

**THE UTILITY OF ACCEPTANCE AND COMMITMENT THERAPY AFTER
BRAIN INJURY: PSYCHOLOGICAL FLEXIBILITY AND WELL-BEING**

by

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Abstract

Psychological impacts of acquired brain injury (ABI) include depression and anxiety, which often persist following acute stages of recovery (e.g., formal rehabilitation). Biological factors (e.g., neurological deficits), are generally blamed for the majority of adverse effects, whereas psychological impacts that influence employment, relationships, and even the ability to participate in social activities remain largely unaddressed. Acceptance and Commitment Therapy (ACT) has been used to enhance Psychological Flexibility and disease management without targeting any particular pathology making it a versatile therapy for those patients with varied types of impairments. In this study, survivors of ABI completed measures of psychological flexibility, well-being, and reactions to impairment. Participants who reported more maladaptive reactions to impairment had greater physical and psychological symptoms and lower psychological flexibility. Further, Psychological Flexibility predicted significant variance in psychological and physical well-being beyond time and injury severity. Theoretically, implementing ACT in this population early in recovery will improve outcomes.

Keywords: Acquired Brain Injury, Traumatic Brain Injury, Life Satisfaction, Reactions to Impairment, Quality of Life, Personality

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List of Abbreviations

AAQ-II	Acceptance and Action Questionnaire
ABI	Acquired Brain Injury
ACT	Acceptance and Commitment Therapy
CBT	Cognitive Behavioural Therapy
CID	Chronic Impairments and Disability
CIT	Comprehensive Inventory of Thriving
CompACT	Comprehensive Assessment of Acceptance and Commitment Therapy
EF	Executive Function
HRQL	Health-Related Quality of Life
PCS	Post-Concussion Symptom
PTSD	Post-Traumatic Stress Disorder
QOLIBRI	Quality of Life Instrument Brain Injury
RIDI	Reactions to Impairment and Disability Inventory
SWB	Subjective Well Being
SWL	Satisfaction with Life
TBI	Traumatic Brain Injury
TIPI	Ten Item Personality Inventory

1.0 Exploring the utility of acceptance and commitment therapy after brain injury: The role of psychological flexibility and reactions to impairment in well-being post injury

Acquired Brain Injury (ABI) includes any non-progressive damage to the brain and includes traumatic brain injury (TBI), stroke, anoxic injury, and any other injury to the brain that occurs after birth (i.e., not congenital; Ontario Brain Injury Association, n.d.). Over 1,000,000 Canadians live with effects of ABI, and the Public Health Agency of Canada (2014) estimates that an additional 550,000 individuals will sustain a brain injury each year. In Canada, the incidence of ABI outnumbers that of breast cancer, spinal cord injury, multiple sclerosis, and HIV/AIDS combined. Functional outcomes of ABI are varied and include physical, cognitive, emotional, and behavioural impairments that are linked to social and personal issues (Jones, Haslam, Jetten, Williams, Morris, & Saroyan, 2011).

In comparison to other populations with chronic disabilities, survivors of brain injury have lower levels of health-promoting behaviours and self-efficacy, coupled with significant barriers to health (Braden et al., 2012). For instance, Wood and Rutterford (2006) found that functional competence and community integration levels of individuals with ABI were slightly lower than levels reported in the general, healthy population and the average overall life satisfaction score of individuals with ABI indicated a slight dissatisfaction with life. In the months and years following ABI, survivors struggle in many aspects of their lives, including changes in the employment status of household members, spousal separation, and changes in co-habitation (Doser & Norup, 2014). Thus, this study examined: 1) how survivors interpret such obstacles; 2)

how reactions to disability and impairment impact overall psychological well-being; and, 3) how levels of psychological flexibility impact overall psychological well-being.

1.1 Well-Being and Quality of Life

Lower levels of subjective well-being (SWB) and Health-Related Quality of Life (HRQL) are well documented among survivors of ABI. Subjective well-being measures have their roots in positive psychology and evaluate affective and cognitive components of well-being. Overall, SWB is an indication of an individual's overall evaluation of his or her life and emotional experiences. Satisfaction with Life (SWL) is a cognitive component of SWB that is often used in research to measure overall SWB. More complete measures of SWB include both the cognitive and affective components. The affective component assesses the effects of positive and negative emotions, and the cognitive component consists of global appraisals of life satisfaction that consider both dispositional and situational factors (Diener, Suh, Lucas, & Smith, 1999). Personality factors are key contributors to SWB; individuals with lower levels of neuroticism and higher levels of extroversion are more likely to have higher SWB (Schimmack, Radhakrishnan, Oishi, Dzokoto, & Ahadi, 2002). Schimmack and colleagues found that the influence of personality on affective components of SWB was consistent, whereby other factors influenced cognitive aspects SWB. Thus, it is important to consider the effect that personality factors have on the SWB of the population we examined in this study.

A common health outcome measure for chronic conditions, including ABI, is HRQL. Health-Related Quality of Life is a measure of the perceived stability of psychological, social, and physical well-being and includes an index of overall

functioning (Anderson, Aaronson, & Wilkin, 1993). Given that this measure is more functional (assesses physical and mental functioning) and objective than measures of SWB, it does not account for salient psychological aspects of SWB, such as life satisfaction. For instance, it is possible that someone is functioning well (high HRQL) but unhappy with his or her life as a whole (low SWL); likewise, an ABI survivor could be physically able and have family support, but still be depressed and anxious. This disconnect is especially common for individuals who have survived brain injuries yet struggle with anger, anxiety, and behavioural issues associated with life changes and neurological damage.

1.1.1 Comparing HRQL and SWB. HRQL and Satisfaction with Life (SWL), a component of SWB, are positively correlated in healthy samples (e.g., Yildirim, Kilic, & Akyol, 2013). Severe disability and the manner in which an individual adapts to disability-related changes can have long-term negative impacts on SWB (Diener et al., 1999). People who live with chronic illness are more likely to have decreased levels of life satisfaction compared to the general population (Strine, Chapman, Balluz, Moriarty, & Mokdad, 2008). Life satisfaction is positively correlated with levels of HRQL and is also related to low social support, worsening health, mental distress, symptoms of depression/anxiety, reduced sleep, and increased pain (Strine et al., 2008).

Although there are similarities between these outcome measures, there are differences that warrant examination. To illustrate, Tessier, Lelorain, and Bonnaud-Antignac (2012) attempted to isolate clinical determinants of both HRQL and SWB in long-term breast cancer patients, and results indicated that the measures were associated with unique outcomes. For instance, medical factors (e.g., tumor size, cancer stage)

negatively influenced SWB. Moreover, patients receiving certain types of treatment (chemotherapy and hormone therapy) were happier and reported fewer adverse effects regardless of the time that had passed since their diagnosis than those receiving other types of treatment. Interestingly, SWB was influenced by treatment type and not by time since the disease onset, whereas HRQL was directly related to physical health outcomes. Even in cases of declining physical health, other factors impacted the patients' levels of SWB, indicating they were still happier with their life. These results suggest that examining SWB alongside HRQL provides a more complete representation of the impacts of medical interventions. Conversely, physical improvements may relate to increases in HRQL but not affect levels of SWB. Although these constructs are related, each uniquely adds to overall quality of life and were examined together in this study to accurately measure patient outcomes.

These two outcome measures may also differ with regard to malleability. When a patient is motivated and willing to contribute effort to change, SWB is malleable, with specific interventions leading to positive changes (Diener et al., 1999). Improvements in SWB can lead to improved health and longevity as well as more positive social relationships (Diener et al., 1999); however, these are not one-way causal relationships. SWB can encourage more prosocial behaviours, as evidenced by the fact that those who are married tend to have higher SWB (Diener et al., 1999). The reverse is also true; higher SWB can impact sociability and increase the quality of relationships (Diener et al., 1999). Time since injury, individual personality factors, and illness uniquely affect both SWB and HRQL. Improvements in physical functioning during a period of rehabilitation often increases HRQL but may not lead to comparable increases in SWB.

These differences can be especially important for chronic conditions, including brain injuries, characterized by reduced cognitive functioning rather than outward physical health.

1.1.2 Well-Being and Quality of Life in Brain Injury Survivors. When examining well-being (SWB and HRQL) and its relation to time since injury and severity of injury, researchers may intuitively expect to find that recent and more severe injuries are associated with lower life satisfaction of the survivor. Contrary to this hypothesis, researchers have found that SWL and HRQL are relatively stable across time and severity of injury (SWL; Proctor & Best, 2015; Williamson et al., 2015; HRQL; Forslund, Roe, Sigurdardottir, & Andelic, 2013). Chronic conditions such as ABI lead to unique circumstances that influence global HRQL and SWB beyond the level of impairment.

An extensive study ($N = 3,157$) conducted by Williamson and colleagues (2015) initially indicated that, as expected, SWL increased with time since injury; however, after the influence of sociodemographic, injury-related, and pre-injury covariates were held constant, SWL remained lower and stable over time. In this study, average SWL for survivors was lower than published norms and indicative of a slight dissatisfaction (Diener et al., 1999). Higher cognitive and motor independence accounted for significant variance in overall SWL, and this influence was greater for cognitive independence as opposed to motor independence. Interestingly, when Williamson and colleagues (2015) compared those who had high versus low motor functioning at one-year post injury, the latter group experienced increases in SWL at ten years post injury, whereas the former group experienced slight decreases. At the end of

the 10-year study, both high and low functioning survivors had scores in the average range of life satisfaction, possibly indicating the low functioning ABI survivors had a larger range in which to improve. Many factors related to the ability to cope and adjust to novel levels of functioning influence the relation between SWL and individual adaption to new levels of functioning.

In a study of long-term psychological effects, Jacobsson, Westerberg, and Lexxel (2010) reported that an individual's appraisal of the impact TBI has had on his or her life was significantly correlated with his or her overall level of SWL at 10 years post injury. The majority of the research focused on the determinants of physical and psychological functioning after injury concludes that improved physical functioning alone does not predict SWL. Situational factors such as personal relationships, leisure activities, and psychological factors must also be examined.

Consistent with SWL research, HRQL has also been found to be stable one to two years post injury (Corrigan, Bogner, Mysiw, Clinchot, & Fugate, 2001; Forslund, Roe, Sigurdardottir, & Andelic, 2013). Variations that are observed in SWL and HRQL can be accounted for by changes in marital status and depressed mood (Corrigan et al., 2001), social factors such as isolation and leisure activities (Proctor & Best, 2015), and awareness of injury-related impairments (Johnson et al., 2010). Interestingly, Jones and colleagues (2011) documented that a more severe injury was related to greater SWL, and this was mediated by social changes and personal identity. Strengthening personal identity and encouraging positive social interaction had a positive influence on those with severe brain injuries.

Jacobsson, Westerberg, and Lexxel (2010) found that deficits in SWB and HRQL among survivors persisted for more than 10 years post-injury. These deficits were related to the survivor's appraisal of the impact that his or her brain injury had on his or her life and current occupational productivity; perceiving a lower impact on his or her life resulted in higher satisfaction with life. Interestingly, survivors who rated the impact of the brain injury on their life to be low, were cohabiting or married, older at time of injury, and had a more severe injury had higher life satisfaction. Social and family support, coupled with a lower perceived impact on their life, predicted higher positive outcomes even when the injury was more severe. Moreover, no differences were found in the SWL of individuals who had sustained either a mild injury or a moderate-to-severe injury, indicating that factors other than injury severity influenced overall quality and judgements of life satisfaction (Jacobsson et al., 2010).

Johnson and colleagues (2010) found both increases and decreases in SWL in the five years post injury; family satisfaction and low levels of functional impairment were important determinants in the formula for increasing satisfaction over time. Detailed analyses indicated that, although the life satisfaction of survivors with less functional impairment was not dependent upon family satisfaction or marital status, the combination of higher levels of functional impairment and family satisfaction were associated with greater SWL. Mixed findings pertaining to the severity of injury and its influence on SWL suggest that individual perceptions and reactions to injury are additional important determinants that should be examined in relation to SWL.

In a large study, Proctor and Best (2015) compared SWL of survivors who had sustained an injury less than two years ago to survivors whose injuries occurred more

than two years and found generally lower levels of SWL that were similar regardless of the time since injury. In this study, leisure satisfaction, romantic loneliness, and depression contributed to differences in SWL at all stages post-injury. Time alone does not heal all life satisfaction woes post-injury including feelings of depression, loneliness, and isolation. As such, other variables should be explored further to contribute to a better understanding of what factors contribute to an overall positive life experience.

For survivors of brain injury, the increase of mental and physical functioning over time are not the only variables that can explain outcomes associated with the injury. Psychological factors may negatively impact SWB even when the brain injury survivor appears to be recovering physical functioning. The manner in which the brain injury survivor copes with his or her deficits, and not simply the severity of these deficits, may be just as important to their overall recovery and is a factor that should not be overlooked.

1.2 Community Reintegration

The current rehabilitation structure focuses on returning to work following ABI (Hofgren, Esbjörnsson, & Sunnerhagen, 2010); however a vast majority of people who sustain an ABI reside at home without long-term professional care or support. For instance, in a study by Lannoo, Brusselmans, Van Eynde, Van Laere, and Stevens (2004), approximately 20 percent of survivors returned to full-time employment or resumed their educational endeavours, whereas over half of survivors remained at home in the absence of any structured activities to fill their day. If the end goal of

rehabilitation is a return to employment, it is expected that survivors who are employed will have higher levels of SWL.

To examine the relation between employment and life satisfaction among survivors, Johansson and Bernspång (2003) assessed life satisfaction at three and six years after rehabilitation. Results indicated that overall life satisfaction was consistently low during the time period between three and six year follow-ups regardless of whether there had been a change in work status. Employment alone did not influence SWL and no significant differences in life satisfaction emerged at these follow-ups regardless of employment statuses. Survivors who were not satisfied with their lives reported more negative symptoms at the 6-year follow-up. There were also reported differences related to activities of daily living (e.g., cleaning, cooking, shopping), indicating that satisfaction in this domain reduced over time. Although it is possible that, over time, survivors become more aware of their disability and limitations in their daily activities, it is also likely that other products of the injury (such as depression and anxiety) impact their ability to keep up with domestic chores, leading to increased amounts of dissatisfaction in this domain over time.

1.3 Reactions to Impairment and Disability

Varied reactions to impairment can affect how an individual copes with or adapts to his or her chronic illness and disability (CID; Liveneh & Anotack, 1990). When these factors are examined using the Reactions to Impairment and Disability Inventory (RIDI), acknowledgment and adjustment are considered positive reactions to impairment or disability, whereas denial, shock, anxiety, depression, internalized anger, and externalized hostility are considered maladaptive reactions. These reactions, and

their relevance to ABI survivors will be further explored in the following sections.

Importantly, maladaptive reactions have been directly associated with psychological distress.

To date, most research has examined reactions to disability and impairment in stages, with gradual progression reported as time passes after the injury (Livneh & Antonak, 1990). Theoretically, increased time since injury coupled with higher levels of *acknowledgement* and *adjustment* leads to fewer and less severe maladaptive reactions to impairment and disability (*anxiety, depression, internalized anger, externalized hostility*; Livneh & Antonak, 1990). In a sample of individuals who sustained a spinal cord injury, Livneh and Antonak found a negative association between the length of time since the injury occurred and RIDI *denial* scores. At the same time, length of time since injury appeared to be independent of the other RIDI scales (i.e., other reactions remained stable over time; Martz & Livneh, 2004). Further analyses indicated that non-acceptance of the injury (higher scores on *denial, shock, internalized anger* and *externalized hostility*) was more common among participants who were recently injured (0-4 years), but lower for those who had sustained an injury further in the past (20-56 years). Thus, it appears that some variables may change over longer periods of time. This cited dichotomy is an extreme example (i.e., length of time since injury differences between groups) and the present study explored if similar differences existed in a population of those who have sustained a brain injury.

Although findings such as these are widely reported, the proposed model may not apply to individuals who have experienced trauma and, as a result, suffer from symptoms of Post-Traumatic Stress Disorder (PTSD). It is estimated that 18% of TBI

survivors have co-morbid PTSD; therefore, the temporal course of the reactions to impairment and disability described by Livneh and Antonak (1990) may not apply to all survivors. Martz (2004) investigated how PTSD symptoms can interact with and affect these eight reactions to impairment and disability in a sample tested, on average, 14 years after spinal cord injury. Reactions to impairment and disability that were expected to appear in the acute stages of an injury (e.g., *anxiety, depression, shock*) also reappeared alongside the clusters of PTSD symptoms (re-experiencing, hyperarousal and avoidance) regardless of how much time had passed since the initial injury occurred (Martz, 2004).

1.3.1 Shock/Denial. Shock is characterized by numbness and cognitive disorganization and often appears immediately after the initial injury or diagnosis leading to disability. Depending upon the traumatic nature of the event, some individuals may experience long-term effects that present as PTSD, whereas others may have symptoms that are short-lived (Livneh & Antonak, 2005). Denial also tends to occur immediately after the onset of the disability but can be more complex depending on the type and level of impairment or disability that is acquired. For example, losing a leg suddenly in a car crash versus by planned surgical removal may result in differing levels of denial. Individuals with a spinal cord injury often experience high levels of denial in the early stages of disability (Livneh, Martz, & Bodner, 2006). Among those patients diagnosed with rheumatoid arthritis, Treharne, Lyons, Booth, and Kitas (2007) found that individuals who had been recently diagnosed (less than two years prior) had higher levels of denial than those who had a long-standing diagnosis (longer than two years). For these individuals, denial about the future course of their disease decreased

over time (Treharne et al., 2007). Denial is also common among lower limb amputees who report high levels of anxiety and depression (Ungratwar & Chepure, 2016). It is important to note that although denial appears to act as an early coping mechanism, levels of anger, anxiety, and depression were consistent across the time since diagnosis categories (Livneh et al., 2006), indicating that some of these individuals are not moving passed the maladaptive reactions to reach the more adaptive reactions of acknowledgement and adjustment.

For survivors of a brain injury, denial can be a way to cope with newfound deficits. For example, denial can function as a coping mechanism that lessens the initial effects of trauma and as a way to maintain hope. In some instances of chronic illness, the use of denial as a coping strategy is a short-term way to avoid feelings of depression and anxiety (Livneh & Antonak, 2005). Oftentimes, the chronic disability experienced by survivors of brain injury is cognitive in nature (i.e., an “invisible” injury). As such, these individuals may remain in stages of denial for longer periods, with denial manifesting itself as a lack of awareness of their deficits (See Acknowledgment).

1.3.2 Anxiety/Depression. Anxiety, as a reaction to impairment, is part of an initial response that shares commonalities with trait-based anxiety but is a unique and direct response that can persist beyond the acute stage (Livneh & Antonak, 1990). Clinically significant levels of anxiety are more common among those who have sustained a brain injury; 10% of those with a brain injury have co-morbid anxiety and depression (Osborn, Mathias, Fairweather-Schmidt, & Anstey, 2017). Up to two years post injury, the caregiver-reported anxiety level of survivors, but not neurological test scores, significantly predicted both affective/behavioural (e.g., argumentative

behaviours, tension) and cognitive functioning (e.g., difficulty planning, organization); however, neither anxiety nor neurological test scores predicted physical dependency (e.g., poor balance, visual problems; Bertisch, Long, Langenbahn, Rath, Diller, & Ashman, 2013). The anxiety that lingers past the initial stages of reacting to the impairment can have long-term impacts on both behavioural and cognitive functions beyond effects of deficits in neurological functioning.

In TBI, anxiety and depression are often co-morbid and long-lasting (Bertisch et al., 2013). Depression rates among survivors are high (59%, Glenn, O'Neil-Pirozzi, Goldstein, Burke, & Jacob, 2001; 25%, Ownsworth et al., 2011) at various stages post-injury, but causes of depression are not expressed by prevalence. High levels of depressive symptoms and other co-morbid psychiatric disorders (anxiety, PTSD) are related to slower return to work (Bertisch et al., 2013) and poorer psychosocial outcomes (Gould, Ponsford, Johnston, & Schönberger, 2011). Individuals with a history of psychiatric conditions before sustaining a brain injury have an even higher risk and are more likely to relapse. Among older patients, major depressive disorder diagnosis in the first three months post injury predicted long-term outcomes (psychological distress/dysfunction and post-concussion symptoms) at one-year post injury. Similarly, survivors who experienced poor progress returning to pre-injury activities self-perceived lower levels of functioning and were more likely to have increased depression scores at three months post-injury (Ownsworth et al., 2011).

