

AN INVESTIGATION OF HOW TRAUMATIC BRAIN INJURIES LEAD TO EMOTIONAL
DYSREGULATION

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Abstract

The purpose of this Capstone Research Project is to explore research surrounding traumatic brain injury (TBI) and its negative impact on emotional regulation. This capstone will focus on research pertaining to major, minor and multiple TBIs, as well as a focus on diffuse axonal injuries. To start, a background of TBI and persistent post-concussion syndrome (PPCS) will be presented along with a purpose statement, the relevance of contribution to the field, and a reflectivity/positionality statement from the writer. Chapter two will provide a deeper analysis into what a TBI is, what emotional regulation is, and the lasting effects of a TBI. There will be discussion surrounding degeneration of core neural tracks, Alexithymia, and impacts on psychological and cognitive functioning. Chapter 3 will discuss potential interventions for TBI recovery and support from a mental health perspective, including utilization of narrative therapy and cognitive behavioural therapy (CBT).

Keywords: traumatic brain injury (TBI), post-concussion syndrome (PPCS), diffuse axonal injury, narrative therapy, cognitive behavioural therapy (CBT)

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Chapter One: Introduction

The prevalence of traumatic brain injuries (TBI) has steadily increased in recent years and has become a “silent epidemic” in its potential for long-term effects for injured individuals. Traumatic brain injuries (TBIs) are now one of the leading causes of neurological disabilities and death (Hoxha et al., 2024). It has been found that in 2018 in North America alone, 1.3% of the population has suffered a TBI, which equates to around 7.8 million people in total (Dewan et al., 2018). With that said, TBIs will affect 1300 out of every 100,000 people, yet research behind best practices and methods towards recovery are lagging behind the growing number of people who suffer from TBIs. Even further, the number of TBIs which occur to the general population is way underestimated, as many individuals who incur a TBI will not seek immediate medical attention. When an individual has to navigate their world with post-concussion syndrome, they are often not educated on what is happening to them, whether it is psychoeducation on what happens in the brain, or the implications on emotional regulation. It has been found that 50% of individuals who suffer a TBI will continue to experience post-concussion symptoms after a year of recovery (McMahon et al., 2014), which is a staggering number considering the sheer number of people who will encounter a TBI at some point themselves or take care of someone with a TBI in the future. Someone recovering from a TBI may experience symptoms such as mood swings, irritability, memory issues, cognitive impairment and delays. It is estimated that 69 million people world-wide will suffer from a TBI yearly (Dewan et al., 2018). TBI is now the leading cause of mortality and disability worldwide, as it accounts for 30% of all injury-related deaths (Demlie et al., 2022).

When considering the potential for long-term effects for individuals who suffer from a TBI, be it major or minor, there is a gap between the medical literature surrounding TBIs and the treatment which is prescribed or initiated by medical professionals. A major area which must be elaborated on is dealing with the social and emotional realms which often become affected for recovering TBI individuals. It has been found that on average, it can take 3 to 6 months for post-concussion symptoms to dissipate (McMahon et al., 2014). At 6-month follow up post-TBI, 30% of patients reported increased significant distress in their lives, while 45% of people reported clinically significant decline in overall life satisfaction (McMahon et al., 2014). To take this a step further, it has been found that approximately 76% of people who experience persistent post-concussion syndrome (PPCS) report higher levels of anxiety and depression (Sheldrake et al., 2022). Again, this number is likely underreported because for some medical facilities, in order to be diagnosed with persistent post-concussion syndrome, one must display three of the following for a minimum of 3 months: cognitive impairments, fatigue, headache, dizziness, sleep disruptions, irritability, apathy or changes in personality (Sheldrake et al., 2022). As will be discussed later, these limited definitions of TBI and PPCS do not give an accurate picture of vast scope of recovery which individuals manage during their recovery.

When an individual suffers a TBI, their world will often change drastically, as the ability to engage in life the way one previously did in the past has to be negotiated and relearned. While for some, their concussion journey will end within the first three months (approximately 23% of people), many are left functionally impaired one-year post injury. One major potential reason for these results is that emotional regulation and mental health tends to become affected and decline after the onset of a TBI. A major potential reason for this is the neural

degeneration which can occur after a TBI is sustained (Choi & Jang, 2021). In studies of long-term effects of TBI(s), it has been found that there is a delay in the physical effects from a TBI, which include degeneration of white volume which surround neural tracts. This means that for an injured individual dealing with PPCS, there will often be a deterioration in emotional and social functioning as neural degeneration continues to develop, therefore leading to more issues surrounding navigating and adjusting to a “new normal” in terms of brain functioning.

To take this a step further, when an individual suffers multiple TBIs, as is often the case through falls, sports, or motor vehicle accidents, the compounding affect leads to even quicker and more serious neural degeneration (Hay, 2018). Fortunately for some, neuroplasticity will play an important role in helping regenerate some of these lost connections and therefore, slow but possible improvements in overall social and emotional functioning can occur. For others, chronic traumatic encephalopathy (CTE) becomes a neurodegenerative condition which individuals will suffer through. CTE is caused by multiple or repeated episodes of blunt head trauma, which include concussions and TBIs (Byard et al., 2023). Often, the individuals this affects the most are athletes at all levels, military personnel, victims of domestic violence, and those with treatment-resistant epilepsy (Byard et al, 2023). CTE is highlighted by difficulties in higher order brain functions, such as multitasking and decision-making, while also impacting short term memory, emotional stability, apathy and depression; furthermore, these individuals are also at an increased risk of developing diseases, such as Parkinsons Disease or Alzheimer’s Disease, by between 3 and 10% (Byard et al., 2023).

CTE has been associated with higher levels of aggression and risk of suicide. Burley (2020) discusses how CTE, while not directly causing death, has been connected to issues such

as depression and suicide due to the degenerative nature of the injury. A recent study by Taylor (2023) analyzed the brain of 152 individuals who were deceased, of which 70% were amateur athletes. It was found that 41% of individuals had neuropathological evidence of CTE, and previous records found that these athletes suffered from depression, apathy, difficulties controlling behaviour, problems with decision making, and substance use/abuse (Taylor, 2023). It is important to note that the brains which were studied were of individuals who had died before the age of 30 years (Taylor, 2023). It was found that the most common sports which resulted in CTE were American football (92% of athletes studied) and ice hockey (38%).

As is evident in these aforementioned studies, the necessity for medical health professionals to understand the lasting effects of TBIs and PPCS is crucial to helping these individuals lead meaningful lives through navigating changes in emotional health. It is evident that TBI injuries occur beyond only contact sports and affects the general population, yet counselling aimed to help these individuals has fallen behind. With the increasing amount of people seeking out mental health services, it is important for counsellors to have some background knowledge in relation to TBI management and recovery, because it is highly likely that these individuals will be dealing with life-changing adjustments which can lead to emotional dysregulation.

