favorable relationships with distress and life satisfaction (r s .24 to -.33); Insight, Avoidance and Acceptance were unrelated to outcomes among the Significant Other group. Displays of Anxiety ($r = .26$) and Sadness ($r = .34$) predicted BSI Depression among the TBI group but not the Significant Other group. For the Significant Other group, Anger predicted distress (BSI Depression $r = .30$, BSI Anxiety $r = .24$) and poor life satisfaction (SWLS $r = -.34$), and was associated with poor functional status among the TBI care recipients ($r = -.26$); Anger showed no relation to outcome among the TBI group. Helplessness also had an adverse relationship with distress (r s = .23 to .28) among significant others only.

Aim 2: Examine the role of coping in functional and subjective well-being, specifically accounting for profile of coping strategies (e.g., dominant style).

Hypothesis 2a: Individuals with TBI and Significant Others will have different patterns of coping style.

A mixed-model analysis of variance (ANOVA) was used to compare the patterns of coping styles between the two groups. The between-subjects factor (group) had two levels (i.e., TBI and Significant Other) and the within-subject factor (coping style) had four levels (task, emotion, and the two subscales of avoidant coping - distraction and social diversion). The main effect of group was not significant, $F(1, 119) = 0.19, p = .667, \text{partial } \eta^2 = .02$, indicating that the two groups (i.e., TBI and Significant Other) endorsed equivalent levels of coping behaviors overall. However, there was a large main effect for the coping scale, $F(3, 117) = 94.81, p < .001, \text{partial } \eta^2 = .71$, indicating that across both groups combined, the four coping scales (i.e., task, emotion, distraction and social diversion) were endorsed at significantly different levels: Post-hoc comparisons of the marginal means showed that across both groups combined (TBI and Significant Other), emotion-oriented coping ($M = 0.57, SE = 0.07$) was endorsed significantly greater than task-oriented coping ($M = 0.05, SE = 0.09$), which in turn was endorsed more than distraction ($M = -0.82, SE = 0.08$) and social diversion ($M = -0.11, SE = .07$). Of note, the group x scale interaction was significant, $F(3, 117) = 5.73, p = .001, \text{partial } \eta^2 = .13$. Figure 1 depicts the interaction.

Post-hoc contrasts ($p < .05$) conducted to explicate the specific nature of the interaction showed that the pattern of coping styles differed between the TBI group and Significant Others. As shown in Table 2, post-hoc comparisons of the two groups on each of the coping scales revealed a significant and large effect indicating that the Significant Other group endorsed using significantly more task-oriented coping than did the TBI group. Also, the TBI group endorsed using significantly more emotion-oriented coping than did the Significant Other group, a small to medium effect. However, distraction ($p = .986$) and social diversion ($p = .960$) were statistically equivalent between the groups. Within-group, paired contrasts indicated that the TBI group

reported using significantly higher levels of task-oriented coping as compared distraction, $t(59) = 3.55, p = .001, d = 0.69$, as well as significantly higher levels of emotion-oriented coping as compared to task-oriented coping, $t(59) = -5.56, p < .001, d = 1.08$; distraction $t(59) = 13.29, p < .001, d = 1.68$; and social diversion $t(59) = 5.48, p < .001, d = .99$. Also, the TBI group reported using significantly more social diversion than distraction, $t(59) = -5.67, p < .001, d = 0.86$. For the Significant Other group, similar statistically significant differences between were observed: the Significant Other group used relatively more emotion-oriented coping as compared to both distraction, $t(60) = 9.95, p < .001, d = 1.43$; and social diversion, $t(60) = 3.68, p = .001, d = 0.61$; additionally, use of task-oriented coping was significantly greater than distraction $t(60) = 8.29, p < .001, d = 1.49$ and social diversion $t(60) = 3.72, p < .001, d = 0.59$; and social diversion was significantly greater than distraction, $t(60) = -5.27, p < .001, d = 0.94$.

Hypothesis 2b: The TBI group and Significant Others will have different profiles of predominant coping.

Although mean levels of coping are of interest, group means do not necessarily represent individuals within the group, and the frequencies of coping profiles was of considerable interest. Therefore, the participants were classified according to their predominant coping style to examine the relative frequency of task, emotion, and avoidant coping among the TBI group and Significant Others. Eighty-one of the participants (66.9%) were classified as using predominantly task-oriented coping (i.e., task > emotion and avoidant) whereas 28.1% of the participants were classified as using predominantly emotion-oriented coping (i.e., emotion > task and avoidant) and only 5.0% of the sample was classified as using predominantly avoidant coping (i.e., avoidant > task and emotion); even fewer participants could be classified into a

predominant coping style for the two subscales of avoidant coping, distraction and social diversion.

A chi-square test was utilized to evaluate whether the TBI and Significant Other groups differed significantly in the percentages of individuals who adopted the three coping styles; however, the predominantly-avoidant style was too rare (violated expected frequency) to be included in an omnibus analysis. The main question of interest, comparing frequency of a predominantly task-oriented coping style, was tested separately. The proportion of Significant Others who adopted a predominantly task-oriented coping style (75.4%) was significantly greater than the proportion of the TBI group who adopted a predominantly task-oriented coping style (58.3%), $\chi^2(1, N = 121) = 3.99, p = .046$. Furthermore, the proportion of the TBI group who adopted a predominantly emotion-oriented coping style (36.7%) was significantly greater than the proportion of Significant Others who adopted a predominantly emotion-oriented coping style (19.7%), $\chi^2(1, N = 121) = 4.32, p = .038$. Among both the TBI and Significant Other groups, an avoidant coping style, including the subscales of distraction and social diversion, was endorsed with such rare frequency that chi-square analyses were not performed.

Hypothesis 2c: Individuals utilizing predominantly task-oriented coping will have better well-being outcomes than will individuals who do not.

Univariate ANOVAs were conducted to examine the role of predominant coping style with each of the outcome variables. The outcome variables included SWLS, BSI indices, and PCRS (TBI group only). SWLS and BSI scales were examined with 2 x 2 factorial ANOVA: One of the between-subjects factors (Participant group) had two levels (i.e., patient and significant other) and the other between-subjects factor (Coping Style group) also had two levels

(predominantly task coping and predominantly emotion coping). Table 6 presents the marginal means, standard deviations, and effect sizes reflecting the main effect of Coping group, which was significant in each of the analyses. Table 7 presents descriptive statistics for well-being outcomes by group (TBI or Significant Other) and predominant coping style (task or emotion).

For BSI Somatization, the main effect of group was not significant, $F(1, 111) = 1.62, p = .205$, partial $\eta^2 = .01$, indicating that the two groups (i.e., TBI group and Significant Other group) endorsed equivalent levels of somatization overall. Again, there was a main effect for the predominant coping style, $F(1, 111) = 19.58, p < .001, d = 0.94$, indicating that across all participants those identified as using predominantly task coping had lower levels of somatization ($M = 50.8, SD = 9.6$) than did those utilizing predominantly emotion coping ($M = 59.9, SD = 9.8$). The group x predominant coping style interaction was not significant, $F(1, 111) = 0.54, p = .465$, partial $\eta^2 = .01$, again indicating that the benefits of utilizing predominantly task-oriented coping (or the adverse effect of utilizing predominantly emotion-oriented coping) were present regardless of whether the participant was a patient or a significant other.

For BSI Depression, the main effect of group was not significant, $F(1, 111) = 2.01, p = .159$, partial $\eta^2 = .02$, indicating that the two groups (i.e., TBI group and Significant Others) endorsed equivalent levels of depression overall. The main effect for the predominant coping style, $F(1, 111) = 63.36, p < .001, d = 1.65$, indicated that participants using predominantly task coping had lower levels of depression ($M = 49.4, SD = 8.9$) than did those utilizing predominantly emotion coping ($M = 64.2, SD = 8.9$). The group x predominant coping style interaction was not significant, $F(1, 111) = 0.44, p = .509$, partial $\eta^2 = .00$.

For BSI Anxiety, the main effect of group was not significant, $F(1, 111) = 1.35, p = .901$, partial $\eta^2 = .00$. Again, there was a main effect for the predominant coping style, $F(1, 111) =$

47.13, $p < .001$, $d = 1.45$, indicating that participants with predominantly task coping had lower mean levels of anxiety ($M = 49.1$, $SD = 9.3$) than did those with predominantly emotion coping ($M = 62.6$, $SD = 9.1$). The group x predominant coping style interaction was not significant, $F(1, 111) = 0.25$, $p = .619$, partial $\eta^2 = .00$.

For BSI Global Severity Index, the main effect of group was not significant, $F(1, 111) = 1.54$, $p = .218$, partial $\eta^2 = .01$; however, the main effect of predominant coping style was significant, $F(1, 111) = 55.13$, $p < .001$, $d = 0.34$, indicating lower levels of general distress among task-oriented copers ($M = 50.2$, $SD = 9.8$) than among emotion-oriented copers ($M = 64.7$, $SD = 7.5$). The group x predominant coping style interaction was not significant, $F(1, 111) = 0.14$, $p = .907$, partial $\eta^2 = .00$.

For the SWLS, the main effect of Participant group was not significant, $F(1, 111) = 1.58$, $p = .212$, partial $\eta^2 = .01$. A significant main effect of predominant coping style, $F(1, 111) = 16.97$, $p > .001$, $d = 0.85$, indicated that across both participant groups combined (i.e., TBI group and Significant Others) those identified as using predominantly task coping had better overall life satisfaction ($M = 19.9$, $SD = 7.3$) than did those utilizing predominantly emotion coping ($M = 14.0$, $SD = 5.8$). Of note, the group x predominant coping style interaction was not significant, $F(1, 111) = 1.42$, $p = .236$, partial $\eta^2 = .01$, suggesting that the benefit of utilizing predominantly task-oriented coping (or the adverse effect of utilizing predominantly emotion-oriented coping) were present regardless whether the participant was a patient or a significant other.

For PCRS, which reflects the patient's level of functional independence from the perspective of the patient or the significant others, the ANOVA examined only the TBI group. Thus, one-way ANOVAs tested whether TBI-group participants with predominantly task-

oriented coping style had greater functional independence than did those with predominantly emotion-oriented coping style. For PCRS – Patient Report, the effect of coping style was significant, $F(1, 55) = F(1, 55) = 26.87, p < .001, d = 1.40$. TBI group participants who adopted a predominantly task-oriented coping strategy had greater functional independence than did TBI participants who had predominantly emotion-oriented coping style. PCRS – Significant Other confirmed the Patient self-report, with their informant ratings also indicating that functional independence was significantly greater among TBI participants with task-oriented coping style than emotion-oriented coping style, $F(1, 55) = F(1, 55) = 11.08, p = .002, d = 0.89$.