Various indicators associated with post-concussion syndrome symptoms are not unique to concussion (Mild Traumatic Brain Injury [MTBI]) sufferers and share commonalities with depression (Lange, Iverson, & Rose, 2011). A Canadian study by

Lange and colleagues noted that individuals diagnosed with Depression (but not MTBI), had fewer post-concussion symptoms than those with both MTBI and Depression, but suffered more than non-depressed MTBI survivors. If individuals diagnosed with Depression and not MTBI have higher scores on post-concussion symptoms than those individuals who have had a MTBI, it is possible that elevated scores of those individuals with both MTBI and Depression are not solely due to long-term neurological damage but are, at least partially, psychological. If these symptoms linger, they can lead to long-term disability and may not be treated in the same way that they would be in a non-injured patient (as a modifiable symptom). It is possible that some survivors of brain injury experience enhanced (physical) post-concussion symptoms (e.g., headaches, dizziness, fatigue, memory deficits) that are not due to neurological deficits, but rather, a reactive form of depression that causes a physical reaction to the stress associated with the injury (American Psychiatric Association, 2013; Moldover, Goldberg, & Prout, 2004).

1.3.3 Anger/Hostility. Internalized anger is self-directed and often associated with self-blame and guilt. Those with brain injury are more likely to assign blame for an injury to chance happenings (Proctor & Best, 2015); however, this attribution may vary based on the source of the injury (e.g., Anoxic injury due to a suicide attempt). With a prevalence rate of greater than 28%, externalized anger (hostility) is widespread among survivors of brain injury. The most common type of aggression among these individuals is verbal aggression (Rao et al., 2010). Rao et al. reported that younger patients with Rheumatoid Arthritis had higher levels of hostility than older participants. Further, across the entire sample, acceptance of the illness was related to less anger and hostility.

For survivors of brain injury, aggressive behaviour may have its roots in neurological dysfunction associated with the injury itself and not be simply a reaction to their newfound disability. Survivors may not have physical scars from the cognitive disabilities resulting from a brain injury. Furthermore, the visibility of these injuries can affect how the survivor's behaviour is attributed. McClure, Buchanan, McDowall, and Wade (2008) found that when there was no visible scar associated with the brain injury, behavioural problems, such as aggression, were less likely to be attributed to the injury. Measuring anger and hostility as reactions to impairment and disability may help tease apart types of behaviours that may not be rooted in neurological damage but are maladaptive psychosocial adaptations to disability and impairment and are therefore barriers to the desired outcomes of Acknowledgement and Adjustment.

1.3.4 Coping Skills. Reactions to impairment and disability are related, at least in part, to coping skills (Livneh & Antonak, 2005). Less adaptive coping strategies (cognitive and problem disengagement/emotion-focused coping) have been positively associated with RIDI psychosocial reaction scales that reflect psychological stress (*anxiety, depression, internalized anger, externalized hostility*), and active problem solving has been related to successful adaptation to CID (Martz & Livneh, 2016). For example, RIDI scores of those who recently lost a lower limb (21 lost due to medical interventions and 12 from traumatic causes) were compared to their coping scores approximately one month after limb loss. The most common reaction was depression, and the least common was externalized hostility (Medical: adjustment; Trauma: depression). Notably, adverse reactions were correlated with denial and self-blame (Livneh, Antonak, & Gerhardt, 1999). Acceptance was negatively correlated with all

maladaptive reactions to impairment and disability and positively correlated with more positive/health reactions to impairment and disability (Livneh et al., 1999).

Neuropsychological functioning (specifically passive coping) in brain injury survivors was a significant predictor of HRQL three months following discharge from a rehabilitation facility (Boosman et al., 2017). Brain injury survivors who reported using non-productive coping styles pre-injury had greater anxiety and poorer psychosocial outcomes at 1-year post-injury. Moreover, survivors who continued to use these non-productive coping techniques in conjunction with less productive coping styles continued to show higher levels of anxiety and poorer psychosocial outcomes one-year post-injury (Gregório, Gould, Spitz, van Heugten, & Ponsford, 2014).

1.3.5 Acknowledgement. Acknowledgement is associated with being able to accept and recognize the real future implications of the CID. The path to acknowledgment involves the acceptance of functional impairments into one's self-concept (Livneh & Antonak, 1990). Acknowledgement also requires an accurate assessment of the reality of disability and the impact the disability will have on the future. Kelley and colleagues (2014) examined self-awareness and its relation to outcomes at five or more years following a brain injury. Comparisons between self-reported and significant other's ratings indicated that those individuals who had sustained a brain injury significantly underreported their neurological symptoms and over reported their levels of home and work functioning. Further, similar scores between the groups in domains of emotional distress and social functioning emerged; survivors and significant others agreed more on these ratings. Self-reported perceptions of neurological functioning were positively associated with SWL for both groups.

Interestingly, the degree of similarity between the self- and other-ratings did not impact satisfaction with life. Thus, survivors who thought that they were doing well were more satisfied with their lives. It appears that it is the perception of the survivor that is essential to their well-being and not the neurological deficits reported by their partners (Kelley et al., 2014). Those individuals who agreed with their partner's reports of their cognitive deficits were more likely to be employed, and this held true even after accounting for severity of the injury. Although there are benefits (higher SWL) associated with less awareness of neurological impairments, gaining self-awareness may influence employability and, therefore, social integration.

It is possible that staying in denial may help a brain injury survivor avoid negative emotions and improve his or her life perceptions (e.g., life satisfaction), yet, denial may not aid them in reaching a state of acknowledgement that is necessary if he or she is to move to the final desired state of adjustment. If one's self-perception is not accurate, the increases in happiness associated with an inaccurate perception of neurological functioning may not lead to appropriate employment or leisure activities. Evans, Sherer, Nick, Nakase-Richardson, and Yablon (2005) examined the early stages of recovery and found that impaired self-awareness and level of disability (physical functioning) ratings acquired upon admission to a rehabilitation facility were independently predictive of SWB at discharge; in contrast, lower awareness was related to decreased SWB. From the beginning of the recovery process, self-perceived levels of overall functioning and awareness are significant contributors to well-being. Furthermore, being aware of one's deficits is vital to being an active participant in occupational therapy interventions that

aim to improve overall functioning (Katz, Fleming, Keren, Lightbody, & Hartman-Maeir, 2002).

Survivors can have different levels of awareness of their functioning (Belchev et al., 2017). The ability to accurately estimate overall functioning is not solely dependent upon the severity of injury or performance on neurological tests. Those survivors who underestimate (denial) or overestimate (unaware) their functioning are significantly more likely to use denial and projection as coping mechanisms (Belchev et al., 2017). Survivors who are unaware of their level of functioning tend to have higher depression and utilize a greater number of denial strategies. On the other hand, no relation was found for survivors who underestimated functioning and survivors who were good estimators (Belchev et al., 2017). Further, injury severity, cognitive deficits, and time since injury did not predict levels of impaired awareness of functioning in survivors, but the use of denial did predict awareness of overall function, activities of daily living, and interpersonal functioning.

1.3.6 Adjustment. Adjustment is considered the final and most adaptive reaction to disability. This response builds on the acknowledgment of the disability and its future implications for functioning, but also includes an aspect of behavioural adaptation (Livneh & Antonak, 1990). When an individual presents with high levels of adjustment, acceptance of the disability and the integration of positive life changes associated with obstacles related to impairments can occur. Brain injury survivors that had a positive view of disability (both self and other) reported higher levels of health and community integration as well as more acceptance of their injury. These individuals were more likely to find their place in society despite injury-related impairments (Snead & Davis,

2002). Snead and Davis documented that these positive attitudes were not due to physical functioning, age, or time since injury, and that positive views about disability and an acceptance of their disability led to higher HRQL. Those high in adjustment can accurately assess their impairments and model their behaviour to adjust to their newfound life circumstances and limitations. Of note, these individuals are not necessarily the highest functioning or the ones with the least severe disability. Although the RIDI has not been used in a population of brain injury survivors, it is expected that certain aspects of the temporal model tested by Livneh and Antonack (1991) will be relevant to ABI survivors.

1.4 Acceptance and Commitment Therapy

There are six processes of Acceptance and Commitment Therapy that support the development of psychological flexibility: acceptance; cognitive defusion; self-as-context; committed action; values; and, contact with the present moment. One purpose of the current study was to explore each component of ACT therapy to determine how they affect well-being and to explore conceptual applications for those who have sustained a brain injury. Unlike Cognitive Behavioural Therapy (CBT), the ACT process is not focused on eliminating or changing negative thoughts; rather, an individual may have persistent negative thoughts and yet be able to interact with them flexibly in order to live a life that is in line with their core values despite these negative emotions (Kashdan & Rottenberg, 2010). This value-based action has been shown to be beneficial to individuals living with chronic conditions such as pain (Wicksell, Ahlqvist, Bring, Melin, & Olsson, 2008). Acceptance and Commitment Therapy has conceptual utility in accepting long-term deficits experienced by those who have sustained a brain

injury (Kangas & McDonald, 2011; Soo et al., 2017; Whiting, Simpson, McLeod, Deane, & Ciarrochi, 2012) by fostering acceptance and creating more conscious, present, and flexible approaches to psychological experiences (Soo et al., 2011). In many ways, ACT is a framework from which to approach other forms of therapy, including CBT (Hayes, Pistorello, & Levin, 2012). In the same way that aforementioned negative emotions may continue, daily difficulties such as pain, deficits in emotional liability, depression, cognitive dysfunction, and memory loss are some of the many long-lasting consequences of ABI. In the following sections, we will explore the components of the ACT process and how these relate to brain injury survivors.

Psychological flexibility, a measurable outcome of Acceptance and Commitment Therapy (ACT; pronounced "act"), is a broad, and higher level construct that encompasses a series of interconnected processes (See Figure 1; Soo, Tate, & Lane-Brown, 2017). The outcome goal of the ACT model is high Psychological Flexibility, which includes experiential avoidance, acceptance, cognitive defusion, and mindfulness (Gloster, Klotsche, Chaker, Hummel, & Hoyer, 2011). The concept of psychological flexibility was formulated over the course of three decades and is based on the foundations of Contextual Behavioural Science (CBS).

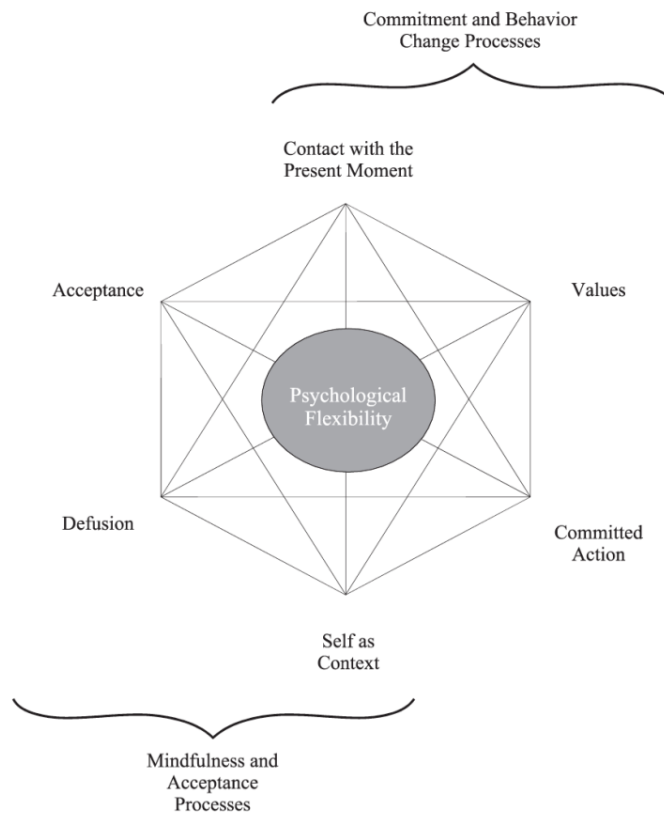


Figure 1.

Acceptance and Commitment Therapy Model of Psychological Flexibility
(Hayes, Levin, Plumb-Villardaga, Villatte, & Pistorello, 2013)

1.4.1 Psychological Flexibility. Psychological flexibility is assessed on a continuum from psychological inflexibility to psychological flexibility and is different from cognitive flexibility, which is a subcomponent of psychological flexibility. Psychological flexibility allows an individual to pursue goals that are in line with their values even in the face of adverse events or conditions. This ability has a positive influence on psychological health (Gloster et al., 2011). For example, significant differences in psychological flexibility levels have been found between clinical (panic disorder with agoraphobia, anxiety/social phobia) and non-clinical samples (Gloster et al., 2011; Kashdan & Rottenberg, 2010). Low levels of psychological flexibility (i.e.,

higher inflexibility) are associated with general pathology but not to any particular condition.

The psychometric properties of psychological flexibility have been assessed and the construct moderately correlates with depression, anxiety, anxiety sensitivity, behavioural inhibition, as well as the personality factors of neuroticism (negative correlation) and extroversion (positive correlation). Furthermore, psychological flexibility accounts for aspects of mental health that would not otherwise be explained (Gloster et al., 2011; Kashdan & Rottenberg, 2010). To illustrate, Gloster et al. (2011) reported that Psychological Flexibility was a significant predictor of outcomes of functioning and impairment in almost all clinical groups (panic disorder with agoraphobia, Anxiety/Social Phobia), above and beyond the influence of established constructs such as depressive symptoms, neuroticism, and anxiety sensitivity. Psychological flexibility is best understood as an overarching concept that predicts levels of functioning and not specific symptomology. For this reason, increasing Psychological Flexibility may be beneficial to individuals who have sustained an ABI and have impaired overall function with varying presentations of symptomology and deficits. A construct that aids in the prediction of individuals' levels of functioning and pathology would be a useful tool for both practitioners and researchers.

Given that psychological flexibility is an integral part of psychological health, it naturally follows that psychological inflexibility would be associated with many adverse psychological outcomes (Gloster et al., 2011; Kashdan & Rottenberg, 2010). However, we cannot assume that pathology or lack of pathology confers good overall psychological health. Similarly, simply because low psychological flexibility is

associated with higher levels of pathology, it cannot be inferred that psychological flexibility transfers to good health in all cases (psychopathology is relatively independent of positive experience). When examining the benefits of psychological flexibility, the absence of symptoms and disorder should only be one component under examination (Gloster et al., 2011).

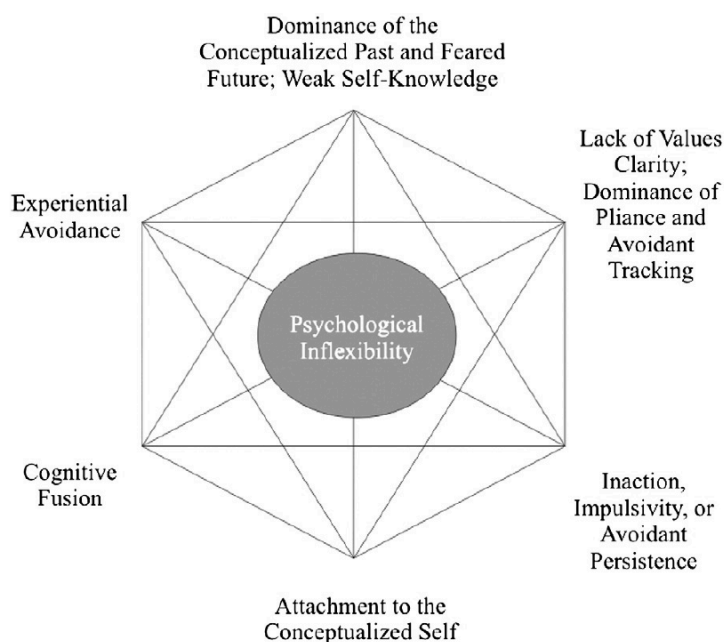


Figure 2
Acceptance and Commitment Therapy
Model of Psychological Inflexibility
(Hayes et al., 2013).

Psychological flexibility is best understood and measured on a continuum with lower levels representing inflexibility. Psychological inflexibility can be defined as being rigid, with a lack of contextual sensitivity and associated psychopathologies (See Figure 2, Hayes et al., 2013; Kashdan & Rottenberg, 2010). Given this relation and the high levels of psychopathology experienced by those individuals who have sustained a brain injury (e.g., depression; Proctor & Best, 2015), the current study was designed to

examine the causal status of inflexibility as a risk factor for these. For example, depression is characterized by pervasive negative mood, inability to derive pleasure from the environment and the feeling that the world is flat, dull, and empty. Often those individuals who suffer from depressive symptoms experience feelings of hopelessness and report decreased involvement in activities of daily living (ADL; McCall, Dunn, Rosenquist, & Hughes, 2002).

A meta-analysis of 32 studies by Hayes, Luoma, Bond, Masuda, and Lillis (2006) found that Psychological Flexibility was moderately correlated (pooled effect size; $r = .42$) with outcomes such as job performance, life satisfaction, daily activity, and overall mental health in chronic pain patients. Higher flexibility has also been associated with higher pain tolerance, endurance, and faster recovery (Feldner et al., 2006). Rather than focusing on a reduction in negative thoughts or symptoms, therapeutic methods that foster higher levels of psychological flexibility allow individuals to move on with their lives and focus on being happier in the present moment, rather than in the future. For many of those individuals who have suffered a brain injury, a day when they are asymptomatic will likely never come; therefore, an approach that focuses on accepting and moving on with life goals to improve well-being is a good fit for this population.

1.4.2 Cognitive Flexibility. When discussing psychological flexibility, it is important to differentiate it from cognitive flexibility. Cognitive flexibility is the ability to change behaviour (thoughts or actions) in response to situational demands and is a well-understood component of Executive Function (EF). Comparatively, psychological flexibility is linked to health and well-being and is associated with empathy,

understanding, and expression of emotions (Grattan & Eslinger, 1989; Shamay-Tsoory, Tomer, Berger, & Aharon-Peretz, 2003). Both concepts focus on developing the ability to modify behaviour in the form of thought or action and, when impaired, they both have strong associations with pathology (Whiting, Deane, Ciarrochi, Mcleod, & Simpson, 2015).

Cognitive flexibility is a subcomponent of Psychological Flexibility; thus, the ability to change behaviours will undoubtedly be an asset for the behaviour change process in ACT. There is a need to separate these concepts and determine whether cognitive inflexibility, often present in ABI (Heled, Hoofien, Margalit, Natovich, & Agranov, 2012), would limit the Psychological Flexibility of individuals who have sustained an ABI. Impairments in Cognitive Flexibility have been associated with a range of psychological disorders and poor treatment outcomes. Walter (2010) found enhancements in cognitive flexibility were related to an improvement in PTSD symptoms, indicating that the ability to shift the focus away from maladaptive thinking may help reduce symptoms. Given that Cognitive and Psychological Flexibility are related constructs, it is important to stress that it is possible to have high Cognitive Flexibility and low Psychological Flexibility (and vice versa). This distinction is important when considering Psychological Flexibility as a part of ABI rehabilitation as individuals often suffer from diminished executive function, including cognitive flexibility. A certain level of EF provides a firm neurological base from which to develop self-regulation skills. Therefore, the application of ACT to enhance Psychological Flexibility in survivors of brain injury may be more applicable to those survivors who are high functioning. Nonetheless, EF is only a small subcomponent of

Psychological Flexibility, and it is possible to cultivate Psychological Flexibility even when deficits in EF exist (Whiting et al., 2015).

1.4.3 Cognitive Fusion/Defusion. Cognitive fusion has its roots in Relational Frame Theory and, as such, is based on the idea that human language has a great influence on our cognitions (Hayes, 2004). A strong belief in thoughts may lead to a state where ideas and thoughts are “fused” and an individual is unable to distinguish awareness (reality) from their internal cognitive narratives. When this occurs, they continue to engage in the same ineffective strategies simply because they seem “right” or “fair” while, at the same time, ignoring direct experiences from their environment. As a result, they become inflexible in both their cognitions and actions. In an attempt to minimize discomfort due to an unpleasant cognition, those individuals who are cognitively fused tend to focus on methods that aim to control negative thoughts or emotions. In turn, this creates a vicious cycle of self-monitoring evaluation, emotional response, and control efforts which can lead to further self-monitoring (Whiting et al., 2012).