Purpose Statement

The purpose of this capstone is to shed light on a growing epidemic that is impacting more people worldwide. The goal of this capstone is to highlight the connection between traumatic brain injuries (TBIs) and emotional dysregulation. As will be highlighted, a TBI or multiple TBIs can lead to emotional dysregulation not just in the short-term, but long-term as

well. Emotional dysregulation can look like mental health challenges such as depression, anxiety, impulse control and apathy; it can also look more severe depending on brain and axonal degeneration following blunt head trauma. The goal is to provide a resource for counsellors and clients about the “what” and “why” behind how a TBI can lead to such life-altering circumstances. In a world where TBI individuals may feel isolated, lost and alone, this can provide another lens to view TBI recovery through for both counsellor and clients.

Theoretical/Conceptual Framework

While not explicitly discussed, this capstone aims at providing more of a voice for those who suffer from a TBI or multiple TBIs. Since a TBI can occur in a plethora of different ways, it is crucial to listen to clients and patients and really understand their story. In narrative therapy, the voice and experiences of the client are at the forefront of therapy. This voice is important to foster and hone-in for clients who are dealing with brain injuries, as no two people will experience the exact same ramifications or life changes from a TBI. However, it is imperative that both medical and mental health professionals listen to their clients and patients because their struggles are real and clinically significant.

Contribution to the Field

With growing numbers of TBIs occurring per year both in North America and worldwide, there are more individuals dealing with persistent post-concussion syndrome and other TBI effects following an injury. A reason why this research is important is because a TBI can occur in many different ways, whether it is from playing sports, motor vehicle accident, assault or domestic violence, falls, or workplace injuries. A crucial aspect of a TBI is there is no predictable trajectory for recovery, and research shows that recovery can take anywhere from a couple

weeks to being a life-long recovery process. Current research surrounding TBIs, neuronal degeneration, and emotional dysregulation continues to develop and be released; however, there is still a major gap between the biological/physiological changes that occur in the brain through a TBI, and the psychological/emotional impacts these changes will have on an individual.

Research is still inconclusive as to whether or not white matter formation increases post-concussion symptoms, or if it is coincidental. However, other research clearly shows the connection between neuronal degeneration and the onset of emotional and social challenges. Current research is also showing that there is a delayed effect between TBI and impacts on behaviour, likely due to the brain changes that occur over time following a TBI. At the worst case, CTE is becoming more recognizable in those individuals who have committed suicide and who's brains have been studied by researchers. For individuals who suffer long-term from post-concussion syndrome or CTE, suicide can be an escape from the dark world which results from a TBI. The goal is to provide more psychoeducational information for clients and professionals alike when working with individuals with one or multiple TBIs. While professionals cannot "fix" a TBI, there are ways to manage symptoms and bring to consciousness the changes which occur after experiencing a TBI, in hopes of "normalizing" the long-term effects not just for the TBI individual, but for their support systems as well.

Reflectivity and Positionality Statement

The topic of traumatic brain injuries and persistent post-concussion syndrome are something I am passionate about because of my own experiences with head injuries. In my 20s, I went through a series of unfortunate events in which I endured at least 7 concussions over the

span of 5 years. The cause of these concussions varied: for one, I fainted after receiving dental work and hit my head on the floor of the dental office, in which I briefly lost consciousness and was rushed to the hospital. Another concussion was an unfortunate incident in which I was jumped and assaulted by a group of people; this left me with a concussion and broken jaw. In another instance, I hit my head on the ice playing rec league hockey. Another concussion incident occurred in my current job as a teacher, when a student kicked me in the head. My most recent concussion was due to a motor vehicle, in which I was hit by a drunk driver. What I have learned through my experiences in the medical and mental health systems is that ultimately, no one knows how a concussion or TBI will heal. No one knows with certainty when things may get better or often the case, worse.

When I went through my experiences of TBI, one common theme was that there was minimal support for my recovery. The most difficult aspect of this was, I also did not know what I needed for my recovery. I have broken bones in the past, and the recovery for a broken bone is quite researched and straightforward. With a brain injury, the internal feelings and changes which occurred for me were onerous and scary, because it changed aspects of my being, such as my mood and focus, impulse control, memory, and physical abilities. However, while I was going through my various concussion recoveries, I never knew I was truly going through the recovery process because I did not know what to expect. For example, I initially had memory lapses and was also diagnosed with a non-restorative sleep pattern, as TBIs are known to affect sleep. Eventually, I was prescribed sleeping pills which were my only method of sleep for months. After about two years, my sleep started to normalize and my memory was adjusting to a new normal, which included brain fog and difficulty recalling words at times. Again, through all this, I was

unaware that these changes in functioning were “normal” for someone dealing with a persistent post-concussion syndrome, especially after multiple TBIs. While slowly adjusting to these symptoms and navigating a new “new normal,” my mood was characterised by impulsivity, depression and anxiety. I started to use medication to help offset these symptoms while, but it is safe to say I am not the same person I was pre-concussions.

I believe that my experiences with TBIs echoes the experiences of many other individuals who have incurred one or multiple TBIs. My goal of this capstone is to create awareness and a potential resource for people who may be working with individuals who are navigating a TBI; this may be in a counselling office, doctor office, hospital room, or at home with a loved one. After engaging in a variety of research and diving into different aspects of TBI, there is a clear consensus that more research, especially longitudinal, needs to be done to gain a more holistic understanding of persistent post-concussion syndrome and TBI recovery. Therefore, when approaching this topic, I have a perspective of compassion and curiosity because the changes which occurred for me during my concussion recovery were very subtle and nuanced. When I got to a place where I could reflect on this concussion recovery journey to this point, I realize how much of my life changed when I sustained the concussions.

As a middle-class male and visible minority, I hold privilege in that I have access to resources which other individuals may not have. I also recognized through the research that much of it is based around biological males, especially when it comes to CTE studies on donated brains from athletes. I also recognize that in the grand scheme of my TBI experiences and post-concussion recovery and symptom management, I am fortunate that I can now live an independent and healthy lifestyle, where I can continue to work full-time, engage in studies,

and do recreational activities. For many others, this process of recovery will be vastly different due to a range of factors such, especially TBI severity and type. Also, socioeconomic status is a major factor, as many people rely on full-time work and will continue to persist through post-concussion symptoms out of necessity.

Definition of Terms

Brief Symptom Inventory-18 (BSI-18)- gathers patient-reported data to measure psychological distress and psychiatric disorders

Cerebral Blood Flow (CBF)- blood supply to the brain in a given period of time

Cognitive Behavioural Therapy (CBT)- a form of psychological treatment that has been demonstrated to be effective for a range of problems such as depression, anxiety disorders and severe mental health illness

Chronic Traumatic Encephalopathy (CTE)- a brain disorder caused by repeated head injuries, which causes death of nerve cells to the brain

Diagnostic and Statistical Manual- 5 (DSM-5)- a comprehensive manual which is used for assessment and diagnosis of mental disorders

Diffusion Tensor Imaging tractography (DTI)- a MRI technique that measures water molecule diffusion and directionality

Glasgow Outcome Scale Extended (GOSE)- an outcome instrument used to assess global disability and recovery after a traumatic brain injury

Minor Traumatic Brain Injury (mTBI)- a bump, blow or jolt to the head or a hit to the head that causes the brain to move rapidly back and forth

Magnetic Resonance Imaging (MRI)- a non-invasive medical imaging test used to produce detailed images of almost every internal structure in the body, using large magnet and radio waves

Multiple Sclerosis (MS)- a potentially debilitating disease of the brain and spinal cord

Post-concussion Syndrome/Persistent Post Concussion Syndrome (PCS/PPCS)- occurs when symptoms of traumatic brain injury last longer than expected after injury

Rivermead Post-Concussion Questionnaire-13 (RPQ-13)- a self-report scale to measure the severity of post-concussive symptoms following a traumatic brain injury

Satisfaction With Life (SWL)- measures self-perceptions of individual life satisfaction, as it correlates with mental health, quality of life, and likelihood to attempt suicide

Traumatic Brain Injury (TBI)- an injury that affects of the brain works

Outline of the Capstone Project Chapters.