Aim 3: Examine emotional expression as a mediator between coping style and well-being.

To test for a mediation effect of emotional expression on the relationship between coping style (i.e., task, emotion, or avoidant) and well-being (i.e., BSI indices, SWLS, and PCRS), a series of hierarchical multiple regression analyses were performed. Emotional expression was captured via the LIWC indices (Positive Emotion, Negative Emotion, Anxiety, Anger, Sadness) and the Emotion Observation Ratings (Happiness, Acceptance, Anxiety, Sadness, Anger, Helplessness, Insight, Avoidance). In theoretical terms, in order for emotional expression to be considered a mediator of the relationship between coping style and well-being, coping style must predict emotional expression, emotional expression must predict well-being, and coping style must predict well-being. Most importantly, when emotional expression is added to the regression equation with coping style predicting well-being, the variance contributed by coping style must become zero (complete mediation) or show a decrease (partial mediation).

Hypothesis 3a: For the Total Sample, emotional expression will mediate the relationship

between coping style and well-being.

Examination of zero-order correlations for the Total Sample (see Table 3) indicates that task-oriented coping was not generally related to measures of emotional expression ($r_s = -.01$ to $-.15$); in the one case where task-oriented coping was significantly related to emotional expression (Happiness observation, $r = -.15$), the happiness observation was not subsequently, significantly related to any of the well-being outcomes ($r_s = -.02$ to $.14$). Thus, task-oriented coping was not examined in the mediation analyses for the Total Sample. Similarly, avoidant coping was not examined in the mediation analyses given that it was generally not related to measures of emotional expression ($r_s = .01$ to $-.10$); in the three instances in which avoidant coping was significantly related to measures of emotional expression (LIWC Negative Emotion $r = .26$, LIWC Anger $r = .20$, LIWC Sadness $r = .16$), emotional expression was not related to well-being outcomes ($r_s = .01$ to $.13$) or avoidant coping was not significantly related to the well-being outcomes ($r_s = -.01$ to $.09$).

Although emotion-oriented coping was not significantly ($r_s = .00$ to $.14$) related to many of the measures of emotional expression, emotion-oriented coping was significantly related to observations of sadness ($r = .16$), observations of anger ($r = .19$), and observations of avoidance ($r = -.17$). Given significant zero-order correlations between these measures of emotional expression and various outcomes ($r_s = -.16$ to $.19$), however, a series of hierarchical multiple regression analyses were performed to evaluate the role of emotional expression as a mediator between emotion-oriented coping and measures of well-being (see Figure 1).

Mediation effects were evaluated via the formal statistical procedures as defined by Baron and Kenny (1986). Results are presented in Table 8a for the Total Sample.

Observations of expressed sadness as a mediator between emotion-oriented coping and

depression. Each of the requirements for mediation were tested: (1) Emotion-oriented coping was significantly correlated with observations of sadness ($r = .16, p < .05$). (2) The mediator, observations of expressed sadness, was significantly correlated with depression (BSI Depression, $r = .17, p < .05$). (3) Emotion-oriented coping showed a significant association with depression, $F(1,119) = 66.55, p < .001, R^2 = .35$. (4) Finally, with the addition of observations of sadness in the regression model predicting depression, $F(2,118) = 33.79, p < .001, R^2 = .36$; however the change in R^2 was not significant, $F_{change}(1,118) = 1.02, p = .314, R_{change}^2 = .01$. Therefore, observations of sadness did not mediate the relationship between emotion-oriented coping and depression.

Observations of expressed anger as a mediator between emotion-oriented coping and life satisfaction. Each of the requirements for mediation were tested: (1) Emotion-oriented coping was significantly correlated with observations of anger ($r = .19, p < .05$). (2) The mediator, observations of expressed anger, was significantly correlated with life satisfaction (SWLS, $r = -.16, p < .05$). (3) Emotion-oriented coping was a significant predictor of life satisfaction, $F(1,119) = 16.03, p < .001, R^2 = .12$. (4) Finally, with the addition of observations of anger in the regression model predicting life satisfaction, $F(2,118) = 8.66, p < .001, R^2 = .13$, the change in R^2 was not reliably different, $F_{change}(1,118) = 1.25, p = .266, R_{change}^2 = .01$. As such, observations of anger did not mediate the relationship between emotion-oriented coping and life satisfaction.

Observations of expressed avoidance as a mediator between emotion-oriented coping and measures of well-being (BSI Somatization, BSI Depression, BSI GSI, and SWLS). Each of the requirements for mediation were tested: (1) Emotion-oriented coping was significantly correlated with observations of avoidance ($r = -.17, p < .05$). (2) The mediator, observations of avoidance, was significantly correlated with somatization (BSI Somatization, $r = -.18, p = .05$),

depression (BSI Depression, $r = -.17, p < .05$), general distress (BSI-GSI, $r = -.19, p = .05$) and life satisfaction (SWLS, $r = .19, p = .05$). (3) Emotion-oriented coping showed a significant association with somatization, $F(1,119) = 17.08, p < .001, R^2 = .13$, depression, $F(1,119) = 66.55, p < .001, R^2 = .36$, general distress, $F(1,119) = 62.38, p < .001, R^2 = .34$, and life satisfaction, $F(1,119) = 16.03, p < .001, R^2 = .12$. (4) Finally, with the addition of observations of avoidance in the regression models predicting well-being outcomes (BSI Somatization, BSI Depression, BSI GSI, and SWLS) none of the changes in R^2 were significantly different, [BSI Somatization, $F_{change}(1,118) = 2.07, p = .153, R_{change}^2 = .02$; BSI-Depression, $F_{change}(1,118) = 0.75, p = .389, R_{change}^2 = .00$; BSI-GSI, $F_{change}(1,118) = 1.53, p = .219, R_{change}^2 = .01$; SWLS, $F_{change}(1,118) = 2.26, p = .135, R_{change}^2 = .02$]. Therefore, observations of avoidance did not mediate the relationship between emotion-oriented coping and measures of well-being (BSI Somatization, BSI Depression, BSI GSI, or SWLS).

Expressed negative emotion as a mediator between distraction coping and aspects of well-being (depression and general distress). Each of the requirements for mediation were tested: (1) Distraction coping was significantly correlated with of expressed negative emotion ($r = .25, p < .01$). (2) The mediator, expressed negative emotion, was significantly correlated with depression (BSI Depression, $r = .18, p < .05$) and general distress (BSI GSI, $r = .19, p < .05$). (3) Distraction coping was a significant predictor of depression, $F(1,119) = 5.37, p = .022, R^2 = .04$, and general distress $F(1,119) = 6.66, p = .011, R^2 = .05$. (4) Finally, with the addition of expressed negative emotion in the regression model predicting depression and general distress, the change in R^2 was not reliably different for either outcome, BSI Depression $F_{change}(1,118) = 2.22, p = .139, R_{change}^2 = .02$, BSI GSI $F_{change}(1,118) = 2.22, p = .139, R_{change}^2 = .02$. As such, expressed negative emotions did not mediate the relationship between distraction coping and

depression or general distress.

Hypothesis 3b: For the TBI Group, emotional expression will mediate the relationship between coping style and well-being.

Examination of zero-order correlations for the TBI group indicates that task-oriented coping was not related to measures of emotional expression ($r_s = -.00$ to $-.20$). Thus, task-oriented coping was not examined in the mediation analyses for the TBI group. Similarly, avoidant coping was not examined in the mediation analyses as the required significant correlations were not found ($r_s = .01$ to $.16$) between the predictor, mediator (measures of emotional expression), and outcome (measures of well-being).

Although emotion-oriented coping was not significantly ($r_s = .03$ to $.21$) related to many of the measures of emotional expression, emotion-oriented coping was significantly related to expression of sad words ($r = .26$), observations of acceptance ($r = -.24$), and observations of avoidance ($r = -.24$). Given significant zero-order correlations between these measures of emotional expression and various outcomes ($r_s = -.32$ to $.67$), however, a series of hierarchical multiple regression analyses were performed to evaluate the role of emotional expression as a mediator between emotion-oriented coping and measures of well-being. Results are presented in Table 8b for the TBI group.

Expression of sad words in speech as a mediator between emotion-oriented coping and measures of well-being in the TBI group. Each of the requirements for mediation were tested: (1) Emotion-oriented coping was significantly correlated with expression of sad words ($r = .26$, $p < .05$). (2) The mediator was significantly correlated with somatization (BSI Somatization, $r = .34$, $p < .01$), and general distress (BSI GSI, $r = .25$, $p < .05$). (3) Emotion-oriented coping showed a

significant association with somatization, $F(1,58) = 14.40$, $p < .001$, $R^2 = .20$, and general distress, $F(1,58) = 47.40$, $p < .001$, $R^2 = .45$. (4) Finally, the addition of expression of sad words in the regression models predicting well-being resulted in a significant change in R^2 for somatization only, $F_{change}(1,57) = 4.06$, $p = .049$, $R^2_{change} = .05$, with a correlation reduction from $r = .39$ to $r = .24$. The addition of expression of sad words did not mediate the relationship between emotion-oriented coping and general distress, $F_{change}(1,57) = 0.74$, $p = .394$, $R^2_{change} = .01$. Therefore, expression of sad words partially mediated the relationship between emotion-oriented coping and somatization (see Figure 2). In contrast, expression of sad words did not mediate the relationships between emotion-oriented coping and general distress.

Observations of expressed acceptance as a mediator between emotion-oriented coping and measures of well-being (BSI Somatization and BSI GSI) in the TBI group. Each of the requirements for mediation were tested: (1) Emotion-oriented coping was significantly correlated with observations of acceptance ($r = -.24$, $p < .05$). (2) The mediator was significantly correlated with somatization (BSI Somatization, $r = -.24$, $p < .05$) and general distress (BSI GSI, $r = -.25$, $p < .05$). (3) Emotion-oriented coping showed a significant association with somatization, $F(1,58) = 14.40$, $p < .001$, $R^2 = .20$ and general distress, $F(1,58) = 47.40$, $p < .001$, $R^2 = .45$. (4) Finally, with the addition of observations of acceptance in the regression models predicting well-being outcomes (BSI Somatization and BSI GSI) none of the changes in R^2 were significantly different, BSI Somatization, $F_{change}(1,57) = 1.43$, $p = .237$, $R^2_{change} = .02$; and BSI-GSI, $F_{change}(1,57) = 0.88$, $p = .353$, $R^2_{change} = .01$. Therefore, observations of acceptance did not mediate the relationships between emotion-oriented coping and measures of well-being (BSI Somatization or BSI GSI).