The process of moving from cognitive fusion to defusion, or disengaging from the mind, is part of the mindfulness processes found on the left side of the Hexaflex model of psychological flexibility (Contact with the present moment; Acceptance; Defusion; Self as Context; See Figure 1; Soo et al., 2011). Acceptance-based therapy serves to promote and foster the ability to discriminate between helpful and non-helpful thoughts. More specifically, this skill has been described as shifting from a maladaptive problem-solving mode to a descriptive-engaged mode (Soo et al., 2011). Noticing thoughts as they come to mind and not making an effort to change them, but instead, noticing them

and acknowledging them, allows an individual to reach a state of cognitive defusion. In this state, both positive and negative emotions are welcomed and there is no attempt to modify or label any thought process.

Acceptance-based therapies view negative thought processes as inevitable and encourage individuals not to place too much emphasis on trying to eradicate them. As an alternative, believe that it is a skill to be able to notice a thought as just a thought without any further emotional assessment or action attached to it. Although individuals may attempt to change their thoughts from negative to positive in order to avoid feelings of anger or sadness, immediate attempts to change negative thoughts may have the opposite effect by increasing the perceived importance of the thought and amplifying its negative impact (Whiting et al., 2012). Further, when trying to attain specific goals, positive emotions are not always appropriate and helpful as there are situations in which negative emotions have utility. For example, although anger has been labeled as a toxic emotional reaction (Berkowitz, 2012), it may be a productive reaction when used in the right context. As such, instead of labeling specific emotions as “bad” or “good”, a better approach may be to aim for flexibility in our application of emotion based on the appropriateness for the context.

1.4.4 Experiential Avoidance/Acceptance. Experiential avoidance is an immediate consequence of cognitive fusion that occurs when attempts are made to avoid, suppress, or eradicate “unwanted personal experiences” (Soo et al., 2011), in the same way that people target and seek to eliminate external adverse events. These “unwanted personal experiences” may include thoughts, memories, emotions, and even bodily sensations. This reaction is an overextension of our innate problem solving skills

and cognitions (Whiting et al., 2012). As humans, we routinely attempt to keep negative feelings at bay by avoiding situations (experiential avoidance) which, over time, can lead to further isolation or confirmation of the inability to cope with distressing circumstances (Hayes, 2012). These types of behaviours can push individuals to make important life choices based on how to avoid distress, which encourages them to hang on to the “specialness” of their pathology and provides them validation for their actions (Hayes et al., 2013).

Experiential avoidance is similar to other problems such as distress intolerance and emotional suppression. It can offer short-term utility in decreasing discomfort, but may also have long-term adverse effects (Hayes et al., 2013). The ACT process stresses that it is typical to have both pleasant and unpleasant thoughts and feelings, and helps individuals move from a state of experiential avoidance to one of acceptance. Acceptance is not passive, but rather an intentional behaviour that shifts the focus from the avoidance of unpleasant thoughts and feelings to approaching them with a sense of interest, curiosity, and observation (Hayes et al., 2013).

For many individuals who have sustained a brain injury, anxiety is a part of everyday life and often managed in the same way that it is in the general population, that is, by using coping strategies and medication (Wood & Rutterford, 2006). The use of Experiential avoidance is common in anxiety disorders (Avdagic, Morrissey, & Boschen, 2014). For brain injury survivors, using avoidant strategies can prevent engagement in social or novel productive leisure activities. Individuals with anxiety disorders avoid situations that evoke unwanted arousal or panic, and, over time, avoidance becomes a means of controlling and maintaining the disorder. Excessive

worry, obsessions, and racing thoughts are often uncontrollable despite utilization of specific coping efforts. Attempting to conceal, control or hide emotions can be defined as being inflexible (Avdagic et al., 2014). One goal of therapy is to invoke acceptance and cognitive reappraisal early in the thought process, before the negative emotions are generated, this is superior to suppression that occurs once the negative emotion is processed (Gross & John, 2003). Acceptance and cognitive reappraisal can be used to address unwanted feelings of anxiousness instead of avoiding life events that would otherwise be considered rewarding.

1.4.5 Weak Self-Knowledge/Contact with the Present Moment. Situations that foster cognitive fusion and experiential avoidance remove the individual from the current moment and encourage them to focus on moving away from feelings of discomfort and distress. To stay connected with the present, an individual must attend to the present moment in a flexible, open, and non-judgmental way (Whiting et al., 2012). Learning mindfulness techniques (e.g., focusing on the tone of voice) is part of being present in the moment. Being in the present moment requires less problem solving (e.g., “How do I change this thought/feeling?”) and more curiosity and appreciation (e.g., “I am having this thought or feeling.”; Hayes et al., 2013). Being present involves a full connection with what is happening in the present moment and accepting emotions and cognitions without labelling them as positive or negative. The purpose of being present is to maintain focus on the current experience. As an example, individuals with epilepsy have been prompted to experience their seizures more “fully” without trying to struggle with the feelings, thoughts, and even emotions that accompany them (Lundgren, Dahl, & Hayes, 2008). Similarly, brain injury survivors may approach their symptoms (e.g.,

anxiety, memory impairment, headaches) without judgment or attempting to change them. In both instances, this acceptance may allow individuals to move beyond their initial negative emotions to thoughts and emotions associated with acceptance.

1.4.6 Conceptualized Self/Noticing Self. The ACT process encourages detachment from a conceptualized self, defined as a rigid and fused sense of who we are, and movement towards a sense of self that is based on the present context (Soo et al., 2011). To gain this new perspective, those individuals involved in ACT observe their current moment and experience it from the view of another, possibly older or wiser, version of themselves (Hayes et al., 2012). This process allows the individual to gain an outside perspective independent of their current situation and emotions. For example, Whiting and colleagues (2012) explain that a brain injury survivor may conceptualize themselves as a social butterfly or the "life of the party", and due to cognitive impairments they may no longer be able to act in accordance with this concept of themselves. In turn, they may avoid all social situations, resulting in an increase in loneliness and social isolation. Expanding the view of self beyond the conceptualized self and connecting with their post injury self is part of the process of becoming more psychologically flexible and, therefore, may allow a survivor to be able to participate in social activities despite their deficits. Most importantly, self as context allows an individual to move away from overarching labels, to see themselves through the lens of their impairment (e.g., self as brain injured), and to understand brain injury as one only part of life (Lundgren et al., 2008).

1.4.7 Unclear, Compliant, or Avoidant Motives/Values. Values embody the preferred outcome of ACT, which is to change or persist in behaviours that bring an

individual toward or in line with chosen values. As part of the ACT process, individuals identify the global values that define how they want to live their life as well as what is important to them (Hayes et al., 2012). Values are not something obtained, rather they are a direction of focus in an individual's life that one strives to move toward (Lundgren et al., 2008). For example, a brain injury survivor may hold "family" as a core value and must work toward participating in behaviours and actions that are in line with those values (e.g., not skipping family events).

1.4.8 Inaction, Impulsivity or Avoidant Persistence/Committed Action. Each part of the ACT process leads to behaviours that support the life that the individual wants to live and encourages goals setting that aligns with their overarching life values. Being in the present moment aids in behavioural choices (Soo et al., 2011). For example, if attending your daughter's school play is in line with your life values of family and parenting, it follows that your feelings of anxiety associated with the crowd will need to be recognized and experienced in order to for you to behave in accordance with these values. Skills of cognitive defusion and acceptance as well as being present in the moment all contribute to the ability to be able to choose behaviours that are in line with your values, despite whether these actions or situations cause distress or discomfort.

2.0 The Current Study

The purpose of this research was to examine Psychological Flexibility and Reactions to Impairment and Disability (psychosocial adaptation) as potential modifiable variables that affect the association between brain injury and general well-being. Specific aspects of how brain injury survivors approach and adapt to their new

life circumstances (e.g., Psychological Flexibility and Reactions to Impairment and Disability) influence overall SWB and HRQL. Thus, in this study, both SWB and HRQL were used as outcome variables. In addition, the impact of situational variables, including years since the injury, injury severity, gender, financial resources, and ongoing PCS symptom severity were measured, and when applicable, controlled.

Conceptually, the benefits of ACT with those individuals who have sustained a brain injury have not been fully explored. ACT has been shown to increase Psychological Flexibility in populations with chronic conditions, but its effectiveness among individuals who have sustained a brain injury has only been examined in case studies (Kangas & McDonald, 2011; Soo et al., 2011; Whiting et al., 2015). Researchers have yet to examine and establish whether those who have sustained a brain injury have deficits in Psychological Flexibility, and more importantly, how potential deficits may relate to other variables such as time since injury, reactions to impairment and disability, and potential impacts on SWB and HRQL. This research examined psychological variables and thought processes that may be maladaptive, leading to decrements in SWB and HRQL. Specifically, in the pursuit of overall increases in SWB and HRQL, it is of interest to consider the impacts of modifiable psychological variables, such as psychological flexibility. If higher psychological flexibility is related to increases in well-being in ABI survivors, acceptance-based therapies should be considered early in the rehabilitation process.

2.1 Research Questions/Hypotheses

The following research questions were investigated:

1. Do ABI survivors who have higher levels of psychological flexibility report higher SWB and HRQL? Specifically, does psychological flexibility predict both SWB and HRQL beyond time since the injury? I hypothesized that psychological flexibility would predict both SWB and HRQL. However, I expected the percentage of variance explained would be larger for SWB when compared to HRQL.
2. For ABI survivors, do lower levels of psychological flexibility predict a higher number of reported post-concussion symptoms? I hypothesized that psychological flexibility would predict number of reported post-concussion symptoms beyond injury severity and time since the injury.
3. Will psychological flexibility moderate the effect of time since the injury on maladaptive reactions to impairment and disability (denial, anxiety, depressions, internalized anger, externalized hostility)? I hypothesized that psychological flexibility would increase the expected impact of time on maladaptive reactions to impairment.

3.0 Methods

3.1 Participants

Participants were recruited from “private/closed” online Facebook ABI support groups. These “private/closed” groups are online peer support forums where individuals who have sustained a brain injury or individuals who care for someone who has sustained an injury can post about their experiences and receive support and feedback from other members of the group. These groups have administrators, who are often survivors themselves that monitor posts and screen requests to join the group. The

administrators do not formally facilitate or mediate conversations as would be seen in a traditional support group setting.

Participants who were over the age of 18, sustained a brain injury, and could complete the online questionnaire independently were recruited. For the purposes of this study, “brain injury” was defined as any ABI including TBI, Anoxic Injury (injury due to loss of oxygen), Stroke, or Aneurism. Generally, members of these groups are assumed to be relatively high functioning and have the ability to communicate independently using a computer. Thus, this pool of ABI survivors is representative of brain injury survivors who are living in the community and not those survivors who are in the acute stages of recovery and rehabilitation.

3.2 Materials

3.2.1 Demographics. General information on age, gender, and area of residence was collected along with variables associated with the brain injury, including the type of injury, time since injury, ongoing symptoms, initial severity, and information on rehabilitation (see Appendix A). In the demographics section, participants answered questions about their leisure activities and satisfaction with their participation in these activities. In addition to these general questions, those who indicated they spent time in a rehabilitation facility (in-patient) or were recommended to do so by a physician (even if they did not choose to comply) were considered as having a more severe injury than survivors who were not.

3.2.2 Reactions to Impairment and Disability Inventory (RIDI; Livneh & Antonak, 1990b; See Appendix B). The RIDI includes questions focused on the psychosocial adaptation of individuals with CID. Items that asked questions about the

disability were modified such that the word "disability" was replaced with "brain injury" (e.g., *Since I acquired my disability [brain injury], I am less interested in people.*). This measure includes 60 questions and a short demographics questionnaire to examine related but distinct facets of psychosocial reactions: *Shock* (7 items; e.g., *I feel frozen, unable to move.*); *Anxiety* (8 items; e.g., *I find myself trembling without any apparent reason.*); *Denial* (7 items; e.g., *I am certain that I will be completely cured.*); *Depression* (8 items; e.g., *I feel that nothing will ever be the same again.*), *Internalized Anger* (8 items; e.g., *When I look at other people I get jealous.*); *Externalized Hostility* (7 items; e.g., *Nobody is going to tell me what to do.*); *Acknowledgement* (7 items; e.g., *I am seeking new meaning in my life.*); and, *Adjustment* (8 items; e.g., *When I look in the mirror I see myself and not a disability [brain injury].*). Participants were asked to respond to these statements on a 4-point Likert scale (1= *never; reaction is never experienced* to 4 = *often; reaction is frequently experienced, 10 or more times per month.*).

Total scores for the RIDI were calculated for each of the subscales separately, and the six maladaptive subscales were combined to produce a maladaptive total score. The RIDI has not been used specifically on a population of brain injury survivors; however, since its development in 1989, it has been used on a number of diverse populations with CID including those with Rheumatoid Arthritis (Treharne et al., 2007), spinal cord injury (Livneh & Martz, 2014), amputations (Livneh et al., 1999), and diabetes (Martz & Livneh, 2007). In this study, the RIDI Alpha's ranged from $\alpha = .68$ to $.82$ on the eight subscales (See Table 1; Livneh & Antonak, 2005). In addition to the subscales, a total score was used to measure maladaptive reactions (Cronbach's $\alpha = .93$).

3.2.3 The Comprehensive Inventory of Thriving (CIT; Su, Tay, & Diener, 2014; See Appendix C). The CIT measures a wide range of psychological constructs related to well-being. This measure has 54 items and 18 subscales: *support; community; trust; respect; loneliness; belonging; flow; skill; learning; lack of control; accomplishment; self-efficacy; self-worth; meaning, optimism; life satisfaction; positive emotions; and, negative emotions*. Questions such as, “*There are people I can depend on to help me out*” are measured on a 5-point Likert scale (1= *strongly disagree* to 5 = *strongly agree*). Analyzed in four separate and diverse groups, the CIT good test-retest reliability ($r = .57$ to $r = .83$) over the span of four months (Su et al., 2014). The CIT has demonstrated good convergent validity with other measures of psychological well-being (*Flourishing Scale, Satisfaction with Life, Life Orientation Test, Core Self-Evaluation Scales*) and was developed specifically for use in health settings. This holistic view of well-being not only predicts positive functioning and health outcomes beyond other measures of well-being, but also shows higher increment validity when predicting objective and self-report health outcomes (e.g., 10% predicting doctor's visits; 10% for perception of general health; Su et al., 2014). Su et al. also reported that the CIT had positive correlations with general health status, HRQL, physical functioning and health behaviours, and negative correlations with the number of medical visits during the previous year. In the current study, the CIT subscales had good overall internal consistency in this study with alpha's ranging from $\alpha = .75$ to $\alpha = .92$ (See Table 1). The total score calculated for analysis in this study had a Cronbach's α of .97.

3.2.4 Comprehensive Assessment of Acceptance and Commitment Therapy (CompACT; Francis, Dawson, & Golijani-Moghaddam, 2016: See Appendix D).

This 23-item measure has a stable, theoretically-backed three-factor structure with alphas in this study ranging from $\alpha = .78$ to $\alpha = .86$ (See Table 1); *openness to experience* (eight acceptance items; two defusion items); *behavioural awareness* (five contact with present moment/mindfulness items); and, *valued action* (eight values/committed action items). The CompACT includes three interrelated but distinguishable subscales that contain both negative and positively valanced statements; *openness to experience* (e.g., *Thoughts are just thoughts- they don't control what I do.*); *behavioural awareness* (e.g., *I rush through meaningful activities without being really attentive to them.*); and, *valued action* (e.g., *I can identify the things that really matter to me in life and pursue them.*) that are measured on a 5-point Likert scale (1= *strongly disagree* to 5 = *strongly agree*).

In the current study, the internal reliability of the CompACT subscales and total scores was high (Cronbach's $\alpha = .89$). Numerous measures have been developed to examine the ACT process, both generally and in specific populations. The most widely used measure, the Acceptance and Action Questionnaire (AAQ-II; Gámez et al., 2014), was not chosen for this study because I wanted to include a broad measure of Psychological Flexibility. Critics of the AAQ-II argue that it does not represent the construct of Psychological Flexibility or experiential avoidance, which are important parts of the ACT process, but rather, that it measures levels of distress (Gámez et al., 2014). Thus, because I wanted to include a comprehensive, broad measure of Psychological Flexibility that taps into the breadth and scope of Psychological Flexibility and experiential avoidance as representatives of the ACT process, the CompACT was selected. Overall scores ($r = .79$) as well as the three subscale scores (r s

= .41- .78) significantly correlate with the AAQ-II (Francis et al., 2016). Total CompACT scores were significantly negatively correlated with mental ($r = -.67$) and physical ($r = -.23$) functioning; however, the CompACT has shown to measure constructs that are unique from general distress and adds explained variance (2 - 4%) above and beyond the AAQ-II when predicting depression, anxiety, and stress (Francis et al., 2016). The incremental validity of the CompACT supports the inclusion of this measure in this study.

3.2.5 Quality of Life After Brain Injury (QOLIBRI; Von Steinbuechel et al., 2016; See Appendix E). The QOLIBRI is a 37-item measure divided into two parts created to measure the subjective perspective of HRQL in those individuals who have sustained a brain injury. Part One is comprised of 27 questions divided into four subscales designed to measure satisfaction in: *Thinking* (e.g., *How satisfied are you with your ability to make decisions?*); *Feelings and Emotion* (e.g., *How satisfied are you with the way you see your future?*); *Autonomy in Daily life* (e.g., *How satisfied are you with your ability to get out and about?*); and, *Social Aspects* (e.g., *How satisfied are you with your relationships with your friends?*). Items are scored on a 5-point Likert scale (1= “not at all satisfied” to 5 = “very satisfied”). The second part includes 12 questions to measure how “bothered” participants are with, *Emotions* (e.g., *How bothered are you by feeling anxious?*); and, *Physical Problems* (e.g., *How bothered are you by pain, including headaches?*). In the current study, subscales had alphas ranging from $\alpha = .75$ to .91 (See Table 1) and the total score had a Cronbach’s α of .95. Questions were rated using a 5-point Likert scale (1 = *very bothered* to 5 = *not at all bothered*).

All subscales have adequate to excellent test-retest reliability (IIC range = .68 - .91) in samples who had sustained brain injuries and had both low and high Mini-Mental State Examination scores (Von Steinbuechel et al., 2016). The QOLIBRI assesses factors that are more specific to the HRQL of those who have sustained a brain injury than general assessment of HRQL such as the SF-36 (Von Steinbuechel et al., 2016). Total scores below 60 on the first two sections indicate low or impaired HRQL; in the validation sample, just over one-third of participants presented with scores in this range (Truelle et al., 2010). In the currently study, over 84% ($n = 356$) of participants presented with scores below 60.

3.2.6 The Ten-Item Personality Inventory (TIPI; Gosling, Rentfrow, & Swann, 2003; See Appendix F). The TIPI consists of 10 items formulated to measure Extraversion, Agreeableness, Conscientiousness, Emotional Stability, and Openness to Experience. As expected, given the brevity of the measure, the average α for all five, two-item subscales was low ($\alpha = .54$; see Table 1); however, the aim of the TIPI is to measure five broad personality constructs using as few items as possible (Gosling, 2003). Aside from length, this measure was selected as factor scores on the TIPI are highly correlated with other established measures of personality including The Big Five Inventory and the Neuroticism, Extroversion, Openness Personality Inventory-Revised (Freeze, Freeze, Best, & Flood, 2017). Given that personality was not the primary interest of this study, the TIPI was used as a pragmatic compromise.

Table 1.

Cronbach's α coefficients for the measuring instruments

Measure	Cronbach's α	Number of Items
<u>RIDI</u>		
Shock	.79	7
Anxiety	.82	8
Denial	.68	7
Depression	.84	8
Internalized Anger	.81	7
Externalized Hostility	.75	8
Acknowledgement	.71	7
Adjustment	.80	8
<u>CompACT</u>		
Openness to experience	.82	10
Behavioural awareness	.79	5
Valued action	.86	8
Overall	.89	23
<u>QOLBRI</u>		
Part I		
Thinking	.91	7
Emotion	.90	7
Autonomy in daily life	.88	7
Social aspects	.85	6
Part II		
Negative feelings	.84	5
Restrictions	.75	5
Total	.95	37
<u>CIT</u>		
Support	.89	3
Community	.74	3
Trust	.85	3
Respect	.84	3
Loneliness	.78	3
Belonging	.82	3
Flow	.78	3
Skill	.86	3
Learning	.75	3
Lack of Control	.93	3
Accomplishment	.81	3

Table 1 (continued)	Cronbach's α	Number of Items
Self-efficacy	.87	3
Self-worth	.80	3
Meaning	.87	3
Optimism	.90	3
Life Satisfaction	.90	3
Positive Emotions	.91	3
Negative Emotions	.92	3
Overall	.97	54
<u>TIPI</u>		
Extroversion	.74	2
Agreeableness	.34	2
Conscientiousness	.54	2
Emotional Stability	.67	2
Openness to Experience	.41	2

3.3 Procedure

As stated above, participants were recruited through closed online support groups. To access the surveys, participants were provided with a link to the general study information and the informed consent form. They were required to read and agree to the conditions outlined in the consent form before continuing to the questionnaire items. The demographics questionnaire was always presented first and the rest of the measures were randomized. In previous research of this kind, the dropout rate was approximately 30% (Proctor & Best, 2015); in the current study, it was 35%. The total questionnaire package took an average of 40 minutes to complete (Range = 9 -55 minutes).

