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The Influence Of Religion And Spirituality On Rehabilitation Outcomes Among Traumatic Brain Injury Survivors

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THE INFLUENCE OF RELIGION AND SPIRITUALITY ON REHABILITATION OUTCOMES AMONG TRAUMATIC BRAIN INJURY SURVIVORS

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DEDICATION

It is with my deepest gratitude, appreciation and love that I dedicate this work to my family: to my parents for their never-ending support, encouragement and faith in me to achieve anything I set my mind to; to my son, Braden, for being what keeps me going on a daily basis; and to my amazing life partner and husband, Shane, without whose emotional, spiritual and practical support and patience this accomplishment would never have been possible.

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CHAPTER 1

INTRODUCTION: BACKGROUND AND SIGNIFICANCE

Traumatic brain injury (TBI) occurs in 1.7 million Americans annually (Faul, Xu, Wald, & Coronado, 2010), and 5.3 million Americas are living with a disability as a result of a TBI (CDC Injury Center, 1999; CDC Injury Center, 2006). Chronic sequelae may include decreased functional abilities, increased dependence on others for assistance with activities of daily living, increased distress and decreased life satisfaction (Corrigan, Bogner, Mysiw, Clinchot, & Fugate, 2001). The economic impact associated with TBI is great: Direct costs of medical expenses and indirect costs such as lost work productivity amounted to $60 billion in the United States in the year 2000 alone (Finkelstein, Corso, & Miller, 2006).

Many individuals who have suffered a TBI report using religion and/or spirituality as a means to cope with the chronic stress associated with the long-term effects of brain injury (Herrmann et al., 2000). Among healthy adults, religion and spirituality have shown strong association with improved life satisfaction and outcomes through mechanisms which include increased social support and improved coping skills (Ellison, Boardman, Williams, & Jackson, 2001; Ellison & George, 1994; George, Ellison, & Larson, 2002). Furthermore, in both chronically ill and traumatically injured populations, links have been demonstrated between religion and spirituality and rehabilitation outcomes (Brillhart, 2005; Canada, Parker, Basen-Engquist, de Moor, & Ramondetta, 2005; Chally & Carlson, 2004; Fitchett, Rybarczyk, DeMarco, & Nicholas, 1999). Unfortunately, research on religion and spirituality among TBI survivors is very sparse,

and little prior research has explored the potential role of religion and spirituality and its correlates on rehabilitation outcomes in this population.

Traumatic Brain Injury: Using religion to cope

Severe traumatic brain injury can cause dramatic and often long-term changes in physical and social status and cognitive, emotional and physical functioning. Such an injury directly affects nearly all aspects of a person's life. Individuals with brain injury are confronted, quite possibly for the first time, with questions concerning death and mortality, the meaning of life and the injury itself, control and autonomy, and alienation. The prognosis is most times uncertain, but such individuals may expect to live for many years. They may turn to religion at any time to help them cope with their disability and the significant change it brings to their lives. Religion may give new meaning to their lives as individuals with a disability and help them to establish new life goals (Johnstone, Glass, & Oliver, 2007).

People in the post-acute stage of severe brain injury are often times unable to function adequately or as they had previously as employees, employers, students, parents, lovers or friends. Fulfillment of these roles is a large part of what gives people their sense of individuality, personal identity and their humanity. In order to make a positive adaptation to brain injury, the person needs to reestablish a sense of meaning in life and of hope for the future, achieve a sense of self-acceptance and establish a positive self-image (McGrath, 2004).

Religions of the world individually show appreciation for the sometimes painful nature of the human condition. Additionally, world religions offer varied ways to come to terms with suffering, tragedy and a potential reinvention of one's self in the search for

life meaning and purpose after trauma. Thus, any understanding of the human response to extraordinary moments remains incomplete without an appreciation of religion (Pargament, 1997). People often bring their own constellation of religious resources with them when they face stressful times, such as the experience related to the aftermath of TBI. These religious resources are not unidimensional, as they have often been assessed in previous studies, but multidimensional, motivating constructs with cognitive, behavioral, attitudinal, emotional and relational manifestations (Pargament, 1997).

The 2006 Gallop poll shows that 96% of Americans believe in God or a universal spirit, 90% pray, 85% say religion and spirituality are important to them, and 41% attend services weekly or more often (The Gallup Organization, 2006). After September 11, 2001, 90% of a random sample of Americans reported turning to religion to cope (Schuster et al., 2001). On the basis of these findings, it seems that religion is central to the lives of many people, and likely provides general guidance for navigating life's experiences. Religion can help individuals establish their sense of purpose and primary goals for living, and provide them with motivation and guidelines to achieve those goals (Park, 2007).

Religion and coping

The relationship between religion/spirituality and coping with trauma is complex. Some individuals find faith helpful in their recovery and even a platform from which growth can occur; others find it a source of distress and still others abandon their faith entirely.

Recently, there has been growing interest in the role that religion and spirituality can play in adjustment to physical disease and related disability. Studies have shown

that when faced with chronic illness or impairment, many persons turn to their spirituality and religious beliefs (Brillhart, 2005; Chally & Carlson, 2004; Contrada et al., 2004; Fitchett et al., 1999; Keefe et al., 2001). Of participants in a study assessing the role of religion and spirituality in multiple sclerosis, 68% of participants described themselves as religious or spiritual (Makros & McCabe, 2003). In a study of the relationship between spirituality and quality of life in spinal cord injury, 98.7% of individuals who participated reported having a spiritual belief system and/or participating in religious practices of some type (Matheis, Tulsky, & Matheis, 2006).

Consistent with the colloquial belief that many individuals “find religion” in the face of difficult life circumstances, empirical evidence shows that religiousness is often intensified in critical situations (Pargament & Ano, 2006). Religion might be particularly valuable to people when they are facing problems that push them to the limits of their own personal and social coping resources. Half the participants interviewed in a study of trauma related disability noted a change in their faith that coincided or followed closely after their injury (McColl et al., 2000b). Recently, 68% of individuals with TBI reported a significant increase in their faith or spirituality (Johnstone, Pil Yoon, Rupright, & Reid-Arndt, 2009).

Although there is evidence that some individuals report negative changes in their spirituality (e.g., anger at God or loss of faith) following the onset of a traumatic disability (McColl et al., 2000b), disability may also provide a context for spiritual growth in a number of ways. Such frameworks for growth in the face of traumatic disability include reminding individuals that they are not in control of everything in their lives, raising questions about order and purpose in the universe, challenging concepts about God,

slowing down individual's lives for meditation, raising the question about what is and is not important in life, and opening them up to different kinds of relationships with others (McColl et al., 2000b).

Unfortunately, research on the roles of religion and spirituality among persons who have sustained a TBI is very sparse. Reasons for the paucity of research examining how religion and spirituality may facilitate or detract from rehabilitation outcomes are unclear; however, it may reflect a culture of scientific discomfort with issues pertaining to religion, as well as stereotypes that religion is by definition "unscientific." What is clear, however, is that many persons with TBI and their families rely heavily on religion and spirituality as a means to cope with the chronic stress associated with the long-term effects of brain injury, and these practices and beliefs likely enhance or detract from rehabilitation efforts in currently unknown ways.

Religion and Spirituality- definitions and constructs

In the past several years, interest in religion and spirituality has increased among social scientists. An area of a specific interest has been the function that religion and spirituality serve in the lives of individuals who have been confronted with a traumatic event or chronic illness (Brillhart, 2005; Canada et al., 2005; Canada et al., 2006; Chally & Carlson, 2004; Cohen, Pil Yoon, & Johnstone, 2009; Idler & Kasl, 1997a; Keefe et al., 2001; Makros & McCabe, 2003; Matheis et al., 2006; Rippentrop, 2005; Rippentrop, Altmaier, Chen, Found, & Keffala, 2005; Tepper, Rogers, Coleman, & Malony, 2001). However, the way in which the terms religion and spirituality are conceptualized and used has been somewhat inconsistent. Many theorists define *religion* as a societal

phenomenon involving social institutions composed of members who abide by various beliefs and adhere to certain rules, rituals, covenants, and formal procedures (Thoresen & Harris, 2002). *Religiousness* involves “a system of worship and doctrine that is shared with a group, and thus has specific behavioral, social, doctrinal, and denominational characteristics (Underwood-Gordon, Peters, Bijur, & Fuhrer, 1997).” A related but separate concept, *spirituality,* addresses ultimate questions about life’s meaning and purpose and has been defined as “a way of being and experiencing that comes about through awareness of transcendent dimensions characterized by certain identifiable values in regard to self, others, nature, and life” (Elkins, Hedstrom, Hughes, Leaf, & Saunders, 1988). This definition of spirituality encompasses both the religious and non-religious beliefs and expressions.

Although the terms are often conflated, religiousness and spirituality are related constructs that can also be considered independently: Spirituality can be experienced within an organized religious context; however, it may also be experienced separate from an organized religious context. Conversely, formal religion can be practiced in the absence of a spiritual component.

Some authors have examined the existence of two independent aspects of spiritual well-being, existential well-being and religious well-being (Ellison & George, 1994). Consistent with the conceptualization of religion and spirituality presented above, religious and existential well-being are clearly intertwined and overlapping constructs that can also be considered independently. In this conceptualization, religious well-being refers specifically to a meaningful relationship with God, whereas existential well-being refers to the general belief that one’s life is meaningful or has purpose (Ellison &

George, 1994). Overall spiritual well-being then may be thought of as a sense of interconnectedness between self, others, nature, and a transcendent being achieved through an integrative and dynamic growth process that leads to a realization of purpose and meaning in life whether through religious or existential belief systems (Hungelman, Kenkel-Rossi, Lessen, & Stollenwerk, 1985).

Regardless of the intertwined nature of the concepts, only by explicitly operationalizing various components of religiousness and spirituality in terms that reflect the variety of perspectives of potential research participants can any conclusions be made about the function these constructs play in the lives of individuals (Cohen et al., 2009; Zinnbauer et al., 1997). Pargament (1997) has described two specific approaches to the study of religions: substantive and functional. The substantive approach focuses on the beliefs, emotions, practices and relationships of individuals in relation to a higher power, whereas the functional approach emphasized the function that religiousness serves in the life of the individual (Pargament, 1997). Almost all of the research conducted to date has focused on the functional aspects of religion or religiousness (e.g., church attendance), not on spirituality or the more substantive or psychological aspects considered to be more spiritual and seen as somewhat independent from religion (Thoresen & Harris, 2002). Furthermore, there is little well-controlled data on spirituality, seen as independent of religion, and health and life quality. Efforts to identify the mechanisms by which religion and spirituality affect health need to take into account the differential importance of various religious or spiritual dimensions for specific health outcomes.

Religion and health outcomes

The relationship between religion and health outcomes is exceptionally complex. Self identification as religious or spiritual can mean a mix of practices, beliefs, and identities. Health is also a global concept combining mental, physical, social and overall well-being. In much of the research conducted to study the relationships between religion and health outcome, researchers have relied heavily on single item and imprecise global indices of religious or spiritual involvement (Thoresen & Harris, 2002). The limited reliability of such brief measures attenuates the association of religion and spirituality variables with the health variables of interest, resulting in smaller effect sizes then would be observed if the religion and spirituality variable were assessed with more reliable measures (Hill & Pargament, 2003a). Furthermore, such restricted measures may not be sensitive to the potentially harmful health outcomes associated with some aspects of religion and spirituality (Pargament, Koenig, Tarakeshwar, & Hahn, 2001). By relying so heavily on global religion and spirituality indices, researchers have underestimated the complexity of religion and spirituality variables and overlooked the possibility that something inherent within the religious and spiritual experience itself contributes to or detracts from physical and mental health.

Despite these limitations, religion and spirituality have been fairly robust characteristics in predicting health-related outcome (Larson & Larson, 2003; Powell, Shahabi, & Thoresen, 2003; Sloan & Bagiella, 2002; Thoresen & Harris, 2002). The National Institute for Healthcare Research (NIHR) consensus report cited studies providing evidence of a link between frequency of religious service attendance and health factors such as: lower rates of disease including lower blood pressure, improved physical functioning, lower anxiety and pain, better perceived health, and decreased

functional disability (Matthews, Koenig, Thoresen, & Friedman, 1998). Persons who participate in religious groups and highly value their religious faith have been shown to be at a substantially reduced risk of depressive disorder and to recover faster from their depression (Larson & Larson, 2003). Religion and spirituality have also been linked to lower risk for alcohol dependence and drug abuse (Kendler, Gardner, & Prescott, 1997). Even when studies have controlled for up to 12 potential intervening characteristics, some relationship generally still is detected (Thoresen & Harris, 2002).

Religion/ spirituality and health in special populations

Although little research has been conducted on the relationship between religion and spirituality and outcome after traumatic brain injury, the relationship between these variables has been studied in a number of special populations that have important similarities to those with traumatic brain injury. For example, religion and spirituality, life satisfaction, and mental and physical health have been studied among individuals with chronic illnesses or disability such as cancer (Canada et al., 2005; Canada et al., 2006), multiple sclerosis (Makros & McCabe, 2003), spinal cord injury (Brillhart, 2005; Fitchett et al., 1999; Matheis et al., 2006), rheumatoid arthritis (Keefe et al., 2001), HIV/ AIDS (Ironson et al., 2002), heart disease (Contrada et al., 2004) and illnesses and disabilities associated with aging (Chally & Carlson, 2004; Idler & Kasl, 1997b; Koenig, Pargament, & Nielsen, 1998) and have been found to be significantly linked. In a study of individuals with spinal cord injury, existential spiritual well-being was related significantly to life satisfaction and general health, accounting for nearly 35% of the variance in outcome (Matheis et al., 2006). Conversely, religious spiritual well-being did not emerge as a significant predictor. The authors concluded that this finding may indicate that

engagement of an existential belief system in which an individual actively searches for life purpose rather than adherence to a predefined set of beliefs and practices may result in a more positive assessment of overall quality of life. Although many individuals who report adherence to religious beliefs and practices may also have a strong existential belief system, it is likely that many other individuals adhere to either belief system independently from the other, making such distinctions necessary. Furthermore, in a study of individuals with chronic illness (diabetes), existential well-being but not religious well-being appeared to serve as a buffer between illness uncertainty and psychosocial well-being, suggesting spiritual well-being is an important resource for persons forced to adjust to uncertainty related to long-term medical conditions (Landis, 1996). These findings underscore the special relevance of religious and spiritual beliefs and practices for situations in which disability is a factor.

Mechanisms for the link between religion/spirituality and outcomes

What is it about religion and spirituality that accounts for their links to health? Several mechanisms have been proposed to explain this link.

Coping

Coping is a process in which people engage that allows for translation of a general frame of reference for dealing with the world into specific methods (e.g., thoughts, feelings, behaviors, and interactions) suited to the particular demands and challenges of a specific situation. Coping is a transaction between the individual and a situation that is influenced by attributes of both as well as the larger context of other relationship and setting characteristics (Pargament, 1997). The individual must appraise both their own resources and burdens and the situation itself (primary appraisal) and

their ability to successfully navigate the situation (secondary appraisal) (Lazarus & Folkman, 1984).

The theory of stress and coping is a mediated model, wherein resources influence outcome through their impact on appraisal (Lazarus & Folkman, 1984). Stressful events are events that are perceived to be threatening (primary appraisal) and the person perceives that they cannot manage them successfully (secondary appraisal). Thus, it is neither the event itself, nor the persons practical resources per se that influence the outcome of a stressful situation, but how the individual appraises and subsequently copes with the event that is important.

Religion may provide individuals with a variety of ways of coping with and making meaning of illness or traumatic situations in addition to non-religious material, psychological, and social coping resources. The framework of universal truth and enduring values that religion offers provides a source of permanence and stability that can minimize the powerful effect of a negative life event by incorporating it into something much bigger, the divine (Calhoun & Tedeschi, 2006). Furthermore, religious institutions and rituals can provide an outlet for emotional expression and provide predictability in a person's life. Religious belief systems, similarly, may provide a sense of control through interpretive control (i.e., a shift in interpretation of the event allows for acceptance) or vicarious secondary control (i.e., one can control outcome of events through petition to God). A third approach to gaining a sense of control through use of religion in coping is the collaborative approach, in which individuals may work with God as partners in the problem-solving process (Pargament, 2002).

General coping style and outcome

The relationship between coping styles and both mental and physical health has long been studied, and a variety of coping constructs have been proposed. Lazarus and Folkman (1984) suggested that most coping efforts can be classified as either problem-focused or emotion-focused, although coping responses are likely to incorporate both types of strategies to some degree. In general, problem or task-focused coping (i.e., active coping style) aims to confront the event, either in altering the situation (environment directed) or by acquiring the necessary information, skills or assistance (self-directed). Active coping has been associated with better quality of life, psychological well-being and positive health behaviors (Canada et al., 2005; McWilliams, Cox, & Enns, 2003). Active coping is thought by some to be a more adaptive response to stress. Emotion-focused coping (i.e. passive or avoidance coping styles), in contrast, is a palliative response that aims to eliminate or avoid negative emotional reactions to the event. Emotion-focused coping has been associated with higher levels of symptom severity and poorer outcome (McWilliams et al., 2003). A third approach to coping has also been proposed, and has been termed *perception-focused coping* (Pearlin & Schooler, 1978). This coping style may involve strategies such as positive re-appraisal of seeking meaning. Such strategies seek to reduce the threat associated with the problem by redefining it or shifting one's perspective.

The helpfulness of any coping strategy, however, may depend as much on the individual and the situation they find themselves in as the strategy itself (Kleiber, Hutchinson, & Williams, 2002; Stanton, Danoff-Burg, Cameron, & Ellis, 1994). It follows that certain coping strategies are not necessarily unequivocally better than others. Lazarus and Folkman (1994) have hypothesized that the nature and success of specific

coping strategies are associated with the controllability of the event: problem-focused coping is likely to be successful when the event is controllable, whereas emotion-focused coping is likely to be successful when the event is relatively uncontrollable. Emotion-focused coping can aid in regulation of emotions associated with a trauma when efforts toward change of the situation itself are inappropriate or impossible. Resolution of loss and other feelings surrounding negative events requires identification and working through emotions. If this process does not occur, maladjustment may result. Thus, if coping is viewed as a dynamic process, both problem-focused and emotion-focused coping can be viewed as essential parts of the total coping effort that at multiple points in time may even facilitate each other (Lazarus, 1999).

Coping and outcome in TBI

For many years, it was a commonly held belief that the majority of variance in outcome after a significant brain injury was due to neurological or injury factors. However, more recently a great deal of research has evaluated psychosocial influences on outcome. On the basis of the mediated model of coping by Lazarus and Folkman (1984), discussed above, Kendall (1996) proposed appraisal and coping as mediators in the relationship between personal and environmental resources and situational factors and psychosocial adjustment after brain injury.

The hypothesis that both active and emotion focused coping may be useful and appropriate responses to stressors at different times was tested in a sample of traumatic brain injury survivors by Kendall & Terry (2008). Interestingly, even if the situation was perceived to be controllable, the use of problem-focused coping strategies, though associated with short-term role functioning, was not associated with

long-term emotional well-being. This suggests that persistent use of such strategies might reflect an inappropriate perception of the long-term consequences of brain injury being controllable.

On the basis of this study, it seems that the match between actual and perceived control and subsequently selected coping strategy might be more important to emotional adjustment following brain injury than the specific coping strategy employed itself. The same study found that passive emotion-focused coping was not helpful in the short-term or the long-term after brain injury, but suggested that active emotion-focused coping, which was not assessed, may have short-term benefits, similar to what has been seen in other chronic illness conditions (Kendall & Terry, 2008).

Similarly, an avoidant coping style is generally viewed as maladaptive. One meta-analysis of coping, however, found that although avoidant coping methods are not effective long-term in reducing distress, they can be more effective in the short-term when emotional distance from a stressful event could be potentially adaptive (Mullen & Suls, 1982). The relationships among the traumatic experience of brain injury, coping and outcome are likely to be exceptionally complex.

Religion and coping

Religion likely adds a unique dimension to the process of coping with TBI, one that cannot be described as inherently good or bad but as having the potential to help people get through hard times or to make matters worse (Pargament, 1997). A study using principle components analysis (PCA) found 2 dimensions of religiousness/spirituality (R/S) as it functions after trauma: Seeking Spiritual Support, which has been found to be related to ability to grow from the traumatic experience and

Religious Strain related to level of distress (Harris et al., 2008). Thus, it is likely religious and spiritual influences may potentially positively or negatively affect outcome.

The influence of religious and spiritual characteristics on health depends on the particular way in which people integrate their conceptions of divine power with human initiative (Pargament, 2002). Religious and spiritual beliefs have been associated with active coping in a sample of individuals with cancer, and tests of mediation suggested that the positive associations between religion and spirituality and functional well-being and religion and spirituality and overall quality of life were mediated through the use of active coping (Canada et al., 2005; Canada et al., 2006). The relationship between religious and spiritual beliefs, emotion-focused coping and outcome is more complex and dependent on the emotional content of coping efforts (i.e., negative or positive emotion focused) and specific use of R/S belief systems (i.e., positive or negative religious coping; discussed below).

Religious coping methods have been identified and grouped into positive and negative patterns that have demonstrated generalizability across different types of life stressors (Pargament, Smith, Koenig, & Perez, 1998). These positive and negative patterns are likely to reflect the underlying emotionality of the individual in response to the stressful experience in question and thus could be considered extensions of positive and negative emotion-focused coping. Positive religious coping is derived from a secure relationship with God, a sense of spirituality, a belief that there is meaning to be found in life, and a sense of spiritual connectedness with others. Negative religious coping methods include questioning the powers of God, expressions of anger toward God,

expressions of discontent with the congregation and clergy, punitive religious appraisals of negative situations, and demonic religious appraisals (Pargament et al., 1998).

Positive religious coping has been associated with decreased mortality, less depression, better quality of life, and perceived benefit in response to a stressful event. Negative religious coping methods, alternately, have been tied to poor physical recovery from injury, poor physical health, anxious and depressed mood, and greater levels of psychological distress (Pargament, 2002). In a sample of rehabilitation patients, negative religious coping was significantly related to lower levels of activities of daily living at one month follow up (Fitchett et al., 1999). Notably, participants across studies generally make considerably more use of positive than negative coping methods (Pargament, Koenig, & Perez, 2000; Pargament, Koenig, Tarakeshwar, & Hahn, 2004; Pargament et al., 1998). Importantly, religious coping has been shown to add unique power to the prediction of positive outcomes for individuals with disabilities after controlling for the effects of traditional coping strategies (Pargament, 1997).

Transformation from trauma

Although the importance of coping in general lies in the mitigation of suffering, some people do not merely cope with trauma but are transformed by the struggle with it and come to understand life in a more profound way (Tedeschi & Calhoun, 1995). Especially in events that are sudden and unexpected, out of one's control, potentially cause long-lasting problems, and involve major change and loss, such as TBI, coping involves a greater degree of "meaning-making", allowing the individual to transform the meaning of the stressful experience (Park, 2005). Personal religious beliefs can help individuals to reappraise the meaning of the illness by understanding it in a different and

often less stressful way, for example perceiving that there is a larger plan or that personal growth or spiritual purification may arise from the suffering. In one study of individuals paralyzed as a result of an accident, “God has a reason” was the most common explanation offered by individuals for their suffering (Bulman & Wortman, 1977). This demonstrates the prevalence of meaning-making coping after a traumatic accident.

Meaning-making coping is often characterized as attempting to see the event in a better light, reappraising events as more positive or at least creating benign reattributions (Park, 2005). For example, meaning-making coping may involve redefining the event as an opportunity to take a different life path, learn new coping skills or develop new sources of social support. In this regard, religion is a system that can significantly influence the process of meaning-making coping by providing higher order schemas that can serve to organize events that seem senseless and tragic.

Consistent with the reappraisal/meaning-making and religion hypothesis, both baseline faith and increases in faith post-illness have been found to be related to illness-related growth in a sample of cancer survivors (Yanez et al., 2009). Furthermore, meta-analytical methods have found religiosity to be related to benefit finding (Helgeson, Reynolds, & Tomich, 2006).

One specific conceptualization of meaning-making coping is termed adversarial or post-traumatic growth, the expression used to describe the individual’s experience of significant positive changes arising from the struggle with a major life crisis (Calhoun, Cann, Tedeschi, & McMillan, 2000). Previous literature suggests that post-traumatic growth is most likely to occur following an event that “shatter’s one’s basic assumptions

about themselves and the world" and when there is a threat to mortality (Tedeschi & Calhoun, 2004). The experience of growth in the face of adversity has been related to lower levels of distress and positively associated with task-oriented (active) coping and positive religious coping as well as religious activities and intrinsic religiousness (Linley & Joseph, 2004).