Observations of expressed avoidance as a mediator between emotion-oriented coping

and measures of well-being (BSI Somatization, BSI Depression, BSI GSI, and SWLS) in the TBI group. Each of the requirements for mediation were tested: (1) Emotion-oriented coping was significantly correlated with observations of avoidance ($r = -.24, p < .05$). (2) The mediator was significantly correlated with somatization (BSI Somatization, $r = -.30, p < .01$), depression (BSI Depression, $r = -.28, p < .05$), general distress (BSI-GSI, $r = -.33, p < .01$) and life satisfaction (SWLS, $r = .24, p < .05$). (3) Emotion-oriented coping showed a significant association with somatization, $F(1,58) = 14.40, p < .001, R^2 = .20$, depression, $F(1,58) = 40.59, p < .001, R^2 = .41$, general distress, $F(1,58) = 47.40, p < .001, R^2 = .45$ and satisfaction with life, $F(1,58) = 6.62, p = .013, R^2 = .10$. (4) Finally, with the addition of observations of avoidance in the regression models predicting well-being outcomes (BSI Somatization, BSI Depression, BSI GSI, and SWLS) none of the changes in R^2 were significantly different, BSI Somatization, $F_{change}(1,57) = 3.10, p = .084, R^2_{change} = .04$; BSI Depression, $F_{change}(1,57) = 1.62, p = .209, R^2_{change} = .02$; BSI-GSI, $F_{change}(1,57) = 3.22, p = .078, R^2_{change} = .03$; SWLS, $F_{change}(1,57) = 1.95, p = .168, R^2_{change} = .03$. Therefore, observations of avoidance did not mediate the relationship between emotion-oriented coping and measures of well-being (BSI Somatization, BSI Depression, BSI GSI, or SWLS).

Expression of angry words as a mediator between distraction coping and significant-other reports of patient functioning. Each of the requirements for mediation were tested: (1) Distraction coping was significantly correlated with expression of angry words ($r = .27, p < .05$). (2) The mediator, expression of angry words, was significantly correlated with significant other report of patient functioning (PCRS SO informant, $r = -.22, p < .05$). (3) Distraction coping was not a significant predictor of significant other report of patient functioning, $F(1,58) = 2.84, p = .097, R^2 = .05$. As such, expressions of anger did not mediate the relationship between

distraction coping and significant others' report of patient functioning.

Expression of sad words as a mediator between distraction coping and general distress.

Each of the requirements for mediation were tested: (1) Distraction coping was significantly correlated with of expressions of sad words ($r = .27, p < .05$). (2) The mediator, expressions of sad words, was significantly correlated with life satisfaction (SWLS, $r = .25, p < .05$). (3) Distraction coping was a significant predictor of general distress, $F(1,58) = 5.79, p = .019, R^2 = .09$. (4) Finally, with the addition of expression of sad words in the regression model predicting general distress, the change in R^2 was not reliably different, $F_{change}(1,57) = 2.03, p = .160, R^2_{change} = .03$. As such, expressions of sad words did not mediate the relationship between distraction coping and general distress.

Hypothesis 3c: For the Significant Other group, emotional expression will mediate the relationship between coping style and well-being.

Task-oriented coping, avoidant coping, distraction coping, and social diversion were not examined in the mediation analyses for the Significant Other group because the required significant correlations were not found ($r_s = -.01$ to $.20$) between the predictor, mediator (measures of emotional expression), and outcome (measures of well-being) variables.

Although emotion-oriented coping was not significantly ($r_s = .01$ to $.20$) related to many of the measures of emotional expression for the Significant Other group, emotion-oriented coping was significantly related to observations of anger ($r = .34$) and observations of helplessness ($r = .27$). Given significant zero-order correlations between these measures of emotional expression and various outcomes ($r_s = -.34$ to $.54$), a series of hierarchical multiple regression analyses were performed to evaluate the role of emotional expression as a mediator

between emotion-oriented coping and measures of well-being (see Figure 3). Results are presented in Table 8c for the Significant Other group.

Observations of expressed anger as a mediator between emotion-oriented coping and measures of well-being in the Significant Other group. Each of the requirements for mediation were tested: (1) Emotion-oriented coping was significantly correlated with observations of expressed anger ($r = .34, p < .01$). (2) The mediator was significantly correlated with depression (BSI Depression, $r = .30, p < .01$), anxiety (BSI Anxiety, $r = .24, p < .01$), general distress (BSI GSI, $r = .29, p < .01$), and life satisfaction (SWLS, $r = -.34, p < .01$). (3) Emotion-oriented coping showed a significant association with depression, $F(1,59) = 24.75, p < .001, R^2 = .30$, anxiety, $F(1,59) = 12.55, p = .001, R^2 = .18$, general distress, $F(1,59) = 19.32, p < .001, R^2 = .25$, and life satisfaction, $F(1,59) = 7.90, p = .007, R^2 = .12$. (4) Finally, the addition of observations of expressed anger in the regression models predicting well-being resulted in a significant change in R^2 for satisfaction with life only, $F_{change}(1,58) = 4.10, p = .048, R^2 = .06$, however, the correlation was not reduced suggesting that observations of expressed anger did not mediate the relationship between emotion-oriented coping and satisfaction with life. The addition of observations of anger did not mediate the relationship between emotion-oriented coping and depression, $F_{change}(1,58) = 1.38, p = .245, R_{change}^2 = .02$, anxiety, $F_{change}(1,58) = 0.73, p = .398, R_{change}^2 = .01$, or general distress, $F_{change}(1,58) = 1.30, p = .258, R_{change}^2 = .02$. Therefore, observations of expressed anger did not mediate the relationships between emotion-oriented coping and depression, anxiety, or general distress.

Observations of expressed helplessness as a mediator between emotion-oriented coping and measures of well-being (BSI Depression, BSI Anxiety, BSI GSI) in the Significant Other group. Each of the requirements for mediation was tested: (1) Emotion-oriented coping was

significantly correlated with observations of expressed helplessness ($r = .27, p < .05$). (2) The mediator was significantly correlated with depression (BSI Depression, $r = .28, p < .05$), anxiety (BSI Anxiety, $r = .23, p < .05$), and general distress (BSI GSI, $r = .26, p < .05$). (3) Emotion-oriented coping showed a significant association with depression, $F(1,59) = 24.75, p < .001, R^2 = .30$, anxiety, $F(1,59) = 12.55, p = .001, R^2 = .18$, and general distress, $F(1,59) = 19.32, p < .001, R^2 = .25$. (4) Finally, with the addition of observations of helplessness in the regression models predicting well-being outcomes (BSI Depression, BSI Anxiety and BSI GSI) none of the changes in R^2 were significantly different, BSI Depression, $F_{change}(1,58) = 1.52, p = .223, R^2_{change} = .02$; BSI Anxiety, $F_{change}(1,58) = 1.04, p = .313, R^2_{change} = .01$; or BSI GSI, $F_{change}(1,58) = 1.27, p = .265, R^2_{change} = .02$. Therefore, observations of helplessness did not mediate the relationships between emotion-oriented coping and measures of well-being (BSI Depression, BSI Anxiety or BSI GSI).

CHAPTER 4

DISCUSSION

The findings indicate that survivors of moderate to severe TBI and their significant others show different patterns of coping style, and that coping behavior is differentially related to well-being and functional outcomes. The balance of the types of coping (e.g., task-oriented, emotion-oriented or avoidant coping) used by each group was different: Significant others endorsed using substantially more task oriented-coping and more frequently adopted task-oriented coping as their predominant style than did adults with TBI, whereas adults with TBI used more emotion-oriented coping than did the significant others. Both groups endorsed relatively low use of avoidant coping (distraction and social diversion) as compared to other coping strategies and to normative comparisons. Also striking were meaningful associations between both habitual coping style and acute emotional expressions about the stress experienced in the recovery process with subjective and objective well-being outcomes.

Given that the two groups endorsed an equivalent absolute *level* of coping behaviors, the findings that the groups differed on the *types* of coping behavior utilized is *not* a result of the significant others endorsing more coping behaviors overall as compared to adults with TBI. Similarly, although the groups differed in proportions of men and women, the use of gender-adjusted norms confirmed that the preference for emotion-oriented coping among TBI survivors (mostly men) was a large effect as compared to community-dwelling adult men and a medium effect as compared to this women-predominant group of significant others (who theoretically would be showing a stronger tendency toward emotion coping than typical men). Additionally, similar characteristics between the groups, such as socioeconomic status, home environment, and

shared experience of recovery from TBI reduce alternative explanations for the group differences other than changes associated with the TBI. Thus, it is likely that observed group differences in coping behaviors employed arise from changes as a result of brain injury, although this conclusion cannot be stated with certainty, as causation cannot be inferred from cross-sectional, correlational research.

Examining the average level and patterns of coping behaviors endorsed by the two groups may not fully capture the distinct profiles of coping behaviors of individuals; therefore, participants were classified according to their predominant coping styles. Almost two thirds of participants were classified as using predominantly task-oriented coping and more than one quarter were classified as using predominantly emotion-oriented coping; fewer than 5% adopted a predominantly avoidant coping style. Consistent with predictions, survivors of TBI and significant others did have different profiles of predominant coping: significant others more frequently adopted a predominantly task-oriented coping style, and conversely TBI survivors more frequently adopted a predominantly emotion-oriented coping style. This finding is consistent with previous research suggesting that differences in coping style arise from cognitive deficits as a result of brain injury rather than the severity of the injury per se (Krpan et al., 2007; Krpan et al., 2011). Conversely, it is not consistent with prior research reporting that coping styles of individuals with TBI are not different from non-brain injured individuals (Curran et al., 2000).

It is particularly noteworthy that predominant coping style also predicted psychological well-being of both persons with TBI and their significant others as well as functional independence of persons with TBI. Generally, task-oriented coping had favorable relationships with psychological well-being and functional independence whereas emotion-oriented coping

showed adverse relationships with these outcomes. The more that individuals indicated that they focused on their emotions to cope with difficult situations, the more distress they reported. Although avoidant coping was generally not related to outcome in the total sample, closer examination of the two types of avoidant coping revealed some interesting relationships in the TBI group: coping with stress about their TBI via distraction (e.g., “treat myself”) was adversely related to anxiety, depression and their objective functional independence, whereas social diversion (e.g., “try to be with other people”) showed favorable relationships to depression and satisfaction with life. The latter finding might be explained in light of research on social support which suggests that social support provides a buffer against the detrimental effects of stress (Rauch & Ferry, 2001); coping via social diversion or spending time with others likely has a protective effect for people with TBI. Consistent with prediction as well as previous research (Christensen & Kessing, 2005; Hanks et al., 2007; McWilliams et al., 2003; Meuser & Marwit, 1999; Rosenberger et al., 2004; Wells et al., 2005), adopting a predominantly active, task-oriented coping style was associated with lower emotional distress (e.g., somatization, depression and anxiety) and improved satisfaction with life as compared to those who adopted a predominantly emotion-oriented coping style. Additionally, people with TBI who adopted a predominantly-task oriented coping style had better functional outcome, whether it was reported by the participants themselves or by the significant others, as compared to those who utilized predominantly emotion-oriented coping. In sum, the way in which you cope with stress drastically affects well-being, satisfaction with life, as well functional independence.