Chapter two will provide an in-depth review on current literature surrounding traumatic brain injuries and its impact on emotional regulation. The first part of chapter two will be dedicated to defining and providing current research on what a TBI is, what emotional dysregulation is, and what happens after a TBI is incurred. A discussion elaborating on qualitative and quantitative changes following a TBI will be discussed, as well as related changes which are recorded by various scales and brain scans. Brain scans have provided a way for measuring longitudinal impacts of brain health following a TBI in individuals, and research surrounding neuronal degeneration and its impact will be discussed. Lastly, putting it all together, the end of chapter two will provide more insight into emotional regulation impairments which can develop following a TBI or after incurring multiple TBIs. Chapter 3 will

discuss implications for the findings and consistent themes which were covered in chapter 2.

More insight into why this topic is important, and how it can be applied to current practices and help guide research with also be discussed.

Chapter Two: Literature Review

What is a Traumatic Brain Injury (TBI)?

A traumatic brain injury (TBI) is characterized by a disturbance in brain function due to a change in pathophysiological functioning (Lima-Santos et al., 2023). This can be caused by a traumatic event to the brain, such as a sports related hit to the head, motor vehicle accident, work-related injury or falls, and involves an acceleration-deceleration force of the brain or body (McDonald et al., 2019). TBI is the most common cause of brain damage in the world outside of war zone injuries, and research is ever growing in the field (McDonald et al., 2019). Another common term for a TBI is a concussion. In this paper, the terms TBI, mTBI and concussion will be used interchangeably, as researchers have not been able to accurately distinguish a difference between these definitions definitively. Researchers have attempted to classify TBIs in order of severity and will often categorize a TBI as being either a regular TBI or a minor traumatic brain injury (mTBI). A major challenge with this classification system is that 90-95% of reported traumatic brain injuries in hospitals are classified as minor; however, this does not take into account those individuals who did not receive hospital care after injury (Theadom et al., 2016). Often, an individual will receive care for a TBI after a traumatic event such as a motor vehicle accident or assault, especially when a loss of consciousness is a result. The same can be said about athletes who suffer from a TBI; it often takes a loss of consciousness or a severe blow to the head to determine whether the individual will receive hospital care or not. The notion of “getting one’s bell rung” is common in contact and other extreme sports, where athletes are encouraged to “shake it off” and get back to competition. It is estimated that in the United States alone, there are over 2 million individuals, adults and children, who suffer from a TBI

every year, yet only a quarter are hospitalized (Lima-Santos et al., 2023). A recent conference held by the International Conference on Concussion in Sport led to a comprehensive classification of a TBI being defined as a receiving a direct or indirect trauma to the head, face, or neck with a significant force transmitted to the head; the immediate or long term impairment in daily neurological function; negative neuroimaging looking at functional, over structural, injury with either a loss or non-loss of consciousness; and resolution of these clinical and cognitive symptoms (Conder et al., 2020).

A major issue in accurately assessing and diagnosing a TBI is that traditional neuroimaging and clinical markers are not always present immediately; these effects can take weeks to show up on a scan, and often do not show up at all (Conder et al., 2020). The unique individuality of how a TBI will impact someone is largely unpredictable as there are no set parameters on recovery. When an individual suffers from a TBI, there are many ramifications which can occur both during short term and long-term recovery. Many individuals report a lower quality of life post TBI due to post concussion symptoms both at the onset of a TBI, six months post TBI, and one year post TBI (McMahon et al., 2014). One major outcome of a TBI is persistent post-concussion syndrome (PPCS). It is estimated that 63% of individuals who suffer from a TBI still experience post-concussion symptoms one month after injury, and many will continue to suffer from post-concussions symptoms after three years post injury (Theadom et al., 2023). The short- and long-term effects of PPCS will be discussed and expanded on in later sections. Examples of post-concussion symptoms include migraines, headaches, too much or too little sleep, mood instability (anxiety, sadness, irritability, depression), vestibular symptoms, oculomotor symptoms and neurocognitive symptoms, such as problems with

attention/concentration, memory processing and recall (Conder et al., 2020). It has been found that up to 76% of individuals with PPCS will suffer from anxiety and/or depression as a post-concussion symptom (Sheldrake et al., 2022).

What is Emotional Dysregulation?

A common, and perhaps the most pervasive outcome of a TBI, is difficulties regulating emotions. As mentioned, this often manifests itself as post-concussive symptoms related to anxiety, irritability, depression, and lack of attention/concentration. This will be expanded upon in later sections. When an individual suffers a TBI, many fail to return to work as what was previously “normal” to them. Often, individuals will report a decreased desire and ability to engage in leisure activities, and often experience breakdowns in intimate relationships as a result of emotional regulation issues stemming from a TBI (Dethier et al., 2013). One challenge of understanding emotional regulation issues is comorbidity with preexisting emotional regulation issues unrelated to the TBI injury. In literature, researchers would be remiss to ignore previous diagnoses of anxiety, depression, etc. It has been found that a significant predictor of emotional regulation issues after the occurrence of a TBI were previous mental health problems faced before the TBI event; a TBI may exacerbate the symptoms of emotional dysregulation (Waljas et al., 2015).

It is evident that reporting of post-concussion symptoms is an individualized experience and therefore will be influenced by factors such as genetics, mental health history, perceived life stress, medical issues, personality factors and other psychosocial/environmental factors (Waljas et al., 2015). However, it has also been reported that suffering from post-concussion syndrome at one-month follow up from a TBI is a significant predictor of suffering from these symptoms at

one year follow up, especially in the case of depression and anxiety symptoms (Waljas et al., 2015). Additionally, patients who have endured a TBI will perform more poorly on memory related tasks at one month follow up than control groups; however, this seems to last between one to three months, as TBI individuals perform memory tasks about at par with control groups at one-year follow up (Waljast et al., 2015). However, this area of research was focused on memory tasks and recovery in memory, but not other emotional regulation issues such as depression and anxiety. When assessing for emotional dysregulation issues, practitioners should assess depressive symptoms as part of a TBI assessment; however, this is not common practice when working with TBI patients.