Adversarial or post-traumatic growth and perceived benefit finding in the face of trauma are thought to be related to a positive primary appraisal, or reframing, of the event (McGrath, 2004). The event may then be seen as, for example, a miraculous escape from death, an opportunity to review life and change direction, a means of acquiring new relationships, or a means by which personality is changed for the better. Furthermore, success at mastering the challenges presented by a brain injury may enhance self-esteem, another area of potential growth or benefit finding (McGrath, 2004).

Meaning making coping in special populations and links to outcome

In both chronically ill and disabled populations, coping styles and ability have been associated with health, psychosocial and functional outcomes. In such samples, adversarial growth has been reported in 45-90% of the participants (Linley & Joseph, 2004; McMillan, 1999). When asked about changes since the onset of their disability, a number of individuals with brain and spinal cord injury spontaneously reported an appreciation for their abilities, their strengths, and the new skills they had learned during their recovery (McColl et al., 2000a). In this study, themes of positive change and post-traumatic growth after traumatic onset disability included increased awareness of self,

others and the world, increased closeness and trust with others, changes in beliefs about life purpose, and a new understanding of mortality.

Previous research has demonstrated benefit-finding to be related to less depression and greater positive well-being but unrelated to anxiety and measures of global distress (Helgeson et al., 2006), most strongly at times greater than two years post-injury. Two studies in spinal cord injury patients found post-traumatic growth to be associated with higher levels of psychological distress. They noted that this may not reflect a direct causal relationship but instead indicate that a balance between positive and negative perceptions of the significantly traumatic experience itself is most adaptive (Elfstrom, Kreuter, Ryden, Persson, & Sullivan, 2002; Pollard & Kennedy, 2007). Thus, perceived benefit may not necessarily be associated with an absence of negative emotion. Importantly, perceived benefits and contexts for posttraumatic growth have been consistently associated with self-reported spirituality and religious participation (Cadell, Regehr, & Hemsworth, 2003; McColl et al., 2000b; Pargament et al., 1998; Tedeschi & Calhoun, 2004).

Social support

It is believed that another way in which religion contributes to health outcome is through its beneficial effect on social well-being and perceived social and emotional support. Social support and connectedness has been consistently linked to improved mental and physical health (Uchino, 2006). A significant positive relationship between religious involvement and greater social support has been consistently demonstrated across several studies (Koenig, McCullough, & Lason, 2001). In a repeated measures analysis, individuals attending services weekly or more often were more likely to quit

smoking, become more physically active, not get depressed, and increase their number of personal relationships (Strawbridge, Shema, Cohen, & Kaplan, 2001).

Being integrated in a social network may provide a generalized source of positive affect, and a sense of stability and belonging which may in turn reduce psychological distress and result in greater motivation to care for oneself or to actively cope (Koenig & Cohen, 2002). There is evidence that religious involvement allays feelings of loneliness and disconnectedness (Ellison & George, 1994). Religious groups can offer both spiritual and practical help in the form of prayers, visits, transportation, food, etc. (Idler, 1995).

An individual with higher levels of perceived religious support is likely to believe that they can count on the assistance, both spiritual and practical, of a group of like-minded individuals who share a set of values and a common view of the world even in the most difficult of circumstances. Frequent attendees at religious services have been reported to have larger social networks, more contacts with them, more social support from them, and more feelings of being valued and cared for than infrequent attendees or nonattenders (Ellison & George, 1994; Krause, Ellison, Shaw, Marcum, & Boardman, 2001). Having a wide range of individuals in the social support system provides one with multiple sources of information and thereby increases the probability of having access to an appropriate information source. This access may in turn influence outcome-relevant behaviors and help one minimize or avoid additional stressful situations (Koenig & Cohen, 2002).

Social support operates in response to a stressful situation in two ways. First, the degree to which an individual believes that others will provide necessary resources will

substantially influence an individual's assessment of his or her ability to cope with the demands of a particular situation. Second, beliefs about one's support system will modify their affective reaction to a stressful event and may dampen their physiological response to the event or prevent a maladaptive behavioral response.

Evidence of this relationship between religious support and better outcome is convincing. The support that individuals derive from the members, leaders and clergy in their congregations has been linked to a number of health benefits including improved life satisfaction and lower levels of depression, especially in times of stress (Hill & Pargament, 2003a; Pargament et al., 2000). A study that assessed the differential impact of spiritual experiences, religious practice and congregational support on the mental health of people with heterogeneous medical disorders found that congregational support was the only R/S construct found to be predictive of outcome (Cohen et al., 2009). Importantly, religious support may provide additional benefits above and beyond that of general social support, as it has emerged as a significant predictor of psychological adjustment after controlling for the effects of general social support in a medically ill population (VandeCreek, Pargament, Belavich, Cowell, & Friedel, 1999).

Social support and relationship to outcome in special populations

Disability and illness are known to have strong negative effects on social participation, and numerous studies in brain injury have shown a decrease in social network size and support post-injury (Idler & Kasl, 1997a; Pierce & Hanks, 2006). However, in a study of individuals with a brain injury, social support was the most important factor reported to have helped in adjustment to life post head injury (Powell,

Ekin-Wood, & Collin, 2007). Especially in the context of traumatic brain injury, social support plays an important role in overall rehabilitation by providing individuals with a greater number of resources and supports to successfully deal with stressful situations, as well as increasing an individuals' motivation to complete specific behaviors (Driver, 2005). Lower levels of social support have been linked to lower self-esteem and life satisfaction, and decreased occupational independence (Driver, 2005). Religion and spiritual involvement may ameliorate those negative effects by increasing social participation and subsequently social support.

Although some studies have shown a connection between religiousness and spirituality and social support, few of these studies have been conducted in persons with chronic diseases or impairments. In a study of the role of religion in an aging population with disabilities, religious participation was positively associated with increases in social roles and activities and enhanced social ties and closeness (Idler & Kasl, 1997a). Some evidence also exists for a relationship between these variables in a chronic pain population, such that individuals who reported religious or spiritual experiences reported much higher levels of social support and higher levels of positive mood (Keefe et al., 2001). In a study of individuals with heterogeneous medical disorders including TBI, positive spiritual beliefs and congregational support were shown to be positive predictors of mental health outcome (Cohen et al., 2009).

Health behaviors

Another mechanism by which religion and spirituality may enhance health is via improved health behavior including abstinence from drugs, alcohol, and smoking, improved nutrition, increased exercise behavior and increased level of general activity.

Those who are more religious have been shown to generally lead healthier lifestyles including higher levels of preventative health behaviors (e.g., cancer screenings) (Reindl Benjamins & Brown, 2004). Religiousness/ spirituality has been associated with both improved health behaviors and improved mental and physical health outcomes as well as improved psychosocial functioning in a chronically ill patient population, though the causal relationship between these variables has not been made clear (Ironson et al., 2002).

Among individuals with disability including TBI survivors, physical inactivity and other poor health behaviors may be particularly prevalent. This population is also particularly at risk for functional limitations and secondary health conditions such as obesity, depression and social isolation that may result from poor health behaviors and limited activity patterns that can result from their disabilities, behavior, lifestyle and environment (Rimmer, Wolf, Armour, & Sinclair, 2005). Although general activity level including exercise behavior has consistently been linked to more positive outcome in individuals with disability including traumatic brain injury (Driver, 2005; Muller, Czymmek, Thone-Otto, & Von Cramon, 2006), nationwide in 2005, a smaller proportion of adults with a disability engaged in recommended levels of physical activity than respondents without a disability (Rimmer et al., 2005). Of persons with a disability, 25.6% reported being physically inactive during a usual week compared with 12.8% of those without a disability. It is important, however, to consider that this finding of inactivity may be the consequence of the disability itself and associated functional or environmental barriers (Rimmer et al., 2005). There is significant potential to increase level of general activity in disabled populations, however, which would likely impact

health, psychosocial and functional outcomes. One method of accomplishing this goal could be encouraging participation in religious social groups or activities.

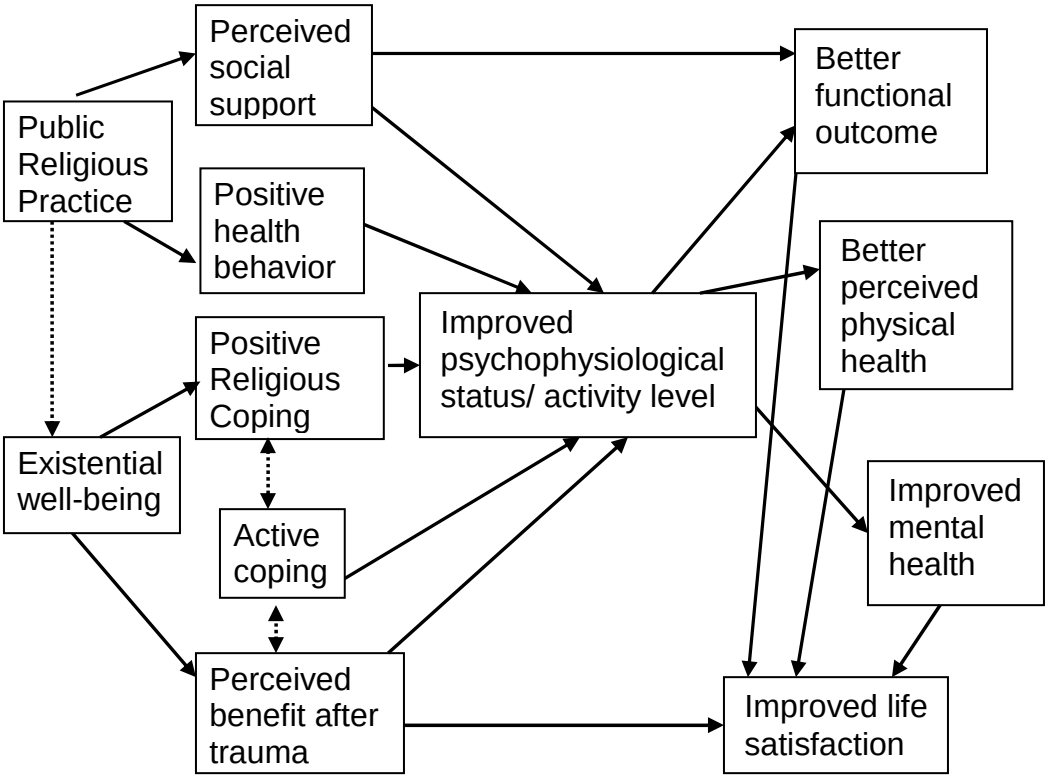
Interactions and pathways

Individual characteristics that link religion and spirituality to health likely interact with each other to influence outcome. One proposed pathway is that religion and spirituality may influence opportunities to develop and maintain socially supportive relationships, which in turn may reduce or prevent depression and support positive health behaviors. These factors may in turn may reduce or prevent undesirable physiological states, such as chronically elevated cortisol and norepinephrine levels, which have been linked to poorer health outcomes (Thoresen & Harris, 2002). Religion and spirituality may also be closely related to coping style and ability. Individuals who perceive themselves to be more religious or spiritual may engage in more active and meaning making coping, which in turn may lead to increased activity levels, increased social interaction, improved mental health and overall life quality.

In general (including the persons with brain injury), an individual is often pervasively influenced by various dimensions of their religiousness and spirituality; their beliefs and goals, and the decisions that follow, likely influence health and well-being on multiple levels and through multiple pathways. In particular, an individual's ways of dealing with life's stressors, including traumatic onset disability as well as their general orientation towards life, would be expected to have long-reaching effects on both mental and physical health, rehabilitation outcome and overall life satisfaction across time. The variables that will be investigated in the proposed study may be linked via the following pathways (see Figure 1). Religious practice is likely to be related to overall perceived

social support and improved health behaviors, which will likely result in improved outcomes. Existential well-being is likely related to increased perceived benefit after trauma, greater amounts of active and positive religious coping, and resulting improved outcomes. All pathways may exert their effects through mechanisms that include increased general activity level and improved overall psychophysiological status.

Figure 1: Religion and spirituality and relationships to outcome: Various mechanisms



Importance of studying relationship in Detroit population

The Detroit metro area offers an interesting context in which to explore the links between religious involvement and mental health outcomes. There is substantial diversity of race, ethnicity, culture and religion in the area, with a substantial African American population, many members of which report religious affiliation (Ellison et al.,

2001). Importantly, there is considerable evidence that factors relating to religion and spirituality may be more salient predictors of outcome in the African American population as compared to other racial groups (Musick, Koenig, Hays, & Cohen, 1998). The 1995 Detroit Area Study (Ellison et al., 2001) included a probability sample of over 1000 residents of Detroit and surrounding suburban counties. The study collected data on religious involvement (i.e., church attendance, prayer and belief in eternal life) and positive and negative mental health outcomes (i.e., psychological distress and psychological well-being) among other variables (Ellison et al., 2001).

The Detroit study found that the frequency of attendance at religious services was inversely related to distress even with sociodemographic predictors of distress accounted for. Regular attendees at religious services were found to experience fewer health problems and report fewer stressors overall than persons who did not regularly attend religious services. Prayer was found to have a positive relationship with distress, though when the net effects of social stressors were taken into account, this relationship was reduced, indicating that the seemingly adverse effect of prayer likely reflects more frequent prayer (i.e., prayer coping response) among individuals facing multiple life difficulties (Ellison et al., 2001). Interestingly, the study found that religious effects on psychological distress were primarily direct and did not reflect a mediational role for access to key social and psychological resources. However, this study examined only perceived family support and perceived pragmatic (i.e., helping behaviors) congregational support, not overall perceived social support and for this reason may have not been able to demonstrate the proposed pathway. The authors also note that

the validity of various hypothesized pathways may differ depending upon the specific outcome being measured (Ellison et al., 2001).

The study also found that the greatest benefits associated with religious belief and/or participation may be found among individuals confronting stressful events or conditions (Ellison et al., 2001). Clear stress buffering effects of religion and spirituality on well-being were detected primarily in conjunction with stressors that require long-term adjustment to changed circumstances, such as seen in TBI. These effects may be particularly magnified among persons with TBI, who are in greater need of social support but likely to have less of it due to various sequelae of their injuries (e.g., neurobehavioral troubles, access to support network, etc.), and whose coping strategies might have greater variability due to cognitive impairments. On the other hand, the pattern of relationships might be substantially different among persons with TBI; for example, unlike persons without cognitive impairment, the relationship between religion and health outcomes may be mediated by social support, because social support is more necessary to their daily functioning. Thus, the study of religious and spiritual beliefs and practices in TBI survivors living in the Detroit area is appropriate and necessary.

PURPOSE AND AIMS OF THE CURRENT STUDY

Evidence from traumatically injured and chronically disabled populations other than TBI emphasizes the relationship between spirituality and medical, psychological and social well-being and suggests that these are important issues to examine in the lives of persons with traumatic brain injury through the course of rehabilitation,

reintegration into the community, and living with disability. Although many individuals with TBI report being religious or spiritual and using their religious or spiritual resources to cope, little work in this population has focused on the aspects of religion and spirituality that may play a role in physical and mental health, life satisfaction and functional improvement or the correlates of those religious or spiritual factors.

Prior research has shown that persons who have sustained a TBI are at particularly high risk for poor social support and health behaviors and diminished physical activity; thus, it is especially important to study the role of religion and spirituality and the links between religious and spiritual characteristics, social support, health behaviors and activity level in this population. These factors likely have a complex interrelationship and may together significantly influence rehabilitation, functional, psychosocial and health outcomes.

The present study evaluated the effects of various aspects of religion and spirituality on emotional and functional outcomes among people living with brain injury, a group of individuals at increased risk for decreased activity, drug and alcohol abuse and poorer outcomes in general. Substantial evidence suggests that religion and spirituality are important coping resources and play significant roles in predicting mental and physical health, psychosocial, and functional outcomes in general, though few studies have focused on this relationship in the TBI population. From a therapeutic standpoint, affirming any personal practices that help the patient cope is an important role of the practitioner. Ultimately, knowledge about which aspects of religion and spirituality enhance positive outcomes can be incorporated into treatment plans in a

manner that considers survivor's personal preferences. Accordingly, the following aims and hypotheses were explored:

Specific Aim 1. Describe the extent to which religious practice and spirituality confer unique benefits and have unique predictive value in rehabilitation outcomes.

Hypothesis 1a

Religious practices and spirituality independently predict rehabilitation outcomes including global life satisfaction (SWLS), general level of distress (BSI-GSI), functional independence (i.e., ability to perform daily instrumental activities, PCRS), participation in home and community (PART-O), and general health and level of disability (Modified BRFSS Health Inventory), beyond that accounted for by injury severity, demographic characteristics and general social support.

Specific Aim 2. Describe the extent to which social support is the mechanism by which there is a relationship between religious practices and rehabilitation outcomes.

Hypothesis 2a

The relationship between religious practices and rehabilitation outcomes is partially mediated through the effect of enhanced general social support. This mediational relationship is not present for the relationship between spirituality and rehabilitation outcomes (i.e., religious practice, but not spiritual belief, is likely associated with greater perceived social support and subsequently better rehabilitation outcome).

Specific Aim 3. Describe the extent to which spiritual well-being (existential and religious well-being), religious styles of coping (positive and negative), general styles of coping (task-oriented, emotional and avoidant) and perceived benefit after trauma are related and ultimately predict rehabilitation outcomes.

Hypothesis 3a

The relationship between spirituality (as measured by existential well-being) and psychosocial outcome is partially mediated through its effects on active coping and enhanced benefit finding.

Hypothesis 3b

Positive religious coping style will predict higher levels of perceived benefit after TBI. Positive religious coping will also be more strongly related to active (task-oriented) than to passive (emotion-focused or avoidant) coping styles, whereas negative religious coping will be more strongly associated with passive (emotion-focused or avoidant) than with active (task-oriented) coping and will be inversely related to perceived benefit after trauma.

Hypothesis 3c

Perceived benefit and positive religious coping will be positively associated with overall life satisfaction, beyond that accounted for by general coping style and basic demographic characteristics.

Specific Aim 4. Explore the relationships among various aspects of religion and spirituality and rehabilitation outcomes.

Hypothesis 4a

Existential well-being (EWB) and religious well-being (RWB) are significantly related and not orthogonal; however, each will independently predict rehabilitation outcomes.

Hypothesis 4b

Religious practice and EWB will have differential relationships with psychosocial and rehabilitation outcomes. Specifically, it is expected that religious practice will be more

strongly related to participation outcome (i.e., increased integration into the community), whereas existential well-being is expected to be more strongly related to overall satisfaction with life, general health and level of general distress.

Specific Aim 5. Explore the relationships among religious and spiritual practices and well-being, health behaviors, and rehabilitation outcomes.

Hypothesis 5a

The relationship between religious/ spiritual practices and rehabilitation outcomes is partially mediated through the effect of a positive health behaviors profile.

CHAPTER 2

METHOD

Participants

Each participant was asked to be accompanied to their appointment by a family member or close friend (i.e., significant other) knowledgeable as to the survivor's daily habits and functional abilities both before and after their injury. Participants included 88 adults who sustained a TBI and 82 of their identified significant others. Only self-report data were collected for those participants who were not accompanied by a significant other. Participants were between the ages of 20 and 70 and enrolled in the Southeastern Michigan Traumatic Brain Injury System (SEMTBIS). SEMTBIS defines TBI as an injury to brain tissue caused by an external mechanical force as evidence by: loss of consciousness from brain trauma, posttraumatic amnesia, skull fracture, or objective neurologic findings that can be reasonably attributed to TBI by physical or mental status examination. All persons included had sustained a TBI severe enough to warrant acute inpatient hospitalization and rehabilitation care in the last 1-20 years. In order to capture the time period during which changes related to long-term adjustment to disability is most likely to occur, no individuals were included who had sustained their injury within the past year. Cause of injury, time since injury, length of the acute period of confusion (days of post-traumatic amnesia; PTA), and time (days) to follow commands as well as some basic demographics (e.g., income) were obtained from the SEMTBIS database. PTA was established in the clinical setting via one of two well-established measures of orientation: The *Galveston Orientation and Amnesia Test (GOAT; Levin, O'Donnell, & Grossman, 1979)* and/or the *Orientation Log (O-Log;*

Jackson, Novack, & Dowler, 1998). Time to follow commands was measured by number of days to obtain a score of 6 on the motor portion of the *Glasgow Coma Scale (GCS*.

The TBI participants were 67 men (76%) and 21 (24%) women. Sixty-six participants identified themselves as Black/African American (75%), 18 as White/Caucasian (21%), 1 as Hispanic (1%) and 3 as Other (3%). The majority of the sample was single (59%), 20.5% described themselves as married, 15.9% as divorced or separated, and 4.5% as widowed. Only 13.6% of the sample indicated that they were employed either full time or part time, whereas 54.5% described themselves as disabled, 14.8% unemployed, 11.4% retired, 3.4% students and 2.3% other. A large majority of the sample (77.3%) was unable to report their income level. Those who were able to report their income were significantly more likely to be employed and less likely to describe themselves as disabled (X^2 (6, N = 88) = 21.51, p = .001). See Table 1 for demographic characteristics including age, level of education, duration of PTA, and time since injury.

Mechanisms of injury of the sample included motor vehicle accidents (32.9%), assaults or other violence (34.1%), gunshot wounds (13.6%), fall or hit by falling object (11.3%) and pedestrian accidents (8.0%). At the time of discharge, 13 individuals were still in PTA and data were missing for 8 participants; therefore, mean substitution was used to estimate PTA characteristics, which likely under-represents the duration of PTA, because missing PTA often reflects a patient who was discharged still in PTA. When asked to report level of disability both before and after the injury, 68.2% survivors described themselves as currently disabled (SO report 65.9 %) with 10.2% describing themselves as disabled prior to their brain injury (SO report 17.0%).

Religious characteristics of the sample are presented in Table 2. The majority of participants described their religious orientation as a Christian denomination (76.1% total). Rated on a Likert scale from 1 (“not at all”) to 4 (“a great deal”), religion was reported to be “quite a bit” or “a great deal” important by 68.2% of TBI participants. Thirty-three percent of the sample reported that they attend religious services weekly or more often, 25% reported that they never attend religious services, 25% reported that they attend monthly or several times per year, 8% reported they attend1-2 times per year and 9% less than yearly.

Significant other (SO) age and education are presented in Table 1. Of the 83 SO’s that participated, 2 did not know the survivor at the time of injury, 5 were not familiar with their daily habits, and 5 were themselves significantly cognitively impaired. Only valid data from these participants were included (i.e., no data reported by cognitively impaired SOs were included; data not able to be accurately reported by SOs based on their knowledge of the person with TBI were coded as missing). Women comprised 70.7% of the SO sample; 75.3% described themselves as Black/African American, 24.7% as White/Caucasian.

SO’s were asked whether they reside with the person with TBI, how many days per week they generally spend helping or caring for the person with TBI, and their opinion of that individual’s level of independence. Of the significant others, 53.4% were living with the survivor. The modal response was 7 days per week spent helping or caring for the person with TBI. Forty-seven percent of the TBI participants were described by the SOs as independent. Significant others were also asked to report on the height and weight of the persons with TBI. Based on this report, the range of

calculated body mass index was 18.0 - 39.3 (*M* = 26.2, *SD* = 5.0). Of the valid sample, 51.3% were overweight or obese (BMI > 25) (World Health Organization, 2006).

Measures

All measures are included in Appendix B.

The *Religious Practices and Attitudes Questionnaire (RPAQ)* consists of 9 items used in various other studies examining the influence of religion and spirituality on health outcomes (Fetzer Institute/ National Institute of Aging Working Group, 1999; Zinnbauer et al., 1997). Participants report the importance of religion in their life, to what degree they adhere to religious practices and teachings, and their general attitude or philosophy toward religion and spirituality. Participants also report how often they attend religious services and how often they participate in other activities at a place of worship. These two items reflect *public religious practice*. Participants also respond to items assessing how often they engage in various *private religious practices*, such as prayer or meditation, reading religious works, or attending to religious programs. Items are rated on a Likert scale ranging from 0 (*never engage in the activity or practice*) to 5 (*engage in the activity or practice several times per week*). Total item scores for public and private religious practice, respectively, were used for analyses. Although this instrument has not been formally evaluated psychometrically prior to this study, variations of the constituent items have appeared in internally consistent, validated scales (Fetzer Institute/ National Institute of Aging Working Group, 1999). In the present study, internal consistency reliabilities (coefficient alpha) were .68 for public religious practice and .75 for private religious practice. Given the low number of items and the independent nature of each item, this is not a surprising outcome. For the purposes of

exploratory analyses, the scales were retained and the hypotheses tested as proposed. It is a methodological weakness of the study, however.