Whereas coping style reflects a habitual, enduring way of dealing with stress, transient emotional expressions about the stress of dealing with recovery from TBI also showed meaningful relation to subjective and objective well-being of these participants. When describing

stressful aspects of recovery, both verbal expressions of emotion as well as observations of expressed emotions predicted well-being outcomes, and the patterns of these relationships differed between TBI participants and significant others. Among both groups was observed a high proportion of verbal content related to cognitive mechanisms (i.e., focusing on causes of the problem, attempts at insight, knowing, and things that “ought” to be), well above the norm observed in other populations (Pennebaker et al., 2007). This finding seems perhaps understandable given that the trauma experienced and described was externally caused. Also of note, however, in the present study, this tendency toward focus on cognitive mechanisms was substantially higher among significant others as compared to TBI survivors. There was also a substantial difference between the groups in the proportion of content focused on social processes, which reflects relative emphasis on interpersonal interactions. Significant others used markedly more of this type of language relative to TBI survivors and to normative expectations, which may reflect a greater reliance on a social network as they struggle through the patient’s recovery process. This finding likely partly reflects the demands of the task and the stressful situation itself. Although the significant others addressed personally stressful aspects of the patient’s recovery process, much of the nature of the stressful situation arises from someone else (the person with TBI); hence, references to others in their social network might understandably be relatively more frequent. Relative to normative expectations, the TBI group showed a tendency to use few references to social processes. Focus on positive and negative emotions was much higher among both groups than is typically observed in other populations as well; however, the proportions of words reflecting negative emotions, positive emotions, and biological processes when describing stressful aspects of the recovery process was similar between the TBI and significant other groups. Consistent with previous research (Hartley &

Jensen, 1991), TBI survivors used fewer words in their speeches than did the significant others. This is not surprising given that thinking and language skills are often disrupted following TBI (Hanks et al., 2004; Roebuck-Spencer & Sherer, 2008). This difference in number of words expressed may be a direct result of language impairment (i.e., deficits in verbal expression) or come about as a result of difficulties with executive functioning and memory. For example, those with TBI may have greater difficulty organizing and remembering the information they wished to discuss during their speeches. Although word count did differ between the groups, it cannot explain group differences in content or the relationships between content and outcome because verbal emotional expression was assessed as a percent of the total output.

Some relationships were found between emotional expressions, including verbal expressions and observations of emotions, and outcomes. For example, expression of positive emotion predicted lower levels of depression among the adults with TBI, but a meaningful relationship between using positive emotion words and distress was not found for the significant others. Although previous research has shown beneficial relationships between expression of negative emotion and health, in this study the expression of negative emotion was adversely related to somatization among adults with TBI and with depression for significant others. Interestingly, the more TBI survivors talked about biological processes (e.g., health, pain, specific body parts) the less distressed and more functionally independent they were. It is possible that talking about the biological consequences of their recovery from TBI serves as a marker for patients who are dealing with their injury and what has happened to them. In contrast, the opposite pattern was observed among the significant others: The more they talked about biological processes when describing their experiences during the TBI survivor's recovery process, the more depressed they were and the less functionally independent they rated the

patients to be. Also, the more the participants with TBI talked about cognitive processes the less they were actually satisfied with their lives. Two previous studies that observed links between linguistic references to cognitive processes and well-being outcomes examined adults coping with trauma and adults coping with arthritis pain; these are populations very different than TBI who do not have, at the heart of their conditions, difficulties with cognitive functioning (Pennebaker et al., 1997; van Middendorp & Greenen, 2008). Therefore, use of these types of cognitive process words may function very differently in individuals' recovering from brain injury. Although expression of emotion and use of causal words has generally been found beneficial relationships well-being and health in previous research (e.g., Frattaroli, 2006; Frisina et al., 2004; Pennebaker, 1999), this was not consistently found with this sample. It should also be noted that most of the studies examining language used and outcomes were intervention studies in which the nature of the intervention was to change language use. As the present study is descriptive by nature, causality cannot be determined; it may be that coping and emotional expression serve as markers for other constructs, like personality or reflections of functioning, rather than causes for change.

Group differences were also found on the observations of expressed emotions: TBI survivors exhibited more happiness and less anxiety than the significant others when describing stress associated with the recovery process. Research on awareness of deficits after TBI may provide some explanation for this finding (Malec, Machulda, & Moessner, 1997; Malec & Moessner, 2000; Malec, Testa, Rush, Brown, & Moessner, 2007). Individuals with impaired awareness of their cognitive and neurobehavioral problems may be less distressed about troubles associated with their TBI than are individuals who appreciate the consequences of the injury. Overall, among TBI survivors, this finding held true as observations of expressed insight were

adversely related the outcomes of well-being and functional independence. Furthermore, expressions of avoidance and acceptance predicted favorable subjective well-being outcomes in terms of distress and life satisfaction. So, among people with TBI, awareness about their problems was associated with distress and low global satisfaction with life, whereas avoiding the topic of stressful aspects in recovery or demonstrating acceptance of their circumstances were associated with low distress and high satisfaction with life. Interestingly, although the significant others demonstrated greater outward signs of anxiety when talking about stress associated with the TBI, their subjective experience of anxiety was equivalent to that of the TBI survivors. Similarly, although TBI survivors appeared happier when describing their post-injury recovery, they were more likely than significant others to have clinically meaningful distress, depression, and poor life satisfaction than were the significant others.

On the other hand, much research has demonstrated the adverse effects of the patient's recovery process on the significant other (e.g., Anderson et al., 2002; Carnes & Quinn, 2005; Kreutzer et al., 2009), which may account for the lower expressions of happiness and greater expressions of anxiety observed among significant others as compared to the participants with TBI. Another interesting finding emerged regarding expressed anger, which consistently predicted poor well-being for significant others (distress, poor life satisfaction, and poor functional status among the people with TBI for whom they cared) but showed no relation to well-being outcomes among people with TBI. Given that the survivors were at least 1.5 years from the onset of the TBI, it may be that such outward expressions of anger this far out from the patient's injury may be a dysfunctional marker for distress rather than a healthy willingness to experience and share feelings about the trauma. Behavioral expressions of anger among significant others in close proximity to the patients injury likely represent a typical response in a

range of responses to such a life changing event; however, continuing to express anger over very long periods of time may be detrimental to well-being.

The potential paradox is that several large bodies of literature (i.e., psychotherapy, emotional disclosure, and general emotional expressiveness) posit that expressing and focusing on emotions is beneficial to psychological and physical health (Barlow et al., 2004; Frattaroli, 2006; Greenberg & Safran, 1989; Holmes et al., 2007; Pennebaker & Beall, 1986; Shaffer et al., 1987). Yet, in this study, emotion-oriented coping, which by definition involves emotional reactions in attempts to decrease stress, was associated with depression and dissatisfaction with life, whereas task-oriented coping utilizing problem solving to change the stressful situation had beneficial relationships with outcomes. Of note, however, the scale used to assess emotion-oriented coping in this study focuses on negative emotions and concepts, like helplessness, self-blame, worry, and inadequacies. Alternatively, more positively worded measures of emotion-focused coping may yield different results. For example, the Emotional Approach Coping scale (Stanton, Kirk, et al., 2000) taps Emotional Processing (e.g., “I take time to figure out what I’m really feeling,” “I delve into my feelings to get a thorough understanding of them”) and Emotional Expression (e.g., “I take time to express my emotion,” “I feel free to express my emotions,” Stanton, Danoff-Burg, et al., 2000)) in comparatively positive terms. It may be that coping via ruminative focus on negative emotion and adverse outcomes is toxic to well-being whereas a more balanced expression of emotion is stress relieving and prophylactic to chronic wear on psychological and physiological well-being.

Predictions that emotional expression would mediate the relationship between coping and well-being, satisfaction with life, and functional outcome were not supported, with one exception among very numerous explorations. Conceptually, of the logical criteria needed to support the

path, coping was well associated with well-being outcomes, and the weakest link was that there were few meaningful relationships observed between coping style and emotional expression; this was particularly true for task-oriented coping and avoidant coping. In the few instances that coping and emotional expression were meaningfully related, the specific type of emotional expression was generally not substantially related to well-being, satisfaction with life, or functional outcome. In the TBI group, expression of sad words partially accounted for the relationship between emotion-oriented coping and somatization. The high number of exploratory analyses of this hypothesis greatly increased the likelihood that this one finding consistent with prediction was observed by chance. It is possible that, in this population, an alternative conceptualization may better account for the relationships among the TBI group: as coping and emotional expression were generally meaningfully related to outcomes these relationships might best be explained by cognitive impairments as some research has already demonstrated the importance of skills such as executive functioning (Krpan et al., 2007).

Limitations and Future Research

Limitations of the study primarily reflect the specific nature of the sample, which also represents one of the study's greatest strengths. The sample was predominantly urban dwelling, African American adults, with the majority of survivors of TBI being men and the majority of significant others being women; these groups are typically underrepresented in research. The results of the current study may not generalize well in rural samples with a different racial composition. At least one study found that African Americans fare worse than whites after TBI (Hart et al., 2007). On the other hand, the rates of depression and anxiety observed in the present study are consistent with the broad range reported in prior studies (Diaz et al., 2012; Kreutzer et

al., 2009; Perlesz, Kinsella, & Crowe, 1999). Similarly, satisfaction with life observed among these participants is also consistent with other research (Cicerone & Azulay, 2007; Ergh, Hanks, Rapport, & Coleman, 2003a; Livingston et al., 2010).