4.0 Results

4.1 Data Conditioning

4.1.1 Missing Data. A frequency analysis was conducted to check for missing data and out of range values. Participants who did not complete more than three questions were removed from the data set before any analyses were conducted ($n = 107$). There were no issues with out of range variables; however, 34% of participants had missing values on at least one of the variables of interest. Participants missing more than 20% of their responses for any given measure were excluded and their scale scores were not included in relevant analyses. Given the large number ($n = 200$) of participants missing more than 20% of their responses on one or more of the criterion and outcome variables, an extra dichotomous variable (scored 1 [$n = 380$] or 0 [$n = 200$]) was created (" M ") to identify participants who were missing scores. Statistically significant differences were found between participants with missing data and those who did not

have any missing data (see Table 2). Specifically, those with missing data had higher scores in Maladaptive RIDI but had lower severity of their injury scores and CIT. Given the number of t-test performed for comparisons, results should be interpreted cautiously. Using a conservative correction ($.05 / 17$), significance can be assumed at $p < .01$

Participants with missing data reported no statistically significant differences in their current level of functioning, indicating that there was insufficient evidence to conclude that this was related to the missing data. Taking into consideration the differences between these groups, mean substitution was not used to replace any missing variables and these differences be accounted for using this "M" variable in regression analysis, where applicable. All of our regression analyses used the CompACT as a variable therefore the "M" variable was not utilized. All 200 participants who were missing data did not complete the CompACT measure. Participants were retained for analyses of the measures for which they completed.

Table 2.

T-test comparisons for variables by whether a respondent missed items.

Variable (possible range)	Missing			Complete			T-test
	n	Mean	SD	N	Mean	SD	t
Age	185	44.34	11.75	358	45.73	12.07	1.29
Severity (1–3)	156	2.08	.84	144	2.06	.83	2.39***
Years Since Injury	185	10.44	12.68	364	9.40	10.68	-1.01
Current Functioning (1-6)	145	3.93	1.30	380	3.90	1.10	-.275
PCS (0-72)	149	35.83	14.87	380	38.37	13.11	-1.99
PC-PTSD (0-4)	148	2.16	1.55	379	1.89	1.53	-1.85
<u>Measures</u>							
QOLBRI (0-100)	61	37.48	14.91	363	44.98	16.05	3.04***
CIT (1-5)	65	2.96	.70	366	3.15	.71	-2.27*
CompACT (0-5)	0	-	-	380	2.87	.84	N/A
Maladaptive (1-4)	61	2.52	.45	372	2.11	.47	-6.49***
Shock (1-4)	60	2.80	.67	370	2.31	.62	-5.66***
Anxiety (1-4)	60	2.62	.70	370	2.18	.68	-4.66***
Denial (1-4)	62	1.51	.50	369	1.46	.44	.85
Anger (1-4)	62	2.66	.68	372	2.11	.66	-5.97***
Depression (1-4)	62	2.98	.65	372	2.55	.70	-4.57***
Hostility (1-4)	60	2.98	.61	369	1.98	.60	5.75***
Acknowledgement (1-4)	60	2.79	.58	371	2.81	.58	.301
Adjustment (1-4)	60	2.58	.60	371	2.80	.61	2.59***

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. All t values that were significant $< .01$ are boldface

4.1.2 Considerations of univariate outliers and normality. The next step was to screen for univariate outliers and assess normality (i.e., skewness, kurtosis, probability plots). Outliers were assessed by using suggested cut off z-scores (z -score greater than 3.29 or less than -3.29; Tabachnick & Fidell, 2013). Following this criterion, numerous scores fell outside these values in the time since injury variable but were considered continuous with the remaining distribution. Outliers were noted on the RIDI (Denial and Externalized Hostility subscales) and were modified to the next highest score plus .10. Numerous skewed responses were noted in demographic variables. Most notably, the time since injury item was extremely positively skewed, indicating many participants had newly acquired injuries. Further investigation of the range (*Range* = 18 days to 59.7 years, *M* = 9.75 years, *SD* = 11.39) revealed this skew resulted because some participants incurred their injury at a very young age. To control for this, variables named "Age at Injury" (*M* = 35.97 years, *SD* = 14.79) and "Injured in Adulthood" were computed to determine if differences between these groups existed that should be controlled for. Independent sample *t*-test results indicated that participants who were injured in adulthood (after 18 years of age, *n* = 451) had lower Internalized Anger ($t = -2.26, p = .025$) than participants who sustained a childhood brain injury (less than 18 years of age). Specifically, for HRQL, being bothered by emotional ($t = -2.47, p = .014$), and physical ($t = -1.97, p = .050$) challenges were more prevalent for participants who were injured before the age of 18 (*n* = 58).

Additionally, age, number of post-concussion symptoms, and three RIDI subscale (anxiety, denial, externalized hostility) were slightly skewed. Individual item variables were found to be visually skewed in the CompACT (values subscale items),

CIT (loneliness and social subscales) as well as a mild overall skew in QOLBRI (social interaction, sex life, headaches, emotion, and leading the life they want). Consistent with previous research, these values are expected in the ABI population and were not adjusted. Tabachnick and Fidell's (2013) recommendation that skewness and kurtosis greater than the absolute value of 3.29 are representative of non-normality was used and none of the variables fell into this category and therefore no score adjustments were performed.

4.1.3 Consideration of Multivariate Outliers. Mahalanobis distances were used to detect the presence of multivariate outliers. All values were continuous with the rest of the dataset. No multivariate outliers were deleted in this data set.

4.1.4 Multicollinearity and Singularity. The assumption of non-multicollinearity is important to multiple regression as this statistical procedure is not robust to these violations. Tolerance levels assess the linear relationships that exist between predictors; high tolerance indicates that predictors are independent of each other. Tolerance levels for all of predictors, in the analyses were within acceptable limits, with values between .88 - .89. Furthermore, correlations between the criterion variables did not exceed $r = .60$.

4.1.5 Type I Error rate and power. For all analyses, type I error rate was controlled for by using $p = .05$. Prior to data collection, a power analysis using G-Power was conducted to determine the required sample size. Given the current sample size ($N = 340$) and a medium effect size ($f^2 = .15$) the achieved power was .99.

4.2 Sample Characteristics

4.2.1 Demographic Variables. This sample ($N = 580$, $M_{age} = 45.35$, $SD = 11.97$) contained an uneven number of Males ($N = 106$) and Females ($N = 473$). Gender differences on variables of interest are presented in Table 3. Given the number of t -test performed for comparison purposes, results should be interpreted cautiously. Using a conservative correction, significance can be assumed at $p < .01$. Most participants were from the United States of America ($N = 389$; 67.1%), followed by Canada ($N = 107$; 18.4%), United Kingdom ($N = 41$; 7.1%), Australia ($N = 26$; 4.5%), and other countries ($N = 17$; 2.9%). There was a wide range (0.05 - 59.70) of reported years since the injury occurred ($M = 9.75$, $SD = 11.39$). Less than half ($N = 167$, 28.8%) of participants were currently engaging in paid employment compared to 410 participants (78.7%) who indicated they were employed prior to their injury; 46.7% ($n = 41$) of the sample indicated that they were currently dissatisfied with their current state of employment. Reported mean levels of financial security (measured on a 6-point scale) were significantly lower immediately after injury ($M = 1.86$ $SD = 1.27$) compared to their current levels ($M = 3.91$, $SD = 1.15$; $t(515) 4.51$, $p < .001$). With regard to ACT awareness, two thirds of the sample (66.5%) of the sample had not heard about ACT before taking part in this research, 50 participants had participated in ACT and felt it was useful to their recovery, and 40 reported participating in ACT and did not find it useful.

Table 3.

T-test comparisons of gender differences on variables of interest.

Variable (possible range)	Male			Female		<i>t</i> -test	
	N	Mean	SD	Mean	SD		
Age	100	43.97	12.40	442	45.56	11.87	-1.20
Severity (1-3)	96	2.21	.84	421	1.88	.84	3.43***
Years Since Injury	102	14.13	14.35	446	8.75	10.37	4.37***
Functioning (1-6)	95	3.78	1.20	429	3.94	1.14	-1.23
PCS (0-72)	98	33.76	14.30	430	38.56	13.39	-3.16***
PC-PTSD (0-4)	97	1.62	1.51	429	4.04	1.54	2.47*
<u>Measures</u>							
QOLBRI (0-100)	73	42.02	16.49	350	44.30	16.03	-1.10
CIT (1-5)	75	2.96	.70	355	3.15	.71	-2.13*
CompACT (0-5)	61	2.73	.76	318	2.90	.85	-1.41
Maladaptive Total (1-4)	74	2.21	.51	358	2.16	.48	.73
Shock (1-4)	74	2.14	.66	355	2.27	.65	.47
Anxiety (1-4)	74	2.08	.73	355	2.27	.69	-2.14*
Denial (1-4)	73	1.45	.52	357	1.47	.44	-2.00*
Internalized Anger (1-4)	74	2.33	.79	359	2.16	.70	-5.97*
Depression (1-4)	74	2.71	.75	259	2.59	.70	1.28
Hostility (1-4)	72	2.17	.65	356	2.02	.62	1.85
Acknowledgement (1-4)	74	2.71	.59	356	2.83	.58	-1.61
RIDI Adjustment (1-4)	74	2.63	.63	356	2.80	.61	-2.03*

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. All t values that were significant $< .01$ are boldface

4.2.2 Symptoms and Severity In total, 305 participants (60.4%) reported that their injury was due to a traumatic event and were labelled “TBI”. Participants who reported injuries caused by anoxic injury, hemorrhage, stroke, viral infections, and brain bleeds ($N = 200$; 39.6%) were placed in a second category labelled ABI (other). Differences between these groups are presented in Table 4. Overall severity was measured by self-report of Glasgow Coma Scale (GCS) ratings (1 = *mild*, 2 = *moderate*, 3 = *severe*). Participants who were unsure of their GCS rating were scored based on their answer to the question “Was it recommended (by a physician) that you spend any time at an in-patient rehabilitation facility?” (yes = 2.5, no = 1). Mean severity of injury (Range = 1-3) in this sample was 1.94 ($SD = .84$). Over half of participants (54.1%; $n = 314$) reported that they lived with a caregiver or someone who gave them support; 61.8% ($n = 194$) were cared for by a spouse, 14% ($n = 44$) by a child, and 11.7% by a parent ($n = 27$). Five questions, were used to rate the quality of their caregiver’s abilities to meet their physical and emotional needs (1 = *definitely agree* to 5 = *definitely disagree*) and responses ranged between one and 17 ($M = 8.51$, $SD = 3.13$).

Table 4.

T-test comparisons of TBI and ABI (other).

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. All t values that were significant $< .01$ are

Variable (possible range)	TBI			ABI (other)			T-test
	N	Mean	SD	N	Mean	SD	t
Age	29	43.44	12.66	184	47.73	10.90	-3.80**
Severity (1-3)	296	1.89	.86	178	1.99	.80	-1.33
Years Since Injury	293	11.62	12.20	189	2.08	7.52	5.59**
Current Functioning (1-6)	304	3.79	1.18	199	4.02	1.09	-2.16*
PCS (0-72)	305	40.82	12.94	200	33.42	13.44	6.19**
PC-PTSD (0-4)	305	2.21	1.55	199	1.63	1.50	4.11**
Measures							
QOLBRI (0-100)	264	41.82	15.91	158	47.27	15.89	-3.41**
CIT (1-5)	266	3.06	.68	163	3.19	.74	-1.89
CompACT (0-5)	234	2.80	.80	144	2.95	.88	-1.67
Maladaptive (1-4)	268	2.22	.47	163	2.08	.51	3.02***
Shock (1-4)	267	2.44	.61	161	2.27	.70	2.59*
Anxiety (1-4)	267	2.34	.69	161	2.08	.70	3.66**
Denial (1-4)	265	1.44	.45	164	1.52	.46	-1.70
Anger (1-4)	268	2.24	.69	164	2.50	.71	-5.97***
Depression (1-4)	268	2.69	.70	164	2.50	.71	2.69***
Hostility (1-4)	265	2.12	.63	162	1.94	.59	2.86***
Acknowledgement (1-4)	267	2.79	.61	161	2.84	.61	-1.07
Adjustment (1-4)	267	2.72	.61	162	2.83	.61	-1.05

boldface

The full range of scores (0 - 72) were reported on the Rivermead Post Concussion Symptoms Questionnaire ($M = 37.68$, $SD = 13.66$), indicating a wide range of post-concussion symptoms severity. Furthermore, using the Primary Care PTSD (PC-PTSD) screening questions, 62.5% of participants ($N = 363$) met criteria for a PTSD diagnosis. Additionally, participants completed demographics questions about their leisure activities ($M = 36.86$, $SD = 12.12$, Range = 2 – 70) and online community involvement ($M = 11.28$, $SD = 4.53$, Range = 4 - 24).

4.2.3 Overall Well-Being As expected, mean CIT subscale scores were lower than published norms taken from the general population (see Table 5). Comparably, mean QOLBRI percentage-based scores ($M = 43.90$, $SD = 16.09$) fell below the 60% cut off recommended by Wilson and colleagues (2012), indicating poor or impaired HRQL. In total, 84% ($N = 356$) of this sample had a score below this set point.

Table 5.

Mean Thriving Subscale Scores Compared to General Population-Based Norms

Variable	Current Sample			Norms		Percentile Rank
	N	Mean	SD	Mean	SD	
Relationship						
Support	439	3.94	1.03	4.18	.81	<50 th
Community	438	2.86	1.01	3.32	.98	< 25 th
Trust	438	3.16	.96	3.43	.87	< 25 th
Respect	438	3.51	.84	3.96	.71	< 25 th
Loneliness	437	3.27	1.05	2.46	1.08	>75 th
Belongingness	438	2.89	.96	3.38	.96	< 25 th
Engagement						
Flow	437	3.20	.89	3.60	.75	< 25 th
Master						
Skill	437	3.04	1.04	3.63	.95	25 th
Learning	436	3.34	.88	3.81	.79	25 th
Accomplishment						
Self-Efficacy	436	3.16	1.00	4.02	.79	< 25 th
Self- Worth	436	3.24	1.04	3.71	.89	< 24 th
Autonomy						
Lack of Control	436	3.61	1.04	2.07	1.03	< 75 th
Meaning						
Meaning	433	3.06	1.08	3.71	.98	<25 th
Optimism						
Optimism	432	3.22	1.04	3.77	.98	<25 th
Subjective Well-Being						
Life Satisfaction	433	2.61	1.09	3.40	1.01	<25 th
Positive Emotions	433	2.12	1.08	3.68	.58	<25 th
Negative Emotions	433	3.29	1.15	2.71	.78	<25 th

4.3 Correlational Analyses

Given the novelty of using this combination of measures with our targeted study population, correlations between these and other variables of interest were calculated and reported in the following subsections.

4.3.1 Thriving and Quality of Life. As expected, total scores on the QOLBRI and CIT were positively correlated ($r = .78, p < .001$). Statistically significant, moderate correlations were found between all subscales on these measures (see Table 6). In relation to details of the injury, different relationships emerged for QOLBRI and CIT. Specifically, Thriving scores were negatively correlated with PCS Severity ($r = -.42, p < .001$) and total PC-PTSD scores ($r = -.36, p < .001$), but were not related to severity or visibility of the injury. Comparably, there were inverse relations between the QOLBRI and PCS Severity ($r = -.63, p < .001$), and total PTSD scores ($r = -.47, p < .001$); additionally, a weak, but statistically significant correlation was found with overall severity ($r = .12, p = .02$).

Table 6.

Pearson Correlations between Thriving and HRQL

Variable	Total	Part I				Part II	
		<i>Thinking</i>	<i>Emotions</i>	<i>Autonomy</i>	<i>Social</i>	<i>Emotions</i>	<i>Physical</i>
CIT Total	.782**	.505**	.754**	.667**	.619**	.427**	.598**
Relationship							
<i>Support</i>	.235**	.235**	.347**	.283**	.541**	.230**	.257**
<i>Community</i>	.448**	.323**	.433**	.417**	.319**	.176**	.323**
<i>Trust</i>	.457**	.302**	.406**	.332**	.389**	.284**	.444**
<i>Respect</i>	.570**	.382**	.499**	.425**	.519**	.344**	.481**
<i>Loneliness</i>	-.595**	-.329**	-.532**	-.426**	-.620**	-.339**	-.583**
<i>Belongingness</i>	.514**	.344**	.494**	.385**	.434**	.306**	.416**
Engagement/ Flow	.473**	.351**	.485**	.400**	.308**	.276**	.275**
Master							
<i>Skill</i>	.527**	.372**	.545**	.493**	.283**	.318**	.357**
<i>Learning</i>	.374**	.303**	.374**	.311**	.299**	.124*	.234**
<i>Accomplishment</i>	.609**	.406**	.607**	.311**	.421**	.382**	.365**
<i>Self-Efficacy</i>	.525**	.406**	.490**	.486**	.346**	.280**	.315**
<i>Self- Worth</i>	.583**	.405**	.541**	.563**	.375**	.328**	.412**
Autonomy/ Lack of Control	.475**	.344**	.355**	.535**	.382**	.149***	.353**
Subjective Well-Being							
<i>Life Satisfaction</i>	.642**	.327**	.630**	.573**	.546**	.391**	.486**
<i>Positive Emotions</i>	.695**	.424**	.699**	.574**	.530**	.399**	.571**
<i>Negative Emotions</i>	.621**	.365**	.631**	.476**	.495**	.348**	.611**

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

4.3.2 Reactions to Impairment and Disability. As expected, total scores on RIDI (maladaptive reactions) were negatively correlated with both total scores on the CIT ($r = -.62, p < .001$), and QOLBRI ($r = -.66, p < .001$). All subscales of the RIDI and the CIT and QOLIBRI were negatively correlated, with the exception of denial which was positively correlated with CIT ($r = .14, p < .01$) and QOLBRI ($r = .15, p < .01$) total scores. Notably, denial was positively correlated with six subscales of the CIT: Skills ($r = .13, p < .01$); Accomplishment ($r = .25, p < .01$); Self-efficacy ($r = .20, p < .01$); Meaning ($r = .14, p < .01$), Life Satisfaction ($r = .192, p < .01$) and, Positive Feelings ($r = .150, p < .01$), as well as three QOLBRI subscales: Cognitions ($r = .12, p < .01$); Self ($r = .186, p < .01$); and, bothered by Physical problems ($r = .24, p < .01$).

Total RIDI (maladaptive) scores were significantly correlated with PCS severity ($r = .51, p < .001$) and total PC-PTSD ($r = .53, p < .001$) scores, but were not significantly related to injury severity, time since injury, visibility of injury, or age at injury. Negative relationships were found between adaptive reactions (Acknowledgement; $r = -.15, p < .001$, and Adjustment; $r = -.34, p < .001$) and PCS total scores. Statistically significant negative relationships were also found between the PC-PTSD scores and Adjustment $r = -.27, p < .001$, but not Acknowledgment. All maladaptive reactions to impairment and disability had positive relationships with PC-PTSD (Shock; $r = .49, p < .001$, Anxiety; $r = .58, p < .001$, Internalized Anger; $r = .37, p < .001$, Externalized Hostility; $r = .49, p < .001$, Depression; $r = .34, p < .001$) and PCS severity (Shock; $r = .51, p < .001$, Anxiety; $r = -.64, p < .001$, Internalized Anger; $r = .31, p < .001$, Externalized Hostility; $r = .46, p < .001$, Depression; $r = .36, p < .001$) with the exception of Denial which was negatively associated with PCS symptoms ($r = -$

.20, $p = .01$) and unrelated to PC-PTSD scores. Interestingly, denial was the only reaction to impairment that was related to time since injury ($r = -.12, p = .02$) and was positively correlated with both adaptive reactions (Acknowledgement; $r = .12, p = .01$, and Adjustment; $r = .166, p < .001$).