When putting into context what this means for an individual who suffers from a TBI, it can lead to many changes in daily life. One analogy which has been used with concussion survivors is the analogy of marbles in a cup. At the beginning of the day, a person with PCSA will wake up with a full cup of marbles; however, due to concussion symptoms, they are dealing with insomnia or hypersomnia, which is a result of sleep and circadian rhythm impairments caused by a TBI (Korthas et al., 2022). This individual wakes up with only 70% of their marbles left. From there, this individual engages in their daily routine before starting work. The individual has had to prepare themselves, their children, drop them off, and get to work on-time. Due to increased headaches and concentration issues, simple tasks such as multitasking or driving become more onerous on the brain. Now, this individual has 40% of their marbles left, and it is only morning. After a day at work, the average person may use 60% of their marbles. Now, this individual is negative marbles and they have not yet made it home. This illustrates a common issue amongst TBI survivors. This individual now has the task of making it through the

rest of their day with little cognitive and emotional resources available. For some, this leads to memory lapses or other cognitive deficits (Kahana et al., 2023). For others, this may lead to feelings of anxiety or depression. For some, this can lead to difficulties in relationships both romantically and socially (McDonald et al., 2019). I will further elaborate on social difficulties as they pertain to TBI individuals, as social cognition is a complex process which is hindered by a TBI (McDonald et al., 2019). While there are methods to help aid in TBI recovery, there is no “quick fix.” For this individual, there is a road of recovery ahead which is often filled with uncertainty and angst.

Following up: What Happens After a TBI?

Research surrounding TBIs is relatively recent and therefore, long term studies are still being conducted to determine possible long-term ramifications of a TBI. A study by McMahon et al. (2014) followed TBI patients over a one-year period, utilizing scans such as a Computed Tomography (CT) scan, scales such as the Rivermead Post-Concussion Questionnaire-13 (RPQ-13), Brief Symptom Inventory-18 (BSI-18) Satisfaction With Life (SWL), and the Glasgow Outcome Scale Extended (GOSE), combined with reported post-concussion symptoms at 3-month, 6-month and 1-year post TBI. The results have given support to the concept that the impact and effects of a TBI can become worse over time. The long-term implication for someone dealing with a TBI is that it is anything but “minor,” which gives light to why the term mTBI (minor traumatic brain injury) can be misleading and detrimental to the emotional health of an individual. The term “mild” insinuates that symptoms from the incident should be “mild” and therefore temporary. However, cognitive, emotional and physical changes in a human is going to cause other changes for an individual and often these can have a domino effect where

symptom management becomes challenging and onerous. The importance of these findings cannot be understated, as there is often a lack of expertise from general practitioners who often treat patients who have suffered a TBI.

When first looking at prevalence of post-concussion symptoms, an astonishing 82% of patients reported at least one post-concussion symptom at both 6- and 12- month follow ups. It appears that at the 3-month follow-up, the average number of post-concussion symptoms reported by patients were 3-4 symptoms; this went up at the 6-month follow-up to between 4-5 symptoms (MacMahon et al., 2014). At the one-year follow-up, patients reported between 3 and 5 symptoms (MacMahon et al., 2014). These results suggest that post-concussion symptoms do take time to settle in as the brain fights to recover from a TBI. An important finding in this part of the study is that between 6- and 12- month follow-ups, 50% of patients reported no progress in reduction of TBI symptoms (MacMahon et al., 2014). This study highlights the struggle towards becoming symptom-free and returning to “normal” functioning when recovering from PPCS. Medical patients or therapy clients would benefit from psychoeducation in understanding that often, TBI symptoms may become worse before they get better, and the timeline for recovery is uncertain.

One crucial take-away from this study are the types of PPCS symptoms that patients endured, and the recovery trajectory for the patients followed in the MacMahon et al. (2014) study. The most common types of post-concussion symptoms that were reported were physical symptoms, sleep disruptions, emotional symptoms and cognitive symptoms. It appears that over time, physical symptoms (headaches, nausea, locomotor impairment) tend to increase, especially between 3-6 months (MacMahon et al., 2014). Cognitive deficits (disorientation,

memory/concentration problems) also significantly increased between 3-6 months and tend to persist past 12-month follow ups. Between 3-6 months, disruption in sleeping patterns tend to occur, but improvement in these symptoms is often seen between 6 and 12 months (MacMahon et al., 2014). It was also found that emotional symptoms may follow a similar pattern as changes in sleeping patterns. Again, it is important to note that 50% of patients did not report positive changes between 6 and 12 months, and 65% of patients still had post-concussion symptoms at all three follow-ups (MacMahon et al., 2014).

The scales used to gather and analyze these results were the GOSE, BSI-18 and RPQ-13. The GOSE found that 33% of patients failed to return to functional status at 3- and 6-months post TBI, and 22% reported impaired functional status at the one-year follow up (MacMahon et al., 2014). The SWL found that after one year, 30% of patients reported dissatisfaction with their overall wellbeing (MacMahon et al., 2014). These scales provide support the notion that recovering from a TBI can be mentally, physically, and emotionally taxing as it does not allow an individual to live the same quality or pace of life that they once had. What also shines light on this is the RPQ-13 measures, which show that the severity of post-concussion symptoms tends to lower over a one-year period (MacMahon et al., 2014). However, even when progress is made through TBI recovery, patients still experience elevated and problematic symptoms as a result of their TBI one year later.

When an individual endures a TBI which requires hospital care, often a CT scan or MRI will be suggested to determine the severity of a TBI, especially to determine if there is a brain bleed (Lee, 2020). In some cases, these scans can provide valuable information which is used for recovery. However, in the majority of cases, these scans do not accurately identify the problem

areas of the brain. There are various other scans which are currently being researched, such as Diffusion Tensor Imaging (DTI), which can provide information on white matter function and abnormalities in the brain (Lee, 2020). It is evident that there is a lack of current research and findings on what conventional imaging, if any, will accurately predict the specific injuries or recovery processes for an individual (Lee, 2020). In the MacMahon et al. (2014) study, it found that at 3-month follow up of TBI individuals, there was no difference in the presence of post-concussion symptoms between CT-negative and CT-positive patients (MacMahon et al., 2014). Interestingly and important to this paper, at the 3- and 6- month follow ups, CT-negative patients reported on average 1-2 more post-concussion symptoms at each follow up than CT-positive patients (MacMahon et al., 2014).

While recognizing that CT scans are not necessarily an accurate portrayal of TBI injury, it is a method of measurement which has been researched in the neurology community, especially related to TBIs. The findings from the study provides support that the effects of a TBI take time to set in. In almost every measure used by McMahon et al. (2014), the results showed that post-concussion symptoms often worsened before getting better. It also shows that a CT scan can may indicate early abnormalities in a positive reading, but receiving a negative -CT scan does not mean that no symptoms will occur. The research suggests the opposite, that over time, abnormalities in brain function can occur and likely will occur. One reason why these abnormalities occur is due to neural degradation in the brain, which will be a topic area covered later. When abnormalities in brain function occur, an individual will likely experience one or multiple post-concussion symptoms in different domains, as described above. This is important because when working with clients with various foci of dysfunction, it can easily become an

overwhelming experience which has no known short-term solution besides symptom management.