Differences in gender proportions between the two groups may limit generalizability of these findings as well to women with TBI and men significant others; however, this relative imbalance of genders is a natural demographic of TBI, which occurs more frequently among men than women (Bruns & Hauser, 2003), and of TBI caregiving, which is a role assumed more frequently by women than men. Additionally, characteristics examined in the present study that have shown gender differences were assessed using gender-adjusted norms when appropriate. Although the disproportionate composition of genders in the two groups is a weakness of ideal statistical design, it is ecologically valid and represents individuals that find themselves in this situation of recovering from TBI or being a significant other of an individual with TBI. Replication in an independent sample with different racial and gender proportions would increase generalizability of these findings. Additionally, this study relied on self-report measures of coping as well as for subjective well-being; limitations associated self-report methodology as well as with shared method variance apply (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). As with all research employing self-report wherein the same person is providing responses for predictor and criterion variables, participants may respond in a socially desirable manner, respond in a certain fashion as a result of a mood state (positive or negative), or otherwise feel reluctant to share their emotional upset during a relatively brief encounter for research purposes. Attempts were made to diminish these issues, such as assuring participants that their information would be kept confidential via informed consent procedures and establishing rapport with participants. In this regard, a considerable strength of this study involves the multi-method

measurement in the design, such as employing observer ratings of emotional expression, and obtaining significant other reports of the patient's functional independence.

Interrater reliabilities for the emotional expression observation coding were not calculated; however, it may be that low reliability of the coding system limited its ability to detect relationships of interest. If this situation were the case, the results would underestimate the strength of relationships observed between emotional expression, coping style, and well-being. The emotion observation ratings were conducted with knowledge of group status (i.e., TBI or significant other), and it would not have been feasible or realistic to assume that raters would not be able to determine who had sustained a moderate to severe TBI. Raters were, however, blind to the participants' scores on all other measures employed in the study (e.g., coping, subjective and objective well-being scales, etc.). The normative data for the LIWC came from 72 different studies and was compiled from a very large and diverse group of individuals (e.g., children, adults, elderly, college students, psychiatric prisoners, etc.) and situations (e.g., experimental writing conditions, science articles, blogs, novels and transcriptions of conversations). Most of these studies, if not all, were conducted with individuals without moderate to severe acquired brain impairment.

Despite the modest sample size in the present study, the power was sufficient to detect effect sizes of interest (medium or larger). Additionally, examining which specific aspects of task-oriented coping are beneficial as well as which aspects of emotion-oriented coping are detrimental may prove fruitful in subsequent research. Given some of the limitations of many of the measures of emotion-focused coping (i.e., focusing on negative emotions), incorporating more positively framed measures of emotional-approach coping may replicate findings in other areas of research that suggests talking about your feelings is good for you.

Conclusions and Clinical Implications

In sum, people with TBI who had objectively good functional outcome themselves relied predominantly on task-oriented coping while minimizing emotion-oriented and avoidant coping in the form of distraction. Moreover, they were associated with caregivers who relied predominantly on task-oriented coping, expressed positive emotion, and did not openly exhibit much anger or dwell on physical states and body functions when discussing their experience as a caregiver during the TBI recovery process. On the other hand, *subjective* well-being among people with TBI appeared to be enhanced by task-oriented and social diversion coping while minimizing emotion-oriented coping, expressing positive emotion, as well as openness to talking about their body functioning and personal connections with others, and generally avoiding confronting the consequences of the TBI, be it via distraction or lack of insight. Moreover, significant others with positive well-being relied on task-oriented coping and avoided emotion-focused coping, showed little helplessness and anger about the circumstances, and did not dwell on the TBI survivors' physical functioning.

The findings contribute to a limited body of research investigating coping, emotional expression, and well-being among survivors of moderate to severe TBI and their significant others; both the patterns and profiles of coping behaviors are different among adults who have survived a TBI as compared to significant others. Additionally, this study adds to the growing body of literature that supports the notion that task-oriented coping has beneficial effects on outcomes whereas emotion-oriented coping is linked to adverse psychological and physical well-being outcomes. Regarding the role of emotional expression in well-being, expressed anger emerged as a marker for distress in significant others. Unlike the theoretical beneficial effects of

avoiding repressed emotions of an acute stressor, ongoing expressions of anger maintained far after the patient's injury may signal long-standing unresolved problems and may be detrimental to well-being. This kind of research is important because it may lead to effective interventions with survivors of TBI and their families. For example, as task-oriented coping was associated with beneficial outcomes, interventions aimed at improving or teaching this type of coping might be beneficial for people with TBI and their significant others. Additionally, awareness of the finding that elevated outward displays of anger among significant others long after the patient's initial injury may signal substantial distress might facilitate early interventions to improve coping and increase social support, both of which have been associated with positive well-being outcomes.

APPENDIX A

Table 1. Demographic Characteristics of TBI ($n = 60$) and Significant Other ($n = 63$) Groups.

<i>Variable</i>	<i>TBI</i>		<i>Significant Others</i>		<i>Total</i>		<i>Range</i>
	<i>M</i>	<i>(SD)</i>	<i>M</i>	<i>(SD)</i>	<i>M</i>	<i>(SD)</i>	
Age (years)	44.6	(12.4)	51.0	(13.7)	47.8	(13.4)	21 – 82
Education (years)	11.7	(1.7)	12.5	(2.5)	12.2	(2.2)	7 – 19
Percent Men	77		29		52		
Days to follow commands ¹	7.16	(8.32)					0.5 – 34.0
Days of post-traumatic confusion	29.7	(21.7)					0 – 76
Time since injury (months)	121.7	(64.7)					19 – 222
Caregiving Hours Per Week ²			2.5	(1.5)			0 – 6
Caregiving Days Per Week ³			4.8	(2.3)			1 – 7

1. Defined as ≥ 6 on the Glasgow Coma Scale motor score.

2. Hours per week significant other spends caring for, supervising or helping the person with TBI.

3. Days per week significant other spends time with the person with TBI.

Table 2. Descriptive Statistics and Group Comparisons of Coping Style, Emotional Expression, and Outcome Characteristics for TBI ($n = 60$) and Significant Other ($n = 63$) Groups.

Variable	TBI		Significant Other		$t(119)$	d	95% CI of the difference
	M	SD	M	SD			
<i>Coping Inventory (CISS)</i>							
Task Coping	-0.23	(0.83)	0.32	(0.73)	-3.83**	0.70	[-0.82, -0.26]
Emotion Coping	0.77	(1.00)	0.38	(0.88)	2.24*	0.41	[0.04, 0.72]
Avoidant Coping	-0.46	(0.66)	-0.47	(0.54)	0.04	0.02	[-0.21, 0.22]
Distraction	-0.82	(0.88)	-0.82	(0.79)	0.02	0.00	[-0.33, 0.30]
Social Diversion	-0.11	(0.75)	-0.11	(0.71)	-0.05	0.00	[-0.26, 0.27]
<i>Linguistic Analysis (LIWC)</i>							
Word Count	343.0	(99.2)	402.8	(93.9)	-3.44**	0.62	[-94.3, -25.4]
Social processes	-0.53	(1.33)	2.26	(1.21)	-12.16**	2.18	[-3.24, -2.33]
Affective Processes	0.22	(1.12)	0.23	(0.98)	-0.04	0.01	[-0.38, 0.37]
Positive emotion	-0.59	(0.94)	-0.41	(0.89)	-1.10	0.20	[-0.51, 0.15]
Negative emotion	1.21	(1.47)	0.95	(1.54)	0.94	0.17	[-0.28, 0.79]
Cognitive Processes	0.74	(1.32)	1.22	(1.13)	-2.17*	0.59	[-.92, -.04]
Biological Processes	0.25	(0.97)	0.05	(0.82)	1.22	0.22	[-0.12, 0.52]
<i>Emotional Observations</i>							
Happiness	1.1	(1.0)	0.5	(0.7)	3.44**	0.62	[0.2, 0.9]
Acceptance	0.6	(0.7)	0.9	(0.9)	-1.67 [†]	0.30	[-0.5, 0.0]
Anxiety	0.8	(0.8)	1.2	(0.8)	-2.58*	0.46	[-0.7, -0.1]
Sadness	0.4	(0.8)	0.6	(0.9)	-0.92	0.17	[-0.4, 0.2]
Anger	0.7	(0.5)	0.8	(0.7)	-1.48	0.26	[-0.4, 0.1]
Helplessness	0.5	(0.7)	0.7	(0.8)	-1.95 [†]	0.35	[-0.6, 0.0]
Insight	2.0	(0.9)	2.0	(0.9)	0.50	0.09	[-0.2, 0.4]
Avoidance	1.2	(1.0)	1.1	(1.1)	0.56	0.09	[-0.3, 0.5]
BSI Somatization	54.8	(10.0)	52.1	(11.3)	1.45	0.26	[-1.0, 6.6]
BSI Depression	56.2	(10.9)	51.1	(11.0)	2.58*	0.46	[1.2, 9.0]
BSI Anxiety	54.2	(11.4)	52.3	(11.1)	0.95	0.17	[-2.1, 5.9]
BSI GSI	56.7	(10.6)	52.2	(12.0)	2.21*	0.40	[0.5, 8.6]
Satisfaction with Life Scale	16.9	(7.7)	20.2	(7.0)	-2.51*	0.45	[-5.9, -0.7]
PCRS (Patient)	111.8	(18.4)	--		N/A		
PCRS (SO)	105.2	(25.0)	--		N/A		

Note. CISS = Coping Inventory for Stressful Situations (gender-adjusted Z score); LIWC = Linguistic Inquiry and Word Count (gender-adjusted Z scores except Word Count); BSI = Brief Symptom Inventory-18 (gender-adjusted T scores), GSI = Global Symptom Inventory; PCRS = Patient Competency Rating Scale (Patient = self-report, SO = Significant Other report on patient's functioning); d = Cohen's d . [†] $p < .10$, * $p < .05$, ** $p < .01$ two-tailed.

Table 3. Intercorrelations of Coping Style and Emotional Expression Variables: Total Sample ($N = 123$).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Task Coping (CISS)	1.00														
2. Emotion Coping (CISS)	-.22**	1.00													
3. Avoidant Coping (CISS)	.16*	.27**	1.00												
4. Social processes (LIWC)	.29**	-.18*	.06	1.00											
5. Positive emotion (LIWC)	-.04	-.03	-.03	.05	1.00										
6. Negative emotion (LIWC)	-.15	.10	.26**	-.06	-.14	1.00									
7. Biological Processes (LIWC)	-.11	-.04	.02	-.08	.00	-.12	1.00								
8. Cognitive Processes (LIWC)	.08	-.06	-.04	.15*	.09	.07	-.26**	1.00							
9. Happiness (Observation)	-.15*	.01	.05	-.21*	.05	-.06	.06	-.06	1.00						
10. Acceptance (Observation)	.14	-.14	.01	.02	.39**	-.12	.01	.02	.05	1.00					
11. Anxiety (Observation)	.02	.00	-.02	.11	.02	.08	-.12	.19*	-.12	-.05	1.00				
12. Sadness (Observation)	.02	.16*	-.10	.14	.07	.02	-.07	-.16*	-.21**	-.02	.01	1.00			
13. Anger (Observation)	.01	.19*	-.04	.20*	-.18*	.15*	.07	-.09	-.04	-.12	-.12	.09	1.00		
14. Helplessness (Observation)	.04	.14	.01	.16*	-.13	.22**	-.02	-.04	-.19*	-.15*	.16*	.06	.21**	1.00	
15. Insight (Observation)	-.12	.13	-.06	-.17*	.00	.14	-.05	.06	.04	.04	-.07	.06	.13	-.04	1.00
16. Avoidance (Observation)	.08	-.17*	.08	.05	.06	-.01	.09	-.04	.08	.02	.13	-.12	-.29**	-.02	-.71**

Note. CISS = Coping Inventory for Stressful Situations; LIWC = Linguistic Inquiry and Word Count.