The *Spiritual Well-Being Scale (SWBS*; Ellison, 1983) is a 20-item self-report scale that assesses spiritual well-being in terms of two dimensions: a direct, personal relationship with God referred to as *religious well-being*, and the perception that life has a purpose apart from any specifically religious reference, referred to as *existential well-being*. Items are rated on a 6-point Likert scale ranging from 1 (*strongly agree*) to 6 (*strongly disagree*). The scale generates an existential well-being score (EWB) reflective of a participant's level of life perspective and purpose, a religious well-being score (RWB) that measures how participants view their relationship with God and that reflects a sense of satisfaction and positive connection with God. An overall spiritual well-being score (SWB) is a composite of the RWB and EWB and provides a measure of overall level of spirituality. The scale has been shown to have a test-retest reliability of .93 overall, .96 for religious well-being and .86 for existential well-being; internal consistency has been reported as .89 overall, .87 for religious well-being and .78 for existential well-being (Bufford, Paloutzian, & Ellison, 1991). Internal consistency in the present study was comparable (.89 SWB overall, .89 RWB, and .82 EWB).

The *Brief RCOPE (B-RCOPE;* Pargament et al., 1998) is a theoretically-based measure of religion-oriented coping, designed to assess both the positive and negative aspects of religious/spiritual coping. The scale consists of 10 items that have been associated with two factors: a positive religious/spiritual coping factor that reflects benevolent religious involvement in the search for significance (5 items) and a negative factor that reflects religious struggle in coping (5 items). Participants are asked to rate

the degree to which they used each of the ways of coping described, on a 4-point Likert scale, ranging from 0 (*not at all*) to 3 (*a great deal*). Moderate to high internal consistency estimates have been found for each scale of the original RCOPE among college students, elderly hospital patients, and church groups (Pargament et al., 1998). The internal consistency of the Brief R-COPE, Positive Religious Coping (PRC) in the present study was .86. For Negative Religious Coping (NRC) coefficient alpha was .64, but .72 with the exclusion of Item 8 (*"I try to make sense of the situation and decide what to do without relying on God"*). Item 8 was removed from the scale total used for analyses.

The *Perceived Benefits Scale (PBS)* is designed to measure self-reported positive life changes after a traumatic stress event (McMillen & Fisher, 1998). The instrument includes nine subscales that assess different potential benefits, five of which will be used in the present study: *enhanced self-efficacy*, *increased spirituality*, *increased compassion*, and *increased faith in people*. In addition to the 17 subscale items, 8 negative items are included to avoid response bias. Though these items have not traditionally been scored, they were scored in the present study and the total termed *Perceived detriment* subscale. Respondents were asked to indicate how well each statement describes their experience of the brain injury event by using a 5-point Likert scale, ranging from 0 (*not at all like my experience)* to 4 (*very much like my experience*). Internal consistency for the selected subscales reportedly ranges from .84 (faith in people) to .93 (spirituality) in a population reporting a traumatic event. Test-retest reliability ranged from .66 (increased compassion) to .93 (spirituality) after 2 weeks in the validation study (McMillan & Fisher, 1998). In the present study, internal consistency

was somewhat lower, ranging from .76 (increased compassion) to .83 (detriment). Total scale internal consistency was .90.

The *Coping Inventory for Stressful Situations- Short Form (CISS- SF*; Endler & Parker, 1999*)* consists of 21 items and was developed to assess three dimensions of responses to stressful circumstances; task-orientation, avoidant, and emotional coping with 7 items included per subscale. The CISS-SF was created by using a large normative sample and eliminating from the original 48 CISS items those with the lowest item-total correlations (Cohan, Jang, & Stein, 2006; Endler & Parker, 1994). Respondents rated the extent to which they engage in various types of coping activities when confronted with a particular stressful situation using a 5-point Likert response scale ranging from 1 (*not at all*) to 5 (*very much*). Internal consistency for the three subscales included in the original measure have been reported from .78-.87 for task-oriented, .78-.87 for emotional and .70-.80 for avoidant (Endler & Parker, 1999). Internal consistencies in the present study were adequate for task-oriented coping (.82) and emotion-focused coping (.83), and adequate for avoidant coping with Item 1 (*"In stressful situations, I take some time off and get away from the situation")* removed (.72).

The *Social Provision Scale (SPS-12)* is a 12-item self-report measure that examines perceptions of social support (Cutrona & Russell, 1987). Respondents indicated the extent to which they felt that six provisions (attachment, social integration, reassurance of worth, reliable alliance, guidance and opportunity for nurturance) are currently available to them, taking into consideration their entire support network. Responses were given on a 4-point Likert scale (1 = *not at all true*, 4 = *completely true*)

to descriptions of both the presence and absence of a specific provision. Internal consistency reliability has consistently been .70 or greater in various populations (Cutrona & Russell, 1987) and was .81 in the present study.

The *Positive and Negative Affectivity Scale* (PANAS) (Watson, Clark, & Tellegen, 1988) requires participants to rate the extent to which they are currently experiencing 20 different affective states (10 are positive; 10 are negative) using a 5-point scale (*Very Slightly = 1 to Extremely = 5).* The PANAS generates estimates of both Positive Affectivity (PA) and Negative Affectivity (NA), constructs that are considered largely independent of one another. The reliability and validity of the PANAS is supported by two studies in non-clinical samples (Crawford & Henry, 2004; Watson et al., 1988). In the present study, internal consistencies were good (.88 and .90 for positive and negative affectivity, respectively).

The *Satisfaction With Life Scale (SWLS;* Diener, Emmons, Larsen & Griffen, 1985) is a 5-item measure designed to assess global judgment of life satisfaction. SWLS items are global rather than specific in nature, which allows respondents to weight domains in terms of those they deem most important. Statements were rated on a 7-point Likert scale (1 = *strongly disagree*, 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.” The internal consistency reliability of the SWLS has been reported as .87, whereas 2-month test-retest reliability was .82 in the validation study (Diener et al., 1985). Coefficient alpha in the present study was .81.

The *Brief Symptom Inventory-18* (*BSI-18*; Derogatis, 1993) is an 18-item multidimensional measure of psychiatric symptomatology that has been shown to

assess distress in a number of populations. Participants are asked to rate their level of distress in the past week from specific symptoms on a scale from 0 (*not at all*) to 4 (*extremely*). For the purposes of the analyses, Global Symptom Inventory (GSI) was used, a subscale of the measure believed to assess general distress. Internal consistency of the GSI has been reported as .89, whereas test-retest reliability estimates have been reported as .90 for that index (Derogatis, 1993). In the present study, internal consistency was .90.

The *Participation Objective Instrument (PART-O*; TBINDCS, 2007*)* is a 25-item questionnaire presented in interview format to both the brain injury survivor and the SO knowledge of the survivor's daily activity pattern. The measure aims to quantify the degree to which rehabilitation patients/ clients play a normal role in household, family and society, defined as participation. The goal is to assess participation as an objective state. The measure was created by combining items from other measures widely used to assess participation after brain injury. A total score indicating the person's level of participation is created by combining individual items. In the present study, the total score was calculated without Item 19. This item assesses religious attendance and therefore would be redundant with predictor variables in several analyses. Although no studies have yet been published regarding the PART-O's reliability or validity, preliminary data are very promising and indicate that the reliability and validity of this measure likely exceeds that of other, more commonly used measures in this population (TBINDCS, 2007). Internal consistency reliabilities in the present study were adequate (.81 survivor report, .78 SO report). Ten SOs (12.2%) could not report on participation. Therefore, survivor report was used to replace missing SO data for each individual

case.

The *Patient Competency Rating Scale* is a 30-item measure that was used for survivor and significant other report of the survivor's ability to perform a variety of simple tasks. A 5-point Likert scale (*can't do* = 0 to *can do with ease* = 4) is used, resulting in possible scores ranging from 0 to 120 (where lower scores indicate impairment). Good test-retest reliability has been reported on this measure (Prigatano & Fordyce, 1986). Unpublished data from the SEMTBIS project has shown that the measure also has excellent internal consistency for use in both patients and significant others. In the present study, coefficient alpha was .93 for self-report and .96 for SO report of survivor.

Twenty-five items were used to assess general health, level of disability and daily positive and negative health behavior practices. These items are included in or adapted from the *Behavioral Risk Factor Surveillance System (BRFSS)* (Centers for Disease Control and Prevention, 2007). Both the brain injury survivor and a knowledgeable significant other reported on nutrition (i.e., fruit and vegetable intake; junk food intake), alcohol and drug consumption, smoking status, preventative medical practices (e.g., cancer screenings, most recent visit to physician), current health status and perception of disability. A *health outcome subscale* was calculated for each survivor or SO by totaling the presence of 8 possible health conditions (high scores indicate poor health). The *negative health behaviors subscale* (self-report and SO report) is a sum of practices including smoking and drug use (0-2), number of binge drinking episodes in the past 30 days (0-30) and total "junk food consumption" per week (reported number of servings quartiled and scored 1-4). The *positive health behaviors subscale* (self-report and SO report) is a sum of practices including recency of last health check up (0-4),

receipt of flu shot in last year (0-1), number of days of moderate physical activity in a typical week (0-7), total fruit and vegetable consumption per week (reported numbers divided in to quartiles and scored 1-4). A difference score was calculated (Positive Health Behaviors minus Negative Health Behaviors) to reflect an overall health behavior profile. A positive score on this index reflects that positive health behaviors outweigh negative health behaviors (an overall "healthier" behavior profile or a better balance of overall health practices).

A large proportion of the SO participants (36.6%) were unable to report survivor's health behaviors; 23.2% of SO's were unable to report on the survivor's current health status. Caregiver's who were able to report on these characteristics of the survivors spent significantly more days were week [$F(1,85) = 7.32$, $p = .004$] and more hours per day [$F(1,79) = 4.56$, $p = .036$] with the survivor. Survivors also required significantly more supervision [$F(1,85) = 7.32$, $p = .008$] in the group of SOs able to report health behaviors. Given the large amount of missing objective (SO report) data for health behaviors and health outcomes, combined variables were created to reflect these constructs. For negative health behaviors and health outcome, a report in the positive direction (either survivor or SO) was always taken (i.e., "Yes" to that outcome or behavior) for individuals whose data contained both reports. If only one report was available, this data point was included in the combined variable. The combined variable for positive health behaviors represents SO report with survivor report included only when data were missing. This procedure was adopted to minimize the influence of responses influenced by social desirability.

The *Symbol Digit Modalities Test (SDMT*; Smith, 1973) is a measure of neuropsychological functioning that requires the examinee to pair specific numbers with given geometric figures within a time limit. The measure has been found to be sensitive to neurological impairment in a sample of individuals with brain injury and can be quickly and easily administered (Smith, 1973). Thus, this measure was used as an estimate of global neuropsychological functioning.

The *Wechsler Test of Adult Reading (WTAR; Psychological Corporation, 2001)* is a word-reading task commonly used with adults aged 16-89 years. Word-reading is often used as a measure of premorbid cognitive functioning because it is highly correlated with verbal IQ (correlation with WAIS-III verbal intelligence .66 - .80), and relatively robust to the effects of age and brain injury/disease. In addition it is co-normed with the Wechsler Adult Intelligence Scale – Third Edition, and the Wechsler Memory Scale – Third Edition (*Wechsler Test of Adult Reading (WTAR): Administration and Interpretaiton Manual*, 2001). The WTAR consists of a list of 50 words of increasing difficulty presented on a card. The participant begins with the first word, and reads each out loud until he/she produces 12 consecutive errors or reaches the end of the card. The internal consistency of this measure was excellent in both the U.S. and U.K. standardization samples.

Procedure

Participants and their significant others who had consented through the SEMTBIS project to be contacted regarding additional research were recruited for participation in the study. Participants were asked to travel to the Rehabilitation Institute of Michigan to participate in the study, but if they were unwilling or unable to do so, the

interview was conducted in their home (3.4% of the sample). Informed consent was obtained from the participants and their legal guardian if applicable. Participants and significant others responded to questionnaires administered in an interview format and completed neuropsychological tests. Total time for administration was 90 minutes or less. All participants received monetary compensation ($10) for their participation. Injury characteristics were collected from the SEMTBIS database following study completion.

CHAPTER 3

RESULTS

Screening procedures were completed for all variables to ensure that assumptions for univariate and multivariate tests were met (Tabachnick & Fidell, 2006). Univariate outliers were detected and winsorized for age at time of injury. After management of univariate outliers, no multivariate outliers were detected. Logarithmic transformations were used to improve normality and linearity in the variables time to follow commands and PANAS negative affectivity. A square root transformation was used for RCOPE Negative religious coping; however, this variable remained skewed after transformation. For ease of interpretation, the raw scores are presented in tables containing descriptive statistics, whereas the transformed scores were used in correlation and regression analyses. Missing data points were replaced with sample means; no variable required more than 5 points for the 88 cases.

Tables 3 and 4 show the descriptive statistics of the predictor and outcome variables (in raw score metrics, before transformation). Tables 5 through 9 show correlations among variables. No multicollinearity was detected among the outcome measures or psychosocial and religious predictors.

As can be seen in Table 5, agreement between self- and SO-report of functional outcomes was moderate. Rehabilitation outcomes in general (with the exception of community participation) were modestly correlated (*r*s .27 to -.47). Injury severity characteristics and level of current functioning were also modestly interrelated. Greater age and age at time of injury predicted poorer health and decreased functional outcome.

Table 6 presents the relationships of PANAS subscales Negative Affectivity (NA) and Positive Affectivity (PA) to rehabilitation outcomes, religious and spiritual practices and beliefs, and coping styles. Negative affectivity (NA) showed a moderate negative correlation with functional ability (PCRS) and participation (PART-O) and a moderate positive correlation with level of distress (BSI). Negative affectivity also showed a moderate negative correlation with spiritual well-being [more so religious well-being (RWB; *r* = -.45) than existential well-being (EWB; *r* = -.22)] and with social support. A significant positive correlation was found between NA and negative religious coping (*r* = -.42), NA and perceived detriment and NA and emotion-focused coping. Positive affectivity (PA) was significantly correlated (small to moderate) with social support, most variables of religious/spiritual content (RWB *r* = .26, EWB *r* = .30), perceived benefits and task-focused coping.

Table 7 presents correlations of religious and spiritual characteristics and benefit finding with rehabilitation outcomes. Zero-order correlations are presented, along with partial correlations that account for time since injury, injury severity (time to follow commands), age at injury, current cognitive function (SDMT), and social support (SPS).

As expected, there were several significant relationships between religious and spiritual practices and beliefs and negative and positive views of the traumatic experience and rehabilitation outcomes. Life satisfaction (SWLS) was moderately correlated with total perceived benefit (PBS *r* = .30) and spiritual well-being, but that correlation was driven by the strong correlation with religious well-being (RWB *r* = .51) whereas existential well-being was unrelated to life satisfaction (EWB *r* = .12). General distress (BSI) was moderately related to negative religious coping, benefit finding,

spiritual well-being total and religious well-being (*rs* .21 to -.45). Spiritual well-being total and religious well-being were also significantly correlated with SO report of functional abilities (PCRS), and again the correlation to the SWB total was driven by RWB alone (RWB *r* = .31, EWB *r* = .08). Religious well-being also showed a significant relationship with SO report of participation (PART-O *r* = .22). Negative religious coping showed a small but significant negative correlation with SO report of functional abilities and community participation. The perceived detriment scale (PBS Negative) was moderately associated with poorer rehabilitation outcomes for SWLS, BSI, and PCRS (*r* = -.31 to -.46) but not PART-O (*r* = -.16). Thus, in general, positive use of religion or views of the traumatic experience were associated with good rehabilitation outcome whereas negative use of religion or views of the traumatic experience were associated with poor rehabilitation outcomes.

Also as expected, there were several significant intercorrelations among the religious/spiritual variables and benefit/detriment variables. Private religious practices showed strong correlation to public religious practices, positive religious coping and existential religious well-being (*r*s .51 to .62), and modest correlation to perceived benefit. Public religious practice showed a similar but weaker pattern, with modest correlations to positive religious coping, existential religious well-being, and perceived benefit (*r*s .26 to .33). In addition to religious practices, perceived benefit was moderately correlated with positive religious coping, and overall spiritual well-being as well as existential well-being and religious well-being independently; however, it was unrelated to negative religious coping. In contrast, perceived detriment was significantly related to negative religious coping and showed strong inverse relation to spiritual well-

being total and religious well-being specifically (*r* = -.45), but it was unrelated to religious practices and existential well-being. Spiritual well-being showed moderate correlations with religious coping in the expected directions.

Table 8 shows correlations among religious and spiritual characteristics, coping characteristics (CISS) and outcome variables. As in Table 7, zero-order correlations are presented, along with partial correlations that account for covariates used in the results presented in addressing the hypotheses.

The three coping scales were relatively independent of one another: avoidant coping showed significant correlation with both task- (*r* = .24) and emotion-focused (*r* = .33) coping, though task- and emotion-focused coping were not related to one another (*r* = .04). Emotion-focused coping showed moderate to strong negative relationships with rehabilitation outcome, whereas task-oriented coping showed small but significant positive correlations with outcomes. Perceived social support showed a small but significant correlation with outcomes as well as with task-oriented and emotion-focused coping.

Table 9 shows the correlations of religious and spiritual well-being characteristics, health behaviors and health outcome. Again, both zero-order and partial correlations are presented accounting for demographic and injury characteristics and social support. The health behavior difference score was more strongly correlated with (i.e., driven by) negative health behaviors than positive health behaviors (*r* = -.82 and .42).

Health outcome was found to be unrelated to any of the health behavior characteristics or any aspect of religiousness/spiritually, though better health outcome

(i.e., a low number of adverse health conditions) was significantly related to social support (r = -.22). When zero-order correlations are examined, the health behavior variables were generally unrelated to religiousness/spirituality with the exception that negative religious coping showed a small but significant inverse association with positive health behaviors (r = -.22). However, upon examination of the partial correlations after accounting for demographic and injury characteristics, negative religious coping showed a small but significant inverse association with positive health behaviors(r = -.22) and positive religious coping was inversely related to negative health behaviors (r = -.24). Additionally, the health behavior difference score a small but significant correlation with religious well-being (r = .24) and perceived benefit (r = .21). That is, people who report more benefit from trauma and a closer relationship with a higher power engage in better balance of overall health practices.

Hypothesis 1: Unique predictive power of religious practice and spirituality for rehabilitation outcome.

Hierarchical multiple regression analyses determined the overall proportion of the variance in each of four rehabilitation outcomes [life satisfaction (SWLS), level of distress (BSI-GSI), objective participation (PART-O SO report) and objective functional outcome (PCRS SO report)] that could be attributed to religious practice and spiritual well-being beyond that attributable to demographic and injury-related characteristics. Thus, for each rehabilitation outcome, time since injury and injury severity (time to follow commands) were entered on Step 1, age at time of injury and current neuropsychological functioning (SDMT) were entered into the analysis in Step 2, social support was entered in Step 3, and public religious practice and spiritual well-being

(SWBS) were entered in Step 4. As seen in Table 9, because the zero-order correlations between predictor variables and the health outcome measure were not significant (*r*s = .04 to .11) excepting the small relationship with social support (*r* = -.22, *p* = .04), the regression analysis was not conducted predicting to health status.

As can be seen upon examination of the partial correlations in Table 7, after accounting for injury characteristics, cognitive functioning and social support, overall spiritual well-being was associated with life satisfaction and general distress, whereas religious practice was not.

Prediction of satisfaction with life (SWLS; Table 10). Steps 1 and 2 were not significant (Step 1 R^2 = .01, F(2,85) = 0.23, p = .799; Step 2 R^2 = .01, F(4,83) = 0.15, p = .962). The entry of social support in Step 3 approached but did not reach significance, explaining an additional 3.7% of the variance. The addition of public religious practice and spiritual well-being in Step 4 was significant (R^2 change = .10, p = .011) but the overall model only showed a trend toward significance (F(7,80) = .1.97, p =.070), resulting in an overall model prediction of 15% of the variance in life satisfaction. Examination of the semipartial correlations indicated that the SWBS contributed the most unique variance to the prediction of life satisfaction (sr_i^2 = .10, p < .01). Years from injury, time to follow commands, age at time of injury, neuropsychological functioning, perceived social support and public religious practice each contributed 2% or less of unique variance.

General Distress (BSI-GSI; Table 11). Steps 1 and 2 were again not significant (Step 1 R^2 = .05, F(2,85) = 2.03, p = .137; Step 2 R^2 = .07, F(4,83) = 1.52, p = .370), but the addition of SPS in Step 3 was significant (R^2 = .19, F(5,82) = 3.81, p = .001). Step 4

with the addition of the religious/spiritual variables was not significant ($F(7,80) = 3.34$, $p = .147$). However, in the total model ($R^2 = .23$, $F(7,80) = 3.34$, $p = .004$), squared semipartial correlations revealed that injury severity ($sr_i^2 = .04$, $p < .05$), perceived social support ($sr_i^2 = .05$, $p < .05$) and spiritual well-being ($sr_i^2 = .04$, $p < .05$) as unique predictors of general distress. That is, although the change in variance from Step 3 to Step 4 attributed to religiousness and spirituality was not significant, sense of spirituality did account for significant variance in the overall model. The other variables each accounted for 2% or less unique variance.

Functional abilities (PCRS significant other report; Table 12). The addition of SPS in Step 3 to years since injury, time to follow commands, age at time of injury, and neuropsychological functioning reliably improved the prediction model, accounting for an additional 5% of the variance ($R^2 = .13$, $F(5,82) = 2.51$, $p = .029$). Step 4 with the addition of the religious/spiritual variables was not significant ($F(7,80) = 2.04$, $p = .418$). The total model showed a trend toward significance ($p = .06$) and accounted for 15% of the variance in significant other report of functional abilities. Neuropsychological functioning (SDMT) accounted for a significant amount of unique variance ($sr_i^2 = .07$, $p < .01$). Social support contributed 3% of unique variance, whereas the other variables each accounted for 1% or less. Neither spiritual well-being nor public religious practice added significant variance to the model.

Community Participation (PART-O significant other report; Table 13). The addition of age at time of injury and neuropsychological functioning in Step 2 was significant (R^2 change = .10, $p = .012$), but neither Step 3 with the addition of social support (R^2 change = .00, $p = .548$) nor Step 4 with the addition of religious/spirituality

variables (R^2 change = .03, p = .306) was significant. The total model was significant, however (p = .047), and accounted for 16% of the variance in community participation, with age at time of injury and neuropsychological functioning each accounting for a significant amount of unique variance in community outcome (sr_i^2 = .05, p < .05 for both). Neither spiritual well-being nor public religious practice contributed unique variance to the model.

In sum, the overall model was significant for predicting general distress and participation and showed a trend toward significance for prediction of functional ability. The final step which included the religious and spiritual variables was significant for life satisfaction but not the other outcomes. Religious practice was not a unique predictor of any outcome measures, but spiritual well-being was a significant unique predictor for life satisfaction and general distress, beyond that accounted for by demographic and injury-related characteristics.

Hypothesis 1b. Unique predictive power of religious and existential well-being. Hierarchical multiple regression was also used to determine the proportion of variance in outcomes attributable to religious (RWB) and existential (EWB) well-being individually after accounting for demographic and injury characteristics and social support. Again, as can be seen upon examination of the partial correlations in Table 7, after accounting for injury characteristics, cognitive functioning and social support, religious well-being but not existential well-being is significantly related to rehabilitation outcomes.

The regressions used above in Hypothesis 1a were repeated with Steps 1, 2 and 3 held constant and existential well-being and religious well-being entered in Step 4 instead of public religious practice and overall spiritual well-being. All regressions are

presented in Table 14. In the prediction of life satisfaction, the model was significant (R^2 = .29, F(7,80) = 4.75, p < .001) as was Step 4 (R^2 change = .249, p < .001). Religious well-being explained a considerable amount of unique variance in satisfaction with life (sr_i^2 = .24, p < .001). The addition of this step in the prediction of general distress was also significant (R^2 change = .10, p = .007) as was the total model (R^2 = .28, F(7,80) = 4.53, p < .001). Religious well-being explained a significant amount of unique variance in general distress (sr_i^2 = .09, p < .01). The inclusion of RWB and EWB individually in Step 4 of the prediction of PCRS did not add significantly to the model (R^2 change = .05, p = .104); however, the total model was significant (R^2 = .18, F(7,80) = 2.51, p = .022). Neuropsychological functioning and religious well-being each accounted for unique variance in functional outcome (sr_i^2 = .06 and .04, respectively). Step 4 was not significant in the prediction of SO report of community participation (R^2 change = .04, p = .163) but the total model was significant (R^2 = .17, F(7,80) = 2.37, p = .030). Age at time of injury and current neuropsychological functioning each accounted for a significant amount of unique variance (sr_i^2 = .05, p >.05 for both). Religious well-being showed a trend toward significance (p = .076), accounting for 3% of the variance.

In sum, the total model including injury characteristics, neuropsychological functioning, social support and existential and religious well-being was significant for all rehabilitation outcomes. The final step that included the religious and spiritual predictors was significant for psychosocial (life satisfaction, general distress) but not practical (functional and participation) outcomes. Existential well-being was not a unique predictor for any outcome, but religious well-being was a unique predictor for life satisfaction, distress and functional ability and showed a trend toward significance for

participation.