4.3.3 Psychological Flexibility. There were statistically significant correlations between all subscales and total scores ($r = .67 p < .001$) on the CompACT and the CIT (see Table 7). Similar results were found between all subscales and total score the QOLBRI and the CompACT and these results can also be found in Table 7. Significant negative correlations were found between Shock, Anxiety, Internalized Anger, Depression, Externalized Hostility and total scores on the CompACT. Positive relationships were found between adaptive reactions Acknowledgement, and Adjustment, and there was no significant relationship between denial scores and CompACT total scores (see Table 8). Given the number of correlations examined, results should be interpreted cautiously. Using a conservative correction, significance can be assumed at $p < .01$. The majority of these fell well below this value (See Table 7; See Table 8).

Table 7.

Pearson Correlations between CIT and HRQL and Variables of Interest

Variable	PCS	PC-PTSD	Severity	CF ¹	RIDI-M ²	RIDI-ACK ³	RIDI-ADJ ⁴	FLEX ⁵
CIT Total	-.427**	-.358**	.027	.443**	-.621**	.396**	.677**	.665**
Relationship	-.183**	-.189**	-.022	.254**	-.372**	.184**	.376**	.307**
Support								
Community	-.220**	-.146**	.048	.216**	-.327**	.304**	.320**	.325**
Trust	-.221**	-.270**	.025	.232**	-.472**	.263**	.324**	.363**
Respect	-.285**	-.291**	.035	.294**	-.561**	.324**	.462**	.445**
Loneliness	.535**	.340**	-.045	-.341**	.561**	-.202**	-.518**	-.546**
Belongingness	-.262**	-.251**	-.041	.270**	-.465**	.277**	.427**	.439**
Engagement								
Flow	-.296**	-.171**	.070	.329**	-.346**	.353**	.408**	.442**
Master				.347**				
Skill	-.329**	-.225**	.023		-.356**	.245**	.473**	.473**
Learning	-.118*	-.074	-.059	.191**	-.270**	.355**	.346**	.393**
Accomplishment	-.340**	-.259**	.076	.424**	-.390**	.274**	.523**	.485**
Self-Efficacy	.283**	-.202**	-.025	.357**	-.352**	.281**	.524**	.463**
Self- Worth	-.266**	-.223**	.009	.295**	-.425**	.262**	.451**	.423**
Autonomy								
Lack of Control	-.179**	-.204**	-.025	.222**	.383**	.199**	.394**	.445**
Meaning								
Meaning	-.261**	-.232**	-.054	.308**	-.406**	.300**	.520**	.544**

Table 7 (continued)

Optimism								
Optimism	-.359**	-.312**	.024	.337**	-.537**	.379**	.584**	.550**
Subjective Well-Being								
Life Satisfaction	-.362**	-.296**	.002	.402**	-.483**	.233**	.609**	.519**
Positive Emotions	-.462**	-.370**	.039	.391**	-.567**	.311**	.581**	.568**
Negative Emotions	-.412**	-.394**	.090	.326**	-.588**	.316**	.578**	.583**
QOLBRI Total	-.625**	-.473**	.115*	.522**	-.661**	.356**	.662**	.645**
QOLBRI Part I				.411**				
Thinking	-.586**	-.370**	.093		-.490**	.275**	.436**	.508**
Emotions	-.433**	-.395**	.082	.404**	-.541**	.368**	.607**	.627**
Autonomy	-.434**	-.351**	.093	.458**	-.502**	.254**	.560**	.469**
Social	-.384**	-.305**	.055	.381**	-.510**	.314**	.533**	.528**
QOLBRI Part I								
Emotions	-.432**	-.404**	.067	.287**	-.624**	.202**	.444**	.547**
Physical	-.591**	-.356**	.120*	.379**	-.425**	.130***	.390**	.271**

Note: Significant r values are in boldface. * $p < .05$, ** $p < .01$, *** $p < .001$. ¹Current Functioning, ²Maladaptive Reactions, ³Acknowledgement, ⁴Adjustment, ⁵CompACT

Table 8.

Pearson Correlations between Psychological Flexibility and Reactions to Impairment and Disability

ComPACT	RIDI Subscales								
	DEN ¹	SH ²	AN ³	DEP ⁴	IA ⁵	EH ⁶	ACK ⁷	ADJ ⁸	MAL ⁹
CompACT	-.021	-.521**	-.423**	-.608**	-.509**	-.428**	.413**	.571**	-.596**
OPEN ¹⁰	-.043	-.376**	-.340**	-.480**	-.436**	-.305**	.298**	.389**	-.470**
BEH ¹¹	.056	-.438**	-.279**	-.374**	-.275**	-.240**	.244**	.304**	-.370**
VA ¹²	-.005	-.397**	-.352**	-.487**	-.392**	-.336**	.392**	.578**	-.470**

Note: Significant r values are in boldface. * $p < .05$, ** $p < .01$, *** $p < .001$. ¹Denial, ²Shock, ³Anxiety, ⁴Depression, ⁵Internalized Anger, ⁶Externalized Hostility, ⁷Acknowledgement, ⁸Adjustment, ⁹Maladaptive Reactions, ¹⁰Openness to Experience, ¹¹Behavioural, ¹²Valued Action

4.3.4 Psychological Flexibility and Injury Characteristics Total scores on the CompACT were negatively correlated with PCS severity ($r = -.336, p < .001$), PC-PTSD scores ($r = -.348, p < .001$), and reports of poor caregiver relationship ($r = -.118, p = .05$). There were no significant correlations between total scores on the CompACT and time since injury, injury severity, age at injury, or injury visibility.

4.3.5 Personality Characteristics Personality characteristics were measured and those that were found to have acceptable reliability in this sample (Extroversion, Emotional Stability) were compared to the variables of interest. Extroversion was positively correlated with total score on the CompACT ($r = .229, p < .05$) and QOLBRI ($r = .229, p < .05$) and negatively correlated with maladaptive reactions ($r = -.110, p < .05$). As expected, Emotional Stability was also negatively related to maladaptive reactions ($r = -.571, p < .001$) and positively related to total score on the CompACT ($r = .558, p < .001$) and QOLBRI ($r = .547, p < .001$). Both Extroversion ($r = .114, p < .05$) and Emotional Stability ($r = .559, p < .001$) were also correlated with total scores on the CompACT. Emotional Stability and Extroversion were included in the relevant regression analyses.

4.4 Hypothesis Testing

4.4.1 Predictors of Well-Being. Two hierarchical regressions were conducted to examine the impact of psychological flexibility on thriving and HRQL. Specifically, for this analysis, I was interested in the role of the psychological flexibility in predicting thriving and HRQL beyond demographic characteristics (gender, age), time since injury, and injury severity. Gender and age were entered in Block 1, years since injury and injury severity in Block 2, Emotional Stability and Extroversion were entered in Block 3

and total scores on the CompACT were entered in the fourth block. The first model, predicting thriving, was statistically significant $F(7, 309) = 48.04, p < .001, R^2 = .521$ (see Table 9). Block 1 and 2 variables were not statistically significant. In the third block, both Extroversion, $\beta = .128, t = 2.78, p = .006$, and Emotional Stability, $\beta = .561, t = 12.05, p < .001$, were statistically significant predictors ($\Delta R^2 = .335$). Total scores on the CompACT were entered in the fourth block and added significantly to the model, $\beta = .513, t = 10.59, p < .001, \Delta R^2 = .174$. Thus, personality (extroversion, emotional stability) and psychological flexibility were significant predictors of Thriving.

Table 9.

Summary of the Hierarchical Regression Analysis for Hypothesis One Predicting Thriving (N=310)

Variable	Model 1			Model 2			Model 3			Model 4		
	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
Constant	3.063	.251	-	2.995	.283	-	2.079	.245	-	1.583	.215	-
Age	-.004	.003	-.066	-.004	.003	-.059	-.008	.003	-.134**	-.008	.002	-.132**
Gender	.150	.107	.079	.153	.110	.080	.117	.090	.061	.053	.077	.028
Years Since Severity				-.002	.004	-.028	.002	.003	.023	.001	.003	.012
				.032	.049	.037	-.005	.040	-.005	-.030	.035	-.035
Extroversion							.054	.019	.128***	.042	.017	.101
Emotional Stability							.275	.023	.561**	.132	.024	.270
CompACT										.429	.041	.513**
<i>R</i> ²		.010			.012			.347			.521	
<i>F</i> for Change in <i>R</i> ²		1.65			.293			79.62**			112.07**	

Note. Significant *F* and β values are in boldface. * $p < .05$, *** $p < .01$, ** $p < .001$.

The second model, predicting HRQL, was also statistically significant, $F(7, 306) = 40.56, p < .001, R^2 = .481$ (see Table 10). Gender and age were entered in Block 1, years since injury and injury severity in Block 2, Emotional Stability and Extraversion were entered in Block 3 and total scores on the CompACT were entered in the Block 4. Block 1 and 2 variables were not statistically significant. In the third block and both Extraversion, $\beta = .143, t = 2.97, p = .003$, and Emotional Stability, $\beta = .516, t = 10.62, p < .001$ were statistically significant predictors, $\Delta R^2 = .288$. Total scores on the CompACT were entered in Block 4 and it was statistically significant, $\beta = .519, t = 10.27, p < .001, \Delta R^2 = .179$. Thus, these results suggest that higher Emotional Stability, Extraversion, and psychological flexibility are associated with thriving and HRQL.

Table 10.

Summary of the Hierarchical Regression Analysis for Hypothesis One Predicting HRQL. (N=313)

Variable	Model 1			Model 2			Model 3			Model 4		
	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
Constant	2.668	.233	-	2.442	.262	-	1.678	.234	-	1.226	.207	-
Age	-.001	.003	-.020	-.001	.003	-.021	-.006	.003	-.109*	-.006	.002	-.114**
Gender	.097	.099	.056	.131	.101	.075	.106	.085	.061	.049	.074	.028
Years Since Severity				.001	.004	.023	.004	.003	.066	.004	.003	.060
Extroversion				.082	.046	.103	.048	.039	.060	.023	.033	.029
Emotional Stability							1.361	.457	.143**	.043	.016	.114***
CompACT							5.849	.551	.516***	.101	.023	.224**
										10.02	.976	.519***
<i>R</i> ²		.003			.015			.303			.481	
								63.35***				
<i>F</i> for Change in <i>R</i> ²		.541			1.80						105.37***	

Note. Significant *F* and β values are in boldface. **p* < .05, ***p* < .01, *** *p* < .001.

4.4.2 Psychological Flexibility and Post-Concussion Symptoms. A

hierarchical regression was conducted to examine the impact of psychological flexibility on self-reported PCS severity. Specifically, for this analysis, the role of psychological flexibility in predicting PCS severity beyond demographic characteristics (gender, age), time since injury, and injury severity was examined. Gender and age were entered in Block 1, years since injury and injury severity in Block 2, Emotional Stability and Extroversion were entered in Block 3 and total scores on the CompACT were entered in Block 4. The overall model was statistically significant, $F(7, 314) = 12.37, p < .001, R^2 = .216$ (see Table 11). In Block 1, Gender was a statistically significant predictor, $\beta = .129, t = 2.33, p = .02$. In Block 2, Severity of the injury was statistically significant, $\beta = -.157, t = -2.81, p = .005$. In the third block Emotional Stability, $\beta = -.389, t = -7.59, p < .001$, was a statistically significant predictor ($\Delta R^2 = .15$). Total scores on the CompACT were entered in the fourth block and it was also statistically significant, $\beta = -.176, t = -2.86, p < .001, \Delta R^2 = .02$. Thus, significant predictors of more severe PCS were being female, having a less severe injury and reporting lower levels of emotional stability and psychological flexibility.

Table 11.

Summary of the Hierarchical Regression Analysis for Hypothesis Two Predicting PCS Severity. (N=313)

Variable	Model 1			Model 2			Model 3			Model 4		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Age	-.069	.061	-.063	-.093	.062	-.085	-.037	.057	-.033	-.038	.057	-.035
Gender	4.151	1.937	.129*	4.000	1.934	.144*	4.709	1.790	.135*	4.709	1.790	.135**
Years Since Severity				.077	.071	.062	.035	.066	.028	.040	.065	.032
				-2.467	.879	-.157**	-2.046	.813	-.131	-	.807	-.119
Extroversion										1.865		
Emotional Stability							-.212	.388	-.028	-.145	.384	-.019
CompACT							-3.48	.458	-.389***	-	.552	-.288***
										2.577		
										-	.947	-.176***
										2.705		
<i>R</i> ²		.020			.046			.196			.216	
<i>F</i> for Change in <i>R</i> ²		3.32			4.20*			29.37***			8.165**	

Note. Significant *F* and β values are in boldface. **p* < .05, ***p* < .01, *** *p* < .001.

4.4.3 Psychological Flexibility and Reactions to Impairment and Disability.

Six regression analyses were used to test the hypothesis that psychological flexibility moderates the effect of time on maladaptive reactions to impairment and disability. An interaction term was created by multiplying time since injury by total scores on the CompACT (Time*Flexibility). For each of these regressions, gender and age were entered in Block 1, years since injury and total scores on the CompACT were entered in the Block 2. The interaction term (Time*Flexibility) was entered in Block 3.

The first model, predicting Shock, was statistically significant $F(5, 331) = 26.41$, $p < .001$, and the regression equation predicted 28.5% of the variance in the RIDI Shock subscale (see Table 12). Block 1 was not statistically significant. Block 2 was statistically significant, with CompACT total scores accounting for a statistically significant proportion of the variability in Shock subscale scores, $\beta = -.536$, $t = -11.48$, $p < .001$, $\Delta R^2 = .284$. The F for the change in R^2 for block 3 was not statistically significant; thus, the interaction term did not explain significant variance. Therefore, although lower psychological flexibility was associated with higher Shock, this relationship did not vary as a function of time since injury.

Table 12.

Summary of the Hierarchical Regression Analysis for Hypothesis Three Moderation Analysis Predicting Shock.

(N=337)

Variable	Model 1			Model 2			Model 3		
	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
Constant	2.376	.211	-	3.291	.197	-	3.278	.214	-
Age	.001	.003	.011	.002	.002	.048	.002	.002	.048
Gender	-.049	.091	-.029	.015	.078	.009	.015	.078	.009
Years Since CompACT				.000	.003	.004	.002	.009	.026
CompACT * Years Since				-.390	.034	-.536^{***}	-.386	.044	-.530^{***}
<i>R</i> ²		.001			.285			.285	
<i>F</i> for Change in <i>R</i> ²		.164			65.98^{***}			.025	

Note. Significant *F* and β values are in boldface. **p* < .05, ***p* < .01, ****p* < .001.

The second model, predicting Anxiety, was also statistically significant $F(5,332) = 18.73, p < .001, R^2 = .220$ (see Table 13). Block 1 was statistically significant, gender (being female) was a significant predictor of Anxiety, $\beta = .115 t = 2.12, p < .001$. Block 2 was statistically significant, CompACT total scores was a statistically significant predictor, $\beta = -.444 t = -9.12, p < .001, \Delta R^2 = .198$. The F for the change in R^2 for Block 3 was not statistically significant; therefore, the interaction term did not explain significant variance. Thus, gender (being female) and having lower with lower psychological flexibility were predictors of higher Anxiety scores. Anxiety did not vary as a function of time since injury.

Table 13.

Summary of the Hierarchical Regression Analysis for Hypothesis Three Moderation Analysis

Predicting Anxiety. (N=338)

Variable	Model 1			Model 2			Model 3		
	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
Constant	1.962	.196	-	2.853	.223	-	2.802	.424	-
Age	-.005	.003	-.094	-.004	.003	-.074	-.004	.003	-.074
Gender	.206	.097	.115*	.272	.88	.151**	.274	.088	.052**
Since Injury				.003	.003	.049	.008	.010	.128
CompACT				-.349	.038	-.444***	-.332	.049	-.422***
CompACT * Since Injury							-.002	.003	-.086
<i>R</i> ²		.022			.219			.220	
<i>F</i> for Change in <i>R</i> ²		3.691			42.180***			.300	

Note. Significant *F* and β values are in boldface. **p* < .05, ***p* < .01, *** *p* < .001.

The third model predicting scores on the Denial subscale of the RIDI was not statistically significant $F(5, 330) = 1.70, p = .135, R^2 = .025$. The fourth model, predicting Internalized Anger was statistically significant $F(5, 330) = 24.18, p < .001, R^2 = .266$ (see Table 14). Block 1 was not statistically significant. Block 2 was statistically significant, with CompACT total scores adding significantly to the model, $\beta = -.506, t = -10.73, p < .001, \Delta R^2 = .253$. The F for the change in R^2 for Block 3 was not statistically significant; therefore, the interaction term did not explain significant variance. Thus, although psychological flexibility was associated with lower scores on Internalized Anger, these differences did not vary with time since injury.

Table 14.

Summary of the Hierarchical Regression Analysis for Hypothesis Three Moderation Analysis Predicting

Internalized Anger. (N=338).

Variable	Model 1			Model 2			Model 3		
	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
Constant	2.560	.221	-	3.485	.211	-	3.501	.228	-
Age	-.003	.003	-.054	-.001	.003	-.013	-.001	.003	-.013
Gender	-.175	.095	-.099	-.118	.003	-.067	-.118	.083	-.067
Years Since Injury				-.001	.003	-.024	-.003	.009	-.049
Psychological Flexibility				-.389	.036	-.506***	-.394	.047	-.513***
Psychological Flexibility *							.001	.003	.027
Years Since Injury									
<i>R</i> ²		.013			.266			.266	
<i>F</i> for Change in <i>R</i> ²		2.218			57.644**			.032	

Note. Significant *F* and β values are in boldface. **p* < .05, ***p* < .01, *** *p* < .001.

The fifth model, predicting Depression, was statistically significant $F(5, 333) = 43.34, p < .001$, with regression variables predicting 39.4% of the variance in the RIDI Depression subscale (see Table 15). Block 1 was not statistically significant. Block 2 was statistically significant, with CompACT total scores significantly adding to the model, $\beta = -.626, t = -14.62, p < .001, \Delta R^2 = .389$. Block 3 was also statistically significant; however, the interaction term did not explain significant variance. Thus, again although increased psychological flexibility was associated with lower depression scores, there was no effect of time since injury.

Table 15.

Summary of the Hierarchical Regression Analysis for Hypothesis Three Moderation Analysis

Predicting Depression. (N=339)

Variable	Model 1			Model 2			Model 3		
	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
Constant	2.526	.236	-	3.718	.203	-	3.737	.220	-
Age	.004	.003	.063	.006	.003	.103*	.006	.003	.103*
Gender	-.077	.101	-.041	.009	.080	.005	.008	.080	.005
Years Since Injury				.001	.003	.020	-.001	.009	-.010
Psychological Flexibility				-.510	.035	-.626***	-.517	.045	-.634***
Psychological Flexibility * Years Since Injury							.001	.003	.032
<i>R</i> ²		.006			.394			.394	
<i>F</i> for Change in <i>R</i> ²		.945			107.079***			.818	

Note. Significant *F* and β values are in boldface. * $p < .05$, ** $p < .01$, *** $p < .001$.

The last model, predicting Externalized Hostility, was statistically significant $F(5,331) = 17.49, p < .001, R^2 = .209$. The regression equation predicted 20.9% of the variance in the RIDI Externalized Hostility subscale (see Table 16). Block 1 was not statistically significant. Block 2 was statistically significant and, again, CompACT total scores were statistically significant predictors, $\beta = -.438, t = -8.91, p < .001, \Delta R^2 = .191$. The F for the change in R^2 for Block 3 was not statistically significant; therefore, the interaction term did not explain significant variance. Again, psychological flexibility was associated with lower scores on Externalized Hostility and these differences were not related to time since injury.

Table 16.