* $p < .05$, ** $p < .01$.

Table 4a. Pearson Correlations for Coping Style and Verbal Emotional Expression with Outcomes: Total Sample ($N = 123$).

	CISS Task	CISS Emotion	CISS Avoidant	CISS Avoidant- Distraction	CISS Avoidant- Social Div.	LIWC Social Processes	LIWC Positive Emotion	LIWC Negative Emotion	LIWC Biological Processes	LIWC Cognitive Processes
BSI Somatization	-.16*	.35**	.04	.14	-.08	-.15*	-.10	.21*	-.04	.03
BSI Depression	-.35**	.60**	.02	.21*	-.23*	-.27**	-.20*	.18*	.07	-.09
BSI Anxiety	-.25**	.56**	.17*	.28**	-.07	-.19*	-.10	.13	.06	-.08
BSI GSI	-.28**	.59**	.09	.23**	-.14	-.26**	-.15*	.19*	.04	-.08
SWLS	.28**	-.35**	.18*	.07	.27**	.24**	-.04	-.04	.08	-.11
PCRS (Patient)	.33**	-.29**	-.01	-.11	.08	.08	.10	-.18*	.09	-.07
73 PCRS (SO)	.20*	-.23**	-.02	-.07	.03	.00	.14	-.08	-.06	-.07
Age	.14	-.01	-.10	.02	-.10	.18*	.04	-.22**	-.04	.06
Education	.25**	-.21*	-.03	-.01	-.03	.10	.06	-.11	-.18*	.01

Note. CISS = Coping Inventory for Stressful Situations (Task = Task Coping, Emotion = Emotion Coping, Avoidant = Avoidant Coping, with Distraction and Social Diversion subscales); LIWC – Linguistic Inquiry Word Count; BSI = Brief Symptom Inventory (GSI = Global Severity Index); SWLS = Satisfaction with Life Scale; PCRS = Patient Competency Rating Scale (Patient = Patient self-report, SO = Significant Other informant report on patient’s functioning).

* $p < .05$, ** $p < .01$.

Table 4b. Pearson Correlations for Coping Style and Verbal Emotional Expression with Outcomes: TBI group ($n = 60$).

	CISS Task	CISS Emotion	CISS Avoidant	CISS Avoidant- Distraction	CISS Avoidant- Social Div.	LIWC Social Processes	LIWC Positive Emotion	LIWC Negative Emotion	LIWC Biological Processes	LIWC Cognitive Processes
BSI Somatization	-.17	.45**	.09	.17	-.01	-.32**	-.14	.26*	-.24*	.06
BSI Depression	-.22*	.64**	.04	.30*	-.27*	-.14	-.23*	.11	-.24*	.00
BSI Anxiety	-.20	.68**	.29*	.39**	.03	-.17	-.06	.08	-.14	.05
BSI GSI	-.22*	.67**	.14	.30**	-.11	-.27*	-.16	.15	-.20	.01
SWLS	.10	-.32**	.22*	.09	.32**	.15	-.05	.05	.21	-.26*
74 PCRS (Patient)	.43**	-.46**	-.03	-.21	.17	.23*	.06	-.14	.26*	-.16
PCRS (SO)	.24*	-.36**	-.09	-.22*	.05	-.08	.04	.03	.11	-.07
Age	.02	.07	.03	.03	.09	-.23*	.15	-.14	-.11	.02
Education	.14**	-.06	-.09	-.10	.07	-.07	-.03	-.20	-.11	-.09
TBI Severity	.22*	-.08	-.08	-.07	.04	-.02	-.02	-.33**	.19	-.03

Note. CISS = Coping Inventory for Stressful Situations (Task = Task Coping, Emotion = Emotion Coping, Avoidant = Avoidant Coping, with Distraction and Social Diversion subscales); LIWC – Linguistic Inquiry Word Count; BSI = Brief Symptom Inventory (GSI = Global Severity Index); SWLS = Satisfaction with Life Scale; PCRS = Patient Competency Rating Scale (Patient = Patient self-report, SO = Significant Other informant report on patient’s functioning).

* $p < .05$, ** $p < .01$

Table 4c. Pearson Correlations for Coping Style and Verbal Emotional Expression with Outcomes: Significant Other group ($n = 63$).

	CISS Task	CISS Emotion	CISS Avoidant	CISS Avoidant- Distraction	CISS Avoidant- Social Div.	LIWC Social Processes	LIWC Positive Emotion	LIWC Negative Emotion	LIWC Biological Processes	LIWC Cognitive Processes
BSI Somatization	-.08	.25*	.03	.14	-.12	.14	-.04	.15	.12	.04
BSI Depression	-.39**	.54**	.05	.16	-.14	-.16	-.13	.21*	.36**	-.10
BSI Anxiety	-.27*	.42**	.05	.17	-.15	-.21	-.12	.17	.27*	-.18
BSI GSI	-.24*	.50**	.09	.20	-.12	-.08	-.11	.19	.24*	-.10
SWLS	.38**	-.34**	.08	.03	.16	.07	-.08	-.08	-.02	-.04
75 PCRS (Patient)	.23*	-.13	-.02	-.03	-.03	-.09	.14	-.20	-.08	.00
PCRS (SO)	.22*	-.11	.07	.07	.03	.14	.25*	-.18	-.25*	-.06
Age	.14	-.04	-.30**	-.02	-.34**	.22*	-.10	-.25*	.10	.01
Education	.25*	-.30*	-.04	.04	-.17	-.06	.10	-.04	-.21*	.02

Note. CISS = Coping Inventory for Stressful Situations (Task = Task Coping, Emotion = Emotion Coping, Avoidant = Avoidant Coping, with Distraction and Social Diversion subscales); LIWC – Linguistic Inquiry Word Count; BSI = Brief Symptom Inventory (GSI = Global Severity Index); SWLS = Satisfaction with Life Scale; PCRS = Patient Competency Rating Scale (Patient = Patient self-report, SO = Significant Other informant report on patient’s functioning).

* $p < .05$, ** $p < .01$

Table 5a. Pearson Correlations for Emotional Observations and Outcomes: Total Sample ($N = 123$).

	Happiness	Acceptance	Anxiety	Sadness	Anger	Helplessness	Insight	Avoidance
BSI Somatization	-.06	-.13	-.14	.04	.12	.08	.15	-.18*
BSI Depression	-.04	-.19*	.10	.17*	.15	.09	.11	-.17*
BSI Anxiety	-.02	-.14	.06	.08	.13	.12	.18*	-.14
BSI GSI	-.03	-.19*	.01	.13	.16*	.12	.18*	-.19*
SWLS	-.07	.14	.05	-.01	-.16*	-.06	-.23**	.19*
76 PCRS (Patient)	.11	.06	-.09	-.04	-.07	-.10	-.09	.00
PCRS (SO-informant)	.14	.05	-.01	.00	-.09	.08	.05	-.01
Age	-.15	.07	-.36**	-.04	.06	.00	-.11	-.04
Education	-.07	.19*	-.14	-.09	-.16*	-.23**	.19*	-.15

Note. BSI = Brief Symptom Inventory (GSI = Global Severity Index); SWLS = Satisfaction with Life Scale; PCRS = Patient Competency Rating Scale (Patient = Patient self-report, SO = Significant Other report on patient's functioning).

* $p < .05$, ** $p < .01$

Table 5b. Pearson Correlations for Emotional Observations and Outcomes: TBI Group ($n = 60$).

	Happiness	Acceptance	Anxiety	Sadness	Anger	Helplessness	Insight	Avoidance
BSI Somatization	-.14	-.24*	.00	.00	.04	.11	.31**	-.30**
BSI Depression	-.19	-.19	.26*	.34**	.02	-.03	.20	-.28*
BSI Anxiety	-.12	-.15	.11	.14	.02	.02	.27*	-.21
BSI GSI	-.21	-.25*	.15	.23*	.04	.03	.31**	-.33**
SWLS	.01	.20	-.04	-.20	-.02	-.09	-.33**	.24*
77 PCRS (Patient)	.19	.12	-.11	-.17	.04	-.18	-.25*	.15
PCRS (SO-informant)	.14	-.03	.14	-.14	.17	.18	.10	-.13
Age	-.08	.13	-.52**	-.01	-.03	-.05	-.11	.03
Education	.07	-.01	-.22*	-.09	-.22*	-.29*	-.07	.00
TBI Severity	.23*	.11	.01	-.22	-.21	-.04	-.17	.12

Note. BSI = Brief Symptom Inventory (GSI = Global Severity Index); SWLS = Satisfaction with Life Scale; PCRS = Patient Competency Rating Scale (Patient = Patient self-report, SO = Significant Other report on patient's functioning); TBI Severity = Days to follow commands (Glasgow Coma Scale motor score).

* $p < .05$, ** $p < .01$

Table 5c. Pearson Correlations for Emotional Observations and Outcomes: Significant Other Group ($n = 63$).

	Happiness	Acceptance	Anxiety	Sadness	Anger	Helplessness	Insight	Avoidance
BSI Somatization	-.05	-.03	-.19	.09	.20	.09	-.01	-.10
BSI Depression	.00	-.14	.08	.06	.30**	.28*	.00	-.10
BSI Anxiety	.04	-.12	.04	.03	.24*	.23*	.07	-.08
BSI GSI	.03	-.11	-.02	.08	.29*	.26*	.06	-.11
78 SWLS	-.02	.04	.04	.14	-.34**	-.11	-.10	.16
PCRS (Patient)	.06	.00	-.09	.05	-.16	-.06	.07	-.11
PCRS (SO-informant)	.15	.12	-.12	.12	-.26*	.02	-.01	.08
Age	-.09	-.04	-.38**	-.10	.07	-.03	-.09	-.09
Education	-.09	.27*	-.18	-.12	-.17	-.26*	.40**	-.23*

Note. BSI = Brief Symptom Inventory (GSI = Global Severity Index); SWLS = Satisfaction with Life Scale; PCRS = Patient Competency Rating Scale (Patient = Patient self-report, SO = Significant Other report on patient's functioning).