Looking at this elaborate study, it is evident that there are gaps in the literature regarding how professionals can aid an individual through their TBI recovery. Many patients who suffer from PPCS will endure life changes that are out of their control, and often, these changes are not imminent due to the delayed effects of a TBI. Based on the DSM-5, an individual will be diagnosed with PPCS if they suffer from at least three symptoms, such as fatigue, sleep disturbances, headaches, dizziness, irritability, affective disturbance or apathy/personality changes, all occurring for longer than 3 months (Permenter et al, 2023). It is noteworthy that a PCS diagnosis does not require or incorporate brain imaging scans (Senecal & Whitehead, 2021). When an individual is left to deal with the impact of these symptoms, it is inevitable that it will lead to changes in daily life and routine. It has been researched that one of the most common treatments for TBI patients is “reassurance,” which is in other words letting patients know that symptoms will subside (Permenter et al., 2023), but there is no way of telling how long they will last. It is also possible that while some symptoms will recover over shorter periods of time, it is also possible that other symptoms may last for months if not years (Ahman et al., 2013). This is where a gap exists between the research and the reality for many TBI patients; how do we help coach and navigate an individual through this post-concussive journey, while maintaining positivity for recovery and also negotiating changes to daily life. For an individual who has a physically active or demanding job, returning to work at previous capacity may not be an option during recovery. For individuals who are often in front of a screen, loud noises, or bright lights, what adaptations can they make to ensure that cognitive resources are

being utilized in a way that supports the individual? For example, if an individual has to choose between grocery shopping and meeting up for coffee with a friend, but mentally/emotionally/physically they can only do one, how does one navigate having to reduce social interactions in order to focus on daily living?

Senecal and Whitehead (2021) posit that brain injuries, and the structural changes which occur within the brain, should be studied by neurologists and other medical professionals, while the concurrent stresses and changes in life should be handled by psychologists and mental health professionals. This is an important point of research because it speaks to the multidisciplinary nature of dealing with a TBI. It is also crucial to view post-concussion syndrome from an existential and phenomenal perspective, because there are renegotiations and renavigation that occur, and it is beneficial to view these from a zoomed-out existential lens. Goldberg (2017) explains that when an individual endures a TBI, the brain injury impacts the subjectivity of the injured person, in that their entire existence as a human being may be called into question. When an individual is dealing with elevated levels of mental and emotional instability, it can cause an impairment of self-awareness and therefore negatively impact the emotional state of the individual.

Clinical case studies which follow athletes who have been diagnosed with PPCS have shown that the way individuals are able to cope with the loss of identity and existential renegotiation is largely predicated on one's perceived level of social support, as well as the severity of symptoms that are encountered both somatically and psychologically (Senecal & Whitehead, 2021). The idea of the brain and emotions catching up to questions such as "what happened?", "what does this say about me?", and "what's going to happen?" are scary

questions that many TBI individuals will have to ask themselves. When social support is minimal, it can lead individuals to darker places of thinking and sometimes catastrophizing. In other cases, these questions are worrying because the individual is not only going to renegotiate how they spend their time and cognitive resources, but they may also have to contend with career changes or alterations. When dealing with a TBI, feelings of loneliness and despair can easily become overwhelming and when there are no answers for how symptoms will impact daily life, there is a fear of the unknown which can takeover.

Long-term Persistent Post-Concussion Syndrome

A reason why it is essential to approach post-concussion symptom management and PPCS with an existential and phenomenological lens is because there are many patients who will deal with PPCS for longer than three months. The longer an individual must navigate life with PPCS, the higher likelihood that they will need support in their recovery from a mental health standpoint. Ahman et al. (2013) found that the most common post-concussion symptoms their population suffered from was fatigue (53.4%), poor memory (52.5%), headaches (50.9%), frustration (47.9) and depression (47.2%). What was astonishing is that for almost 50% of these individuals, symptoms were present at 3-year follow-up. At the 11-year follow-up, many consequences which had stemmed from a TBI were still being dealt with (Ahman et al., 2013). This is relevant to mental health professionals and medical professionals in general because it speaks to the experience that these individuals may be facing with this invisible illness. This also speaks to the terminology “minor” TBI, because it minimizes the suffering and changes people with a TBI are forced to undergo. Referring to a brain injury as “minor” seems to be misleading because research has shown that a TBI is anything but “minor.” At the 11-year follow-up,

participants showed a significantly lower satisfaction of life than those in the control group, as well as minimal recovery of symptoms between 3-year and 11-year follow-ups (Ahman et al., 2013).

Qualitative research has provided anecdotal information from TBI participants who engaged in the study at both 3- and 11-year follow-ups. One individual remarked that they “have a hard time remembering things. I get annoyed easily. I just want to be alone sometimes. Have difficulties concentrating. If I’m going anywhere, I’m really stressed out” (Ahman et al., 2013, p. 44). This speaks to the difficulties of adjusting to life with PPCS, even eleven years post-injury. There are some clients who commented that they have not been able to return to work eleven years later; while there is still some hope to return, some recognize that a different job or career path may have to be followed. Another major challenge for PPCS individuals is adjusting to social demands. Many reported feelings of isolation and feelings of worthlessness because of an inability to engage socially with both family and friends. Simply put: “Just being understood, that’s what I think is the hardest part in everyday life” (Ahman et al., 2013, p. 45).

When looking at the anecdotal information from TBI patients, there are many complex challenges when re-navigating life with PPCs. A reason why individuals likely report feelings of frustration, anxiety and depression likely stems from the fact that suffering from a TBI is “invisible,” in that no one can see the changes in brain functioning which result in various concussion symptoms. What makes this even more challenging is that there is a lack of awareness in the general population about what it means to suffer from PPCS. For example, there is a degree of social isolation that many individuals will inevitably navigate, because social engagements use up different resources of the brain and require certain social cues and brain

functions to be operating at “normal.” This will be expanded on in later sections. Individuals forced to navigate feelings of loneliness and isolation are often left to their own resources in figuring out how to communicate their needs, especially when it often remains a mystery to the person themselves. While these experiences can be traumatic for some individuals, some are able to “successfully” manage their symptoms through various measures, such as through light exercise, vestibular rehabilitation, and other forms of rehabilitation. While these methods of rehabilitation work for some, they do not necessarily work for all TBI patients. Therefore, an individualized approach and plan is critical when working with a patient with a TBI. The non-linear process of recovery highlights that there must be flexibility in recovery programs, as well as a multidisciplinary team. There is hope for recovery, as many individuals do recover from PPCS symptoms within a few months to one year. For those who do not, it is the role of a clinical professional to be knowledgeable in supporting a client through these peaks and valleys.

From the perspective of a counselor, it is important to recognize and honour the struggle a client is enduring because of the nuanced differences that each individual will face. One way of supporting clients is to educate on other physical therapies which can help alleviate PPCS symptoms, although this would be best elaborated on by a medical professional. When treating the management of psychological symptoms a client is navigating, listening to and understanding the struggles an individual is facing allows the client to form their own story on how this invisible illness has impacted their life. No matter what struggles or symptoms a client is facing, the role of the counselor is to be there with the client in these moments of struggle. As mentioned, individuals with a TBI may experience symptoms such as increased impulsivity, disinhibition, aggression, lack of communication and depression; an approach to therapy such

as the narrative lens can help assist individuals in harnessing their TBI experiences through externalizing the problem and creating new experiences surrounding the TBI (Hawkins et al., 2019).