Hypothesis 2: Social support as a mediator. Tests for mediation effects of perceived general social support (SPS total score) on the relationship between religious practice and attitude variables and outcomes were planned. Examination of zero-order correlations in Table 7 indicates that public religious practice was not significantly correlated with any of the outcome variables (*r*s = .03 to .09), nor was existential well-being (*r*s = .06 to .12). Given significant zero-order correlations between religious well-being and outcome (*r*s = .22 to .51), however, a series of hierarchical multiple regression analyses were performed to evaluate the role of perceived social support as a mediator of this relationship. Because social support was not significantly related to participation (PART-O) or life satisfaction (SWLS), those analyses were excluded. The remaining outcome variables evaluated were functional ability (PCRS) and general distress (BSI-GSI).

Mediation effects were evaluated via the formal statistical procedures as defined by Baron and Kenny (1986). Results are presented in Table 15. Each of the requirements for mediation was tested: (1) Religious well-being (RWB) was a significant predictor of perceived social support (SPS; $r = .51$, $p < .001$). (2) The proposed mediator, perceived social support, was significantly correlated with SO report of functional outcome (PCRS; $r = .25$, $p < .05$) and general distress (BSI-GSI; $r = -.35$, $p < .01$). Religious well-being showed a significant association with PCRS ($R^2 = .10$, $F(1, 86) = 9.42$, $p = .003$) and BSI ($R^2 = .21$, $F(1, 86) = 22.3$, $p < .001$). (3) Finally, the addition of social support (SPS) in the regression model predicting functional outcome

(R^2 = .11, F(2, 85) = 5.23, p = .007) resulted in a reduction in the relative contribution made by religious well-being, but the relationship remained significant (β =.25, p = .037). The addition of SPS in the regression to prediction of BSI-GSI (ΔR^2 = .02, F(2, 85) = 12.31, p < .001), resulted in a reduction in the relative contribution made by SWB, but the relationship remained significant (β = -.39, p < .001). *Thus, social support is a partial mediator of the relationship between religious well-being and both SO report of functional outcome and self-reported level of distress.* The complete regression models accounted for 11.0% of the variance in functional outcome and 22.5% of the variance in general distress.

Hypothesis 3a: Coping style and perceived benefit as mediators. Tests for mediation effects were conducted to examine the roles of emotional coping style (CISS-SF emotion-focused coping), perceived benefits from trauma (PBS Total) and perceived detriment from trauma (PBS negative items subscale) in the relationships between religious well-being (RWB) and psychosocial outcomes (SWLS and BSI-GSI). Task-oriented coping (CISS-SF task focused coping) was evaluated as a possible mediator between religious well-being and participation and functional outcomes (PCRS SO report and PART-O SO report). Examinations of zero-order correlations in Table 8 indicate that the potential mediator PBS Total was significantly correlated with outcomes general distress (BSI-GSI, r = -.23, p < .05) and life satisfaction (SWLS, r = .30 p < .01). The potential mediator CISS emotion-focused coping also was significantly correlated with SWLS (r = -.33, p < .01) and BSI-GSI (r = .53, p < .01). CISS task-oriented coping was significantly correlated with SO report of PART-O (r = .22, p < .05) and SO report of

PCRS (r = .21, p < .05). Perceived detriment was significantly correlated with SWLS (r = -.47, p < .01) and BSI-GSI (r = .45, p < .01). Religious well-being was significantly correlated with all potential mediators (rs = .35 to .47, p < .01) and all outcomes (rs = .22 to .51, p < .05).

Results of the mediation analyses are presented in Tables 15 and 16. Squared semi-partial correlations reflect unique variance in the outcome variables attributable to each individual predictor.

The addition of PBS to the model prediction of SWLS with RWB (ΔR^2 = .02, F(2, 85) = 16.1, p < .001), resulted in a reduction in the relative contribution made by SWB, but the relationship remained significant (β = .46, p < .001). The addition of PBS to the model prediction of BSI with RWB (ΔR^2 = .00, F(2, 85) = 11.5, p < .001), resulted in a reduction in the relative contribution made by SWB, but this relationship also remained significant (β = -.42, p < .001). Thus, benefit finding is a partial mediator of the relationship between religious well-being and both self-reported level of distress and life satisfaction. The complete regression models accounted for 21.2% and 27.5% of the variance in general distress and life satisfaction, respectively.

Task-oriented coping was added to the model of prediction of participation and functional abilities by religious well-being (PART-O: ΔR^2 = .02, F(2, 85) = 3.27, p = .043; PCRS: ΔR^2 = .01, F(2, 85) = 5.21, p = .007). The relationship between RWB and PART-O was fully mediated by a task-oriented coping stale, whereas the relationship between RWB and PCRS was partially mediated. The full models accounted for 7.1% of the variance in SO report of PART-O and 10.9% of SO report of functional abilities.

Emotion-focused coping was tested as a mediator in the relationship between

RWB (predictor) and SWLS and BSI (SWLS: ΔR^2 = .01, $F(2, 85) = 15.42$, $p < .001$; BSI: ΔR^2 = .13, $F(2, 85) = 21.49$, $p < .001$). Both were found to be partial mediators. The total models accounted for 26.6% of the variance in life satisfaction and 33.6% of variance in general distress.

The perceived detriment scale of the PBS played a partial mediation role in the relationship between religious well-being and life satisfaction (ΔR^2 = .08, $F(2, 85) = 17.04$, $p < .001$) and religious well-being and general distress (ΔR^2 = .07, $F(2, 85) = 20.84$, $p < .001$). The total models accounted for 32.9% of the variance in life satisfaction and 28.6% of the variance in general distress.

In sum, perceived benefit partially mediated the relationships between religious well-being and psychological outcomes, but accounted for only a small proportion of the relationship. Task-oriented coping fully mediated the relationship between religious well-being and participation and partially mediated the relationship between religious well-being and functional outcome. However, together the variables accounted for only a small proportion of the total variance in both outcomes. Emotion-focused coping partially mediated the relationship between religious well-being and life satisfaction and religious well-being and distress, accounting for a small proportion of the former relationship but a larger proportion of the latter. Finally, perceived detriment from trauma partially mediated the relationship between religious well-being and both psychological outcomes (life satisfaction and level of distress), accounting for a moderate proportion of the relationship.

Hypothesis 3b: Relationships among coping concepts. Pearson product-moment correlations were used to determine the relationship between positive and negative

religious coping (RCOPE subscales), general coping style (CISS subscales), perceived benefits after trauma (PBS Total) and perceived detriment from trauma (PBS Negative Items). This information is presented in Table 8. As noted, the three coping scales were relatively independent of one another: task- and emotion-focused coping were unrelated (r = .04), whereas avoidant coping showed small to moderate correlation with task- (r = .24) and emotion-focused (r = .33) coping. Task-oriented coping (CISS task) showed a small but significant correlation with Positive Religious Coping (RCOPE Positive; r = .25, p < .01). Negative religious coping (RCOPE Negative) was moderately correlated with emotion-focused coping (CISS emotion; r = .35, p < .01) and avoidant coping (CISS avoidant; r = .32, p < .01). Perceived benefit was moderately correlated with positive religious coping (r = .44, p < .01), task-oriented coping (CISS task; r = .46, p < .01) and with an avoidant coping style (CISS avoidant; r = .38, p < .01). Perceived detriment was strongly correlated with an emotion-focused coping style (CISS emotion; r = .59, p < .01) and also with negative religious coping (r = .21, p < .05).

For the purposes of exploration, correlations between religious and existential well-being and coping styles were also evaluated. Existential well-being did not have a significant relationship to any of the coping styles (rs = .12 - .19), whereas religious well-being showed a significant relationship with task-oriented coping (r = .35, p = .001) and a significant negative relationship with emotion-focused coping (r = -.46, p < .001).

Hypothesis 3c: Unique predictive power of perceived benefit from trauma and positive religious coping. Hierarchical multiple regression analyses were used to determine the proportion of the variance in outcomes (life satisfaction, general distress, functional abilities and participation) that can be attributed to perceived benefit and

detriment from trauma (PBS Total and PBS Negative) and religious coping styles (RCOPE Positive and Negative) beyond that attributable to age at time of injury, injury severity, neuropsychological functioning and general coping style (i.e., task-oriented and emotion-focused coping; avoidant coping style was excluded based on its exclusion from previous literature and its lack of relationship to most outcome measures) .

As can be seen in Table 8, after controlling for injury characteristics, current neuropsychological functioning and general coping style, positive religious coping shows little relationship with outcome, whereas perceived benefit does continue to demonstrate a moderate correlation with life satisfaction and level of distress. Partial correlations also reveal that once those characteristics described above have been accounted for, perceived detriment is negatively related to life satisfaction and negative religious coping actually shows a positive relationship to outcome. This last anomalous finding may be attributed to the fact that emotion-focused (blaming-style) coping has been removed and the remaining variance of negative religious coping actually reflects a connection to a higher power.

The results of the multiple regression analyses are presented in Tables 17-21.

Satisfaction with Life (Table 17). Descriptive correlations presented in Table 8 demonstrate that perceived benefits (r = .30), perceived detriment (r = -.46) and CISS emotion-focused coping (r = -.33) were all modestly correlated with life satisfaction. Step 1 (age at time of injury) was not significant (R^2 change = .00, p = .808), nor was the addition of time to follow commands and current neuropsychological functioning (SDMT) (R^2 change = .01, p = .759). When CISS task-oriented and emotion-focused coping were entered into the equation in Step 3, they reliably improved the prediction of life

satisfaction by 15.0% (p = .001). The addition of positive religious coping and perceived benefit in Step 4 also significantly improved the predictive power of the model (R^2 change = .06, p = .041). The overall model was significant (F(7,80) = 3.26, p = .004) and accounted for 22.6% of the variance in life satisfaction. Examination of semipartial correlations indicates CISS emotion-focused coping (sr^2 = .11, p < .01) accounted for the most unique variance, followed by perceived benefit (sr^2 = .05, p < .05).

A second regression equation evaluated the unique contributory value of negative religious coping (RCOPE-Negative) and perceived detriment (PBS detriment) to life satisfaction. This result is presented in Table 21. Steps 1, 2 and 3 were identical to that conducted above. Step 4 with the addition of RCOPE-Negative and PBS detriment was significant (R^2 change = .14, p = .001), and the total model accounted for 30.1% of the variance in life satisfaction (p < .001). Perceived detriment accounted for the most unique variance (sr^2 = .09), followed by negative religious coping (sr^2 = .05).

General distress (Table 18). Descriptive correlations presented in Table,8 reveal that general distress showed a small but significant correlation with perceived benefit (r = -.23), and moderate correlations with perceived detriment (r = .45) and with CISS emotion-focused coping (r = .54).

The results of the multiple regression analysis reveal that Steps 1 and 2 were not significant in the prediction of general distress. The addition of CISS emotion-focused and task-oriented coping in Step 3 was significant (R^2 change = .27, p < .001). Step 4 also reliably improved the prediction of general distress (R^2 change = .06, p = .025) and the total model accounted for 39.9% of the variance (p < .001). Again, emotion-focused coping accounted for the most unique variance (sr^2 = .25, p < .001), followed by

perceived benefit (sr^2 = .06, p < .01).

A second regression equation evaluated the unique contributory value of negative religious coping (RCOPE-Negative) and perceived detriment (PBS detriment). This is presented in Table 21. Steps 1, 2 and 3 were identical to that conducted above. Step 4 with the addition of RCOPE-Negative and PBS detriment was not significant (R^2 change = .02, p = .300) and the total model accounted for 36.2% of the variance in general distress (p < .001). CISS emotion-focused coping accounted for the most unique variance (sr^2 = .10), with all other variables accounting for 3% or less of the variance.

Functional outcome (SO report PCRS; Table 19). Examination of descriptive correlations in Table 8 reveals small but significant correlations between PCRS and CISS task-oriented coping (r = .21), perceived detriment (r = -.31) and emotion focused coping (r = -.32). Step 1 was again not significant (R^2 change = .01, p = .485). The addition of time to follow commands and SDMT was significant on Step 2 (R^2 change = .07, p = .039), as was the addition of coping styles in Step 3 (R^2 change = .13, p = .002). The final step, the addition of positive religious coping and perceived benefit, did not add significant predictive value (R^2 change = .00, p = .948) but the total model was significant (R^2 = *.21*, $F(7,80)$ = 3.04, p = .007). Squared semi-partial correlations demonstrate that emotion-focused coping explains the most unique variance in functional outcome (sr^2 = .09, p < .01), followed by neuropsychological function (sr^2 = .05, p < .05), and task-oriented coping (sr^2 = .04, p < .05).

A second regression equation evaluated the unique contributory value of negative religious coping (RCOPE-Negative) and perceived detriment (PBS detriment).

This result is presented in Table 21. Steps 1, 2 and 3 were identical to that conducted above. Step 4 with the addition of RCOPE-Negative and PBS detriment was not significant (R^2 change = .01, p = .732). The total model accounted for 21.5% of the variance in functional outcome (F(7,80) = 3.13, p = .006). CISS task-oriented coping accounted for unique variance (sr^2 = .06, p < .05), followed by neuropsychological functioning (4%) and CISS emotion-focused coping (3%; both non-significant).

Community participation (SO report of PART-O; Table 20). Descriptive correlations presented in Table 8 show that SO report of community participation was significantly correlated only with age at injury (r = -.19), cognitive function (r = .23) and CISS task-oriented coping (r = .22) but no other predictor variables. Though the total model was significant (R^2 = .17, F(7,80) = 2.28, p = .036), none of the individual steps was significant in predicting community participation. Age at time of injury (sr^2 = .06, p < .05), task-oriented coping (sr^2 = .06, p < .05) and neuropsychological functioning (sr^2 = .05, p < .05) each accounted for a significant amount of unique variance.

A second regression equation evaluated the unique contributory value of negative religious coping (RCOPE-Negative) and perceived detriment (PBS detriment). This is presented in Table 22. Steps 1, 2 and 3 were identical to that conducted above. Step 4 with the addition of RCOPE-Negative and PBS detriment was not significant (R^2 change = .03, p = .294). The total model, however, was significant and accounted for 18.5% of the variance in community participation (F(7,80) = 2.60, p = .018). Age at time of injury (sr^2 = .06, p < .05) and CISS task-oriented coping (sr^2 = .04, p < .05) each accounted for a significant amount of unique variance.

In sum, each of the total models predicting rehabilitation outcomes after

accounting for injury characteristics, coping style and interpretation of trauma predictors were significant. The inclusion of positive religious coping and benefit finding on the final step was significant for psychological but not functional outcomes. The inclusion of negative religious coping and perceived detriment from trauma on the last step was significant for life satisfaction but no other outcomes. In contrast, emotion-focused coping was a unique predictor for life satisfaction, general distress and functional ability, whereas task-focused coping was a significant predictor for functional outcomes and community participation. After accounting for general coping style, positive religious coping was not a unique significant predictor for any outcome. Perceived benefit from trauma was a unique predictor only for life satisfaction and general distress. Perceived detriment and negative religious coping were unique significant predictors only for life satisfaction.

Hypothesis 4. Religious/spiritual well-being and multidimensional rehabilitation outcome. Canonical correlation treated rehabilitation outcome as a multivariate composite variable represented by the combined influences of the four outcome measures (satisfaction with life, general level of distress, participation outcome and functional outcome). Prediction of overall outcome was assessed by examining its relation to a general religiousness/spirituality construct as measured by the individual religious/spiritual variables (public and private religious practices, and religious and existential well-being). Essentially, canonical correlation reveals sets of religiosity/spirituality and outcome variables that go together. Dimension reduction analyses were used to assess the significance of each canonical correlation to

determine which sets of religiousness/spirituality variables and outcome variables were most closely related. Relative contributions to the prediction of rehabilitation outcome were determined by examining the cross-loadings of the R/S and outcome measures. Simple correlations examining associations between individual R/S variables and outcome measures can be found in Table 7. The relationship between these two sets of variables was evaluated by examining the number of reliable canonical functions, the magnitudes of the canonical correlations, and the relative contributions of each R/S variable in predicting rehabilitation outcome.

The maximum number of canonical functions for the present analysis was four (i.e., the number of variables in the smallest set). With all three canonical correlations included, Wilks' Lambda = .573, $p < .001$. Dimension reduction analyses were used to assess the significance of each canonical function removed in successive order. With the first canonical correlation removed, Wilks' Lambda = .966, $p = .976$ (non significant). The test removing the second canonical correlation was also not significant (Wilks' Lambda = .998, $p = .998$). Thus, only the first pair of variables accounted for the significant relationships between the two sets of variables. The canonical correlation (correlation between the two canonical variates) was .63 ($R^2 = .40$). Table 22 presents the canonical loadings between the variables and the canonical variate. The canonical variate accounted for 42.6% of the variance in the outcome (rehabilitation) variables and 9.4% of the variance in the predictor (R/S) variables. With a cutoff correlation of .3, the only variable within the predictor set that correlated with the canonical variate was religious well-being (.95). Persons with high religious well-being (.95) were associated with high life satisfaction (.85), participation (.39) and functional independence (.51),

and low distress (-.75). Consistent with the analyses presented previously, religious well-being appears to drive the relationship between religiousness/spirituality and both subjective and objective rehabilitation outcome.

Hypothesis 5. Health behaviors as mediator of the relationship between religious/spiritual concepts and rehabilitation outcome. Tests for mediation effects were planned to examine the role of health behaviors (Positive Health Behaviors, Negative Health Behaviors and Health Behaviors Positive-Negative difference score) in the relationship between both spiritual well-being (SWBS) and religious practice (Public Religious Practice scale) and rehabilitation outcomes (SWLS, BSI-18 GSI, SO report of PCRS and SO report of PART-O). Examination of the zero-order correlations between the health behavior variables and predictors (Table 9) and health behavior variables and outcomes (Table 23) revealed that of the health behavior measures (negative health behaviors (NHB), positive health behaviors (PHB) or health behavior difference (HBD) score), NHB was significantly correlated with PART-O (r = -.19) whereas HBD had a significant correlation with two of the four outcome measures (SWLS r = .21; PCRS r = .18). There were few significant relationships between the health behavior measures and the religiousness/spirituality measures (positive health behaviors and negative religious coping r = -.22; health behavior difference and religious well-being r = .20; all other relationships non-significant).

Tests of mediation were conducted as described above in Hypothesis 2 using religious well-being (RWB) as the predictor, the health behavior difference score (HBD) as the mediator, and life satisfaction (SWLS) and functional ability (PCRS) as the

outcomes. Results are presented in Table 24. The health behavior difference score was a partial mediator in the relationships between religious well-being and both life satisfaction and functional outcome, though it accounted for a very small proportion of both relationships. Additionally, the health behavior difference added very little unique variance (sr^2 = .01*)* to the outcomes.

CHAPTER 4

DISCUSSION

Although a great deal of literature has focused on the human response to the experience of traumatic brain injury, very little research has focused on the use of religion in coping among persons with TBI. Each individual brings to the experience of trauma a unique constellation of religious and spiritual resources. These resources influence their thoughts, behaviors, attitudes, emotions and relationships (Pargament, 1997). Until recently, the influence of these resources on outcome had not been assessed in TBI.

The findings of this project indicate that specific facets of religious and spiritual belief systems do play direct and unique roles in predicting rehabilitation outcomes. Specifically, individuals' subjective feeling of connectedness to a higher power was predictive of not only their experience of distress and well-being, but objective functional outcome as well, more so than feeling a sense of meaning and purpose in life or engagement in religious activities. Feeling supported by God enhances positive outcomes in part through the mechanism of enhancing feelings of general support. However, an individual's relationship with God is a resource that cannot be reduced to perceiving oneself to be supported in general. There is something unique about an individual's relationship with a higher power.

Benefit finding does appear to have unique influence on psychological outcomes but not functional outcomes. In contrast, a negative or blaming coping style is especially disadvantageous to both psychological and functional outcome. Experiencing brain injury as extremely negative and being angry at God are uniquely detrimental to life

satisfaction. Taken together, these findings suggest that an individual's use of their spirituality in coping is considerably related to rehabilitation outcome.

Specific Aim 1: Unique influence of religion and spirituality on rehabilitation outcomes

The hypothesis that spiritual well-being has a unique influence on rehabilitation outcome was partially supported. The individual components of spiritual well-being showed markedly different patterns of relation to rehabilitation outcome: Religious well-being was uniquely predictive of subjective (life satisfaction and distress) and objective (community participation and functional independence), even after accounting for time since injury, injury severity, current cognitive function, and social support. Existential well-being was uniquely predictive of participation only. Overall, these findings are consistent with prior research in rehabilitation populations (Brillhart, 2005; Tate & Forchheimer, 2002) that found spirituality predicted health outcomes. However, the present findings also highlight the importance of considering specific aspects of spiritual well-being, and in this regard may explain mixed and null findings reported in prior studies. Contrary to expectation, religious practices (public or private) were unrelated to rehabilitation outcome. This finding contrasts with the large body of literature on religion and health in general (Idler & Kasl, 1997b; Koenig et al., 2001), but it is somewhat consistent with findings from recent studies of individuals with disability, including survivors of TBI. Multiple studies have found little relationship between religious practice and mental or physical health in these populations (Cohen et al., 2009; Johnstone et al., 2009).

One explanation for these findings is that individuals with TBI are not in full

control of their ability to participate in religious activities because they often must rely on others for scheduling and transportation to social events; thus, their religious participation does not accurately reflect their true use of religious resources. Another hypothesis is that religious activity may sometimes exacerbate family difficulties, such as those associated with the caregiving that is often necessary in TBI (Pargament, 2002). Lack of support from the church, religious stigma and blame, and unrealistic expectations from religious groups regarding family obligation are all possible ways in which religious participation may be detrimental to a TBI survivor. For example, the congregation may not understand the difficulties in daily living encountered by the person with TBI because their disability may not be overtly visible. Therefore, the congregation may not offer them the support that they need and may, in fact, place unrealistic expectations on the person with TBI, adding to the level of stress that the person encounters. In this regard, it is possible that in some situations religious participation could be considered disadvantageous. Thus, the finding of no relationship between religious practice and outcome may reflect complexity in the relationship in this population.

Although they were examined as potential explanatory mechanisms, injury characteristics (i.e., time since injury, injury severity, and present neuropsychological functioning) were unrelated to psychosocial outcome (quality of life and acute distress) in post-acute TBI. Previous research in this area has reported similar findings (Corrigan et al., 2001; Kalpakjian, Lam, Toussaint, & Hansen Merbitz, 2004; Mailhan, Azouvi, & Dazord, 2005; Wood & Rutterford, 2006). Current neuropsychological functioning, as expected, was uniquely predictive of functional ability and community participation

(Kendall & Terry, 1996), as was age at time of injury (Marquez de la Plata et al., 2008). In general, as suggested by others (Kendall & Terry, 1996; Rutterford & Wood, 2006), coping and psychosocial factors were of greater importance in predicting outcome than were injury-specific characteristics.

Specific Aim 2: Social support as the link between religiousness and outcome

Social support is one of the primary mechanisms through which it is believed that religious practice influences health outcomes (Ellison et al., 2001; Ellison & George, 1994; George et al., 2002; Powell et al., 2003). That is, the practical and emotional support garnered by becoming involved in activities within a religious community is likely to influence outcome via provision of resources, both physical and psychological.

To be considered as the mechanism by which religion influences outcomes, social support must be found to be related to outcome. Indeed, perceived social support was predictive of psychosocial (life satisfaction) and practical (community participation) outcomes, consistent with prior research. For example, Kendall and Terry (2009) found that social support within the family predicted both short-term and long-term emotional adjustment. Similarly, Johnstone et al. (2009) demonstrated that social support in the form of congregational support is very strongly related to general mental health. Thus, feeling supported by others is uniquely important in feeling happy in one's life and free from distress, and the relation between perceived and actual support likely plays an important role in its link to recovery of functional abilities.

Hypothesis 2a, which proposed that social support is a mechanism by which religious practice relates to rehabilitation outcome, was not supported. Religious practice showed no significant relationship to either social support or outcome;

therefore, social support could not be a mediator of that relationship. On the basis of this finding, it is not likely that religion confers its positive effects only via enacted support garnered by being part of a religious community.

Perceived social support was found to be a partial mediator, however, of the relationships between religious well-being and functional ability and religious well-being and distress. It may be that feeling supported by God enhances positive outcomes (less distress and greater functional abilities) in part through the mechanism of enhancing feelings of being supported in general. This finding of partial mediation is consistent with prior research that demonstrated social support does not fully account for the relationship between religious well-being and health outcome (Ironson et al., 2002) and that spiritual support is an independent predictor of outcome (Maton, 1989). Feeling connected to a higher power remains independently related to functional outcome and distress after accounting for perceived social support. Taken together, these findings indicate that an individual's relationship with God is a resource that cannot be reduced to perceiving oneself to be supported in general.