* $p < .05$, ** $p < .01$

Table 6. Descriptive Statistics (Marginal Means) and Group Comparisons for Participants with Predominantly Task-Oriented ($n = 81$) or Emotion-Oriented ($n = 34$) Coping Styles.

	Coping				$F(111)$	d
	Task-oriented		Emotion-oriented			
	M	SD	M	SD		
BSI – 18						
Somatization	50.8	(9.6)	59.9	(9.8)	19.58***	0.94
Depression	49.4	(8.9)	64.2	(8.9)	63.36***	1.65
Anxiety	49.1	(9.3)	62.6	(9.1)	47.13***	1.45
Global Severity Index	50.2	(9.8)	64.7	(7.5)	55.13***	0.34
SWLS	19.9	(7.3)	14.0	(5.8)	16.97***	0.85
PCRS (Patient self-report) ¹	120.1	(15.2)	98.9	(14.6)	26.87***	1.40
PCRS (Significant Other) ¹	114.2	(22.5)	95.3	(17.9)	11.08**	0.89

Note. BSI = Brief Symptom Inventory (GSI = Global Severity Index); SWLS = Satisfaction with Life Scale; PCRS = Patient Competency Rating Scale (Patient = Patient self-report, SO = Significant Other informant report on patient's functioning). F statistics are main effects.

1. Univariate ANOVA tested TBI participants only ($n = 35$ predominantly task-oriented copers, $n = 22$ predominantly emotion-focused copers).

* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 7. Descriptive Statistics for Well-being Outcomes by Group (Patient or Significant Other) and Predominant Coping Style (Task or Emotion).

	TBI				Significant Other			
	Task-focused (<i>n</i> = 35)		Emotion-focused (<i>n</i> = 22)		Task-focused (<i>n</i> = 46)		Emotion-focused (<i>n</i> = 12)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
BSI Somatization	51.4	(8.9)	62.0	(7.8)	50.3	(10.2)	57.8	(12.6)
BSI Depression	51.3	(9.4)	64.9	(7.6)	47.4	(8.2)	63.5	(11.1)
BSI Anxiety	48.7	(9.0)	63.2	(9.1)	49.5	(9.5)	62.0	(9.5)
BSI GSI	51.5	(9.4)	65.8	(6.1)	48.9	10.1	63.6	(9.7)
SWLS	18.1	(7.9)	13.9	(5.8)	21.6	(6.5)	14.0	(6.1)
PCRS (self-report)	120.1	(15.2)	98.9	(14.6)				
PCRS (SO-informant)	114.2	(22.5)	95.3	(17.9)				

Note. BSI = Brief Symptom Inventory (GSI = Global Severity Index); SWLS = Satisfaction with Life Scale; PCRS = Patient Competency Rating Scale (Patient = Patient self-report, SO = Significant Other report on patient's functioning).

Table 8a. Mediation Analyses: Step 2 in Multiple Regression (Total Sample).

<i>Variables</i>	R^2 Total	Beta	sr^2	F Total	df	p	R^2 Change	Sig F Change
Model 2 (BSI Depression)	.36			33.79	2,118	<.001	.01	.314
Emotion Coping (CISS)		.59***	.34					
Sadness (Observation)		.08	.01					
Model 2 (SWLS)	.13			8.66	2,118	<.001	.01	.266
Emotion Coping (CISS)		-.33	.10					
Anger (Observation)		-.10	.01					
Model 2 (BSI Somatization)	.14			9.66	2,118	<.001	.02	.153
Emotion Coping (CISS)		.33	.11					
Avoidance (Observation)		-.13	.02					
Model 2 (BSI Depression)	.36			33.58	2,118	<.001	.00	.389
Emotion Coping (CISS)		.59	.34					
Avoidance (Observation)		-.07	.00					
Model 2 (BSI GSI)	.35			32.09	2,118	<.001	.01	.219
Emotion Coping (CISS)		.57	.32					
Avoidance (Observation)		-.09	.01					
Model 2 (SWLS)	.14			9.23	2,118	<.001	.02	.135
Emotion Coping (CISS)		-.32	.10					
Avoidance (Observation)		.13	.02					
Model 2 (BSI Depression)	.06			3.82	2,118	.025	.02	.139
Distraction Coping (CISS)		.17	.03					
Negative Emotion (LIWC)		.14	.02					
Model 2 (BSI GSI)	.07			4.47	2,118	.013	.02	.139
Distraction Coping (CISS)		.20*	.04					
Negative Emotion (LIWC)		.14	.02					

Note. BSI = Brief Symptom Inventory (GSI = Global Severity Index), CISS = Coping Inventory for Stressful Situations, SWLS = Satisfaction with Life Scale

* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 8b. Mediation Analyses: Step 2 in Multiple Regression (TBI Group).

<i>Variables</i>	R^2 Total	Beta	sr^2	F Total	df	p	R^2 Change	Sig F Change
Model 2 (BSI Somatization)	.25			9.61	2,57	< .001	.05	.049
Emotion Coping (CISS)		.39**	.14					
Sadness (LIWC)		.24*	.05					
Model 2 (BSI GSI)	.46			23.96	2,57	<.001	.01	.394
Emotion Coping (CISS)		.65***	.39					
Sadness (LIWC)		.09	.01					
Model 2 (PCRS SO Inform)	.15			4.86	2,57	.011	.01	.348
Emotion Coping (CISS)		-.39**	.15					
Sadness (LIWC)		.12	.01					
Model 2 (BSI Somatization)	.23			7.97	2,57	.001	.02	.237
Emotion Coping (CISS)		.41**	.16					
Acceptance (Observation)		-.14	.02					
Model 2 (BSI-GSI)	.46			24.09	2,57	<.001	.01	.353
Emotion Coping (CISS)		.65***	.40					
Acceptance (Observation)		-.09	.01					
Model 2 (BSI Somatization)	.24			9.01	2,57	<.001	.04	.084
Emotion Coping (CISS)		.40**	.15					
Avoidance (Observation)		-.21	.05					
Model 2 (BSI Depression)	.43			21.32	2,57	<.001	.02	.209
Emotion Coping (CISS)		.61***	.35					
Avoidance (Observation)		-.13	.02					
Model 2 (BSI GSI)	.48			26.22	2,57	<.001	.03	.078
Emotion Coping (CISS)		.63***	.37					
Avoidance (Observation)		-.18	.03					
Model 2 (SWLS)	.13			4.34	2,57	.018	.03	.168
Emotion Coping (CISS)		-.28*	.04					
Avoidance (Observation)		.18	.03					

Note. BSI = Brief Symptom Inventory (GSI = Global Severity Index), CISS = Coping Inventory for Stressful Situations, SWLS = Satisfaction with Life Scale; * $p < .05$, ** $p < .01$, *** $p < .001$.
(table continues...)

<i>Variables</i>	R^2 Total	Beta	sr^2	F Total	df	p	R^2 Change	Sig F Change
Model 2 (PCRS SO Inform)	.27			2.27	2,57	.113	.03	.203
Distraction Coping (CISS)		-.17	.03					
Anger (LIWC)		-.17	.03					
Model 2 (BSI GSI)	.35			3.96	2,57	.025	.03	.160
Distraction Coping (CISS)		.25	.06					
Sadness (LIWC)		.18	.03					

Note. BSI = Brief Symptom Inventory (GSI = Global Severity Index), CISS = Coping Inventory for Stressful Situations, SWLS = Satisfaction with Life Scale; * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 8c. Mediation Analyses: Step 2 in Multiple Regression (Significant Other Group).

<i>Variables</i>	R^2 Total	Beta	sr^2	F Total	df	p	R^2 Change	Sig F Change
Model 2 (BSI Depression)	.31			13.14	2,58	< .001	.02	.245
Emotion Coping (CISS)		.50***	.22					
Anger (Observation)		.14	.02					
Model 2 (BSI Anxiety)	.19			6.61	2,58	.003	.01	.398
Emotion Coping (CISS)		.38**	.13					
Anger (Observation)		.11	.01					
Model 2 (BSI GSI)	.26			10.36	2,58	< .001	.02	.258
Emotion Coping (CISS)		.45***	.18					
Anger (Observation)		.14	.02					
Model 2 (SWLS)	.18			6.21	2,58	.004	.06	.048
Emotion Coping (CISS)		-.26	.06					
Anger (Observation)		-.26	.06					
Model 2 (BSI Depression)	.31			13.24	2,58	< .001	.02	.223
Emotion Coping (CISS)		.51***	.24					
Helplessness (Observation)		.14	.02					
Model 2 (BSI Anxiety)	.19			6.80	2,58	.002	.01	.313
Emotion Coping (CISS)		.39	.14					
Helplessness (Observation)		.13	.01					
Model 2 (BSI GSI)	.26			10.34	2,58	< .001	.02	.265
Emotion Coping (CISS)		.46***	.20					
Helplessness (Observation)		.13	.02					

Note. BSI = Brief Symptom Inventory (GSI = Global Severity Index), CISS = Coping Inventory for Stressful Situations, SWLS = Satisfaction with Life Scale; * $p < .05$, ** $p < .01$, *** $p < .001$.

APPENDIX B

Figure 1. Group (TBI, Significant Other) by Coping Style (CISS) Interaction.