Technology and TBI

With the incidence of TBIs on the rise, there have been some developments in technology which are being studied more closely today. One example of this technology is Diffusion Tensor Imaging (DTI). DTI provides a more detailed overview of brain anatomy than a traditional Magnetic Resonance Imaging (MRI) scan, as it measures water molecule diffusion and directionality (O'Donnell & Westin, 2011). Scans such as MRIs and Computed Tomography (CT) scans are unable to detect diffuse axonal injuries due to not being sensitive or specific enough to pick up these changes (Shenton et al., 2012). Therefore, DTI can be used to compare brain structures over time, as well as compared to other TBI and non-TBI populations. The benefit of a DTI is that it can help connect the analysis of the structural versus functional brain connectivity due to its ability to detect microstructural changes in the brain, versus MRI scans, which provide macrostructural information (Shenton et al., 2012). This can provide information on white matter changes following a TBI, which tend to show more long-term effects in adults compared to children due to neuroplasticity (Dinkel et al., 2014).

During recovery, this can help provide more targeted therapy for an individual because it can potentially show the biological basis of PCS symptoms, as these tend to be associated with subtle brain alterations, which scans such as CT and MRI fail to detect (Shenton et al., 2012). It is important to note that while DTI scans can help pinpoint potential deficits in brain functioning, it is not always the case. Often, there are more psychologically based symptoms which do not

show on scans. However, as TBI and brain research continues, DTI scans can help provide more information to health professionals to target specific therapy, whether physical or psychological. While diffuse axonal injuries do not always appear in scans, DTI scans will provide the most information for professionals. A benefit of these scans is it picks up on changes in the brain such as changes in myelination, axonal attenuation, and integrity (Dinkel et al., 2014). For example, a study which utilized MRI scans, although not as detailed, does give information on brain function, and showed that for individuals with a severe TBI, demyelination in the brain occurred from the initial scan to the two-year follow up (Dinkel et al., 2014). Between years two and five post TBI, there were less significant differences that were observed (Dinkel et al., 2014). The result of demyelination in the brain can lead to cognitive, emotional and physical impairments (Lex et al., 2022), as has discussed and will continue to be elaborated on.

When an individual experiences a disruption in brain functioning, changes and abnormalities in myelin can lead to neurological disorders that are often seen in research with myelin diseases (Ohno & Ikenaka, 2019). In TBI patients, demyelination is shown to occur in a high number of individuals, given the limited research. When demyelination occurs, neurological disorders that occur involve degeneration and loss of axons and neurons (Ohno & Ikenaka, 2019). At a biological level, this degeneration of neural connections can lead to other immune responses that can negatively impact an individual. When looking specifically at neural degeneration following a TBI, research supports that degeneration can lead to emotional dysregulation issues due to a change in brain functioning (Choi & Jang, 2021; Dethier et al., 2013). These changes result in cognitive changes which can lead an individual to have changes in emotional functioning and reactivity.

Degeneration of Core Neural Tracts and Impacts on Emotional Regulation

Research within the past ten years has increasingly supported the notion that individuals who experience one or multiple TBIs will likely experience emotional dysregulation. As mentioned, the challenge that is now presented is narrowing down what “emotional dysregulation” may look like in an individual and how health and mental health professionals can help. However, to understand the “what” behind emotional dysregulation, we need to understand the “why” behind why emotional dysregulation occurs. There is more recent research that supports that degeneration of neural tract functioning is what leads to concurrent emotional dysregulation, which can occur both emotionally and cognitively.

Choi and Jang (2021) found that there are several brain structures which make up key structures in the neural circuit which underly emotional regulation. Therefore, after a TBI occurs, especially a severe TBI, changes to brain function will occur as the neural tracts degrade over time. In order to measure the change in brain functioning in these structures, diffuse tensor imaging (DTI) data was collected at the 3-month mark and 8 years after the onset of the initial TBI. The results of the 3 month and 8-year follow up yielded significant changes in core neural tract functioning during that time. In both follow up DTI images, the patient showed degradation of core neural tracts for emotional regulation. It was also detected that at the 8-year follow up, the patient showed further core neural tract degradation which led to delayed behaviour changes following the TBI (Choi & Jang, 2021). It has been found that while some areas of the brain do regenerate through myelination, other neural tracts are not reconstructed (Choi & Jang, 2021, p. 1). This rate of regeneration is largely based on age, but also depends on other biological factors (Schirmer et al., 2013). It is worth noting that this study was based on a

single individual with a severe TBI, including a loss of consciousness, due to a motor vehicle accident. Recent studies with larger population sizes surrounding TBI, emotional regulation, and neural degeneration are still in the works; the most recent research largely focuses on smaller sample sizes, with some having healthy control individuals.

A key takeaway from this study as it relates to treating individuals with a TBI is that the DTI gives evidence that neural tract degradation does not occur instantly after a TBI. Therefore, behaviour changes that may occur in an individual after incurring a TBI may be delayed. These behaviour changes are due to the brain's change in functioning due to the inability for certain neurotransmitter connections to repair following a TBI (Choi & Jang, 2021). For this patient, the neural tracts that were reconstructed were narrower at the 8-year mark than the 3-month mark, which speaks to the ongoing degradation which occurs after a TBI. As a result, changes in behaviour were observed over a period of time where emotional regulation was hindered. For this patient, these brain changes led to an inhibition to control behaviors such as shouting with anger, which reportedly worsened over time (Choi & Jang, 2021). The real-world implication that this could have on an individual can include family strain, social strain, memory lapses, impulsive or sporadic behaviour, anxiety and depression.

This study and other studies have explained that diffuse axonal injuries often stem from a TBI and is perhaps the most devastating consequence of a TBI (Sung & Kwon, 2017). An aspect of diffuse axonal injuries is that its effects on an individual can be delayed, depending on the location of the injury and its impact. In a study focused on a single person who was in a motor vehicle accident and in a coma for three months, he only started to report pain five years post accident and onset of the TBI, in which pain was felt in his hands, legs and torso. DTI scans

showed that at the one-year mark post-TBI, the patient had tearing in subcortical white matter, and at the seven-year follow up, the partially torn white matter showed more severe degeneration (Sung & Kwon, 2017). This provides evidence that degeneration of the neural tract can be delayed after a TBI, and likely, severity of the injury will play a crucial role in how degenerative effects may occur.

What is important to consider is that when initial diagnosis occurs for a TBI, there is often limited options for follow up. In this case, MRI scans did not show noticeable differences in brain functioning. However, DTI scans did show the degeneration that occurred over time, due to its more detailed abilities (Sung & Kwon, 2017). If symptoms do not occur until time has passed, that may mean that changes in behaviour may occur that feel “out of character.” It is important to recognize changes in behaviour and seek support as needed. It has been analysed through DTI combined with reports of changed behaviour, that even at 8-year follow up scans, further degeneration has shown to occur and consequently, changes in behaviour were described as exhibiting severe disinhibition, including being violent with others over trivial matters (Choi & Jang, 2021). Even more, this patient was observed as showing severe depressive symptoms and mood swings, supported by the Beck Depression Inventory-11 (Choi & Jang, 2021). DTI scans have shown the functional changes in the brain’s functioning, and there should be more focus on how to help these individuals manage and cope with their persistent post concussion symptoms.