Specific Aim 3: R/S, general coping style, perceived benefit and health outcomes

Relationships among coping constructs

Consistent with previous research, the ability to find benefit from trauma was associated with positive affectivity and positive religious coping (i.e., turning to God for aid in coping) (Calhoun et al., 2000; Linley & Joseph, 2004; Pargament, 1997). Benefit finding was also positively associated with public and private religious practice and both religious and existential well-being. This finding is also consistent with others that have found religious activities and intrinsic religiousness to be positively associated with

growth (Linley & Joseph, 2004). Many religious traditions emphasize the spiritual benefits of enduring life's difficulties, and religion offers ways of reconceptualizing trauma that may aid in adjustment. Thus, although causal direction cannot be determined given a correlational design, the hypothesis that individuals may turn to religion to aid in meaning-making and benefit finding (Hypothesis 3b) was supported.

Consistent with prior studies (Evers et al., 2001; Koenig et al., 1998), ability to find benefit from a traumatic experience was related to problem-solving coping. It is possible that the search for benefits represents a problem-focused coping task. That is, an individual's search for meaning in the traumatic experience may reflect their task-oriented coping effort.

The ability to find benefit from trauma was also associated with an avoidant or distraction-focused coping style. This finding may indicate that perceived benefit often reflects illusory growth (Zoellner, Rabe, Karl, & Maercker, 2008). The concept of illusory growth suggests that individuals may be unaware of or defensively avoiding the negative sequelae of their trauma by alternately reporting that they have found benefit (Zoellner et al., 2008). If this is the case, reports of benefit finding do not reflect adversarial growth after full processing of a traumatic event but instead may reflect superficial perception of benefit. Given the growing literature that demonstrates that individuals with TBI are especially prone to unawareness of negative sequelae of their trauma (Prigatano, 1996) and that unawareness of deficit is associated with enhanced well-being (Ryan et al., 2007), the possibility of illusory growth within this sample is likely. Even illusory growth, however, has been shown to have positive physical and psychological effects, particularly in the context of severely threatening events (Taylor,

Kemeny, Reed, Bower, & Gruenewald, 2000). Further explorations of the cognitive processes underlying meaning-making and post-traumatic growth are necessary for a full understanding of these constructs, the relationship between them and their roles in the coping process and as an outcome.

The perception of detrimental outcomes from trauma was a concept that emerged during the course of this study. Of note, this construct was assessed via items that were included in the perceived benefits scale only to prevent positive response bias, and they generally are not analyzed (McMillan & Fisher, 1998). Yet, the intuitive notion of finding detriment from trauma related to other negative psychological constructs and outcomes as would be expected: It was strongly associated with emotion-focused coping but showed weak relation to other coping styles including task-oriented and avoidant coping, as well as positive and negative religious coping.

Perceived detriment appears to be something different than simply the opposite of benefit finding, because it showed only weak inverse relation to the formal benefit-finding scale; of particularly interest is that it also showed weak relation to trait positive affectivity and only modest overlap with trait negative affectivity. Yet, it associated with poor rehabilitation outcome and was among the strongest predictors of rehabilitation outcomes including satisfaction with life, distress and functional ability. Most relevant to the present study, perceived detriment from trauma showed strong inverse relation to religious well-being and social support. In sum, perceived detriment from trauma was associated with a constellation of adverse characteristics including emotion-focused coping, low religious well-being, low social support, and poor psychological and functional rehabilitation outcomes.

As expected, turning to God for support (positive religious coping) was more strongly related to task-oriented coping than it was to a passive (emotion-focused or avoidant) style. That is, turning to God for support was more strongly associated with what has been shown to be a positive and productive approach to challenge than a poor one (Anson & Ponsford, 2006; Tomberg, Toomela, Ennok, & Tokk, 2007). Negative religious coping was more strongly related to the passive coping styles than the active coping style. That is, individuals who experience anger at God are more likely to avoid their problems or engage in blame and less likely to take action toward problem solving.

R/S and Coping

Religious but not existential well-being was associated with greater use of task-oriented (problem-solving) coping and lesser use of emotion- (blame) focused coping. That is, feeling a connection to and support from a higher power was more closely associated with what could be considered “productive” coping. In contrast, coping style was unassociated with existential well-being, feeling a sense of meaning and purpose in life.

Perceived benefit and task-oriented coping as mediators

Hypothesis 3a proposed that the relationship between spirituality and psychosocial outcomes is partially mediated through its effects on task-oriented coping and enhanced benefit finding. Consistent with previous findings, task-oriented coping was a partial mediator in the relationship of the individual’s connection to a higher power and both functional and participation outcomes (Canada et al., 2005). Task-oriented coping accounts in part for the relationship between a sense of connectedness to God and better psychological and practical functioning, though a direct relationship remains.

Consistent with Pargament's conceptualization of "collaborative religious coping" (Pargament, 1997), this finding suggests that in situations in which task-oriented coping is appropriate, a relationship with God may offer a sense of practical support in coping with TBI. The observation that task-oriented coping partly accounts for the positive relationship between religion and psychosocial well-being supports the notion that God helps those who help themselves: It suggests that people who feel connectedness to God also feel empowered to act in ways that benefit their well-being when they are faced with challenge. One pathway by which this feeling of support may influence problem-solving coping efforts is through increased feelings of self-efficacy, although this hypothesis has not been assessed.

Perceived benefit was also found to be a partial mediator of the relationship between religious well-being and psychosocial outcomes, consistent with expectation based on previous studies (Pargament, 1997; Park, 2005). The findings support the notion that an individual's relationship with God enhances their rehabilitation outcome in part through their ability to see benefit from the traumatic experience of brain injury. Similar to findings from previous studies (Maton, 1989; Park, 2005), a personal relationship with a higher power and use of that resource may influence an individual's ability to make meaning and benefit from trauma. A "meaning-making" approach to coping is particularly relevant in situations that are not amenable to problem-solving, such as those associated with trauma and loss (Pargament, 1997).

Benefit finding, religious and non-religious coping and outcome

Hypothesis 3c was also partially supported. With general coping style and injury related characteristics accounted for, ability to find benefit was uniquely predictive of

higher life satisfaction and lower distress, though not functional outcomes. This finding is consistent with previous research that has demonstrated a relationship between adversarial growth and positive psychosocial outcomes (Linley & Joseph, 2004; McMillan, 1999; Tedeschi & Calhoun, 2004; Yanez et al., 2009). This finding also suggests that benefit finding or adversarial growth represents a distinctive, positive approach to coping that has rarely been assessed as such.

As reported by others (Evers et al., 2001), benefit finding was associated with positive affectivity but not associated with a lack of negative affectivity. Thus, ability to find benefit does not necessarily negate the negative influence of a traumatic event. A variety of associations between benefit finding or growth and distress have been proposed, and it has been suggested that the two are not ends of a continuum but two constructs with complex nuances and patterns of relationships (Linley & Joseph, 2004). Thus, amelioration of distress will not necessarily produce benefit, nor will recognition of benefit necessarily reduce distress.

Consistent with several previous studies (Fitchett et al., 1999; Pargament, 1997; Powell et al., 2003), the use of positive religious coping was not associated with any rehabilitation outcome but negative religious coping was associated with increased distress (Pargament et al., 1998; Rippentrop et al., 2005), decreased functional abilities and decreased community participation (Fitchett et al., 1999). Although turning to God for support in times of stress is equivocally related to rehabilitation outcome, negative emotion toward God appears to be especially detrimental.

Even after accounting for general coping style (task- and emotion-focused) and injury related characteristics, perceived detriment from the experience of TBI and

negative religious coping (i.e., anger at God) were each uniquely predictive of poorer life satisfaction. Thus, anger towards God and experiencing the traumatic experience of brain injury as detrimental are especially influential toward poorer satisfaction with life. Negative religious coping has previously been linked to higher levels of distress and poorer quality of life (Pargament et al., 1998). Thus, consistent with the findings of others, religion is a source of distress as well as a source of adaptive coping in individuals who have experienced a TBI.

In sum, benefit finding does appear to have unique influence on psychological outcomes but not functional outcomes. In contrast, a negative or blaming coping style is especially disadvantageous to both psychological and functional outcome. Experiencing brain injury as extremely negative and being angry at God are uniquely detrimental to life satisfaction.

Specific Aim 4: R/S facets and outcome

Previous studies have found private religious practice to be related to degree of disability and distress (Haley, Koenig, & Bruchett, 2001; Idler & Kasl, 1997b; Pargament, 1997; Powell et al., 2003; Rippentrop et al., 2005), but in the present study there was no relationship between prayer/devotion and any of the rehabilitation outcomes. Private religious practice was associated with positive but not negative affectivity, suggesting that persons who practice religion have a more positive affective outlook. It may be that religious practice facilitates positive affectivity and spiritual or religious well-being (to which it was also strongly associated) or it may be that people high on positive affectivity are more prone to private practices of religion and spirituality. If spiritual well-being and positive affectivity are conceptualized as outcomes

themselves, then private religious practice could be considered to be associated with positive outcomes.

Hypothesis 4a was partially supported. Religious well-being and existential well-being were related but they are definitely not the same concept. Whereas religious well-being was beneficially related to negative affectivity and all the rehabilitation outcomes, and uniquely so, existential well-being was not. Thus, feeling a general sense of meaning and purpose in life was less predictive of healthy outcome than was feeling a sense of connectedness to a higher power. This finding is inconsistent with expectation, in that it was proposed that both religious and existential well-being would be independently related to outcome.

Previous research has found existential well-being to be most predictive of psychosocial outcomes (Matheis et al., 2006; Riley et al., 1998). The findings from Matheis et al. (2006) focused on persons with spinal cord injury, who offer similar trauma characteristics for comparison; however, those participants were predominantly Caucasian and of higher education and income than were the participants in the present study. Thus, the difference in the findings may reflect a true difference in the importance of these characteristics between the samples.

Although unexpected, the finding of such a strong beneficial relationship between religious well-being (and not existential well-being or religious practice) and outcome is intriguing. Individuals' subjective feeling of connectedness to a higher power was more predictive of their health outcome than was feeling a sense of meaning and purpose in life or engagement in religious activities. This sense of connectedness was distinctively predictive of their objective functional outcome as well as their subjective distress and

life satisfaction. This finding suggests that an individual's own spirituality is an important resource considerably related to rehabilitation outcome as a whole.

Hypothesis 4b was also partially supported. R/S constructs did show differential relationships to outcome. However, in contrast to the hypothesis, religious practice was not more strongly related to participation outcome than the other R/S characteristics, nor was existential well-being more strongly related to life satisfaction, general health or distress. Religious well-being was the only R/S characteristic related to any of the outcomes, and notably, it was related to both subjective and objective outcome, as viewed by the person with TBI as well as a knowledgeable informant.

In this study, a sense of connectedness to and support from a higher power was the most robust predictor of outcome. It could be contended that the strength of this relationship is inflated as a result of shared method variance (self-report) and redundancy in the constructs (e.g., religious well-being reflects general well-being, or greater life satisfaction and lower distress). However, a review of the items used to assess religious well-being reveals that what is assessed is an individual's perception of their relationship to God, not their well-being (see Appendix). The existential well-being items are more reflective of overall perception of life as a positive experience, and the association between the scale and well-being outcomes has been suggested to be tautological (Koenig & Cohen, 2002). Yet, in the present study, although it related to other R/S constructs and social support in expected ways, existential well-being was unrelated to general well-being and other health outcomes.

These findings suggest that when individuals report feeling supported by God and a sense of connectedness to a higher power, they are more likely to have positive

rehabilitation outcome. The same is not true for their religious practices or their general sense of positive meaning in their present life and purpose in their future.

Relationships among religious and spiritual constructs

Despite some overlap among aspects of religiousness and spirituality, each measure appears to have assessed a unique construct. In the present study, private religious practice (e.g., prayer) was more strongly predictive of other aspects of religiousness and spirituality than was public religious practice. For example, private religious practice was strongly linked to belief that one's life is meaningful or has purpose (i.e., existential well-being). However, it was not particularly predictive of psychosocial or practical rehabilitation outcomes. Similarly, public religious practice was related to positive use of religion in coping and sense of meaning in life, although less so than private practice, but was not predictive of outcome as was expected.

Interestingly, in a national survey of adult Black Americans, nearly half reported that prayer was the coping response that helped them most (Levin, Chatters, & Taylor, 1995). Because individuals with TBI may not be able to engage in public religious activities without considerable planning or assistance, and given that the present sample was largely Black adults with TBI, prayer was likely to have been a widely used resource.

Spiritual well-being was measured as the combination of two dimensions, existential well-being and religious well-being (Ellison, 1983). In the present study, as expected, these dimensions were related but each offered unique predictive value. As the experience of meaning and purpose in life (existential well-being) increased, so did the tendency to use positive religious coping strategies. The relationship was

meaningful but not as strong between the experience of connectedness to a higher power (religious well-being) and positive religious coping. Experiencing anger at God (negative religious coping) was associated with poorer existential and religious well-being.

Use of positive religious coping was associated with the experience of more positive affectivity but not less negative affectivity, whereas negative religious coping strategies were associated with negative affectivity but not less positive affectivity. The nature of these relationships supports the belief in the independent nature of positive and negative religious coping, and the findings are generally consistent with expectations (Pargament et al., 1998).

Specific Aim 5: Health behaviors and outcomes

Another mechanism by which it has been proposed that religious beliefs influence health outcome is through health behaviors. A significant amount of previous literature has shown a relationship between religious participation and health outcome [see (Koenig et al., 2001) for a review]. Previous research has shown that persons who more regularly attend religious services report more positive health behaviors and efforts toward improving negative health behaviors (Ironson et al., 2002; Strawbridge et al., 2001). In general, it has been proposed that religious participation promotes good health habits because of religious teachings to take care of and respect one's body (George et al., 2002). Thus, engagement in religious activity may yield improved health behaviors which is likely to predict health outcome.

Unfortunately, the health behavior and outcome measures utilized in the present study were not able to adequately capture health behaviors and outcome in a way that

lent itself to finding the expected relationships among religious and spiritual practices and activity, health behaviors and various outcomes. Age and functional status were the only characteristics related to health outcome, and even these relationships were not strong. The relationships observed between health behaviors and R/S constructs were also not strong, although use negative religious coping was adversely linked to positive health behaviors, whereas religious well-being was beneficially linked with balance of healthy to unhealthy behaviors.

In general, Hypothesis 5 was supported. The relationship between religious well-being and life satisfaction and the relationship between religious well-being and functional outcomes were partially mediated through the effect of a positive health behaviors profile. However, the health behaviors accounted for a very small proportion of a very small relationship.

There are a few possible explanations for the lack of strength in these relationships. The first alternative hypothesis is that among the present sample, little attention is paid within religious communities to facilitating healthy behavior or engaging in health promotion. Given that the 1995 Detroit area study did not even mention health behaviors as a possible mechanism by which religion influences outcome, this hypothesis seems very plausible. The Detroit metropolitan area, and especially its African-American citizens, are among the nation’s most obese adults (Michigan Surgeon General's Health Status Report, 2010); among the present sample, more than half were overweight. The region also has high rates of smoking and individuals frequently engage in unhealthy eating practices, which may be related to poverty and the relatively high cost of nutritious food, as well as to the absence of traditional grocery

stores in the city. It is also possible that participants (including significant others) do not attend to their health behaviors and were unable or unwilling to accurately recall their engagement in health behaviors (e.g., the amounts of “good” and “bad” food they consume; number of episodes of moderate activity). Thus, the measure may have lacked validity because of the retrospective report nature.

Conclusions

Caveats and study weaknesses

The present study has several significant limitations that should be addressed.

Similar to an earlier Detroit study (Ellison et al., 2001), nearly three quarters of the sample identified themselves as Christian; most (85-90%) stated that they adhere to the teachings and practices of their religion at least somewhat and that religion is at least somewhat important to them. Thus, the findings of the present study may not be generalizable to a less religious population or a population that adheres to non-Christian beliefs and practices (e.g., Muslim, Jewish, Buddhist). In fact, depending upon the non-Christian tradition, the relative roles of existential and religious well-being might well be much different than was observed here. For example, because of the greater emphasis on meaning and purpose in life and less emphasis on an afterlife with God within the Judaic and Buddhist traditions, existential well-being may play a much larger role in predicting outcome in these populations. Future research should strive to sample a cross-section of participants from broader populations of religious beliefs and orientations.

Although a prospective, experimental study design of the influence of religion on coping in brain injury is not feasible, the cross-sectional design of the present study

does not permit inference of causality nor does it permit inference of the directionality of a causal relationship in most cases. Thus, we cannot be certain whether use of religious resources in coping results in better outcome, or if better outcome results in more engagement of those resources, or both. However, because the influence of R/S on outcomes is a burgeoning area of research, any contribution to the understanding of the nature of these relationships is relevant.

The use of self-report measures to assess many of the constructs is another potential limitation of the present study. A potential caveat of reliance on self-report is a sacrifice in validity because of factors including: reading/comprehension level, engagement of the respondent, difficulty in capturing some constructs, and social desirability bias (Hill & Pargament, 2003b). The measures were read to the participants the majority of the time, thus addressing two of those concerns. However, it has been suggested that religion and spirituality measures are especially vulnerable to a social desirability bias (Hill & Pargament, 2003b). That is, participants may have represented themselves as more religious than they really are or as more or less likely to engage in particular thought processes or coping responses because they feel that is the most appropriate response regardless of their actual beliefs and practices. Similarly, participants may have been more likely to report benefit from trauma because of the way in which the questions were posed. Inclusion of the negative item subscale, though intended to minimize response bias, likely did not fully remove this influence.

Shared method variance and a social desirability bias may have inflated the relationships detected. However, including informant report to assess objective outcomes and minimize shared method variance is a considerable strength of this study

as compared to prior investigations. Researchers might consider using some open-ended questions, as previous work has shown that checklists do elicit higher levels of benefit finding and religiousness than open-ended questions (Nolen-Hoeksema & Davis, 2004; Pargament, 1997). However, although spontaneous report of how much and in what ways individuals use religion to cope or find benefit would likely provide interesting information, it would be fraught with a separate set of methodological weaknesses.

One measure in particular that did not perform in the analyses as predicted was that assessing public religious practice. The reliability of the measure was notably low (< .7) and therefore validity was by default also poor. Although previous studies have used only one item to assess religious practice and the present study used two, future research should assess this construct using more items, thus likely improving reliability of the measure.

Clinical implications

Brain injury rehabilitation is often focused on restoration of function that has been lost or decreased as a result of the injury. Although in most individuals some restoration of function is possible, recovery is often incomplete and deficits continue to impair the function of the individual in some way. Partial restoration of function can result in bitter disappointment and a chronic sense of grief and pessimism. If such negative outcomes are to be avoided, rehabilitation must balance its emphasis on recovery versus adaptation. The goal is not necessarily restoring the previous person but enabling the development of an emerging new person, albeit with some continuity between the old and the new (McGrath, 2004). Religion is one coping resource that may assist

individuals in this rehabilitation effort, and clinicians should facilitate use of this resource in a way that is consistent with the client's belief system.

One of the major findings of the present study is that religious well-being, feeling a direct and personal connection with a higher power, was strongly associated with multiple positive rehabilitation outcomes, both subjective and objective. Although religious well-being is strongly associated with perceived social support, it is more powerfully and uniquely associated with positive outcomes than perceived social support, which has previously received a great deal of attention and research support (Pierce & Hanks, 2006; Powell et al., 2007; Söderback & Ekholm, 1992; Steadman-Pare, Colantonio, Ratcliff, Chase, & Vernich, 2001). Thus, this finding is of great clinical significance in that individuals should be encouraged to utilize the resources available to them, including spiritual resources such as connection to a higher power, to cope with the aftermath of any traumatic event.

It has been proposed that an individual's unique religious belief system should be a key component to be considered when evaluating the coping skills of individuals with illness or disabilities, in addition to their social support, inner resources and knowledge of their condition (Ray, 2003). Rehabilitation professionals who understand their client's worldview, including their religious belief system, will work most effectively. Regardless of the mechanisms involved, if an individual's religious belief system aids an individual in coping with a disability in a positive way, its use should be encouraged (Rippentrop, 2005). Thus, as clinicians, we need to ask our clients about their belief system. The findings of this study suggest that we should ask our clients whether they experience a connection to a high power, and how they use that connection presently. From a social

cognitive perspective, the therapist should use his or her knowledge of the client's schemas, including their religious and spiritual belief systems, to help the client focus on and discuss their problems in the way most relevant to them (Carone & Barone, 2001). Future research should focus on whether a clinician's use of inquiry into religious and spiritual belief systems and utilization of those beliefs in the context of therapy actually facilitates therapeutic outcomes in terms of psychological functioning and practical functioning as well.

As stated by Pargament (1997) *"The psychology of religion and coping can weave a respect for the possible together with an appreciation for the futile. It bridges a deep psychological tradition of helping people take control of what they can in times of stress with a rich religious tradition of helping people accept their limitations and look beyond themselves for assistance in troubling times (pg 9)"*. This statement is very much consistent with the principles inherent in what has been called the third wave of cognitive behavioral therapy, acceptance and commitment therapy (Hofmann, Sawyer, & Fang, 2010). Such an approach to treatment suggests that individuals engage in task-oriented coping in realms where it is likely to be successful but learn to accept and remain flexible regarding psychological pain and the struggles inherent in living. Given the difficulties encountered by individuals with TBI, such an approach is likely to be an appropriate and useful intervention and should be further studied in this population. Furthermore, an individual's religious and spiritual resources may be of use to them in taking an acceptance approach to some of their struggles. On the basis of the findings presented here, a clinician may facilitate an individual's process of acceptance by encouraging them to tap into such resources (i.e., a personal connection to a higher

power).

Along a similar vein, the traditions of logotherapy (Frankl, 2006) offer a way of helping people find meaning through self-transcendence and a perceived understanding of the design and order in the universe (McMillan, 1999). In this context, although religion may not offer a specific answer to the cause of an event, faith in the belief that meaning in some way exists from the event or may be personally derived may result in individual gain. When working with clients who have experienced stressful and traumatic events, clinicians are not just working to alleviate distress but also to facilitate more positive functioning. Clinicians should be aware of the potential for positive change in their clients following trauma and adversity and should help their clients understand that personal growth after trauma originates not from the stressful event but from within the person themselves (Tedeschi & Calhoun, 1995).

The present study also found that perception of benefit from trauma facilitates positive subjective outcomes for life satisfaction and distress; a negative emotional focus (i.e., a general blame-focused coping style, anger at God or perceived detriment from a traumatic event) are associated with poor rehabilitation outcomes, both subjective and objective. On the basis of these findings, clinicians should be aware that helping a client focus on possible benefits from their traumatic experience may be helpful, but a redirection of focus away detriment may be even more advantageous. Although these statements are made on the basis of the research findings presented here, it is important to take the individual therapeutic context into consideration when implementing interventions and allow the client to engage in an appropriate process of grief and focus on loss followed by a shift in focus to healing and recovery. Time since

injury and trajectory of the physical and psychological healing processes are likely to be important characteristic to account for when planning any individual intervention.

One potential way in which therapists may manage clinical content related to benefit from trauma is suggested by McMillen (1999). This approach suggests that clinicians reflect the client's statements that could be considered benefit related, using phrases such as "by-products", "changed view of self and others", and "becoming stronger", as these may be better initially received as opposed to "benefit", "growth" or "gains". Clinicians may also introduce benefit concepts by encouraging client self-assessment in areas that may yield benefit or helping clients build new associations between memories of the event and ways their lives have been improved as a result of it.

The few experimental studies that have been conducted to evaluate the influence of a clinical intervention aimed at facilitating post-traumatic growth are encouraging (Stanton et al., 2002) but evidence for positive influence of specific interventions remains minimal. Clinicians should be cautious in their prescriptions for growth as the possibility for unrealistic expectations to have an iatrogenic effect on outcome exists. Growth should proceed at the rate of the client and should be identified by the client, not the therapist (Calhoun & Tedeschi, 2006; Joseph & Linley, 2006). Similarly, individuals should be cautioned against pushing themselves to find transformation out of a traumatic experience in order to relieve psychological pain and should instead address the emotions that they are currently experiencing in whatever way is most currently relevant.

<u>Further explorations</u>

The present study has served to further elucidate the role of religious and spiritual resources in coping with a traumatic event such as TBI. However, a number of additional factors or combinations of factors are involved in coping processes and outcomes in this population and therefore warrant exploration.