Summary of the Hierarchical Regression Analysis for Hypothesis Three Moderation Analysis Predicting Externalized

Hostility. (N=337)

Variable	Model 1			Model 2			Model 3		
	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
Constant	2.403	.202	-	3.145	.200	-	3.233	.216	-
Age	-.005	.003	-.105	-.003	.002	-.061	-.003	.002	-.061
Gender	-.095	.087	-.059	-.061	.079	-.038	-.064	.079	-.040
Years Since Injury				-.003	.003	-.049	-.011	.009	-.205
Psychological Flexibility				-.305	.034	-.438***	-.335	.044	-.481***
Psychological Flexibility * Years Since Injury							.003.	.003	.170
<i>R</i> ²		.015			.206			.209	
<i>F</i> for Change in <i>R</i> ²		2.508			40.023***			1.156	

Note. Significant *F* and β values are in boldface. **p* < .05, ***p* < .01, ****p* < .001.

4.5 Additional Analyses

In addition to analyzing these specific study hypotheses, two additional regressions were conducted to explore relationships that emerged in these data. The first of these follow-up analyses explored the relationship between the variables of interest and total CIT scores. Specifically, for this analysis, the role of the psychological flexibility in predicting thriving beyond demographic characteristics (gender, age), personality, years since injury, injury severity, total PC-PTSD scores, PCS symptom severity, and type of injury (TBI or 'Other ABI') was examined. Gender and age were entered in Block 1, Emotional Stability and Extroversion were entered in Block 2, and years since injury, injury severity, injury cause, PC-PTSD scores, and PCS severity were entered in Block 3. Total scores on the CompACT were entered in Block 4. This model, predicting thriving, was statistically significant $F(9, 316) = 42.53, p < .001, R^2 = .556$. The results from the regression analysis can be found in Table 17. Block 1 variables were not statistically significant. Block 2 personality variables contributed significantly to the model, with Extroversion, $\beta = .130, t = 2.82, p = .005$, and Emotional Stability, $\beta = .560, t = 8.13, p < .001$ contributing to the model. In Block 3, PC-PTSD scores, $\beta = -.124, t = -2.45, p = .02$, PCS severity, $\beta = .269, t = -4.94, p < .001$, and cause of injury, $\beta = -.109, t = -2.21, p = .03$ were statistically significant predictors. Total scores on the CompACT were entered in the fourth block and it was statistically significant, $\beta = .436, t = 8.33, p < .001, \Delta R^2 = .132$. Psychological Flexibility explained an additional 13.2% of the variance in thriving beyond injury characteristics and symptom severity. Thus, higher extraversion, emotional stability, and psychological flexibility and with lower PTSD scores and PCS severity, and traumatic cause of injury had higher thriving.

Table 17.

Summary of the Hierarchical Regression Analysis Predicting Thriving. (N=314)

Variable	Model 1			Model 2			Model 3			Model 4		
	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
Constant	2.997	.252	-	2.056	.224	-	3.102	.287	-	2.405	.263	-
Age	-.004	.003	-.063	-.007	.003	-.125**	-.008	.003	-.129**	-.008	.002	-.127**
Gender	.177	.108	.093	.177	.003	-.063	.127	.089	.066	.136	.077	.071
Extroversion				.052	.019	.124**	.045	.018	.109*	.038	.016	.092
Emotional Stability				.272	.023	.556***	.211	.024	.431***	.104	.024	.212***
PC-PTSD							-.057	.023	-.124*	-.021	.021	-.045
PCS Severity							-.015	.003	-	-.012	.003	.223***
Years Since Injury									.269***			
Years Since Injury Severity							.001	.003	.009	6.124	.003	.001
Injury Type							-.039	.039	-.046	-.051	.034	-.059
Psychological Flexibility							-.163	.073	-.109*	-.130	.065	-.087*
<i>R</i> ²		.012			.342			.426			.557	
<i>F</i> for Change in <i>R</i> ²		1.937			77.426***			8.855***			90.090***	

Note. Significant *F* and β values are in boldface. **p* < .05, ***p* < .01, ****p* < .001.

Results from evaluating the second hypothesis indicated that total scores on the CompACT accounted for a significant amount of variance in PCS severity beyond age, gender, and severity of injury. Descriptive statistics indicated that although severity of injury ($r = -.21, p < .001$) and the CompACT ($r = -.34, p < .001$) were inversely related to PCS severity, CompACT total scores are not significantly related to injury severity. Additionally, survivors who sustained a TBI compared to other types of ABI had significantly higher PCS severity, indicating that this measure may be better suited to this population. A regression analysis was conducted with only survivors who sustained a TBI to examine if total scores on the CompACT moderated the effects of severity on reported PCS severity. An interaction term was created by multiplying injury severity by total scores on the CompACT (Severity*Flexibility).

Gender and age were entered in Block 1, years since injury in Block 2, severity of injury and total scores on the CompACT were entered in Block 3, and Block 4 contained the interaction term (Severity*Flexibility). The model was statistically significant $F(6, 204) = 9.69, p < .001, R^2 = .222$ (see Table 18). Block 1 was statistically significant. Gender was a significant predictor $\beta = .215, t = 2.15, p = .002$. Block 2 was not statistically significant. Block 3 was statistically significant. CompACT total scores, $\beta = -.315, t = -4.96, p < .001$, and severity of injury, $\beta = -.172, t = -2.59, p = .01$, were statistically significant predictors. The interaction term (Severity*Flexibility) was entered in the third block and it was statistically significant, $\beta = -.741, t = -2.99, p = .003, \Delta R^2 = .034$, indicating that a moderation had occurred. Females who reported with a lower injury severity and lower psychological flexibility had higher PCS severity and these differences were not significantly related to time since injury (See Figure 3).

Table 18.

Summary of the Hierarchical Regression Analysis Predicting PCS Severity in TBI Survivors. (N=211)

Variable	Model 1			Model 2			Model 3			Model 4		
	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
Constant	28.545	4.701	-	29.14	4.69	-	45.75	5.48	-	29.78	7.574	-
Age	.035	.062	.038	.073	.066	.079	.050	.062	.054	.074	.062	.080
Gender	6.548	2.059	.215**	6.080	2.064	.200**	6.402	1.985	.210**	6.213	1.949	.204**
Years Since Injury Severity				-.075	.067	-.076	-.126	.070	-.129	-.075	.900	-.172
Psychological Flexibility							-2.330	.900	-.172**	5.973	2.906	.441
Psychological Flexibility* Severity							-4.435	.894	-.315***	.896	1.983	.064
										-2.916	.972	-.741**
<i>R</i> ²		.048			.063			.188			.222	
<i>F</i> for Change in <i>R</i> ²		5.229**			3.239			15.774***			8.993**	

Note. Significant *F* and β values are in boldface. * $p < .05$, ** $p < .01$, *** $p < .001$.

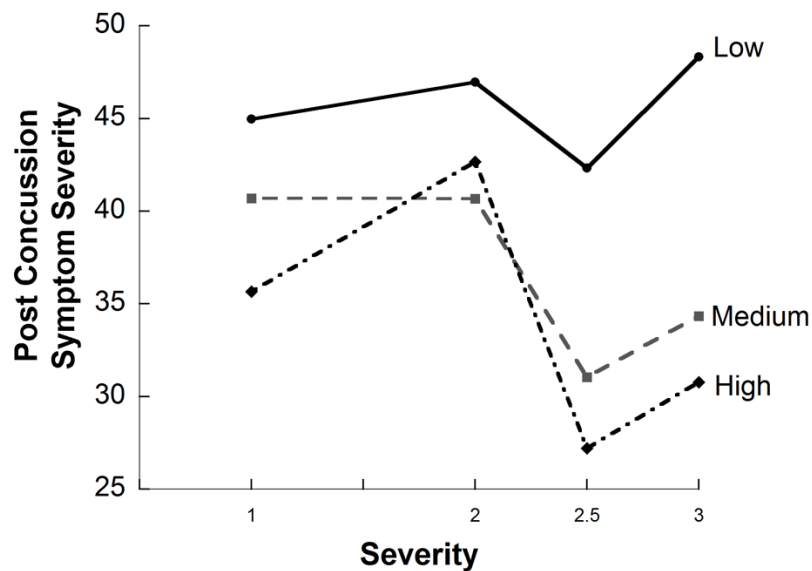


Figure 3. Severity of Injury and Psychological Flexibility as predictors of PCS Severity

5.0 Discussion

A large body of research exists that examines SWB and HRQL after brain injury. The results of this study replicate findings that both of these outcomes are consistently below average among ABI survivors, regardless of the time that has passed since injury or in the case of SWB, regardless of injury severity. This study explored the role that psychological flexibility plays in predicting overall well-being and maladaptive reactions to impairments and disability after ABI. A summary of the findings can be viewed in Table 19.

Table 19.

Summary of Results

Research Question	Results
Do ABI survivors who have higher levels of psychological flexibility report higher SWB and HRQL?	Psychological flexibility predicted unique variance in both SWB and HRQL beyond demographics, personality (extroversion, emotional stability), and injury characteristics (time since injury, injury severity).
For ABI survivors, do lower levels of psychological flexibility predict the severity of reported post-concussion symptoms?	Psychological flexibility predicted unique variance in PCS severity beyond demographics, personality (extroversion, emotional stability), and injury characteristics (time since injury, injury severity).
Will psychological flexibility moderate the effect of time since the injury on maladaptive reactions to impairment and disability (denial, anxiety, depressions, internalized anger, externalized hostility)?	Psychological flexibility did not moderate the effects of time on maladaptive reactions to impairments and disability. In fact, time since injury was not significantly associated with any maladaptive reactions to impairments and disability with the exception of denial which was mildly, positively correlated.

5.1 Thriving (SWB) and HRQL

Overall well-being in this sample was lower than published norms for Thriving, and well below the cut off for diminished HRQL. As expected, there was a strong positive relationship between Thriving and HRQL. The quality of life measure used in this study was developed specifically for use in the ABI population. In the current study, QOLIBRI scores were lower than previously documented in a sample of ABI survivors (Truelle et al., 2010). As the sample characteristics and methodology were similar, Truelle et al.'s sample can serve as a comparison: participants reported similar injuries; participants had a wide age range (17 - 68 years); and, participated three months to 18 years after their injury. Differences between the samples could be due to the fact that Truelle et al. excluded those with injuries other than TBI, pre-traumatic or current psychiatric disease, or ongoing addiction. The current study included all types of ABI and did not exclude individuals who reported current or previous mental health diagnoses. These differences in exclusion criteria, coupled with participants' involvement in an online support group, may account for decreased quality of life that were reported in the current sample.

Findings that emerged in this study support the use of a holistic approach to measuring HRQL in survivors of brain injury and highlighted the importance of including questions specific to emotional difficulties and social isolation. In addition, assessing affect (positive and negative) and quality of relationships help elucidate psychological problems that could otherwise be overlooked. Specifically, QOLIBRI satisfaction with feelings, motivation, and positive views of self were representative of better overall relationships and mastery (use of skills, self-efficacy, self-worth,

accomplishment) that are indicative of thriving. Although the QOLIBRI presents explicit questions to measure Autonomy (e.g., *How satisfied are you with your ability to run your personal finances?*), the CIT is less specific (e.g., *Other people decide most of my life decisions.*).

Tessier and colleagues' (2012) study examined influences on psychological (SWB) and physical (HRQL) well-being in breast cancer survivors and found that the type of treatment was more strongly related to SWB than actual functional impairments (e.g., stage of cancer). In this sample, subscales and total scores for Thriving and the HRQOL had similar patterns of relationships among the study variables, yet these relations were varied in strength and, sometimes, statistical significance. To illustrate, unlike Thriving, QOLIBRI total scores had a small but statistically significant correlation with injury severity; the only subscale with a statistically significant correlation with severity was whether a respondent was affected by physical problems. Further, current results also indicated stronger associations between PCS severity and current functioning, and these variables were more strongly correlated with QOLIBRI than with Thriving. This illustrates that QOLIBRI scales are more representative of function, whereas measures of subjective well-being are more prone to the influence of how an individual feels they are doing rather than how they are actually functioning.

Interestingly, despite these discrepancies between the scales, after other variables were controlled, psychological flexibility contributed almost identical variability to both SWB and HRQL. Thus, both function and perceived function appear to be influenced by psychological variables, which may explain why injury severity did not add to the predictive ability of the model. Lower Thriving and HRQOL in participants with milder

injuries may be related to a comparative assessment; those with more severe injuries are likely to make huge improvements since the injury, which incites them to be appreciative of even a diminished level of functioning in comparison with others (i.e., “it’s better than I thought it would be”). Conversely, those with a milder injury who have less severe impairments may still compare themselves to their pre-injury levels of functioning and therefore be less satisfied with this HRQL (i.e., “it was better before the injury”). Given distinct differences in HRQL, Thriving, and symptom severity across injury severity levels associated with levels of psychological flexibility, other variables must be involved in affecting these individual reports. It is not merely the case that survivors do not know what they have until it is gone, but rather, it is the manner in which an individual approaches life when faced with obstacles that largely determines overall outcomes related to well-being. Despite long term cognitive and physical disabilities, survivors who are more psychologically flexible may experience higher levels of Thriving and perceived quality of function when compared to those who have actual higher rates of functioning.

5.2 Injury Characteristics

Surprisingly, injury characteristics (years since injury, injury severity) had very little impact on post-injury outcome measures. Although these results are more extreme than expected, they are still in line with previous research indicating that SWB and HRQL are relatively stable across time and severity of injury (SWL; Proctor & Best, 2015; Williamson et al., 2015; HRQL; Forslund, et al., 2013). In the current study, years since injury did not have a significant impact on overall well-being or reactions to impairment and disability, regardless of whether or not the injury was sustained during

childhood or adulthood. Further, participants who were younger at the time of injury were more likely to report a more severe injury; thereby, indicating that those who had an injury at a young age were more likely to be in these online support groups, have a more severe injury, and agree to participate.

The most interesting finding related to injury characteristics was that individuals who sustained a less severe injury were more likely to report a higher post-concussion symptom severity and greater PTSD symptoms. Although it was hypothesized that survivors with lower psychological flexibility would report more severe post-concussion symptoms than individuals with higher psychological flexibility, it was not expected that those survivors with less severe injuries would report higher PCS severity. Upon further investigation, these results suggest that lower psychological flexibility coupled with a less severe or mild injury was associated with higher severity of PCS symptoms. This further supports the work by Lang and colleagues (2011), who found that individuals who were diagnosed with depression reported more severe PCS symptoms than individuals who had a mild TBI and not a diagnosis of depression. Given that the current sample consists of a group of survivors who were currently engaged in online support groups, it is likely that they suffered from less severe injuries and are seeking support because they are experiencing the greatest, current (perceived) PCS severity. That is not to say those survivors who have severe injuries do not experience PCS; however, in this sample, participants with high levels of psychological flexibility who reported a more severe injury also reported less severe PCS symptoms. Comparatively, individuals with low psychological flexibility reported more symptoms across severity levels (see Figure 3).

A similar trend, although not statistically significant, emerged for maladaptive reactions to impairment and disability, CIT, and QOLIBRI (see Figure 4 and Figure 5). This exemplifies the predictive value that psychological flexibility has beyond injury severity in predicting maladaptive reactions to impairment and disability and overall well-being.

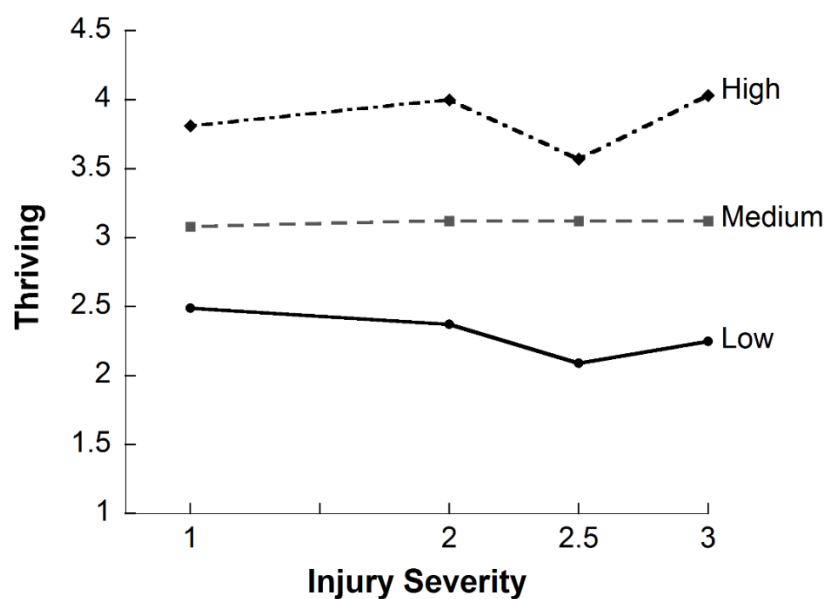


Figure 4. Severity of Injury and Psychological Flexibility as predictors of Thriving

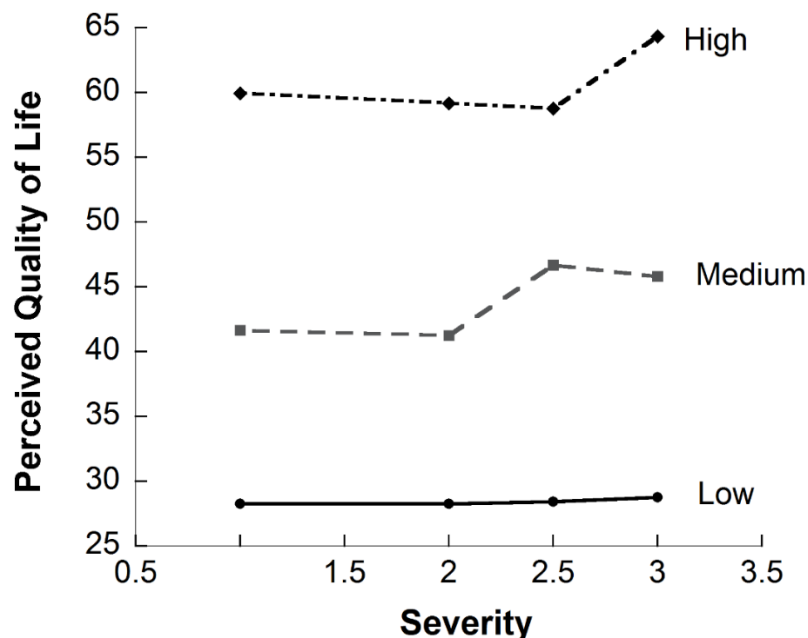


Figure 5. Severity of Injury and Psychological Flexibility as predictors of HRQL

5.3 Impairment, Psychological Flexibility, and Subjective well-being

As expected, there were positive correlations between measures of well-being and psychological flexibility. Individuals who had higher psychological flexibility had higher levels of HRQL, Thriving, and more adaptive reactions to impairment and disability. Conversely, lower levels of psychological flexibility were related to more maladaptive reactions to impairment and disability (with the exception of denial which is discussed below), more severe PCS, and higher scores on the PC-PTSD. Additionally, lower psychological flexibility was related to poorer ratings on the caregiver quality scale, indicating that it is possible that survivors who have lower psychological flexibility are less receptive to caregiving efforts and are more likely to view their caregivers negatively or be unable to see their efforts as helpful. This relationship cannot

be determined based only on this information, but these results lay the groundwork for future research.

Participants who reported both low Emotional Stability and low psychological flexibility were least likely to be thriving, whereas the opposite was true for individuals higher in Emotional Stability and psychological flexibility. The relations between Emotional Stability and psychological flexibility predicting SWB was more complex; there was an observable difference in reported levels of Thriving in survivors who reported different levels of psychological flexibility (see Figure 6). This trend reveals that the combination of higher emotional stability and psychological flexibility may foster greater SWB. These results are consistent with reports by Hentschel, Eid, and Kutscher (2017), who found that personality traits predicted twice the amount of variance in affective well-being (20%) than did major life events (10%), inclusive of major injury or illness. Although psychological flexibility does not eliminate the influences of personality on SWB, it is possible that psychological flexibility may be a protective factor for individuals who are low in Emotional Stability by lessening its impact on SWB. Further research is needed to tease apart the complex relationship between Emotional Stability and psychological flexibility and to determine if the psychological flexibility in individuals with low Emotional Stability is amenable, and if so, will increases mitigate the impacts of low Emotional Stability on overall well-being.