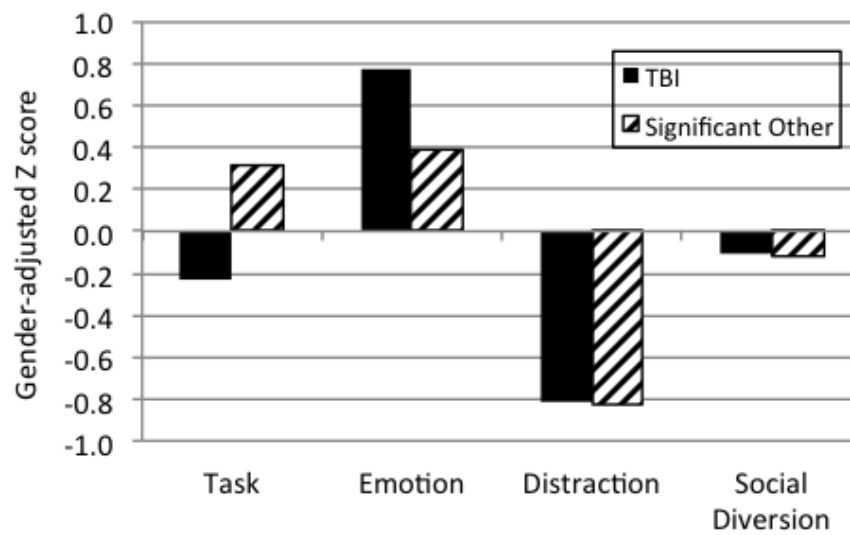
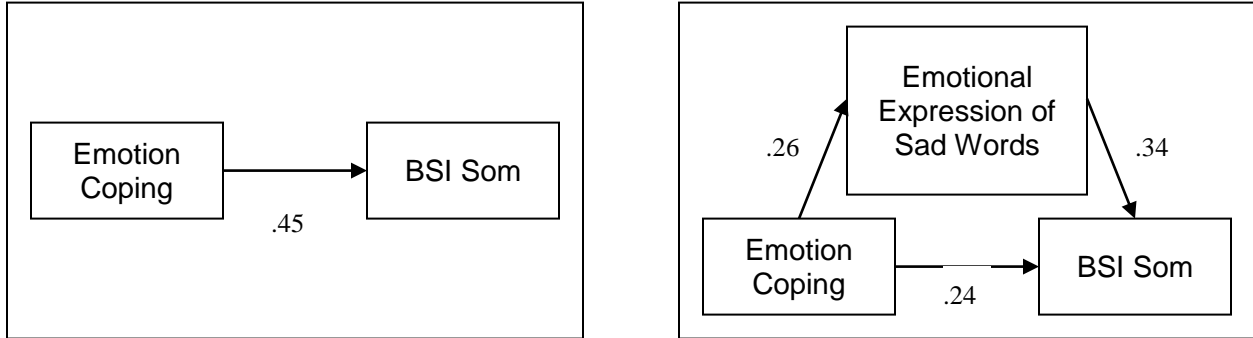


Figure 2. Diagram of Mediation Analyses: Emotional Expression (LIWC) as a Mediator Between Coping Style (CISS Emotion-Oriented Coping) and Well-Being Outcome (BSI-18 Somatization) for the TBI Group.



APPENDIX C

Emotion Expression Observation Rating Form

	None	Low	Medium	High
Happiness	0	1	2	3
Attributes: characterized by amusement, joy, cheerfulness, and/or delight; surprise in a positive context Physical Cues: may see smiling, grinning, giggling, laughing				
Excitement	0	1	2	3
Attributes: characterized by positive energy, eagerness, enthusiasm, and/or exhilaration Physical Cues: smiling/grinning; speaker may exhibit rapid fluctuations in pitch, volume, and rate of speech; may see joyful laughing				
Acceptance	0	1	2	3
Attributes: characterized by peacefulness, relief, contentment, satisfaction Physical Cues: calmness of face/body, deep breath				
Anxiety	0	1	2	3
Attributes: characterized by speaker appearing tense, nervous, uncomfortable, worried, uneasy; speaker may fidget Physical Cues: nervous laughter, lip biting, hand wringing, deep breaths, press hands or lips together, rubbing face, pulling at hair, frequent eye movements, uneasy smiles, wiggling legs, other un-relaxed gestures				
Fear	0	1	2	3
Attributes: characterized by alarm, horror, shock, terror, mortification; fear is much more intense than tension/anxiety; person may look as if they are in imminent danger like a 'deer in headlights' Physical cues: 'deer in headlights' look; may look painful; may sob/cry				
Sadness	0	1	2	3
Attributes: characterized by a low mood - appearing gloomy, down, depressed, downhearted, hopeless; speaker may talk slowly, may appear at a loss Physical Cues: tearful, sobbing, hands covering face, look downward or away, voice may waver/quiver				
Anger	0	1	2	3
Attributes: characterized by appearing irritated, annoyed, offended, hostile, bitter; speaker may seem flustered, exasperated; words likely to be biting/abrupt Physical Cues: speaker may exhibit large movements, throw hands up and slap back down on table/legs, may increase volume of speech, expression may be in small bursts, pursed lips, stuttering, sighs in short bursts, deep sighs, clenched teeth, raise up out of seat, may look flushed in the face, sweating, shaking head "no"				
Helplessness	0	1	2	3
Attributes: characterized by inability to act or react; resignation; vulnerable; appearing at end of their rope Physical Cues: hands up as if to say, what can I do?, pleading look in their eyes				
Guilt	0	1	2	3
Attributes: characterized by awareness of wrongdoing, remorse, conflict about something not being done that should be; appear shameful; wishful for things to be different; a longing/desperation in their speech; not living up to expectations; disappointment in self; regret at lower levels Physical Cues: may look downward/away, may cry/tear up; sigh				
Insight	0	1	2	3
Attributes: characterized by acknowledgement of difficulties faced, awareness, realistic, on-topic; willing to look into the self/introspective Physical Cues: may have good eye contact				
Avoidance	0	1	2	3
Attributes: characterized by drifting off topic, requiring redirection to task, difficulty expressing self, may or				

may accompany tension, may say little or may be very expressive about irrelevant details/topics; appear timid Physical Cues: poor eye contact, downturned eyes/head, draw inward				
Overall Engagement	0	1	2	3
Attributes: characterized by perseverance, continuing to talk until time was up, few prompts to continue Physical Cues: good eye contact				
Overall Emotional Intensity	0	1	2	3

APPENDIX D


Human Investigation Committee Approval

**WAYNE STATE
UNIVERSITY**

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NOTICE OF EXPEDITED APPROVAL

To: Kaja Harper
Psychology

From: Dr. Scott Mills 
Chairperson, Behavioral Institutional Review Board (B3)

Date: January 24, 2012

RE: IRB #: 013412B3E
Protocol Title: Emotional Expression and Coping Style in Predicting Well-Being After Traumatic Brain Injury in Survivors and Caregivers
Funding Source: Unit: Psychology
Protocol #: 1201010507

Expiration Date: January 23, 2013

Risk Level / Category: Research not involving greater than minimal risk

The above-referenced protocol and items listed below (if applicable) were **APPROVED** following *Expedited Review Category (#7)* by the Chairperson/designee for the Wayne State University Institutional Review Board (B3) for the period of 01/24/2012 through 01/23/2013. This approval does not replace any departmental or other approvals that may be required.

- Revised Protocol Summary Form (received in the IRB Office 01/23/2012)
- Protocol (received in the IRB Office 01/06/2012)
- A waiver of consent has been granted according to 45CFR 46 116(d) and justification provided by the Principal Investigator in the Protocol Summary Form. This waiver satisfies: 1) risk is no more than minimal, 2) the waiver does not adversely affect the rights and welfare of research participants, 3) the research could not be practicably carried out without the waiver, and (4) Providing participants additional pertinent information after participation is not appropriate.
- Data Collection Tools: PANAS, Brief Symptom Inventory 18 (BSI 18), Satisfaction with Life Scale (SWLS), Coping Inventory for Stressful Events (CISS), and Modified Cumulative Illness Rating Scale

- Federal regulations require that all research be reviewed at least annually. You may receive a "Continuation Renewal Reminder" approximately two months prior to the expiration date; however, it is the Principal Investigator's responsibility to obtain review and continued approval **before** the expiration date. Data collected during a period of lapsed approval is unapproved research and can never be reported or published as research data.
- All changes or amendments to the above-referenced protocol require review and approval by the IRB **BEFORE** implementation.
- Adverse Reactions/Unexpected Events (AR/UE) must be submitted on the appropriate form within the timeframe specified in the IRB Administration Office Policy (<http://www.irb.wayne.edu/policies-human-research.php>).

NOTE:

1. Upon notification of an impending regulatory site visit, hold notification, and/or external audit the IRB Administration Office must be contacted immediately.
2. Forms should be downloaded from the IRB website at each use.

*Based on the Expedited Review List, revised November 1998

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ABSTRACT**EMOTIONAL EXPRESSION AND COPING STYLE IN PREDICTING
WELL-BEING AFTER TRAUMATIC BRAIN INJURY**

by

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Many survivors of traumatic brain injury (TBI) and their significant others face the chronic stress of living with cognitive and physical impairments associated with TBI; this stress takes a toll on well-being. Unfortunately, research on the mechanisms of coping after TBI has been sparse. Thus, the present study examined the influence of acquired cognitive impairment on the pattern of relationships between emotional expression, coping styles and health outcomes. Sixty individuals with moderate to severe TBI as well as 63 significant others of individuals with TBI participated. Coping style was assessed via the Coping Inventory for Stressful Situations. Emotional expression was assessed via linguistic analysis (Linguistic Inquiry and Word Count Program) as well as observation ratings made during a speech task in which participants described stressful aspects of recovery from TBI. Main outcomes were subjective well-being, including psychological distress (depression, anxiety, and somatization), life satisfaction, and for TBI participants, objective functional independence assessed via ratings from their significant others. Results indicate that individuals with TBI and their significant others show different patterns of coping style, and that these patterns are differentially related to subjective well-being

and functional outcome: Consistent with prior research, task-oriented coping was associated with good outcomes whereas emotion-oriented coping was associated with poor outcomes. Moreover, significant others were more likely to adopt a task-oriented coping style than were adults with TBI, whereas adults with TBI used relatively more emotion-oriented coping; consistent with this finding, the TBI group fared substantially worse in well-being than did the significant other group. When describing stressful aspects of recovery, both verbal emotional expressions and observations of expressed emotions predicted well-being outcomes; however, the pattern differed between adults with TBI and their significant others. Among TBI participants, expressing awareness about the stressful aspects of recovery was associated with distress and low satisfaction with life, whereas avoiding problems or demonstrating acceptance predicted low distress and high satisfaction with life. Ongoing expression of anger long after the survivor's injury was a dysfunctional marker for distress in significant others. Interventions aimed at facilitating healthy coping styles may be helpful for individuals with TBI and their families.

AUTOBIOGRAPHICAL STATEMENT

KAJA TELMET HARPER

Kaja Telmet Harper received her Bachelor of Science degree in Psychology from Wayne State University in 2000, graduating summa cum laude, with high honors, and inducted as a member of Phi Beta Kappa. After working as a Senior Research Assistant for the Southeastern Michigan Traumatic Brain Injury System (SEMTBIS) at the Rehabilitation Institute of Michigan, she was admitted to the Clinical Psychology Graduate Program at Wayne State University in 2003 and opted to specialize in Neuropsychology. During her graduate training, she received extensive training and experience in clinical neuropsychology at the University Health Center, the Rehabilitation Institute of Michigan, and during her APA-approved internship (Neuropsychology Track) at the Cincinnati VA Medical Center. During her time in graduate school, she has had the opportunity to teach undergraduate psychology classes as well as teach laboratory portion of Assessment to first year clinical psychology graduate students. Her dissertation project was funded by a grant from the Wayne State University graduate school as well as the Clinical Psychology Department. Kaja will be pursuing postdoctoral training in neuropsychology at the Rehabilitation Institute of Michigan in September of 2012.