In difficult times, individuals turn to the coping resources available to them in the proportions that those resources exist. In other words, coping resources likely interact and moderate one another's influence. It has been proposed that religious involvement may have stronger health benefits for persons with low levels of social ties than for persons with extensive high-quality social networks (George et al., 2002). Thus, although investigated in this study as a mediator, *social support is a potential moderator* of the relationship between R/S and outcome. Furthermore, like religion and spirituality, social support is also a multidimensional construct comprising available social network, social interaction, instrumental assistance, and subjective social support (George et al., 2002). In the present study, only perceived social support was assessed because it has historically shown the strongest relationship to health outcomes. However, it is likely that a variety of relationships exist in the ways in which various dimensions of social support and the various dimensions and religion and spirituality influence coping. Hence, future research could explore in greater depth than this study, effects of both perceived and enacted social support on the religious belief system, and its relation to behavior.

It is important to note that participants in this study sample included only individuals greater than 1 year post injury in order to capture chronic but not acute coping with TBI. It is likely that the relationship between coping and outcome changes

longitudinally over the course of recovery for each individual. *Time since injury* may moderate the relationship between coping and outcome, as different coping approaches may be adaptive or maladaptive at different points post injury. A qualitative study that assessed the process of coping in individuals with chronic illness or serious injury derived five stages, including Apprehension, Diagnosis and Devastation, Choosing to Go On, Building a Way to Live, and Integration of the Trauma/Expansion of the Self (Salick & Auerbach, 2006). Though the stages may vary given the nature of TBI and its effects on cognitive function, it is likely that TBI survivors move through a process of coping with the consequences of their injury. Thus, accounting for time since injury as a moderator may reveal interesting relationships between coping, religious and non-religious, and outcome. Enhanced knowledge of these relationships would help guide the timing of clinical interventions.

Over the past several years, increasing amounts of attention have been paid to positive psychological or *resiliency* factors in individuals' ability to face adversity (Sheldon & King, 2001). Flexibility, tenacity, resilience, optimism, self-efficacy, an internal locus of control, sense of coherence, extraversion, positive affectivity, openness to experience and creativity have all been tied to more productive and adaptive coping efforts and better outcomes (Cicerone & Azulay, 2007; Dixon, Thornton, & Young, 2007; Rutterford & Wood, 2006; Tedeschi & Calhoun, 1995). Religiousness and spirituality have frequently been considered as factors related to resiliency (Sheldon & King, 2001). Together, the characteristics related to resiliency promote a willingness to approach the process of overcoming crisis with a proper respect for what cannot be changed and the persistence to work toward difficult changes that remain possible. These principles

should be further considered in the context of recovery from TBI.

Pre-injury psychosocial functioning is likely to be of significant influence on outcome (Kendall & Terry, 1996). Additionally, personal history and individual experiences also play an important role in the prediction of outcome via their influence on the development of coping mechanisms. Individuals may have experienced particular life events either pre- or post-trauma that either positively or negatively affect the coping process. Trauma-specific characteristics relevant to coping efforts including the degree to which violence or destruction was involved in the trauma, the degree to which blame of self or others is associated with the trauma, and the individual perception of the degree to which justice has been achieved. Changes in functional status (such as ability to complete ADLs or to return to work), changes in relationships or medical or legal problems play may also influence coping approach. Thus, *trauma and lifetime circumstances* are also potential moderators of the relationships between coping strategies (including religious and spiritual resources) and outcomes.

Within this psychosocial context, *culture and cultural difference* should be explored. Several studies have reported that race, socioeconomic status, gender and age may affect coping processes and outcomes (Lazarus & Folkman, 1984; Nolen-Hoeksema & Davis, 2004). Given the likely relationships between these characteristics and religious and spiritual beliefs, these characteristics should be further considered for their influence in future studies.

One dimension of R/S that was not assessed in the present study but that has shown a relationship to outcome is forgiveness. Given that individuals with TBI who are intentionally hurt by others have worse mental health outcomes at 1 year post injury

than persons with unintentional injuries (Hart, Hanks, Bogner, Millis, & Esselman, 2007), blame and subsequently forgiveness are likely to play an important role in outcome.

Assessed as a spiritual variable, forgiveness has been significantly associated with better physical health after TBI (Johnstone et al., 2009). Additionally, forgiveness interventions that have been shown to be effective in improving mental health for mentally ill population (Baskin & Enright, 2004) should be studied for their appropriateness for use in a TBI population. Thus, the relationship between religion and spirituality and forgiveness, the process of engagement in forgiveness, and the effect of that engagement on outcome in individuals post TBI are areas requiring additional research.

The degree to which an individual perceives the event as challenging is likely to vary within and between individuals, and is likely to also affect outcome. Higher levels of religiousness and spirituality have been tied to positive outcomes as the stressfulness of the situation increases (Pargament, 1997). However, if individuals are not aware of the challenging nature of their situation, their use of resources in coping may differ significantly. Among traumatic brain injury survivors with cognitive impairment that affects their understanding of their limitations, awareness of how the traumatic event has affected one's life is extremely relevant. A growing body of literature indicates that accounting for *awareness of deficit*, especially as a moderator for outcomes both subjective and objective, is essential. For example, persons who are unaware of their impairments are less distressed by them and have better satisfaction with life, despite poorer functional outcome than persons who are aware of their deficits (Prigatano, 1996; Ryan et al., 2007). Additionally, persons aware of their deficits are more likely

understand the need to engage in compensatory behaviors and invoke them as appropriate, whereas persons with impaired awareness of deficit may miss cues to invoke compensatory strategies or invoke ineffective coping strategies. It would be of substantial interest to explore whether awareness of deficit influences R/S, and whether it moderates the relationship between R/S and relevant outcomes as it has been shown to do in other contexts.

The present study focused on the use of religion in coping in survivors of TBI, but similar questions could be asked about caregivers of these individuals. How do caregivers cope with the burden of caring? Previous studies have shown that religious coping methods are frequently used by caregivers (Segall & Wykle, 1988-1989). Among caregivers, positive religious coping has been shown to be related to life satisfaction, whereas negative religious coping was related to poor overall psychosocial outcome (Pearce, Singer, & Prigerson, 2006). These relationships should be evaluated in a population of caregivers of individuals with TBI.

Mechanisms: Physiological reactivity and central nervous system function

Though the present study focused only on the coping components of the model of the relationship between religiousness and spirituality and outcome, there is a great deal of evidence that religion and spirituality influence health through a physiological pathway (Koenig & Cohen, 2002). There is a clear role for improved psychophysiological status in the relationships among religiousness, social support, coping approaches, health behaviors and outcomes (see Koenig, McCullough, & Larson, 2001, for a review). Furthermore, numerous studies demonstrate brain involvement in religious experience; thus, there are likely neurological and

neurochemical correlates to the involvement of religion in coping (Seybold, 2007). Thus, emphasis on a greater understanding of the role of psychoneuroimmunology is warranted.

Religion is linked to improved general physiological profile through several mechanisms. Prayer can improve health by producing a physiological state of relaxation similar to that of stress management techniques (Koenig et al., 1998). Social affiliation has been proposed to reduce the body's stress response and subsequently affect health through a hormonal and neurochemical response (Taylor, 2006). A large body of previous research has shown religiousness to be associated with improved immune and neuroendocrine functioning (Hixson, Gruchow, & Morgan, 1998; Ironson et al., 2002; Koenig & Cohen, 2002; Levin, 1996).

Previous studies have shown a relationship between prayer or meditation, increased blood flow to specific areas of cortex, positive affect, and relaxation and immune responses (Seybold, 2007). Roles have been postulated for dopamine, GABA, melatonin, serotonin and cortisol in these responses (Ironson et al., 2002; Levin, 1996; Seybold, 2007).

In general, given that we know that health outcome is linked to optimal physiological functioning, a decreased stress response and reduced allosteric load, we should try to elucidate the mechanisms by which this status can be reached, including religious and spiritual mechanisms (Seybold, 2007). Given the potential for significant variation in psychophysiological and neurological profiles among persons who have experienced TBI and the present findings that show meaningful associations between their religiousness/spirituality and rehabilitation outcomes, investigating the relationship

between religiousness/spirituality and physiological characteristics that might drive those outcomes within this population seems appropriate and necessary.

The present study explored social support and coping approaches as mechanisms by which R/S affects outcome. Future studies may further conceptualize this pathway by exploring links between these variables, psychoneuroimmunological characteristics and outcome. Additionally, although the hypothesis is as yet untested, increased blood flow to certain areas of the brain induced by prayer or meditation may be related to improved rehabilitation and psychosocial outcomes, and this too needs to be investigated.

Contribution to the field

Individuals cope with the tools available to them, and for those with limited means and few alternatives, such as many of those in the present sample, religion takes on great power and plays a large role in providing a genuine reason for living as well as coping resources. In certain circumstances, turning to religion represents the available form of control, turning the problems over to a higher power to handle (Johnstone et al., 2007). Religious resources can offer a way of reconciling the past, finding satisfaction and meaning in the present, and looking forward to the future (McColl et al., 2000a). It is imperative that the influence of religious and spiritual factors be explored in a TBI population, as brain injury is a trauma that likely pushes individuals toward their religious resources for coping with loss and finding strength to continue on in life. Thus, the present study addressed an important gap in the existing literature.

Previous social scientific research has primarily taken a functional (i.e., practical) rather than a substantive (i.e., psychological) approach to understanding the role of

religion in health (Zinnbauer et al., 1997). That is, religious and spiritual resources have predominantly been measured only as church attendance and not necessarily a psychological coping resource. The present study aimed to assess how religion/spirituality influence outcome via both functional and substantive pathways and as such offers a significant contribution to the literature in general and specifically the literature on R/S in TBI.

In general, although some individuals identify themselves as “religious”, others purport to have no religious orientation but do consider themselves as having belief systems that affect their daily behavior. This study assessed not only the influence of religious beliefs on behavior and outcome but the influence of non-religious spiritual belief systems as well. Because religiousness and spirituality were measured multidimensionally, we were able to establish which facets of R/S beliefs and practices influence which outcomes.

In this study, report of connectedness to a higher power was a very robust predictor of rehabilitation health outcome, beyond other measures of religiousness or spirituality. Similar constructs have been termed “religious/spiritual support” in other studies (Maton, 1989). The perception of being cared about and supported is not necessarily limited to relationships with other people but can be perceived by individuals to varying extents in their relationship with God. Closeness to God has been considered in the context of attachment theory, in which God is seen as a positive attachment figure (Hill & Pargament, 2003b). Thus, considered within this context, attachment to a higher power is predictive of healthy psychosocial and rehabilitation outcome.

It has been proposed that the magnitude of the influence of religious support

depends on the individual's other social connections and the quality of their support (Pargament, 1997). In other words, individuals will to turn to a higher power for support in balance to other available resources. Given what is known about the paucity of social support resources after TBI, it is likely that religious support is an especially important resource in this population. Given that this construct had not previously been assessed for its contribution to outcome, the present study was able to demonstrate that religious support does indeed have an important role as a coping resource.

According to George and colleagues (2002), *"Science cannot tell us whether God heals, but it can tell us whether belief in God affects health"* (George et al., 2002, p. 198). This study adds to the growing body of evidence that this is indeed the case by demonstrating that among adults who survived a traumatic brain injury, practical resources elicited by religious and spiritual resources do play a role in enhancing rehabilitation outcome, but something greater is also at work. The body of literature on religion, coping and outcome in general has been unable to explain the relationship between R/S and health outcome exclusively via non-religious factors. The present study provides evidence that religion adds something unique to the prediction of adjustment to stressful life events (Tix & Frazier, 1998). In fact, this study demonstrated that an individual connection with a God, a direct religious resource, consistently showed the strongest relationship to subjective and objective rehabilitation outcomes.

APPENDIX A- Tables

Table 1.
TBI and Significant Other Group Demographic Characteristics

Variables	*M*	*SD*	Minimum	Maximum
TBI group				
Age (years)	45.3	12.8	20	70
Education (years)	11.6	1.8	8	16
Duration of PTA (days)	25.4	17.3	0	76
Time to follow commands (days)	7.5	10.0	.5	41
Time since injury (years)	10.3	5.8	1.63	19.6
WTAR estimated FSIQ	84.9	9.8	69	109
SDMT written (z score)	-1.6	1.2	-4.4	1.6
Significant Other (SO) group				
Age (years)	51.4	14.7	21	86
Education (years)	12.6	2.4	7	19
Days per week with survivor	5.1	2.3	0	7
WTAR estimated FSIQ	89.1	10.4	71	119
SDMT written (z score)	-0.8	1.2	-3.7	1.5

Note. WTAR = Wechsler Test of Adult Reading; FSIQ = Full Scale IQ.

Table 2.
Religious Characteristics of TBI Sample (*N* = 88)

Variables	
Religious denomination (%)	
Refused/missing	10.2%
Baptist	34.1%
Non-denominational Christian/Protestant	29.5%
Apostolic/Pentecostal/Sanctified	5.7%
Catholic/Lutheran	6.8%
No religious affiliation	5.7%
Spiritual, not religious	3.4%
Agnostic	1.1%
Islamic	1.1%
Other	3.3%
Religious philosophy (%)	
Pantheistic	41.2%
Theistic	44.7%
Deistic	2.4%
Agnostic	10.6%
Atheistic	1.2%
Religious importance (%)	
A great deal	44.3%
Quite a bit	23.9%
Somewhat	22.7%
Not at all	9.1%
Religious adherence (%)	
A great deal	18.2%
Quite a bit	27.3%
Somewhat	39.8%
Not at all	14.8%

Table 3. Descriptive statistics: outcomes and psychosocial predictors.

Variable	*Mean*	*SD*	*Range*
Outcome measures			
SWLS	17.5	7.7	5 – 35
BSI-18 GSI	56.0	10.6	36 – 81
BRFSS combined health outcome	2.4	1.3	0 – 6
PART-O self report	30.3	12.6	9 – 60
PART-O SO report	29.2	11.6	9 – 61
PCRS- self-report	113.1	19.8	69 – 150
PCRS- SO report	105.9	23.1	51 – 145
Psychosocial predictors			
SPS-12	45.9	6.9	29 – 60
CISS SF Active coping	23.3	5.3	13 – 35
CISS SF Emotional coping	20.1	6.6	7 – 35
CISS SF Avoidant coping	16.9	5.2	7 – 31
PANAS Negative Affectivity	15.1	6.6	10 – 42
PANAS Positive Affectivity	32.9	8.6	14 – 49
Health behaviors			
Negative health behaviors	9.6	6.9	2 – 38
Positive health behaviors	14.5	4.3	3 – 24
Health behavior difference	4.9	7.5	-29 – 18

Note: SO = significant other; SWLS = Satisfaction with Life scale; BSI-18 GSI = Brief Symptom Inventory, Global Symptom Index; BRFSS = Behavior Risk Factor Surveillance System; PART-O = Participation Objective; PCRS = Patient Competency Rating Scale; SPS-12 = Social Provision Scale; CISS = Coping Inventory for Stressful Situations, Short Form; PANAS = Positive and Negative Affectivity Scale.

Table 4. Descriptive statistics: Religious/spiritual measures

Variable	*Mean*	*SD*	*Range*
Religious/Spiritual measures			
Public religious practice	3.8	2.9	0 – 10
Private religious practice	12.9	5.7	0 – 20
RCOPE Positive religious coping	15.4	4.0	5 – 20
RCOPE Negative religious coping*	5.8	2.4	4 – 16
SWBS Total score	96.3	15.6	55 – 120
SWBS Existential well-being	50.9	8.6	29 – 60
SWBS Religious well-being	44.6	9.2	19 – 60
PBS total	40.7	14.5	0 – 68
PBS self-efficacy	13.7	6.0	0 – 24
PBS spirituality	7.4	3.8	0 – 12
PBS compassion	10.8	3.9	0 – 16
PBS faith in people	8.8	4.3	0 – 6
PBS perceived detriment	13.3	7.7	0 – 32

Note: RCOPE = Religious coping inventory; SWBS = Spiritual well-being scale; PBS = Perceived Benefit Scale.

Table 5. Descriptive correlations of demographic and outcome variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. SWLS	1.00													
2. BSI-GSI	-.47**	1.00												
3. Health Outcome	.00	.20*	1.00											
4. PART-O self report	.00	-.07	.00	1.00										
5. PART-O SO report	.11	-.14	.01	.63**	1.00									
6. PCRS self report	.53**	-.57**	-.21*	.39**	.31**	1.00								
7. PCRS SO report	.27*	-.43**	-.13	.38**	.46**	.47**	1.00							
8. Age	.05	-.04	.21*	-.34**	-.27**	.01	-.08	1.00						
9. Age at injury	.03	.00	.31**	-.20*	-.27**	-.03	-.08	.90**	1.00					
10. Education	-.03	-.08	.14	.25*	.06	.11	.00	.17	.21*	1.00				
11. SDMT	.03	-.16	-.17	.21*	.23*	.28*	.26**	.08	.13	.09	1.00			
12. WTAR	.07	-.04	.04	.26**	.15	.24*	.22*	.08	.17	.50**	.33*	1.00		
13. PTA (days)	.17	-.19*	.02	-.01	-.05	.14	.03	-.03	-.11	-.09	-.23*	-.06	1.00	
14. TTFC (days)	.07	-.21*	.03	.09	.05	.23*	.04	-.07	-.14	.07	.04	.23*	.35**	1.00

Note. SWLS = Satisfaction with Life Scale; BSI GSI = Brief Symptom Inventory Global Severity Index; PART-O = Participation Objective; PCRS = Patient Competency Rating Scale; SDMT = Symbol Digit Modalities Test; WTAR = Wechsler Test of Adult Reading; PTA = Post-traumatic Amnesia; TTFC = time to follow commands.
*$p < .05$, **$p < .01$

Table 6. Correlations between Positive Affectivity (PA)/Negative Affectivity (NA) and religiousness/spirituality and outcome.

	Positive Affectivity (PANAS)	Negative Affectivity (PANAS)
Life Satisfaction (SWLS)	.16	-.15
Distress (BSI-18 GSI)	-.01	.46**
Functional ability (PCRS)	.13	-.23*
Participation (PART-O)	-.03	-.22*
Health Behavior Difference	.14	-.17*
Positive Health Behaviors	.05	-.08
Negative Health Behaviors	-.08	.11
Health Outcome	-.22*	.11
Private RP	.23*	.04
Public RP	.14	-.10
RCOPE-Positive	.29**	-.03
RCOPE-Negative	-.02	.42**
SWBS EWB	.30**	-.21*
SWBS RWB	.26**	-.45**
SWBS Total	.33**	-.36**
Perceived Benefit (PBS)	.45**	-.14
Perceived Detriment (PBS)	.01	.33**
CISS Avoidant	.13	.10
CISS Task	.31**	-.12
CISS Emotion	.04	.43**
Time since injury	.18	.14
Injury severity	.06	-.15
Age at injury	-.21*	.00
Cognitive function (SDMT)	-.19*	-.18*
Social Support (SPS)	.22**	-.41**

Note. SWLS = Satisfaction with Life Scale; BSI GSI = Brief Symptom Inventory Global Severity Index; PCRS = Patient Competency Rating Scale, Significant Other report; PART-O = Participation Objective, Significant Other report; RCOPE = Religious Coping Inventory; SWBS = Spiritual Well-Being Scale, EWB = Existential, RWB = Religious Well-Being; PBS = Perceived Benefit Scale; SPS = Social Provision Scale; SDMT = Symbol Digit Modalities Test.
Note. correlation between PA and NA = .07

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

Table 7. Religious practices and spirituality predict rehabilitation outcomes, Part A: Zero-order correlations (below diagonal) and partial correlations controlling for time since injury, injury severity, current cognitive function, and social support (above diagonal).

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Life Satisfaction (SWLS)	--	-.44**	.24*	-.02	-.01	-.06	.13	.18	.09	.48**	.30**	.27**	-.44**
2. Distress (BSI-18 GSI)	-.47**	--	-.37**	-.01	.08	-.01	.01	.05	-.08	-.33**	-.21*	-.16	.35**
3. Functional ability (PCRS)	.27**	-.43**	--	.42**	.01	.09	.07	-.07	.06	.23*	.14	.02	-.19*
4. Participation (PART-O)	.01	-.07	.46**	--	.06	.11	.05	-.20*	.08	.21*	.16	.01	-.10
5. Private RP	-.02	.11	-.02	.00	--	.55**	.59**	-.19*	.62**	.26**	.53**	.41**	.08
6. Public RP	-.04	-.03	.09	.08	.54**	--	.28**	-.15	.30**	.15	.28**	.24*	.06
7. RCOPE-Positive	.11	.05	.03	.01	.60**	.29**	--	-.06	.63**	.28*	.55**	.46**	.16
8. RCOPE-Negative	.09	.21*	-.19*	-.22*	-.15	-.15	.00	--	-.44**	-.27**	-.42**	.01	.02
9. SWBS EWB	.12	-.12	.08	.06	.62**	.33**	.63**	-.41**	--	.50**	.89**	.31**	.12
10. SWBS RWB	.51**	-.45**	.31**	.22*	.19*	.18*	.23*	-.36**	.51**	--	.83**	.20*	-.30**
11. SWBS Total	.33**	-.30**	.21*	.16	.48**	.31**	.52**	-.44**	.88**	.85**	--	.31**	-.07
12. Perceived Benefit (PBS)	.30**	-.23*	.06	.03	.36**	.26**	.44**	-.02	.36**	.33**	.41**	--	-.06
13. Perceived Detriment (PBS)	-.46**	.45**	-.31**	-.16	.10	.03	.18*	.21*	.03	-.45**	-.21*	-.14	--
14. Time since injury	.00	-.05	-.05	-.16	.22*	.08	.13	-.08	.10	.02	.08	.00	.06
15. Injury severity	.07	-.21*	.04	.05	-.17	-.04	-.12	-.07	-.11	.09	-.05	.05	-.01
16. Age at injury	.03	.00	-.08	-.19*	-.05	-.02	-.11	-.10	-.08	-.07	-.10	-.13	-.07
17. Cognitive function (SDMT)	.02	-.16	.26**	.23*	-.07	-.07	-.16	-.32**	-.09	.04	-.05	-.17*	-.25**
18. Social Support (SPS)	.19*	-.35**	.25**	.11	-.03	.11	.02	-.28**	.23*	.51**	.42**	.33**	-.40**

Note. SWLS = Satisfaction with Life Scale; BSI GSI = Brief Symptom Inventory Global Severity Index; PCRS = Patient Competency Rating Scale; PART-O = Participation Objective; RP = Religious Practice; RCOPE = Religious Coping Inventory; SWBS = Spiritual Well-Being Scale, EWB = Existential, RWB = Religious Well-Being; PBS = Perceived Benefit Scale; SDMT = Symbol Digit Modalities Test; SPS = Social Provision Scale.
*$p < .05$, **$p < .01$.

Table 8. Religious practices and spirituality predict rehabilitation outcomes, Part B: Zero-order correlations (below diagonal) and partial correlations controlling for time since injury, injury severity, current cognitive function, and general coping style (above diagonal).

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Life Satisfaction (SWLS)	--	-.34**	.15	-.09	.12	.26**	.04	.37**	.21*	.28**	-.34**	.05	.33**
2. Distress (BSI-18 GSI)	-.47**	--	-.29**	.05	-.01	-.02	-.06	-.22*	-.15	-.28**	.17	-.23*	-.18*
3. Functional ability (PCRS)	.27**	-.43**	--	.38**	.04	-.02	.02	.12	.06	.00	-.08	.11	.02
4. Participation (PART-O)	.00	-.07	.46**	--	-.02	.18*	.03	.11	.08	-.09	-.05	.03	.04
5. RCOPE-Positive	.11	.05	.03	.01	--	-.07	.62**	.25**	.53**	.36**	.16	-.04**	.06
6. RCOPE-Negative	.09	.21*	-.19*	-.22*	-.00	--	-.46**	-.26**	-.43**	-.08	-.07	.23*	.20
7. SWBS EWB	.12	-.12	.08	.06	.63**	-.41**	--	.50**	.89**	.31**	.16	.15	.13
8. SWBS RWB	.51**	-.45**	.31**	.22*	.19*	-.36**	.51**	--	.82**	.25**	-.18*	.38**	.33**
9. SWBS Total	.33**	-.30**	.21*	.16	.52**	-.44**	.88**	.85**	--	.34**	.01	.30**	.26**
10. Perceived Benefit (PBS)	.30**	-.23*	.06	.03	.44**	-.02**	.36**	.33**	.41**	--	-.20*	.25**	.30**
11. Perceived Detriment (PBS)	-.46**	.45**	-.31**	-.16	.18*	.21*	.03	-.43**	-.21*	-.14	--	-.30**	-.23*
12. Social Support (SPS)	.19*	-.35**	.25**	.11	.02	-.28**	.23*	.51	.42**	.33**	-.40**	--	.21*
13. CISS Avoidant	.22*	.03	-.08	.02	.15	.32**	.12	.17	.17*	.38**	.03	.16	--
14. CISS Task	.21*	-.15	.21*	.22*	.25**	-.07	.19	.35**	.29**	.46**	-.13	.28**	.24**
15. CISS Emotion	-.33**	.53**	-.32**	-.09	.12	.35**	-.13	-.46**	-.31**	.07	.59**	-.25**	.33**
16. Time since injury	.00	-.05	-.05	-.16	.13	-.08	.10	.02	.08	.00	.06	-.06	-.14
17. Injury severity	.07	-.21*	.04	.05	-.12	-.07	-.11	.09	-.05	.05	-.01	.02	-.04
18. Age at injury	.03	.00	-.08	-.19*	-.11	-.10	-.08	-.07	-.10	-.13	-.07	-.11	.02
19. Cognitive function (SDMT)	.03	-.16	.26**	.23*	-.16	-.32**	-.09	.04	-.05	-.17	-.25**	.04	-.24**

Note. SWLS = Satisfaction with Life Scale; BSI GSI = Brief Symptom Inventory Global Severity Index; PCRS = Patient Competency Rating Scale, Significant Other report; PART-O = Participation Objective, Significant Other report; RCOPE = Religious Coping Inventory; SWBS = Spiritual Well-Being Scale, EWB = Existential, RWB = Religious Well-Being; PBS = Perceived Benefit Scale; SPS = Social Provision Scale; CISS = Coping Inventory for Stressful Situations; SDMT = Symbol Digit Modalities Test.
*$p < .05$, **$p < .01$.