Figure 6. Emotional Stability and Psychological Flexibility as predictors of PCS Severity

5.4 Denial

Although Denial is categorized as a maladaptive reaction to impairment, in some analyses, relationships that emerged were analogous to relationships of the adaptive reactions. Specifically, with the exception of Denial, the comparison of TBI and other-ABI sufferers indicated differences in all of the maladaptive reactions to impairment and disability. With the exception of Internalized Anger (which was higher in the other-ABI group), maladaptive reactions aside from Denial were experienced more by individuals who sustained a TBI. The adaptive reactions to impairment and disability (Acknowledgement and Adjustment) were similar in the TBI and other-ABI groups. Interestingly, Denial was the only RIDI subscale that was not associated with psychological flexibility.

In this study, Denial emerged as a protective factor related to higher levels of Thriving and HRQL and less severe PCS. For ABI participants, denial appears different from other maladaptive reactions to impairment and disability. In the current study,

Denial was the only reaction related to the time since injury, whereby more recent injuries were associated with greater Denial. Although these relationships are similar to the relationships reported by spinal cord injury patients (Livneh et al., 2006), further research is needed to determine whether there is a link between long-term denial and negative impacts on overall well-being. Deficits and limitations may not seem as dire if they are perceived as only temporary. Thus, it is possible that, for ABI survivors, the belief that their condition will improve and eventually be cured appears to protect them from other maladaptive reactions.

Previous research has supported the limited protective influence of denial against depression and anxiety, minimizing decreases in overall well-being (Livneh & Antonak, 2005). There may be an inverse relationship between catastrophizing the injury/magnifying the symptoms and being in denial of the severity and potential for long-term impacts. Despite the immediate advantages of denial, it remains unclear if this type of reaction would help or hinder individuals in the long term. Researchers should focus on this connection and tease apart if specific aspects of denial can be beneficial over time. Specifically, future studies could examine these complex relationships to determine what levels of denial are protective and how they affect other aspects of the survivor's life. For instance, being hopeful of a full recovery in the face of inevitable long-term disability may delay the implementation of coping strategies and acceptance of long-term deficits. Conversely, remaining hopeful and positive that things will improve may push survivors to keep on striving for this goal and, ultimately, increase their SWB. It is possible that these impacts vary based on other factors, such as

personality characteristics and injury severity, which should be considered in future studies.

5.5 Gender Differences

The current sample had a higher proportion of female participants in comparison with males. Although males are more likely to sustain some types of TBI (Javouhey, Guérin, & Chiron, 2006), women have a higher lifetime prevalence rate of stroke (ABI; www.strokeassociation.org). In fact, it has been reported that the inclusion of gender comparisons in ABI research is lacking; specifically, the reporting and examination of female TBI (Colantonio, Harris, Ratcliff, Chase, & Ellis, 2010). Thus, either females are more likely to be in these online support group forums or they are simply more eager to participate in this type of research.

Analysis of participation in cancer support groups revealed that 75% of all active participants were women (Ginossar, 2008). Further, women were more likely to provide emotional support, whereas men tended to offer more fact-based responses (Ginossar, 2008). There is no current research to suggest that there are more females than males in all online support groups; however, a similar gender split was observed in similar studies of ABI survivors (Proctor & Best, 2015). Further, access to the basic demographic information for two of the online support groups in the current study was possible and this information was reviewed. The “Brain Injury Support Group” has 7,501 members; 70.5% of the members and six of the ten top contributors were female. Examination of a smaller group, “Brain Injury New Brunswick”, with 302 members, revealed similar ratios, with 62.6% female membership. Although specific demographics are not available for all of these groups (access restricted to

administrators/facilitators) that this study recruited from, it is likely that the ratio is similar for most groups and that this sample is representative of the population that was targeted.

Gender was included as a control variable in all regression analyses, and only emerged as a statistically significant predictor (being female) for increased PCS severity and Anxiety. The increased prevalence of post-concussion symptom severity is consistent with research by King (2014), which documented that females were more likely to suffer long-term post-concussion symptoms. It is interesting to note that females also reported significantly higher overall levels of Thriving and men reported more Internalized Anger. The literature on gender differences in SWB for survivors is mixed; Ren et al., (2017) did not find differing levels of SWB in survivors, whereas Cicerone, & Azulay (2007) reported gender as a significant predictor of SWB.

Given that males and females had similar levels of psychological flexibility, it is possible that females have greater PCS severity based on the type of injury that they sustained. Additionally, although not statistically significant, compared to women, men were more likely to have other maladaptive reactions, including Externalized Hostility and Depression. Previous research has not found gender to be related to any of the RIDI subscales (Livneh & Antonack, 1990), suggesting these trends are not associated with actual differences. Overall, differing reactions between genders reinforces the control of gender in this study and in future studies.

5.6 Strengths and Limitations

This study has many strengths and made unique contributions to the literature concerning overall well-being after brain injury. This study was the first to examine

levels of psychological flexibility in a large sample of brain injury survivors and compare them to other aspects of well-being and specific injury characteristics, such as time since injury and initial severity. This study boasts a broad sample, with a large range of injury severities and time since injury, which allows the examination of the impacts of these important variables. Additionally, this study was the first to compare the impacts of psychological flexibility on well-being and physical symptoms in brain injury survivors.

The online format of this study allowed for a large and geographically diverse sample; this is both a strength and a limitation. Online recruitment with little incentive for participants results in high rates of attrition (27% or more; Quach et al., 2013; Gregory & Pike, 2012). In the current sample, attrition rates were even higher (35%). Higher attrition was likely due to the length of the questionnaire packages; however, during the pilot study, participants indicated that although the survey was long, completion was possible. Studies have demonstrated that as the length of the online questionnaire increases, so does the amount of missing data (Gregory & Pike, 2012). A Canadian-based study by Gregory and Pike indicated that researchers often receive a large number of responses to health-related surveys ($N=1,346$) at the price of high rates of usable and missing data (37.3%). This prompts the question of a biased sample as the current sample included only individuals who were willing and able to independently complete a 40-minute survey. Even short online surveys conducted using student populations are associated with higher attrition and more missing data than traditional methods of in-person recruitment procedures (Quach et al., 2013). Despite this, a review of nine online health related research projects reported low completion rates, but valid

findings. There are both positive and negative aspects of online recruitment, however, the consensus in the literature is that missing data and taking extra precautions to ensure responses are unique (preventing multiple responses by the same IP) is the price that must be paid to recruit larger and more diverse samples (Alshaikh, Ramzan, Rawaf, & Majeed, 2014).

In current study, comparisons were made between participants who completed the study in its entirety and participants who only completed the demographics portions, and differences were found on a variety of measures (See Table 2). The target population of this study included relatively high functioning brain injury survivors who were able to complete this survey independently. Although I was able to collect from this participant pool, it is possible that participants with less motivation, attention span, or ability to focus started, but did not complete the entire questionnaire package. Participants were given an option to return to their responses up to 48 hours after they began, however, very few (<10%) returned to complete the study. Given the wide range of injury severity and current functioning reported by participants, it is likely that the sample is still representative of relatively high functioning brain injury survivors who have sustained a wide range of injury types and severities.

The fact that the outcome variables were normally distributed suggests the sample was diverse on the constructs of interest. ABI encompasses such a wide range of symptoms and severity levels and including the full range of these variables in one sample may have diminished significant associations that may have emerged in a more specific subsample. For example, the experiences of participants who sustained a TBI

after the age of 18 are different than the experiences of participants who sustained a stroke after the age of 40.

With an anonymous online survey, it is challenging to measure severity and course of recovery accurately. This study was successful in linking psychological constructs (psychological flexibility) to physical symptoms (PCS) and well-being, however, to develop causal connections, these methods need to be expanded upon. This study served its purpose as a preliminary examination of these relationships and has created a stepping stone from which to base future research.

5.6.1 Sample Bias. This sample was drawn from a pool of survivors who were a part of online Facebook support groups. For this reason, the sample has some unique characteristics, including a large number of participants who recently sustained an ABI, leading to a positively skewed time since injury distribution. This is not surprising considering that individuals who recently incurred an injury would be the most active in support groups as they are reaching out for support. This sample also included participants who had acquired their injuries at very young ages, which may yield a different pattern of results in terms of reactions to impairment and disability. Among participants who were injured after the age of 18, significant correlations emerged between severity of the injury and maladaptive reactions to impairment and disability; specifically, less severe injuries were associated with less shock and anxiety. Further, among these participants who sustained their ABI during adulthood, maladaptive reactions were also weakly related to time since injury; less time since injury was related to higher denial and internalized anxiety. These patterns did not emerge in the total sample or when examining only individuals who were injured in their earlier years. In

fact, for individuals injured under the age of 18, only depression was significantly correlated; a longer time since injury was related to more depression. In previous research, the RIDI has been used with individuals who have acquired various types of impairments in adulthood. Additionally, this study was focused on higher functioning survivors which excludes those who have more severe disabilities associated with their injury and may have limited the results (smaller range to examine relationships).

Intuitively, even a mild brain injury can be considered a dramatic life change. If the injury occurred at a time in a person's life during which they had already entered their chosen career, had started a family or were in school, or in a long-term relationship, the impact could be large. Most individuals who are injured at a young age have a parent or guardian to help them navigate their new-found deficits and limitations, whereas older adults may be forced to rely on a spouse or grown children to care for them. Older survivors may be more likely to experience financial and relationship struggles alongside the symptoms of their injury. Arbour and colleagues (2017) found only small advantages for younger ($M_{age} = 27$ years) survivors in terms of functioning and reported no difference in levels of resilience. Conversely, older patients ($M_{age} = 53$ years) were more likely to view specific complaints formed by younger survivors (i.e., "too much time on my hands") as positive as opposed to negative. To summarize, different life experiences may yield different reactions to impairments and disability and these differences may not have been accurately evaluated in this study. These varied experiences may not be captured in a large inclusive sample such as the current sample, and this should be examined further using other research methods and more targeted populations.

5.7 Future Directions for Research

This study has laid the groundwork necessary for the justification of ACT as an integral part of treatment post ABI. The results of this study indicate that the impact of psychological flexibility on actual and perceived quality of life is worthy of further examination. Although these results strongly suggest that there is a benefit to the enhanced ability to live life in line with self-perceived values and participate in all aspects of life regardless of deficits, merely making the connection is not enough. Future research should further examine the relationship between psychological flexibility and maladaptive reactions to impairment and disability immediately post injury as well as their long-term effects on well-being and its amenability.

5.7.1 The effect of caregivers. Although not examined in this study, the impacts of survivors' psychological flexibility alongside that of their caregivers is worthy of examination. In this study, lower levels of psychological flexibility were inversely related to levels of reported caregiver quality. Survivors with lower psychological flexibility felt as though they were a burden and that their physical and emotional needs were not being met. Given that the current results focus only on the experience of the survivors, it is impossible to definitively state that lack of psychological flexibility is at the root of these perceptions; however, this could be clarified in future research by pairing the experiences and perceptions of caregivers and survivors. Additionally, comparing the assessment of the survivors functioning and ability by the caregiver to that of the survivor may lend insight into how they impact each other. For example, it is possible that discrepancies may be the product of underestimating deficits by the survivor or catastrophizing by the caregiver. It is

expected that the caregivers' ability to cope with life changes will impact the survivors' overall well-being (Lehan, Arango-Lasprilla, de los Reyes Aragón, Quijano, & Godwin, 2012). The reverse may also be true, as caregivers may struggle to provide adequate care to those survivors who are lower in psychological flexibility; in turn, resulting in diminished overall well-being in both parties.

Further, the results of this study suggest that not all post-concussion symptoms that are experienced are a direct result of the injury, but may be, at least in part, psychological (Lange et al., 2011). These psychological problems may be apparent to a caregiver and not a survivor. This disconnect in perceived ability to function may create tension between these two roles and, in turn, add burden to the caregiver's load. Previous research has compared the ratings of survivors and caregivers and have found discrepancies (Kelley et al., 2014). Further research may link these discrepancies to different combinations of psychological flexibility levels in both parties.

5.7.2 Qualitative Research. As discussed in the previous sections, survey data comes with benefits and limitations. A research design that includes not only a quantitative component but also a qualitative portion could help to isolate specific relationships between psychological flexibility and well-being. For instance, quality of caregiving and severity of long-term physical and psychological symptoms may be better assessed using either open-ended survey questions or semi-structured interviews. Qualitative research designs may lend insight into the survivor's individual rate of recovery and specific areas of their lives that have been impacted by the injury. Although sample sizes tend to be smaller in studies using qualitative data, the results are often rich with information (Yardley & Bishop, 2015).

5.7.3 Randomized Control Trials. Most importantly, future research needs to establish if ACT increases psychological flexibility in ABI survivors. If this is a robust relation and changes in psychological flexibility translate into higher overall well-being and fewer maladaptive reactions to impairment and disability, there is a need for controlled research studies. Randomized control trials inform clinical practice (Buckley, 2009) and will encourage the inclusion of acceptance-based therapies in rehabilitation. Experimental studies using pre- and post-therapy assessments coupled with a control group who receives recommended treatment (including other types of psychological interventions) should be conducted. If possible, it would be beneficial to include both survivors and caregivers in these samples.

A large number of brain injury survivors are drawn to online support groups and forums for advice and community support. Numerous international, online Facebook support groups exist for brain injury with membership upwards of 7,000 to 10,000 members each. Considering the success of ACT and CBT in online formats for depression (Pots et al., 2016) and anxiety (Donovan, Spence, & March, 2017), it may be beneficial to examine its effectiveness in this population where they are already comfortable accessing online support. Pre- and post-session results will aid in fully understanding how gaining psychological flexibility impacts overall well-being and mitigates the impacts or even decrease maladaptive reactions to impairment and disability.

5.7.4 Longitudinal Studies. Although it is useful to include survivors who are at varied stages of recovery post injury, given the differences (denial, HRQL) that emerge as a product of time since injury it is also valuable to study the individual course of

recovery for individuals. Following survivors in the months and years after injury to examine how psychological factors influence their progression in reactions to impairment and disability, symptom reporting, and overall well-being would add depth to our understanding of how best to develop individualized treatment plans for survivors (Williamson et al., 2015).

5.8 Implications

The suggestion that both physical and psychological deficits after brain injury are intertwined may not be positively interpreted by survivors. Living with an injury that is not visible to others can be a struggle and the implication that some of the effects of the injury are rooted in psychological functions could be discouraging to some. It is vital that these results are interpreted in a positive manner and presented as a method of increasing overall well-being. It is important to focus on the goal of increased overall well-being without targeting specific cognitive or physical deficits. The clear distinction between survivors with higher and lower psychological flexibility emphasizes the importance of the incorporation of acceptance-based therapies into existing rehabilitation structures. The current results do not suggest that there are not long-term physical and psychological struggles after injury but do suggest that the ways in which survivors interpret and identify with these struggles can impact overall well-being. Further, through self-directed therapy or clinical sessions, ACT is accessible to survivors who are not in long-term care. Incorporating ACT into community reintegration strategies might improve their rate of success.

Although it is important to define and measure deficits and impairments, the focus on how to lessen their impact on overall well-being is crucial. Survivors of brain

injury suffer from decreased SWB (Proctor & Best, 2015) and HRQL and have increased levels of depression, anxiety (Osborn, et al., 2017), and loneliness (Proctor & Best, 2015). Further, research has also shown that leisure satisfaction is related to greater life satisfaction (Winkler, Unsworth, and Sloan, 2005). Identifying and targeting modifiable variables both during and after formal rehabilitation is essential. The current results provide a building block for future research in this area as well as evidence that ACT may be a beneficial tool for use in the ABI population. Clinicians strive to follow best practice techniques that are evidence-based and tested in the particular population they are working with (Berke, Rozell, Hogan, Norcross, & Karpiak, 2011). Without conducting research of this nature, the benefits of ACT for brain injury survivors would not be possible.

5.9 Conclusions

This study established a baseline level of psychological flexibility and reactions to impairment and disability in a sample of relatively high functioning brain injury survivors and communicated results that reflect their impact on both SWB and HRQL. Both reactions to impairment and disability and psychological flexibility are accessible and easy to screen for in the early stages of injury. The ACT process focuses on the acquisition of skills that enhance survivors' lives long after therapy sessions come to an end. Optimistically, future research will expand on the findings of this research with Randomized Control Trials (RCTs) that include pre and post treatment outcomes. In addition to RTCs, longitudinal studies will help identify the long-term impacts of therapy and document maintenance of progress.

This study uniquely contributes to the body of research that is available on well-being after injury. Psychological flexibility predicted statistically significant variability in Thriving, HRQL, PCS severity and maladaptive Reactions to Impairment and Disability. Additionally, this study has demonstrated the predictive validity of psychological flexibility beyond the influence of demographics, personality characteristics and injury specifics. Utilizing acceptance-based therapies as a part of the rehabilitation process for ABI survivors may foster overall well-being.

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APPENDIX A**Demographics****1. Have you sustained a brain injury in the past?**

Please choose **only one** of the following:

Yes

No

2. How many brain injuries have you had?

(Only numbers may be entered in this field)

Please write your answer here: ____

3. What Country do you live in?

Please choose **only one** of the following:

Canada

United States of America

Australia

United Kingdom

Other

Make a comment on your choice here:

4. What is your gender?

Please choose **only one** of the following:

Female

Male

5. What is your date of birth?

Please enter a date

6. When did your injury occur?

**If you are not sure of the exact date
please choose the correct month and year.**

Please enter a date:

7. Do you know the brain areas that were affected by your injury ?

Please choose **only one** of the following:

- Yes
- No

8. Which brain areas (that you know of) were affected by your injury?

Only answer this question if the following conditions are met:

Displayed only if answer was 'Yes' at question '7' (Do you know the brain areas that were affected by your injury ?)

Please write your answer(s) here:

-
-
-
-
-
-

9. What was the severity of your injury ?

Please choose **only one** of the following:

- Mild Traumatic Brain Injury/Concussion (Glasgow Coma Scale score 13-15)
- Moderate Traumatic Brain Injury (Glasgow Coma Scale core 9-12)
- Severe Brain Injury
- I am not sure
- Other (please feel free to comment)

Make a comment on your choice here:

10. How visible/noticeable is your injury to others?

Please rate from 1 = Not at all visible to 10= Very visible

Please choose the appropriate response for each item:

1 2 3 4 5 6 7 8 9 10
Visibility ○○○○○○○○○○○

11. Was it recommended (by a physician) that you spend any time at an in-patient rehabilitation facility?

Please choose **only one** of the following:

- Yes
 No

12. If you were admitted to an in-patient rehabilitation facility, how long was your stay?

Please write your answer(s) here:

- Days
- Months
- Years

On the following scale please rate your overall level of functioning.

1 = poor 10 = excellent

Please choose the appropriate response for each item:

1 2 3 4 5 6 7 8 9 10
Immediately following injury ○○○○○○○○○○○
Currently ○○○○○○○○○○○

13. For each item please indicate how much the symptom has bothered you over the past 2 days

Please choose the appropriate response for each item:

	none	mild	moderate	severe		
Headache	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nausea	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vomiting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Balance Problem	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dizziness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Visual Problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fatigue	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sensitivity to Light	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sensitivity to Noise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Numbness/Tingling	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pain other than Headache	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling Mentally Foggy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling Slowed Down	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Difficulty Concentrating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Difficulty Remembering	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Drowsiness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sleeping Less than Usual	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sleeping More than Usual	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trouble Falling Asleep	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Irritability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sadness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nervousness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling More Emotional	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

14. Have you been diagnosed with PTSD?

15. What is your marital status?

Please choose **only one** of the following:

20. Did you receive any kind of monetary settlement related to your injury?

Yes , it was substantial

No

Rather not say

21. If yes,

The amount of money I received was enough to relieve the financial stress of my injury?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

22. Are you familiar with the following therapies or terms?

Please choose the appropriate response for each item:

	Acceptance and Commitment Therapy (ACT)	Cognitive Behavioural Therapy (CBT)
Yes, I have heard of this but never participated	<input type="radio"/>	<input type="radio"/>
No, I have never heard of this	<input type="radio"/>	<input type="radio"/>
Yes, I have participated in this and found it useful to my recovery	<input type="radio"/>	<input type="radio"/>
Yes, I have participated in this and did not find it useful	<input type="radio"/>	<input type="radio"/>

23. How did your brain injury occur?

Please choose **only one** of the following:

- Motor Vehicle Accident
- Pedestrian/Motor Vehicle Accident
- Stroke
- Aneurysm
- Anoxic (Damage due to Oxygen Loss)
- Sports Related
- Biking Accident
- Other (please comment)

Make a comment on your choice here:

24. Do you participate in the following activities?

Please choose the appropriate response for each item:

	Yes	No
Watching TV/Movies	<input type="radio"/>	<input type="radio"/>
Reading Newspaper or Magazines	<input type="radio"/>	<input type="radio"/>
Board Games/Cards	<input type="radio"/>	<input type="radio"/>
Computer Games	<input type="radio"/>	<input type="radio"/>
Computer/Internet (other than games)	<input type="radio"/>	<input type="radio"/>
Visiting Relatives/Friends/Neighbours	<input type="radio"/>	<input type="radio"/>
Other Hobbies (e.g. Music, Art, Collecting)	<input type="radio"/>	<input type="radio"/>
Concert/Plays	<input type="radio"/>	<input type="radio"/>
Movies (theatre) / Shopping	<input type="radio"/>	<input type="radio"/>
Walking/Exercise	<input type="radio"/>	<input type="radio"/>
Individual Sports (e.g. Running, Swimming)	<input type="radio"/>	<input type="radio"/>
Team/Interactive Sports	<input type="radio"/>	<input type="radio"/>
Other not listed	<input type="radio"/>	<input type="radio"/>

	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree	Not Sure
My opinions are valued within my online support community	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lots of people in my online support community know who I am	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel like my online support community is my own	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

22. What is your relation to your caregiver?

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '24' (Do you have a caregiver or someone who lives with you that is a support?)