When focusing specifically on white matter abnormalities which show up on DTI scans, it provides more information about potential impairments in brain function and therefore insight into cognitive or emotional difficulties and individual is navigating. It was found that intracranial

abnormalities were visible by MRI in 12% of a group of TBI individuals (Waljas et al., 2015). However, DTI scans which focused on various regions of interest in the brain found that unusual white matter was present in 50% of TBI patients, in comparison to 12.4% of the control (Waljas et al., 2015). The presence of abnormal white matter in TBI patients is staggeringly higher than the control, and it speaks to the damage which can occur after TBI which is not picked up in other scans. It is interesting to note that while abnormalities in white matter were detected, they did not correlate to higher reports of TBI post-concussion symptoms (Waljas et al., 2015). When thinking of previously discussed studies, it has been shown that unusual white matter degeneration occurs over time, and therefore it would make sense why abnormal white matter at 3 months post-TBI would not show the same deteriorating effects as scans in later years. However, the abnormal white matter in those TBI patients should be something that is monitored if behaviour changes do occur at a later time. Since microlesions in white matter tracts can occur as a result of a TBI, the deterioration of axons occurs over time, which speaks to the delay in effects of an individual when an axonal injury is occurred through a TBI (McDonald et al., 2019).

In the medical and mental health fields, it seems that support for TBIs is limited as it is a relatively new field in the scope of health. In researching other diseases characterized by neural degeneration, Multiple Sclerosis (MS) is a disease which health impacts that occur are caused by the body's autoimmune response to attack its own nerve sheath and fibres causing demyelination (Li et al., 2020). While the underlying cause for MS and TBI are different, there are some overlaps in how symptoms manifest themselves. What makes a TBI different is that there is an ability for the brain to regenerate through neuroplasticity; however, that rate varies

depending on numerous factors such as age and number of TBIs. One study discussed that there may be two different types of neuronal degeneration, which are separated into primary degeneration and secondary degeneration. Primary degeneration results in death of neurons and glial cells due to an impact (Choi & Jang, 2021). Secondary degeneration occurs through degeneration of neuronal cells caused over time due to by toxic releases and responses to the impact (Choi & Jang, 2021). Since there is no way to distinguish when primary impact effects will change into delayed effects through secondary degeneration, there is no way to know when these changes may occur following a TBI. This is also likely due to both vascular and cellular changes and degeneration which can occur both immediately following a TBI and long-term post TBI (Hay, 2018). When thinking about how to best help someone who will be undergoing constant changes and challenges in their recovery and adaptation to a new normal, a mental health approach should focus on fostering resiliency and recognizing TBI as an invisible illness, which requires concessions and adaptations.

Emotional Regulation Impairments Following TBI

When individuals incur a TBI, the most common and debilitating consequence of the injury is difficulty regulating emotions. As a result, many patients fail to return to work, have decreases in engaging in leisure activities, and experience breakdowns in intimate relationships because of emotional and social behaviour changes (Deithier et al., 2013; Engberg & Teasdale, 2004; Gosling & Oddy, 1999; Morton & Wehman, 1995; Wood & Yurdakul, 1997). In a study which utilized facial and body feedback in both individuals diagnosed with a TBI and compared it to a non-TBI control group, it was found that TBI participants were globally less responsive to the effects of body and facial feedback than the control group. Interestingly, TBI were almost

equally responsive to happy postures as the control group (Deithier et al., 2013). However, when dealing with negative facial and body cues, the participants who had incurred a TBI experienced more difficulty in processing and reacting to these cues. A potential explanation for this is that individuals with a TBI have increased difficulty processing negative emotional cues from others. This could be because of the struggle to consciously identify anger in oneself, which makes it difficult to recognize in other. This leads to a condition called Alexithymia, which is marked by difficulties in identifying and describing one's own emotional experiences. The onset of Alexithymia, as studied by Williams and Wood (2010), can be caused by the onset of a TBI, as was exhibited by 60.9% of TBI individuals as opposed to 10% from the control group.

These findings are significant because there is more support for the notion that TBIs lead to emotional dysregulation. There are more specific details as to where difficulties in emotional regulation and emotional distress stem from. With disruptions in the perception of negative emotions, individuals with a TBI have to re-learn how to recognize negative emotions both in themselves and others. It can be understood why individuals with a TBI have more emotional outbursts: there is an inability to recognize one's own negative emotions and therefore may "lose control" due to an inhibition of emotional control and regulation. It is possible that one reason why TBI individuals are more susceptible to alexithymia is that TBI commonly impairs both the expression and experience of negative affective states (Deithier et al., 2013). As a result, if an individual cannot accurately or quickly enough recognize their own negative affect state, they may exhibit behaviours such as irritability, aggression, and impulsivity (Deithier et al., 2013). For this individual, it creates a lot of emotional distress because social settings become a

more difficult and complicated task. This can become quite frustrating because of the cognitive resources it may take for an individual to attend to general facial cues, let alone potentially negative cues. It seems that self-monitoring of emotions is decreased and therefore reactions to social situations can be affected. For this individual, they will experience more difficulties processing and reacting emotionally to negative facial cues of emotion.

These findings were supported by a study that also compared TBI individuals with a control group, which found that TBI individuals showed a 6 times higher frequency of alexithymia than the control group (Williams & Wood, 2010). It was also found that individuals with higher frequency of alexithymia showed half as much emotional empathy than the control group (Williams & Wood, 2010). For an individual with alexithymia, this diffuse axonal injury will result in disruptions in neural networks which inform various systems responsible for social cognition, which requires a cognitive appraisal of an action, resulting in a lower ability to respond effectively to the emotional attributes of the action (Williams & Wood, 2010). However, a potential confounding aspect in this study is the unavailability of previous emotional regulation and social cognition pre-TBI. There is, however, evidence that neural degeneration does lead to emotional regulation issues, and individuals with higher frequency of alexithymia display emotional regulation issues. While alexithymia cannot be definitively diagnosed in TBI and post TBI cases, it does provide a lens for clinicians and health care professionals to look through when working with an individual who may be struggling with impulse control, lack of inhibition, or social difficulties.

Amongst people with TBI, it was found in a recent study that over 50% of individuals in the group met the criteria for alexithymia (Dockree et al., 2024). It was initially thought that

alexithymia could stem from an impairment of self-awareness due to a TBI. It was found that while individuals with higher alexithymic tendencies reported significantly higher emotional distress and aggression compared to those without evident alexithymia, there was no correlation between impaired self-awareness and alexithymia (Dockree et al., 2024). This may be because self-awareness is necessary to identify deficits stemming from alexithymia.

Therefore, someone who is diagnosed with alexithymia may become more aware of their social abilities and deficiencies; if a lack of self-awareness did stem from alexithymia, an impaired self-awareness would yield greater difficulties. However, it appears that difficulties related to disruptions in emotional regulation is due to emotional processing, and not impaired self-awareness or lack of emotional awareness (Dockree et al., 2024).