Table 9. Religious practices and spirituality predict health behaviors and outcomes: Zero-order correlations (below diagonal) and partial correlations controlling for time since injury, injury severity, current cognitive function, and social support (above diagonal).

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Health Behavior Difference	--	.43**	-.79**	.10	.00	-.11	.11	-.02	.07	.24*	.18*	.21*	-.09
2. Positive Health Behaviors	.42**	--	.18	.05	-.13	-.12	-.13	-.22*	.01	.14	.10	.07	-.15
3. Negative Health Behaviors	-.82**	.15	--	-.06	-.13	.04	-.24*	-.14	-.06	-.16	-.12	-.17	-.01
4. Health Outcome	.04	.05	.00	--	.11	.16	.10	-.12	.02	.01	.02	-.01	-.05
5. Private RP	-.07	-.15	-.07	.04	--	.55**	.59**	-.19*	.62**	.26**	.53**	.41**	.08
6. Public RP	-.14	-.12	.08	.11	.54**	--	.28**	-.15	.30**	.15	.28**	.24*	.06
7. RCOPE-Positive	.03	-.15	-.13	.05	.60**	.29**	--	-.06	.63**	.28**	.55**	.46**	.16
8. RCOPE-Negative	-.11	-.22*	-.03	.01	-.15	-.15	.00	--	-.44**	-.27**	-.42	.01	.02
9. SWBS EWB	.00	.01	.02	-.07	.62**	.33**	.63**	-.41**	--	.50	.89**	.31**	.12
10. SWBS RWB	.20*	.15	-.10	-.11	.19*	.18*	.23*	-.36**	.51**	--	.83**	.20*	-.30**
11. SWBS Total	.10	.10	-.04	-.10	.48**	.31**	.52**	-.44**	.88**	.85**	--	.31**	-.07
12. Perceived Benefit (PBS)	.13	.09	-.07	-.06	.36**	.26	.44**	-.02	.36**	.33**	.41**	--	-.06
13. Perceived Detriment (PBS)	-.13	-.17	.05	.06	.10	.03	.18*	.21*	.03	-.43**	-.21*	-.14	--
14. Time since injury	-.06	-.06	.00	-.18*	.22	.08	.13	-.08	.10	.02	.08	.00	.06
15. Injury severity	.21*	.06	-.20*	.03	-.17	-.04	-.12	-.07	-.11	.09	-.05	.05	-.01
16. Age at injury	-.02	.04	.04	.31**	-.05	-.02	-.11	-.10	-.08	-.07	-.10	-.13	-.07
17. Cognitive function (SDMT)	.32**	.03	-.33**	-.17	-.07	-.07	-.16	-.32**	-.09	.04	-.05	-.17*	-.25**
18. Social Support (SPS)	-.03	.07	.08	-.22*	-.03	.11	.02	-.28**	.23	.51**	.42**	.33**	-.40**

Note. RP = Religious Practice; RCOPE = Religious Coping Inventory; SWBS = Spiritual Well-Being Scale, EWB = Existential, RWB = Religious Well-Being; PBS = Perceived Benefit Scale; SDMT = Symbol Digit Modalities Test; SPS = Social Provision Scale.
*$p < .05$, **$p < .01$.

Table 10. Hierarchical multiple regression analysis: Satisfaction With Life (SWLS)

	R^2	Beta	sr^2	F	df	p	R^2 Change	Sig F Change
Variables								
Model 1	.01			0.23	2, 85	.799	.01	.799
Years from injury		-.01						
Time to follow commands		.07						
Model 2	.01			0.15	4,83	.962	.00	.922
Years from injury		.00						
Time to follow commands		.08						
Age at injury		.03						
SDMT		.03						
Model 3	.04			0.76	5,82	.584	.04	.079
Years from injury		.01						
Time to follow commands		.07						
Age at injury		.06						
SDMT		.02						
SPS		.19						
Model 4	.15			1.97	7,80	.070	.10	.011
Years from injury		-.02	.00					
Time to follow commands		.09	.01					
Age at injury		.07	.00					
SDMT		.02	.00					
SPS		.05	.01					
SWBS		.37	.10**					
Public Religious Practice		-.15	.02					

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

Table 11: Hierarchical multiple regression analysis: General Distress (BSI-GSI)

Variables	R^2	Beta	sr^2	*F*	*df*	*p*	R^2 Change	Sig *F* Change
Model 1	.05			2.03	2,85	.137	.05	.137
Years from injury		.00						
Time to follow commands		-.21						
Model 2	.07			1.52	4,83	.204	.02	.370
Years from injury		-.03						
Time to follow commands		-.20						
Age at injury		-.01						
SDMT written z score		-.15						
Model 3	.19			3.81	5,82	.004	.12	.001
Years from injury		-.06						
Time to follow commands		-.20						
Age at injury		-.06						
SDMT written z score		-.14						
SPS		-.35						
Model 4	.23			3.34	7,80	.004	.04	.147
Years from injury		-.04	.00					
Time to follow commands		-.21	.04*					
Age at injury		-.06	.00					
SDMT written z score		-.14	.02					
SPS		-.26	.05*					
SWBS		-.23	.04*					
Public Religious Practice		.05	.00					

*$p < .05$

Table 12: Hierarchical multiple regression: Functional Abilities (PCRS SO report)

Variables	R^2	Beta	sr^2	*F*	*df*	*p*	R^2 Change	Sig *F* Change
Model 1	.01			0.24	2,85	.790	.01	.790
Years from injury		-.06						
Time to follow commands		.05						
Model 2	.08			1.82	4,83	.134	.08	.039
Years from injury		-.03						
Time to follow commands		.02						
Age at injury		-.11						
SDMT		.27						
Model 3	.13			2.51	5,82	.037	.052	.029
Years from injury		-.02						
Time to follow commands		.02						
Age at injury		-.09						
SDMT		.26						
SPS		.23						
Model 4	.15			2.04	7,80	.060	.02	.418
Years from injury		-.03	.00					
Time to follow commands		.03	.00					
Age at injury		-.08	.01					
SDMT		.27	.07*					
SPS		.17	.03					
SWBS		.13	.01					
Public Religious Practice		.05	.00					

*$p < .05$

Table 13: Hierarchical multiple regression: Participation (PART-O SO report)

Variables	R^2	Beta	sr^2	*F*	*df*	*p*	R^2 Change	Sig *F* Change
Model 1	.03			1.42	2,85	.248	.03	.248
Years from injury		-.18						
Time to follow commands		.08						
Model 2	.13			3.08	4,83	.020	.10	.012
Years from injury		-.17						
Time to follow commands		.04						
Age at injury		-.24						
SDMT		.23						
Model 3	.13			2.52	5,82	.036	.00	.548
Years from injury		-.17						
Time to follow commands		.04						
Age at injury		-.24						
SDMT		.23						
SPS		.06						
Model 4	.16			2.15	7,80	.047	.03	.306
Years from injury		-.19	.02					
Time to follow commands		.05	.01					
Age at injury		-.23	.05*					
SDMT		.24	.05*					
SPS		-.01	.00					
SWBS		.14	.02					
Public Religious Practice		.07	.00					

*$p < .05$.

Table 14. Regression to rehabilitation outcomes: Step 4 includes Religious Well-being (RWB) and Existential Well-being (EWB)

Variables	R^2	Beta	sr^2	*F*	*df*	*p*	R^2 Change	Sig *F* Change
Model 4 (SWLS)	.29			4.75	7,80	< .001	.25	.001
Years from injury		.01	.00					
Time unconscious		.00	.00					
Age at injury		.05	.01					
SDMT		-.01	.00					
SPS		-.10	.01					
SWBS-Religious Well-being		.66	.24***					
SWBS-Existential Well-being		-.20	.03					
Model 4 (BSI-GSI)	.28			4.53	7,80	< .001	.10	.007
Years from injury		-.05	.00					
Time unconscious		-.15	.02					
Age at injury		-.05	.00					
SDMT		-.12	.01					
SPS		-.17	.02					
SWBS-Religious Well-being		-.41	.09**					
SWBS-Existential Well-being		.11	.01					
Model 4 (PCRS-SO)	.18			2.51	7,80	.022	.05	.104
Years from injury		-.02	.00					
Time unconscious		-.02	.00					
Age at injury		-.09	.01					
SDMT		.25	.06*					
SPS		.10	.01					
SWBS-Religious Well-being		.29	.04*					
SWBS-Existential Well-being		-.07	.00					
Model 4 (PART-O-SO)	.17			2.37	7,80	.030	.04	.163
Years from injury		-.17	.02					
Time unconscious		.01	.00					
Age at injury		-.24	.05*					
SDMT		.22	.05*					
SPS		-.06	.01					
SWBS-Religious Well-being		.25	.03					
SWBS-Existential Well-being		-.04	.00					

Note. SWLS = Satisfaction with Life Scale; SDMT = Symbol Digit Modalities Test; SPS = Social Provision Scale; SWBS = Spiritual Well-Being Scale; BSI-GSI = Brief Symptom Inventory, Global Severity Index; PCRS-SO = Patient Competency Rating Scale, Significant-Other report; PART-O = Participation Objective Instrument, Significant-Other report.
***$p < .001$. **$p < .01$, *$p < .05$

Table 15. Mediation analyses: Social support, benefit finding, and task oriented coping

Step 1 predictor-mediator	*β*	R^2	*p*	*Step 2 predictor - outcome*	*β*	R^2	*p*	*Step 3 Test of mediation*	R^2	*β*	sr^2	*p*	*Mediation criteria met?*
RWB-SPS	.51	.26	.001	RWB-PCRS	.31	.10	.003	RWB	.11	.25	.07	.007	partial
								SPS		.12	.00		*Δβ* = .06
				RWB-BSI	-.53	.21	.001	RWB	.23	-.37	.11	.001	partial
								SPS		-.16	.02		*Δβ* =.07
RWB-PBS	.33	.11	.002	RWB-SWLS	.51	.26	.001	RWB	.28	.46	.18	.001	partial
								PBS		.15	.02		*Δβ* =.05
				RWB-BSI	-.46	.21	.001	RWB	.21	-.42	.16	.001	Partial
								PBS		-.09	.01		*Δβ* =.04
RWB-CISS task	.35	.12	.001	RWB-PART	.22	.05	.038	RWB	.07	.17	.02	.043	Full
								CISS task		.16	.02		*Δβ* =.05
				RWB-PCRS	.35	.12	.001	RWB	.11	.28	.07	.007	Partial
								CISS task		.11	.01		*Δβ* =.07

Table 16. Mediation analyses: Negative emotional coping and perceived detriment as pathways

Step 1 predictor-mediator	*β*	R^2	*p*	*Step 2 predictor - outcome*	*β*	R^2	*p*	*Step 3 Test of mediation*	R^2	*β*	sr^2	*p*	*Mediation criteria met?*
RWB-CISS emotion	-.33	.22	.001	RWB-SWLS	.51	.26	.001	RWB	.25	.45	.16	.001	Partial
								CISS emo		-.12	.01		*Δβ* =.06
				RWB-BSI	-.45	.21	.001	RWB	.34	-.27	.06	.009	Partial
								CISS emo		.41	.13		*Δβ* =.18
RWB-PBS detriment	-.43	.19	.001	RWB-SWLS	.51	.26	.001	RWB	.33	.38	.11	.001	Partial
								PBS Neg		.30	.07		*Δβ* =.13
				RWB-BSI	-.45	.21	.001	RWB	.29	-.32	.08	.002	Partial
								PBS Neg		.32	.08		*Δβ* =.13

Table 17. Hierarchical multiple regression with coping: Satisfaction With Life (SWLS)

Variables	R^2	Beta	sr^2	*F*	*df*	*p*	R^2 Change	Sig *F* Change
Model 1	.00			0.06	1,86	.808	.00	.808
Age at injury		-.03						
Model 2	.01			0.20	3,84	.894	.01	.759
Age at injury		-.03						
Time to follow commands		.08						
SDMT		.03						
Model 3	.16			3.06	5,82	.014	.15	.001
Age at injury		.02						
Time to follow commands		.03						
SDMT		-.02						
CISS task-oriented		.22						
CISS emotion-oriented		-.34						
Model 4	.22			3.26	7,80	.004	.06	.041
Age at injury		.06	.01					
Time to follow commands		.04	.00					
SDMT		.02	.00					
CISS task-oriented		.08	.01					
CISS emotion-oriented		-.35	.11**					
RCOPE Positive Coping		.02	.00					
PBS Total		.29	.05*					

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

Table 18. Hierarchical multiple regression with coping: General Distress (BSI-GSI)

Variables	R^2	Beta	sr^2	*F*	*df*	*p*	R^2 Change	Sig *F* Change
Model 1	.00			0.00	1,86	.971	.00	.971
Age at injury		.00						
Model 2	.07			2.02	3,84	.117	.07	.053
Age at injury		-.01						
Time to follow commands		-.21						
SDMT		-.15						
Model 3	.34			8.46	5,82	.001	.27	.001
Age at injury		.00						
Time to follow commands		-.16						
SDMT		-.07						
CISS task-oriented		-.16						
CISS emotion-oriented		.51						
Model 4	.40			7.58	7,80	.001	.06	.025
Age at injury		-.03	.00					
Time to follow commands		-.15	.02					
SDMT		-.10	.01					
CISS task-oriented		-.04	.00					
CISS emotion-oriented		.51	.25***					
RCOPE Positive Coping		.09	.01					
PBS Total		-.30	.06**					

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

Table 19. Hierarchical multiple regression with coping: SO report of functional abilities (PCRS)

Variables	R^2	Beta	sr^2	*F*	*df*	*p*	R^2 Change	Sig *F* Change
Model 1	.01			0.49	1, 86	.485	.01	.485
Age at injury		-.08						
Model 2	.08			2.42	3,84	.072	.07	.039
Age at injury		-.11						
Time to follow commands		.01						
SDMT		.27						
Model 3	.21			4.33	5,82	.002	.13	.002
Age at injury		-.12						
Time to follow commands		-.03						
SDMT		.23						
CISS task-oriented		.23						
CISS emotion-oriented		-.30						
Model 4	.21			3.04	7,80	.007	.00	.948
Age at injury		-.12	.00					
Time to follow commands		-.02	.00					
SDMT		.24	.05*					
CISS task-oriented		.23	.04*					
CISS emotion-oriented		-.30	.09**					
RCOPE Positive Coping		.04	.00					
PBS Total		-.02	.00					

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

Table 20. Hierarchical multiple regression with coping: community participation (PART-O)

Variables	R^2	Beta	sr^2	*F*	*df*	*p*	R^2 Change	Sig *F* Change
Model 1	.04			3.37	1,86	.070	.04	.070
Age at injury		-.19						
Model 2	.10			3.18	3,84	.028	.06	.055
Age at injury		-.23						
Time to follow commands		.04						
SDMT		.26						
Model 3	.16			3.13	5,82	.012	.06	.064
Age at injury		-.24						
Time to follow commands		-.03						
SDMT		.25						
CISS task-oriented		.24						
CISS emotion-oriented		-.07						
Model 4	.17			2.28	7,80	.036	.01	.741
Age at injury		-.25	.06*					
Time to follow commands		-.03	.00					
SDMT		.24	.05*					
CISS task-oriented		.28	.06*					
CISS emotion-oriented		-.07	.00					
RCOPE Positive Coping		-.01	.00					
PBS Total		-.09	.00					

*$p < .05$.

Table 21: Regression with 4 outcomes: Step 4 includes negative religious coping and perceived detriment

Variables	R^2	Beta	sr^2	*F*	*df*	*p*	R^2 Change	Sig *F* Change
Model 4 (SWLS)	.30			4.93	7,80	.001	.14	.001
Age at injury		.02	.00					
Time unconscious		.06	.00					
SDMT		-.02	.00					
CISS task-oriented		.18	.03					
CISS emotion-focused		-.19	.02					
RCOPE Negative coping		.25	.05*					
PBS detriment		-.38	.09**					
Model 4 (BSI-GSI)	.36			6.42	7,80	.001	.02	.300
Age at injury		.01	.00					
Time unconscious		-.17	.03					
SDMT		-.05	.00					
CISS task-oriented		-.13	.02					
CISS emotion-focused		.41	.10**					
RCOPE Negative coping		-.01	.00					
PBS detriment		.18	.02					
Model 4 (PCRS-SO)	.22			3.13	7,80	.006	.01	.732
Age at injury		-.13	.01					
Time unconscious		-.03	.00					
SDMT		.21	.04					
CISS task-oriented		.21	.06*					
CISS emotion-focused		-.23	.03					
RCOPE Negative coping		-.02	.00					
PBS detriment		-.10	.01					
Model 4 (PART-O-SO)	.19			2.60	7,80	.018	.03	.294
Age at injury		-.26	.06*					
Time unconscious		-.03	.00					
SDMT		.19	.03					
CISS task-oriented		.21	.04*					
CISS emotion-focused		.03	.00					
RCOPE Negative coping		-.17	.02					
PBS detriment		-.09	.00					

Note. SDMT = Symbol Digit Modalities Test; CISS = Coping Inventory for Stressful Situations; RCOPE = Religious Coping; PBS = Perceived Benefit Scale; SWLS = Satisfaction with Life Scale; BSI-GSI = Brief Symptom Inventory, Global Severity Index; PCRS-SO = Patient Competency Rating Scale, Significant-Other report; PART-O = Participation Objective Instrument, Significant-Other report. $^{**}p < .01$, $^{*}p < .05$

Table 22: Canonical correlation analysis of religiousness/spirituality and rehabilitation outcome.

	First canonical variate	
	Correlation	Coefficient
Rehabilitation Outcome Set		
SWLS	.85	.65
BSI-GSI	-.75	-.44
PART-O (SO report)	.39	.35
PCRS (SO report)	.52	-.04
Religious/Spirituality Predictor set		
Public religious practice	.08	.02
Private religious practice	-.06	-.11
Religious Well-being	.95	1.10
Existential Well-being	.21	-.29

Note: SWLS = Satisfaction with Life Scale; BSI-GSI = Brief Symptom Inventory, Global Severity Index; PART-O SO = Participation Objective, Significant Other report; PCRS = Patient Competency Rating Scale, significant other report.

Table 23. Relationships between health behaviors and religious/spiritual and outcome variables

	Life satisfaction (SWLS)	Distress (BSI-18 GSI)	Functional ability (PCRS)	Participation (PART-O)
Positive health behaviors	.11	-.09	.16	-.04
Negative health behaviors	-.14	.08	-.12	-.19*
Health behavior difference score	.21*	-.13	.18*	.14

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

Table 24. Mediation analyses: Health behavior difference (HBD) as pathway between religious well-being and outcome

Step 1 predictor-mediator	*β*	R^2	*p*	*Step 2 predictor - outcome*	*β*	R^2	*p*	*Step 3 Test of mediation*	R^2	*β*	sr^2	*p*	*Mediation criteria met?*
RWB-HBD	.20	.04	.033	RWB-SWLS	.51	.26	.001	RWB	.27	.48	.22	.001	Partial
								HBD		.12	.01		*Δβ* =.02
				RWB-PCRS	.31	.10	.001	RWB	.10	.30	.09	.009	Partial
								HBD		.08	.01		*Δβ* =.02

APPENDIX B- Participant Measures

RELIGIOUS PRACTICES AND ATTITUDES QUESTIONNAIRE (RPAQ)
SURVIVOR REPORT

Instructions: Instructions: The following items concern your religious and spiritual beliefs and experiences. Some of the following statements refer to God. If this word is not a comfortable one, please substitute another idea that calls to mind the divine or holy for you.

Answer the following 2 questions using this Likert scale:	**Not at all**	**Somewhat**	**Quite a bit**	**A great deal**
1. How important is religion in your life?	1	2	3	4
2. How much do you adhere to the teachings and practices of your religion?	1	2	3	4

Answer the following 6 questions using this Likert scale:	**Never**	**Less than yearly**	**1-2 times/ year**	**Several times/yr- monthly**	**Weekly**	**Several times/ week**
3. How often do you attend religious services?	0	1	2	3	4	5
4. Besides religious services, how often do you take part in other activities at a place of worship?	0	1	2	3	4	5
5. How often do you pray or meditate privately in places other than at church or synagogue?	0	1	2	3	4	5
6. How often do you watch or listen to religious programs on TV or radio?	0	1	2	3	4	5
7. How often do you read the Bible or other religious/ spiritual literature?	0	1	2	3	4	5
8. How often are prayers or grace said before or after meals in your home?	0	1	2	3	4	5

9. With which of the following statements do you most agree?

☐ Pantheistic: I believe that God is all around us. I look to nature to see God. I see God in every person I meet. I believe God is involved in everything we do and touches every person.

☐ Theistic: I believe God is a personal being who reigns over all creation, who looks after us and listens to our prayers and praise. He responds to our needs and protects us from evil.

☐ Deistic: I believe God created the world and everything in it and then left us to fend for ourselves. God is no longer involved in the happenings of this world and looks down on us from above without ever intervening in our lives

☐ Agnostic: I am not sure what or who God is but I do think that it is beyond our understanding to comprehend such ultimate things. I often wonder if there is a God but I do not think that I will ever know for sure.

☐ Atheistic: I do not believe there is a God. I do not believe that God created the world or controls our affairs. There is no higher power that can intervene in our lives.