Please choose **only one** of the following:

- Spouse
- Parent
- Child
- Friend
- Sibling
- Other

Make a comment on your choice here:

1. Do you feel that you have a positive relationship with your caregiver?

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '24' (Do you have a caregiver or someone who lives with you that is a support?)

Please choose **only one** of the following:

- Yes
 No

Please choose the appropriate response for each item:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I feel that my caregiver attends to my physical needs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that my caregiver attends to my emotional needs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My caregiver is nice to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am a burden to my caregiver	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

APPENDIX B

Reactions to Impairment and Disability Inventory

Following is a list of possible reactions to the occurrence of a physical impairment or a disabling condition. Please circle the appropriate number to the right of each statement that indicates to what extent you are experiencing each specific reaction to your impairment or disability. There are no "right" or "wrong" answers. The degree to which you truly experience each reaction, as expressed by the statements, should be your answer. Please respond to all statements on the inventory as honestly as possible. The information you provide will remain completely anonymous.

1= Never Reaction is never experienced
2= Rarely Reaction is seldom experienced, 1 to 4 times per month
3= Sometimes Reaction is occasionally experienced, 5 to 9 times per month
4= Often Reaction is frequently experienced, 10 or more times per month

1. Since I acquired my disability, I am less interested in other people. ____
2. If I become a better person, my problems will be cured. ____
3. Since I acquired my disability, I cry more often than I used to. ____
4. When I look back on what has happened to me, I feel bitter. ____
5. God will cure me, if I improve my behaviour and follow His ways. ____
6. I am a failure as a person. ____
7. I am satisfied with my present abilities despite my disability. ____
8. Since I acquired my disability, I have attacks of panic. ____
9. My impairment must be a punishment for something I did in the past. ____
10. I am embarrassed about my impairment. ____
11. There are more important things in life than those that my impairment prevents me from doing. ____
12. I have difficulty finding a reason to get up in the morning. ____
13. If I were nicer to people, I would regain my abilities. ____

14. I am rearranging some of my life priorities. ____
15. Although I am restricted in certain ways, there is still much I am able to do. ____
16. My life is empty. ____
17. I find myself trembling without any apparent reason. ____
18. It makes my blood boil to have somebody talk about my impairment. ____
19. I have been through a crisis and feel that I understand things better. ____
20. I feel that nothing will ever be the same again. ____
21. Since I acquired my disability, I have periods of hot or cold spells. ____
22. I am certain that I will be completely cured. ____
23. When I look at other people, I get jealous. ____
24. I am so restless that I cannot sit still. ____
25. Nobody is going to tell me what to do. ____
26. I get mad enough to smash things. ____
27. When I look in the mirror, I see myself and not a disability. ____
28. My mind goes blank. ____
29. I feel lonely even when with friends. ____
30. Everything in my life is coming together again. ____
31. Since I acquired my disability, I have periods of nausea. ____
32. I blame myself for what happened to me. ____
33. I find myself asking: "Why did this happen to me?" ____
34. I feel frozen, unable to move. ____
35. I am seeking new meaning for my life. ____
36. I am interested in getting socially involved with other people. ____

37. I feel that there is nothing I can do to help myself. ____
38. I cannot believe that this is happening to me. ____
39. I got a raw deal out of life. ____
40. I do not mind accepting help when I need it. ____
41. I will soon be just as I was before. ____
42. Since I acquired my disability, I have periods when my heart pounds. ____
43. I think that it is all a nightmare from which I will soon awaken. ____
44. Since I acquired my disability, I have periods of breathlessness. ____
45. I am impatient with the medical treatment recommended for me. ____
46. I realize that my impairment is part of me, but I do not let it interfere with my life. ____
47. I feel like getting even with someone. ____
48. I feel like screaming at others. ____
49. I feel confused about what is happening to me. ____
50. I believe that nothing is wrong with me. ____
51. I am interested in forming new friendships. ____
52. I believe that my impairment will go away by itself. ____
53. Since I acquired my disability, I have nightmares. ____
54. I find myself arguing more with people. ____
55. Despite my impairment, I can do most things non-impaired people can do. ____
56. I cannot absorb everything that is happening to me. ____
57. It makes me angry when people try to help me or do things for me. ____
58. I am interested in making plans for my future. ____
59. It is difficult to keep my mind on one thing. ____

60. I can cope with almost all problems I face. _____

APPENDIX C

Comprehensive Inventory of Thriving (CIT)

Please indicate your agreement or disagreement with each of the following statements using the scale below.

- 1 Strongly Disagree**
- 2 Disagree**
- 3 Neither Agree nor Disagree**
- 4 Agree**
- 5 Strongly Agree**

Relationship Support

- ___ 1. There are people I can depend on to help me
- ___ 2. There are people who give me support and encouragement
- ___ There are people who appreciate me as a person

Community

- ___ 1. I pitch in to help when my local community needs something done
- ___ 2. I invite my neighbors to my home
- ___ 3. I look for ways to help my neighbors when they are in need

Trust

- ___ 1. I can trust people in my society
- ___ 2. People in my neighborhood can be trusted
- ___ 3. Most people I meet are honest

Respect

- ___ 1. People respect me
- ___ 2. People are polite to me
- ___ 3. I am treated with the same amount of respect as others

Loneliness

- ___ 1. I feel lonely
- ___ 2. I often feel left out
- ___ 3. There is no one I feel close to

Belonging

- ___ 1. I feel a sense of belonging in my community
- ___ 2. I feel a sense of belonging in my state or province
- ___ 3. I feel a sense of belonging in my country

II. Engagement

Engagement

- ___ 1. I get fully absorbed in activities I do
- ___ 2. In most activities I do, I feel energized
- ___ 3. I get excited when I work on something

III. Mastery Skills

- ___ 1. I use my skills a lot in my everyday life
- ___ 2. I frequently use my talents
- ___ 3. I get to do what I am good at everyday

Learning

- ___ 1. I learned something new yesterday
- ___ 2. Learning new things is important to me
- ___ 3. I always learn something everyday

Accomplishment

- ___ 1. I am achieving most of my goals
- ___ 2. I am fulfilling my ambitions
- ___ 3. I am on track to reach my dreams

Self-Efficacy

- ___ 1. I can succeed if I put my mind to it
- ___ 2. I am confident that I can deal with unexpected events
- ___ 3. I believe that I am capable in most things

Self-Worth

- ___ 1. What I do in life is valuable and worthwhile
- ___ 2. The things I do contribute to society
- ___ 3. The work I do is important for other people

IV. Autonomy Control

- ___ 1. Other people decide most of my life decisions (R)
- ___ 2. The life choices I make are not really mine (R)
- ___ 3. Other people decide what I can and cannot do (R)

V. Meaning

Meaning and Purpose

- ___ 1. My life has a clear sense of purpose
- ___ 2. I have found a satisfactory meaning in life
- ___ 3. I know what gives meaning to my life

VI. Optimism

Optimism

- ___ 1. I am optimistic about my future
- ___ 2. I have a positive outlook on life
- ___ 3. I expect more good things in my life than bad

VII. Subjective Well-Being

Life satisfaction

- ___ 1. In most ways my life is close to my ideal
- ___ 2. I am satisfied with my life
- ___ 3. My life is going well

Positive feelings

- ___ 1. I feel positive most of the time
- ___ 2. I feel happy most of the time
- ___ 3. I feel good most of the time

Negative feelings

- ___ 1. I feel negative most of the time (R)
- ___ 2. I experience unhappy feelings most of the time (R)
- ___ 3. I feel bad most of the time (R)

Note. Reversely scored items are noted with an (R). The CIT subscales may be used alone or in combination with each other. Dimension names and subscale titles are presented for clarification purpose and will be removed during data collection in the current study

APPENDIX D

CompACT
Comprehensive Assessment of Acceptance and Commitment Therapy

Please rate the following 23 statements using the scale below:

1	2	3	4	5	6
Moderately disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Moderately agree	Strongly agree
___					(
1. I can identify the things that really matter to me in life and pursue them					
___					(
2. One of my big goals is to be free from painful emotions					
___					(
3. I rush through meaningful activities without being really attentive to them					
___					(
4. I try to stay busy to keep thoughts or feelings from coming					
___					(
5. I act in ways that are consistent with how I wish to live my life					
___					(
6. I get so caught up in my thoughts that I am unable to do the things that I most want to do					
___					(
7. I make choices based on what is important to me, even if it is stressful					
___					(
I tell myself that I shouldn't have certain thoughts					
9.					(
I find it difficult to stay focused on what's happening in the present					
___					(
10. I behave in line with my personal values					
___					(
11. I go out of my way to avoid situations that might bring difficult thoughts, feelings, or sensations					
___					(
12. Even when doing the things that matter to me, I find myself doing them without paying attention					
___					(
13. I am willing to fully experience whatever thoughts, feelings and sensations come up for me, without trying to change or defend					
___					(
14. I undertake things that are meaningful to me, even when I find it hard to do so					
___					(
15. I work hard to keep out upsetting feelings					
___					(
16. I do jobs or tasks automatically, without being aware of what I'm doing					
					(

___17. I am able to follow my long terms plans including times when progress is slow

___18. Even when something is important to me, I'll rarely do it if there is a chance it will upset me (

___19. It seems I am "running on automatic" without much awareness of what I'm doing (

___20. Thoughts are just thoughts – they don't control what I do (

___21. My values are really reflected in my behaviour (

___22. I can take thoughts and feelings as they come, without attempting to control or avoid them (

___23. I can keep going with something when it's important to me (

APPENDIX E

QOLIBRI - QUALITY OF LIFE AFTER BRAIN INJURY

In the first part of this questionnaire we would like to know **how satisfied** you are with different aspects of your life since your brain injury. For each question please choose the answer which is closest to how you feel now (including the past week) and mark the box with an "X". If you have problems filling out the questionnaire, please ask for help.

PART 1

A. These questions are about your thinking abilities now (including the past week).

	Not at all	Slightly	Moderately	Quite	Very
1. How satisfied are you with your ability to concentrate, for example when reading or keeping track of a conversation?					
2. How satisfied are you with your ability to express yourself and understand others in a conversation?					
3. How satisfied are you with your ability to remember everyday things, for example where you have put things?					
4. How satisfied are you with your ability to plan and work out solutions to everyday practical problems, for example what to do when you lose your keys?					
5. How satisfied are you with your ability to make decisions?					
6. How satisfied are you with your ability to find your way around?					
7. How satisfied are you with your speed of thinking?					

B. These questions are about your emotions and view of yourself now (including the past week).

	Not at all	Slightly	Moderately	Quite	Very
1. How satisfied are you with your level of energy?					
2. How satisfied are you with your level of motivation to do things?					
3. How satisfied are you with your self-esteem, how valuable you feel?					
4. How satisfied are you with the way you look?					
5. How satisfied are you with what you have achieved since your brain injury?					
6. How satisfied are you with the way you perceive yourself?					
7. How satisfied are you with the way you see your future?					

C. These questions are about your independence and how you function in daily life now (including the past week).

	Not at all	Slightly	Moderately	Quite	Very
1. How satisfied are you with the extent of your independence from others?					
2. How satisfied are you with your ability to get out and about?					
3. How satisfied are you with your ability to carry out domestic activities, for example cooking or repairing things?					
4. How satisfied are you with your ability to run your personal finances?					
5. How satisfied are you with your participation in work or education?					
6. How satisfied are you with your participation in social and leisure activities, for example sports, hobbies, parties?					
7. How satisfied are you with the extent to which you are in charge of your own life?					

D. These questions are about your social relationships now (including the past week)

Not at all
Slightly
Moderately
Quite
Very

1. How satisfied are you with your ability to feel affection towards others, for example your partner, family, friends?					
2. How satisfied are you with your relationships with members of your family?					
3. How satisfied are you with your relationships with your friends?					
4. How satisfied are you with your relationship with a partner or with not having a partner?					
5. How satisfied are you with your sex life?					
6. How satisfied are you with the attitudes of other people towards you?					

PART 2

In the second part we would like to know **how bothered** you feel by different problems. For each question please choose the answer which is closest to how you feel now (including the past week) and mark the box with an "X". If you have problems filling out the questionnaire, please ask for help.

E. These questions are about how bothered you are by your feelings now (including the past week).

Not at all
Slightly
Moderately
Quite
Very

1. How bothered are you by feeling lonely, even when you are with other people?					
2. How bothered are you by feeling bored?					
3. How bothered are you by feeling anxious?					
4. How bothered are you by feeling sad or depressed?					
5. How bothered are you by feeling angry or aggressive?					

F. These questions are about how bothered you are by physical problems now (including the past week).

Not at all
Slightly
Moderately
Quite
Very

1. How bothered are you by slowness and/or clumsiness of movement?					
2. How bothered are you by effects of any other injuries you sustained at the same time as your brain injury?					
3. How bothered are you by pain, including headaches?					
4. How bothered are you by problems with seeing or hearing?					
5. Overall, how bothered are you by the effects of your brain injury?					

APPENDIX F

Ten-Item Personality Inventory

Here are a number of personality traits that may or may not apply to you. Please write a number next to each statement to indicate the extent to which you agree or disagree with that statement. You should rate the extent to which the pair of traits applies to you, even if one characteristic applies more strongly than the other.

I see myself as:

1. Extraverted, enthusiastic.

1	2	3	4	5	6	7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Disagree Strongly	Disagree moderately	Disagree a little	Neither Agree nor Disagree	Agree a little	Agree moderately	Agree Strongly

2. Critical, quarrelsome.

1	2	3	4	5	6	7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Disagree Strongly	Disagree moderately	Disagree a little	Neither Agree nor Disagree	Agree a little	Agree moderately	Agree Strongly

3. Dependable, self-disciplined.

1	2	3	4	5	6	7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Disagree Strongly	Disagree moderately	Disagree a little	Neither Agree nor Disagree	Agree a little	Agree moderately	Agree Strongly

4. Anxious, easily upset.

1	2	3	4	5	6	7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Disagree Strongly	Disagree moderately	Disagree a little	Neither Agree nor Disagree	Agree a little	Agree moderately	Agree Strongly

5. Open to new experiences, complex.

1	2	3	4	5	6	7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Disagree Strongly	Disagree moderately	Disagree a little	Neither Agree nor Disagree	Agree a little	Agree moderately	Agree Strongly

6. Reserved, quiet.

1	2	3	4	5	6	7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Disagree Strongly	Disagree moderately	Disagree a little	Neither Agree nor Disagree	Agree a little	Agree moderately	Agree Strongly

7. Sympathetic, warm.

1	2	3	4	5	6	7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Disagree Strongly	Disagree moderately	Disagree a little	Neither Agree nor Disagree	Agree a little	Agree moderately	Agree Strongly

8. Disorganized, careless.

1	2	3	4	5	6	7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Disagree Strongly	Disagree moderately	Disagree a little	Neither Agree nor Disagree	Agree a little	Agree moderately	Agree Strongly

9. Calm, emotionally stable.

1	2	3	4	5	6	7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Disagree Strongly	Disagree moderately	Disagree a little	Neither Agree nor Disagree	Agree a little	Agree moderately	Agree Strongly

10. Conventional, uncreative.

1	2	3	4	5	6	7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Disagree Strongly	Disagree moderately	Disagree a little	Neither Agree nor Disagree	Agree a little	Agree moderately	Agree Strongly

CURRICULUM VITAE

Candidate's full name: Cecile Justine Proctor

Universities attended:

B.A. (Hons.), Psychology, University of New Brunswick, Saint John, 2015

Publications.

Proctor, C., & Best, L. A., (2015) Loneliness and Isolation after Brain Injury:

Factors Impacting survivor and caregiver's quality of life after injury. In
C. Pracana (Ed.), *Proceedings of the International Psychological
Application Conference and Trends*. Ljubljana: World Institute for
Advanced Research and Science.

Davis, L. L., **Proctor, C.,** Lilly, S., Best L. A., (2016) Body Dissatisfaction:

Effects of Gender, Exercise, Personality and Disordered Eating. In C.
Pracana (Ed.), *Proceedings of the International Psychological
Application Conference and Trends*. Lisbon: World Institute for
Advanced Research and Science.

Proctor, C., & Best, L. A., (2017). The Effects of Concussion: Perceptions and

Awareness of Sufferers. In C. Pracana (Ed.), *Proceedings of the
International Psychological Application Conference and Trends*.
Budapest: World Institute for Advanced Research and Science.

Proctor, C., & Best, L. A. (2018). Life After Brain Injury: A Cross Sectional

Examination of the, Social and Psychological Influences on Satisfaction with
Life. *Disability and Health Journal*. Manuscript submitted for publication.

Conference Presentations

Proctor, C., & Best, L. A. (2018, August). *Acceptance After Injury: the role of psychological flexibility in recovery*. Oral presentation at the Domestic Violence and Brain Injury Symposium, Saint Andrews, Canada.

Nwaonumah, L., **Proctor, C.,** Flood, K., & Best, L. A. (2018, June). *Role of Psychological Flexibility and Loneliness in Predicting Satisfaction with Life*. Poster presentation at the Canadian Psychological Association Annual Convention, Montreal, Canada.

Proctor, C., & Best, L. A. (2017, May). *The Effects of Concussion: Perceptions and Awareness of Sufferers*. Oral presentation at the InPact 2017 International Psychological Applications Conference and Trends, Budapest, Hungary.

Proctor, C., Nwaonumah, L., Flood, K., & Best, L. A. (2018, March). *Impact of Personality, Attachment, and Psychological Flexibility on Thriving*. Poster presentation at the Interprofessional Health Research Day, Saint John, Canada.

Proctor, C., & Best, L. A. (2017, April). *Psychological Well-being after Injury: Strategies for improving wellness*. Oral presentation at the Brain Injury Canada Semi-Annual Conference: Shining a Light on Brain Injury, Saint John, Canada.

Proctor, C., & Best, L. A. (2017, March). *Concussion Symptoms and Recovery: Examining Perceptions and Experience*. Oral presentation at the Interprofessional Health Research Day, Saint John, Canada.

Proctor, C., & Best, L. A. (2016, November). *Life After Brain Injury: Factors Impacting satisfaction with life in caregivers of brain injury survivors*. Oral presentation at the Toronto ABI Network Conference, Toronto, Canada.

Proctor, C., & Best, L. A. (2016, September). *Return to Productive Leisure: Art as Therapy*. Oral presentation at the Brain Injury Canada 13th Annual Conference, Saint John, Canada.

Proctor, C., & Best, L. A. (2015, May). *Life After Brain Injury: Factors impacting satisfaction with life in caregivers of brain injury survivors*. Oral presentation at the International Psychological Applications Conference and Trends, Ljubljana, Slovenia.

Proctor, C., & Best, L. A. (2015, April). *Loneliness and Isolation after Brain Injury: Factors impacting survivor and caregiver's quality of life after injury*. Oral presentation at the Brain Injury Canada Semi-Annual Conference, Halifax, Canada.

Proctor, C., & Best, L. A. (2014, September). *Alternative Roads to Recovery: Exploring online social media networks and art therapy*. Oral presentation at the Brain Injury Canada Semi-Annual Conference, Gatineau, Canada.