SPIRITUAL WELL-BEING SCALE (SWBS)

SURVIVOR REPORT

Instructions: Some of the following statements refer to God. If this word is not a comfortable one, please substitute another idea that calls to mind the divine or holy for you. For each of the following statements, please indicate the degree to which you agree or disagree:

	* Reverse Coded	**Strongly Agree**	**Mostly Agree**	**Sometimes Agree**	**Sometimes Disagree**	**Mostly Disagree**	**Strongly Disagree**
1.	I don't find much satisfaction in private prayer with God.	1	2	3	4	5	6
2.	I don't know who I am, where I came from, or where I'm going.	1	2	3	4	5	6
3.	I believe that God loves me and cares about me.*	1	2	3	4	5	6
4.	I feel that life is a positive experience.*	1	2	3	4	5	6
5.	I believe that God is impersonal and not interested in my daily situations.	1	2	3	4	5	6
6.	I feel unsettled about my future.	1	2	3	4	5	6
7.	I have a personally meaningful relationship with God. *	1	2	3	4	5	6
8.	I feel very fulfilled and satisfied with life. *	1	2	3	4	5	6
9.	I don't get much personal strength and support from my God.	1	2	3	4	5	6
10.	I feel a sense of well-being about the direction my life is headed in. *	1	2	3	4	5	6
11.	I believe that God is concerned about my problems. *	1	2	3	4	5	6
12.	I don't enjoy much about life.	1	2	3	4	5	6
13.	I don't have a personally satisfying relationship with God.	1	2	3	4	5	6
14.	I feel good about my future. *	1	2	3	4	5	6

	* Reverse Coded	**Strongly Agree**	**Mostly Agree**	**Sometimes Agree**	**Sometimes Disagree**	**Mostly Disagree**	**Strongly Disagree**
15.	My relationship with God helps me not to feel lonely. *	1	2	3	4	5	6
16.	I feel that life is full of conflict and unhappiness.	1	2	3	4	5	6
17.	I feel most fulfilled when I am in close communication with God. *	1	2	3	4	5	6
18.	Life doesn't have much meaning.	1	2	3	4	5	6
19.	My relation with God contributes to my sense of well-being. *	1	2	3	4	5	6
20.	I believe there is some real purpose for my life. *	1	2	3	4	5	6

BRIEF RCOPE
SURVIVOR REPORT

Instructions: For each of the following statements, please indicate the extent to which you agree:

		A great deal	Quite a bit	Somewhat	Not at all
1.	I think about how my life is part of a larger spiritual force.	1	2	3	4
2.	I work together with God as partners to get through hard times.	1	2	3	4
3.	I look to God for strength, support, and guidance in crises.	1	2	3	4
4.	I try to find the lesson from God in crises.	1	2	3	4
5.	I confess my sins and ask for God's forgiveness.	1	2	3	4
6.	I feel that stressful situations are God's way of punishing me for my sins or lack of spirituality.	1	2	3	4
7.	I wonder whether God has abandoned me.	1	2	3	4
8.	I try to make sense of the situation and decide what to do without relying on God.	1	2	3	4
9.	I question whether God really exists.	1	2	3	4
10.	I express anger at God for letting terrible things happen.	1	2	3	4

Positive Religious/ Spiritual Coping Subscale: 1-5
Negative Religious/ Spiritual Coping Subscale: 6-10

PERCEIVED BENEFIT SCALE (PBS)
SURVIVOR REPORT

Instructions: Instructions: Please indicate how well each of the following statements describes your experience:

Enhanced self-efficacy: 1, 7, 9, 15, 21, 25
Increased spirituality: 5, 11, 19
Increased compassion: 3, 8, 10, 17
Increased faith in people: 4, 13, 16, 22
Unscored items to reduce bias (Detriment): 2, 6, 12, 14, 18, 20, 23, 24

		Not at all like my experience	Very little like my experience	Somewhat like my experience	Much like my experience	Very much like my experience
1.	My experience with brain injury taught me I can handle anything.	0	1	2	3	4
2.	As a result of my experience with brain injury, I am more afraid that bad things will happen to me.	0	1	2	3	4
3.	As a result of my experience with brain injury, I am more sensitive to the needs of others.	0	1	2	3	4
4.	Because of my experience with brain injury, I learned how good people can be.	0	1	2	3	4
5.	Because of my experience with brain injury, I have greater faith in God.	0	1	2	3	4
6.	As a result of my experience with brain injury, I feel worse about myself.	0	1	2	3	4
7.	Because of my experience with my brain injury, I learned how to cope more effectively.	0	1	2	3	4
8.	Because of my experience with brain injury, I am more compassionate to those in similar situations.	0	1	2	3	4
9.	Because of my experience with brain injury, I am a more assertive person.	0	1	2	3	4
10.	Because of my experience with brain injury, I am more understanding of those in need.	0	1	2	3	4

11.	Because of my experience with brain injury, I am more spiritual.	0	1	2	3	4
12.	As a result of my experience with brain injury, I trust people less.	0	1	2	3	4
13.	Because of my experience with brain injury, I am more aware of how much people care for one another.	0	1	2	3	4
14.	As a result of my experience with brain injury, I am more withdrawn from people.	0	1	2	3	4
15.	I am a more effective person because of what I went through with my brain injury.	0	1	2	3	4
16.	Because of my experience with brain injury, I have a greater faith in other people.	0	1	2	3	4
17.	Because of my experience with brain injury, I show more caring to others.	0	1	2	3	4
18.	As a result of my experience with brain injury, I was harmed financially.	0	1	2	3	4
19.	Because of my experience with brain injury, I am more religious.	0	1	2	3	4
20.	As a result of my experience with brain injury, I lost all faith in other people.	0	1	2	3	4
21.	My experience with brain injury made me a stronger person.	0	1	2	3	4
22.	My experience with brain injury taught me that people will always be there for you.	0	1	2	3	4
23.	As a result of my experience with brain injury, it is harder for me to get close to people.	0	1	2	3	4
24.	As a result of my experience with brain injury, my life is more complicated.	0	1	2	3	4
25.	Because of my experience with brain injury, I am a more capable person.	0	1	2	3	4

COPING INVENTORY FOR STRESSFUL SITUATIONS- SHORT FORM (CISS-SF)
SURVIVOR REPORT

Instructions: The following are ways people react to various difficult, stressful, or upsetting situations. Please indicate a number from 1 to 5 for each item. Indicate how much you engage in these types of activities when you encounter a difficult, stressful or upsetting situation.

		Not at all	Very little	Somewhat	Quite a bit	Very much
1.	In stressful situations, I take some time off and get away from the situation.	1	2	3	4	5
2.	In difficult situations, I focus on the problems and see how I can solve it.	1	2	3	4	5
3.	In difficult situation, I blame myself for having gotten into this situation	1	2	3	4	5
4.	In upsetting situations, I treat myself to a favorite food or snack.	1	2	3	4	5
5.	In stressful situations, I feel anxious about not being able to cope.	1	2	3	4	5
6.	In difficult situations, I think about how I solved similar problems.	1	2	3	4	5
7.	In stressful situations, I visit a friend.	1	2	3	4	5
8.	In difficult situations, I determine a course of action and follow it.	1	2	3	4	5
9.	In stressful situations, I buy myself something.	1	2	3	4	5
10.	In upsetting situations, I blame myself for being too emotional about the situation.	1	2	3	4	5
11.	In difficult situations, I work to understand the situation.	1	2	3	4	5
12.	In difficult situations, I become very upset.	1	2	3	4	5
13.	In difficult situations, I take corrective action immediately.	1	2	3	4	5
14.	In difficult situations, I blame myself for not knowing what to do.	1	2	3	4	5
15.	In upsetting situations, I	1	2	3	4	5

		Not at all	Very little	Somewhat	Quite a bit	Very much
	spend time with a special person.					
16.	In difficult situations, I think about the event and learn from my mistakes.	1	2	3	4	5
17.	In difficult situations, I wish that I could change what happened or how I felt.	1	2	3	4	5
18.	In stressful situations, I go out for a snack or a meal.	1	2	3	4	5
19.	In stressful situations, I analyze the problem before reacting.	1	2	3	4	5
20.	In upsetting situations, I focus on my general inadequacies.	1	2	3	4	5
21.	In upsetting situations, I phone a friend.	1	2	3	4	5

Task oriented: 2, 6, 8, 11, 13, 16, 19
Emotion oriented: 3, 5, 10, 12, 14, 17, 20
Avoidance oriented: 1, 4, 7, 9, 15, 18, 21

SOCIAL PROVISIONS SCALE– 12 (SPS-12)
SURVIVOR REPORT

Instructions: In answering the following questions, think about your current relationships with friends, family members, co-workers, community members, and so on. Please indicate to what extent each statement describes your current relationships with other people. Use the following scale to indicate your opinion:

	* Reverse coded	**Strongly Disagree**	**Disagree**	**Agree**	**Strongly Agree**
1.	There are people I can depend on to help me if I really need it.	1	2	3	4
2.	There is no one I can turn to for guidance in times of stress*	1	2	3	4
3.	There are people who enjoy the same social activities I do.	1	2	3	4
4.	I feel personally responsible for the well-being of another person.	1	2	3	4
5.	I do not think other people respect my skills and abilities.*	1	2	3	4
6.	If something went wrong, no one would come to my assistance.*	1	2	3	4
7.	I have close relationships that provide me with a sense of emotional security and well-being.	1	2	3	4
8.	I have relationships where my competence and skill are recognized.	1	2	3	4
9.	There is no one who shares my interests and concerns.*	1	2	3	4
10.	There is no one who really relies on me for their well-being.*	1	2	3	4
11.	There is a trustworthy person I could turn to for advice if I were having problems.	1	2	3	4
12.	I feel a strong emotional bond with at least one other person.	1	2	3	4

SATISFACTION WITH LIFE SCALE (SWLS)
SURVIVOR REPORT

Instructions: I am going to read five statements with which you may agree or disagree. Your answers can be Strongly Disagree, Disagree, Somewhat Disagree, Neither Disagree or Agree, Somewhat agree, Agree, Strongly Agree. Please be open and honest in your responding.

	Strongly Disagree	**Disagree**	**Slightly Disagree**	**Neither Agree or Disagree**	**Slightly Agree**	**Agree**	**Strongly Agree**
1. In most ways my life is close to my ideal.	1	2	3	4	5	6	7
2. The conditions of my life are excellent.	1	2	3	4	5	6	7
3. I am satisfied with my life.	1	2	3	4	5	6	7
4. So far I have gotten the important things I want in life.	1	2	3	4	5	6	7
5. If I could live my life over, I would change almost nothing.	1	2	3	4	5	6	7

BRIEF SYMPTOM INVENTORY (BSI-18)
SURVIVOR REPORT

Instructions: This questionnaire contains a list of problems people sometimes have. Listen to each statement carefully and say the number of the response that best describes HOW MUCH THAT PROBLEM HAS DISTRESSED OR BOTHERED YOU DURING THE PAST 7 DAYS INCLUDING TODAY.

Please remember, I want to know how much this problem has bothered you in the past 7 days including today, not how often it has happened.

	How much were you distressed by:	**Not at all**	**A little bit**	**Moderately**	**Quite a bit**	**Extremely**
1.	Faintness or dizziness	0	1	2	3	4
2.	Feeling no interest in things	0	1	2	3	4
3.	Nervousness or shakiness inside	0	1	2	3	4
4.	Pains in heart or chest	0	1	2	3	4
5.	Feeling lonely	0	1	2	3	4
6.	Feeling tense or keyed up	0	1	2	3	4
7.	Nausea or upset stomach	0	1	2	3	4
8.	Feeling blue	0	1	2	3	4
9.	Suddenly scared for no reason	0	1	2	3	4
10.	Trouble getting your breath	0	1	2	3	4
11.	Feelings of worthlessness	0	1	2	3	4
12.	Spells of terror or panic	0	1	2	3	4
13.	Numbness or tingling in parts of your body	0	1	2	3	4
14.	Feeling helpless about the future	0	1	2	3	4
15.	Feeling so restless you couldn't sit still	0	1	2	3	4
16.	Feeling weak in parts of your body	0	1	2	3	4
17.	Thoughts of ending your life	0	1	2	3	4
18.	Feeling fearful	0	1	2	3	4

PARTICIPATION OBJECTIVE (PART-O)
SO REPORT OF SURVIVOR (SURVIVOR REPORTS AS WELL)

Instructions: The following questions refer to your friend or family member (brain injury survivor's) daily activities. Please answer each question using these response categories.

		None	1-4 hours	5-9 hours	10-19 hours	20-34 hours	35 or more hours
1.	In a typical week, how many hours do you/they spend in active homemaking, including cleaning, cooking and raising children? (homemaking)	0	1	2	3	4	5
2.	In a typical week, how many hours do you/they spend in home maintenance activities, such as home repairs, home improvements and gardening? (home maintenance)	0	1	2	3	4	5
3.	In a typical week, how many hours do you/ they spend in school working toward a degree or in an accredited technical training program, including hours in class and studying? (school)	0	1	2	3	4	5
4.	In a typical week, how many hours do you/ they spend working for money, whether in a job or self-employed? (working)	0	1	2	3	4	5
5.	In a typical week, how many hours do you/ they ride in trains, buses, taxis and other public transportation? This includes public transportation for people with disabilities. (public transportation)	0	1	2	3	4	5
6.	In a typical week, how many hours do you/ they drive or ride in a car? This includes all private transportation. (private transportation)	0	1	2	3	4	5
		None	**1-4 times**	**5-9 times**	**10-19 times**	**20-34 times**	**35 or more times**
7.	In a typical week, how many times do you/ they socialize with friends, in person or by phone? (socializing with friends)	0	1	2	3	4	5
8.	In a typical week, how many times do you/they socialize with	0	1	2	3	4	5

	family and relatives, in person or by phone? (socializing with family)						
9.	In a typical week, how many times do you/ they give emotional support to other people, that is listen to their problems or help them with their troubles? (emotional support)	0	1	2	3	4	5
10.	In a typical week, how many times do you/ they use the Internet for communication, such as for e-mail, visiting chat rooms or instant messaging? (electronic communication)	0	1	2	3	4	5

		None	**1-2 days**	**3-4 days**	**5-6 days**	**7 days**
11.	In a typical week, how many days do you/ they get out of the house and go somewhere? It could be anywhere – it doesn't have to be anyplace "special". (leaving the house)	0	1	2	3	4

		I rarely leave my bed	**I rarely leave my room - but I do get out of bed**	**I rarely leave my house - but I do get out of my room**	**I rarely leave my block or neighborhood - but I do get out of the house**	**I travel beyond my block or neighborhood**
12.	What best describes how you/ they spend your/ their days in a typical month? (spending days)	0	1	2	3	4

		None	**1-4 times**	**5-9 times**	**10-19 times**	**20-34 times**	**35 or more times**
13.	In a typical month, how many times do you/ they eat in restaurants? (eating out)	0	1	2	3	4	5
14.	In a typical month, how many times do you/ they go shopping? Include grocery shopping, as well as shopping for household necessities, or just for fun. (shopping)	0	1	2	3	4	5
15.	In a typical month, how many times do you/ they engage in sports or exercise outside the home? Include activities like running, bowling, going to the gym, swimming, walking for exercise and the like. (sports and exercise)	0	1	2	3	4	5

		None	1 time	2 times	3 times	4 times	5 or more times
16.	In a typical month, how many times do you/ they do volunteer work? (volunteering)	0	1	2	3	4	5
17.	In a typical month, how many times do you/ they go to the movies? (movies)	0	1	2	3	4	5
18.	In a typical month, how many times do you/ they attend sports events in person, as a spectator? (spectator sports)	0	1	2	3	4	5
19.	In a typical month, how many times do you/ they attend religious or spiritual services? Include places like churches, temples and mosques. (religious services)	0	1	2	3	4	5
20.	In a typical month, how many times do you/ they participate in a club or organization, such as the PTA, a choir, sorority, hobby group, neighborhood organization, brain injury or other support group? (organizations)	0	1	2	3	4	5

		Yes	No
21.	Now, I'd like you to think about the last three months. In that time, have you/ they taken adult education classes, GED classes, continuing education, special courses, or used other opportunities for learning, forinstance, seminars or conferences? (adult education)	1	2
22.	Switching, now, to a somewhat different kind of question . . . Do you/ they live with their spouse or significant other? (spouse)	1	2
23.	Are you/ they currently involved in an ongoing intimate, that is, romantic or sexual, relationship? (intimate relationship)	1	2
24.	[Not including your spouse or significant other], do you/ they have a close friend in whom you confide? (close friend)	1	2

HEALTH BEHAVIORS AND OUTCOMES (MODIFIED BRFSS)
SO REPORT OF SURVIVOR (SURVIVOR REPORTS AS WELL)

General Health

1. During the past 30 days, for about how many days did poor physical or mental health keep you/ them from doing your usual activities, such as self-care, work or recreation?

___ days in past 30 days
7 DK
9 refused

2a. Have you/ they ever been told by a doctor that you have diabetes?

1 yes
2 no
7 DK
9 refused

2b. If yes, do you/ they take any medicine to control your diabetes?

1 yes
2 no
7 DK
9 refused

3a. Have you/ they ever been told by a doctor, nurse, or other health professional that you/ they have high blood pressure?

1 yes
2 no
7 DK
9 refused

3b. If yes, are you/ they currently taking any medicine for your high blood pressure?

1 yes
2 no
7 DK
9 refused

3c. If yes, did you/ they take any blood pressure medicine today?

1 yes
2 no
7 DK
9 refused

4a. Have you/ they ever been told by a doctor, nurse or other health professional that your/ their blood cholesterol is high?

1 yes
2 no
7 DK
9 refused

4b. If yes, are you/ they currently taking any medicine for your/ their high cholesterol?

1 yes
2 no
7 DK
9 refused

5. Have you/ they ever been told you/ they had a heart attack, also called a myocardial infarction?

1 yes
2 no
7 DK
9 refused

6. Have you/ they ever been told you/ they had angina or coronary artery disease?

1 yes
2 no
7 DK
9 refused

7. Have you/ they ever been told you/ they had a stroke?

1 yes
2 no
7 DK
9 refused

8. Have you/ they ever been told by a doctor, nurse or other health professional that you/ they had asthma?

1 yes
2 no
7 DK
9 refused

9a. During the past 30 days, have you/ they had symptoms of pain, aching or stiffness?

1 yes
2 no
7 DK
9 refused

9b. How bad is your/ their pain usually?

1 mild
2 moderate
3 severe
4 very severe
7 DK
9 refused

10. About how much do you/ they weigh without shoes?

____ lbs
7 DK
9 refused

11. About how tall are you/ they without shoes?

_____ft____inches
7 DK
9 refused

Disability
12. Prior to your brain injury, were you/ they limited in any way in any activities because of physical, mental, or emotional problems?

1 yes
2 no
7 DK
9 refused

13. Are you/ they currently limited in any way in any activities because of physical, mental, or emotional problems?

1 yes
2 no
7 DK
9 refused

14. Do you/ they now have any health problem that requires you/ they to use special equipment, such as a cane, a wheelchair, a special bed, or a special telephone?

1 yes
2 no
7 DK
9 refused

Positive Health Behaviors
Health Maintenance

15. About how long has it been since you/ they last visited a doctor for a routine checkup? A routine checkup is a general physical exam, not an exam for a specific injury, illness, or condition.

1 within past year
2 within past 2 years (more than 1 year but less than 2 years)
3 within past 5 years (more than 2 years but less than 5 years)
4 5 or more years ago
7 DK
8 Never
9 Refused

16. A flu shot is an influenza vaccine injected into your arm. During the past 12 months, have you/ they had a flu shot?

1 yes
2 no
7 DK
9 refused

Exercise

17a. During the past month, other than your/ their regular job if you/ they are employed, did you/ they participate in any physical activities or exercises such as running, calisthenics, golf, gardening, vacuuming, or walking for exercise?

1 yes
2 no
7 DK
9 refused

17b. How many days per week do you/ they do moderate activities for at least 10 minutes at a time, such as brisk walking, bicycling, vacuuming, gardening or anything else that causes some increase in breathing or heart rate?

___ days per week
7 DK
9 refused

Nutrition

18. How many servings of fruit or 100% fruit juice (orange, grapefruit, tomato, etc.) do you/ they eat per day? Per week? Do not include fruit flavored beverages.

___ per day
___ per week
7 DK
9 refused

19. How often do you/ they eat green salad? Please count total number of servings per day and per week.

___ per day

___ per week
7 DK
9 refused

20. How often do you/ they eat vegetables other than green salad? Please count total number of servings per day and per week.

___ per day
___ per week
7 DK
9 refused

Negative Health Behaviors

Smoking

21a. Have you/ they smoked at least 100 cigarettes (5 packs) in your entire life?

1 yes
2 no
7 DK
9 refused

21b. If yes, do you/ they now smoke cigarettes every day, some days, or not at all?

1 every day
2 some days
3 not at all
7 DK
9 reused

21c. During the past 12 months, have you/ they stopped smoking for one day or longer because you/ they were trying to quit smoking?

1 yes
2 no
7 DK
9 refused

Alcohol

22a. During the past 30 days, have you/ they had at least one drink of any alcoholic beverage such as beer, wine, a malt beverage or liquor?

1 yes
2 no
7 DK
9 refused

22b. During the past 30 days, how many days per week or per month did you/ they have at least one drink of any alcoholic beverage?

___ days per week
___ days in past 30 days

7 DK
9 refused

22c. One drink is equivalent to a 12-ounce beer, a 5-ounce glass of wine, or a drink with one shot of liquor. During the past 30 days, on the days when you/ they drank, about how many drinks did you/ they drink on average?

____ number of drinks
7 DK
9 refused

22d. Considering all types of alcoholic beverages, how many times during the past 30 days did you/ they have (5 drinks for men, 4 drinks for women) or more drinks on an occasion?

____number of times
7 DK
9 refused

Drug Use
23. Do you/ they use drugs other than alcohol or your own prescription medications (e.g., marijuana, cocaine, heroin, meth, etc.)?

1 every day
2 some days
3 not at all
7 DK
9 reused

Nutrition
24. How often do you/ they eat foods such as pizza, French Fries, potato chips and/or take-out Chinese, etc. (anything you would call "junk food" excluding sweets)? Please count the number of servings.

___ per day
___ per week
7 DK
9 refused

25. How often do you/ they eat candy, cookies, cakes or other sweets?

___ per day
___ per week
7 DK
9 refused

APPENDIX C- HIC Approval

WAYNE STATE UNIVERSITY

HUMAN INVESTIGATION COMMITTEE
101 East Alexandrine Building
Detroit, Michigan 48201
Phone: (313) 577-1628
FAX: (313) 993-7122
http://hic.wayne.edu

NOTICE OF EXPEDITED APPROVAL

To:	Brigid Waldron-Perrine Physical Medicine & Rehabilitation 261 Mack	
From:	Ellen Barton, Ph.D. Chairperson, Behavioral Institutional Review Board (B3)	
Date:	April 25, 2008	
RE:	HIC #:	034808B3E
	Protocol Title:	The Influence of Religion and Spirituality on Rehabilitation Outcomes among Traumatic Brain Injury
	Sponsor:	
	Coeus #:	0803005834
Expiration Date:	April 24, 2009	
Risk Level/Category:	No 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 Behavioral Institutional Review Board (B3) for the period of 04/25/2008 through 04/24/2009. This approval does not replace any departmental or other approvals that may be required.

- Caregiver Consent Form (dated 3/17/08)
- Survivor Consent Form (dated 3/28/08)

- 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 HIC BEFORE implementation.
- Adverse Reactions/Unexpected Events (AR/UE) must be submitted on the appropriate form within the timeframe specified in the HIC Policy (http://www.hic.wayne.edu/hicpol.html).

NOTE:

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

*Based on the Expedited Review List, revised November 1998

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ABSTRACT

THE INFLUENCE OF RELIGION AND SPIRITUALITY ON REHABILITATION OUTCOMES AMONG TRAUMATIC BRAIN INJURY SURVIVORS

by

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The long-term consequences of traumatic brain injury affect millions of Americans, many of whom report using religion and spirituality to cope. Little research, however, has investigated how various elements of the religious and spiritual belief systems affect rehabilitation outcomes. The present study sought to assess the use of specifically defined elements of religion and spirituality as coping resources in a sample of traumatically brain injured adults. Furthermore, various mechanisms by which religion and spirituality may affect outcome were explored.

The sample included 88 adults with brain injury from 1 to 20 years post injury and their knowledgeable significant others (SOs). Participants subjectively reported on their religious/spiritual beliefs and psychosocial resources in coping as well as their current physical and psychological status. Significant others reported objective rehabilitation outcomes. The majority of the participants with brain injury were male (76%), African American (75%) and Christian (76%).

The results indicate that public religious practice was not a unique predictor of any outcome measures after accounting for demographic and injury-related

characteristics. Existential well-being (a sense of meaning and purpose in life) was not a unique predictor for any outcome, but religious well-being (a sense of connection to a higher power) was a unique predictor for life satisfaction, distress and functional ability.

Social support was found to partially explain the relationship between religious well-being and both SO report of functional outcome and self-reported level of distress, though an independent relationship remained. Similarly, ability to find benefit, emotion-focused coping and perceived detriment from trauma each partially explained the relationship between religious well-being and psychological outcomes, whereas task-oriented coping partially explained the relationship between religious well-being and functional outcome. Overall health behavior profile partially explained the relationship between religious well-being and life satisfaction and religious well-being and functional outcome.

After accounting for general coping style, perceived benefit from trauma was a unique predictor for psychological outcomes, whereas perceived detriment and negative religious coping were unique significant predictors only for life satisfaction.

The findings of this project indicate that specific facets of religious and spiritual belief systems do play direct and unique roles in predicting rehabilitation outcomes. Furthermore, the influence of religion and spirituality on rehabilitation outcomes is partly due to its indirect effects on social support and coping. Notably, a self-reported individual connection to a higher power was an extremely robust predictor of both subjective and objective outcome.

AUTOBIOGRAPHICAL STATEMENT

BRIGID WALDRON-PERRINE

Brigid Waldron-Perrine received her Bachelor of Science degree in Psychology and Neuroscience from Allegheny College 2001. She then obtained a Master of Science degree in Clinical Psychology from MCP Hahnemann/Drexel University in 2003. After working with patients with traumatic brain injury and associated disorders at the Health South Rehabilitation Hospital, Thomas Jefferson University Medical Center Comprehensive Epilepsy Center and the Moss Rehabilitation Research Institute, she began the PhD program in Clinical Psychology/ Neuropsychology at Wayne State University in 2005. During her graduate training, she gained extensive experience in neuropsychology and rehabilitation psychology at the Rehabilitation Institute of Michigan and during her APA-approved internship at the John D. Dingell Detroit VA Medical Center. She has presented research at national and international conferences in the areas of multiple sclerosis, epilepsy, and traumatic brain injury as well as basic neuroscience and psychometrics of neuropsychological assessment. Brigid has authored or co-authored 6 manuscripts published in peer-reviewed journals and has been the recipient of multiple awards acknowledging her dedication to both research and clinical work. Her dissertation project was funded by a grant from the Wayne State University graduate school. Upon successful completion of her internship training, Brigid will be pursuing Post-doctoral training in neuropsychology at the Ann Arbor VA Hospital in September 2010.