One reason why discussing Alexithymia and its potential diagnosis with someone who has suffered from a TBI is its relationship to suicide ideation post TBI. It has been found that post TBI, the frequency of depressive disorders is present in 20-50% of individuals (Wood & Williams, 2010). In TBI groups that have been studied, it has been seen that over 80% of TBI individuals have higher feelings of hopelessness than the control group's 31% (Wood & Williams, 2010). Even more salient, it was found in a study that the frequency of suicide ideation following a TBI is around 33%, which drastically varies from the general population at only 1.4% experiencing suicide ideation. As mentioned by Dockree et al. (2024), social impairments and impairments in relationship functioning and emotional processing following a TBI are common, and with humans being inherently social beings, it logically makes sense that there would be higher levels of depression and suicide ideation when emotional difficulties occur. Related to this, it has been researched that individuals who suffer a severe TBI will likely

suffer from inhibitory control impairment (Filipčíková & McDonald, 2023). In a study that was conducting to investigate the role of inhibitory control impairment within the realm of social disinhibition, it was found that in social settings, social inhibition was associated with inhibitory control impairment (Filipčíková & McDonald, 2023). This was explained to happen due to slower processing of social tasks post-TBI, in comparison with the control group. It is plausible that the reason why social tasks result in lower inhibition control is that there is an element of emotional processing that must occur when reading and reacting to social stimuli. Therefore, when an individual has to engage in emotional processing, it places a heavier cognitive demand on the individual thus resulting in speech or actions that may appear impulsive (Filipčíková & McDonald, 2023).

These studies provide further evidence that individuals who have suffered a TBI are more susceptible to emotional dysregulation due to higher rates of depression and impairments in controlling impulses, especially socially. The studies by Wood and Williams (2010) and Filipčíková and McDonald (2023) show that emotional processing is a major deficit which results from a TBI. Many of these studies worked with individuals with TBI who had suffered moderate to severe TBIs; however, it is still highly plausible that individuals who suffer more “minor” or less severe TBIs will still have areas of deficits which are amplified even more in individuals with severe TBI. It also speaks to the relevance of Alexithymia, which is characterized by difficulties in emotional processing and therefore, reading facial cues and social cues incorrectly. When thinking about how this may manifest itself in TBI patients, it may be comforting for patients to know that these impairments and challenges are normal for TBI recovery, and often, do get better in time as the brain has time to repair the diffused axonal connections. This is consistent

with findings by McDonald et al. (2019), which found that as axonal connections deteriorate, changes to personality and behaviour become poorly related to social functioning and relative stress (McDonald et al., 2019).

An important point about social cognition is made, which is that it involves a multitude of processes, such as auditory, visual, verbal and non-verbal processing, which illustrates the neural connectivity that occurs throughout these processes, and that can be interrupted due to a TBI, especially over time (McDonald et al., 2019). In fact, McDonald et al. (2019) found through their elaborate research that specific areas of the brain with abnormal white matter were more predictable of certain social difficulties, as there are certain parts of the brain which are responsible for various aspects of social processing. Some of the impairments observed were an impairment in identifying emotional states and making judgements about feelings, beliefs, intentions and meaning of conversational remarks (McDonald et al., 2019). It was discussed that a “loss of connections would disrupt understanding of naturalistic social stimuli that required multimodal processing, including verbal and non-verbal cues, e.g. facial and body cues, auditory and emotional parameters and broader appreciation of context...the correlations between white matter voxels and TASIT (The Awareness of Social Inference Test) performance bore this out.” (McDonald et al., 2019, p. 823). This supports the notion that social functioning can result from a TBI, due to changes in neural functioning from damage that occurs from impact to the brain. It is also important to note that these axonal disruptions are often seen in acceleration-deceleration injuries, as the stretching and fraying of white matter is a result of the brain shifting due to an impact such as a motor vehicle accident, fall, or blow to the head (McDonald et al., 2019). It is suggested that these types of injuries can lead to disruptions in the

thalamus, which controls and informs many other networks of the brain and has been shown to be impacted in scans following a TBI (McDonald et al., 2019).

To put this into perspective on how this may impact a family or relationship, a study by Kyle et al. (2023) studied perceived partner or caregiver burnout one year into aiding someone who experienced a moderate to severe TBI. The results supported the idea that individuals who have experienced a TBI will experience changes in emotional processing. An individual will potentially navigate having a lower ability to be self-aware of one's own emotional state, sometimes marked by hostility towards others, especially an intimate partner or family member (Kyle et al., 2023). When an individual lacks insight into their own emotions, it is not uncommon for them to lose their temper with a partner or caregiver, which over time, leads to increased burnout and stress on the helping person. This is something to be cognisant for both medical and mental health professions, because while the patient is going through challenges adjusting to their TBI, the people around them are also negatively impacted by the mood swings and flat affect often displayed by someone with a TBI (Kyle et al., 2023). For the individual recovering, having a lack of insight into their own emotions means that they will struggle to process and share emotional experience, while also having difficulty controlling their emotions; this is often amplified in the lack of expression of positive emotions (Kyle et al., 2023).

The discussion engaged by Kyle et al. (2023) also points to the diagnosis of alexithymia being prevalent amongst individuals who have experienced a TBI. This speaks to the overarching theme which is that emotional dysregulation is caused when someone experiences a TBI. The force and impact of a TBI will often dictate the recovering process, from weeks to years; however, it is not always that case that someone who experiences a moderate TBI will have

longer lasting post-concussion symptoms than someone who experiences a “mild” TBI. Part of the research supports that no TBI is indeed “minor,” because the long-term effects can last much longer as time passes and the changes in the brain catches up to the trauma it has incurred. The prevalence of individuals in the United States who have experienced a TBI is over 12%; even further, over 5.5 million people have long term disabilities and challenges as a consequence of a TBI, and this number continues to grow (Kylce et al., 2023).

Chapter Three: Discussion and Application

Discussion on TBI Recovery

The purpose of this capstone was to highlight the connection between TBIs and their negative impact on emotional regulation. TBIs have been attempted to be classified as either minor or simply a TBI, but it is clear that the recovery process and experiences for individuals who suffer a TBI are anything but “minor.” As discussed, there are various aspects of both the injury event and the uniqueness of the individual which will play a role in the recovery process. Research surrounding TBI recovery, and the impact of multiple TBIs on an individual, are still met with much grey area and inconclusiveness. As discussed, the fact that there are no specific diagnostic criteria for post-concussion syndrome usually results in a misdiagnosis, or missing a diagnosis, of PCS (Conder et al., 2020). To take this a step further, the signs and symptoms of PCS often overlap with other mental health illnesses such as depression, anxiety, migraines and ADHD, among others (Conder et al., 2020). This leads to the premise of this capstone, which is that TBIs lead to emotional dysregulation. While deciphering information that has been discussed, the jury is still out on how to best help individuals who have suffered from a TBI.

The reason why this aspect of recovery is so difficult is because it is nuanced based on the individual. If no two people recover from a head injury the same, how can health professionals diagnose or treat individuals systematically? This is where discussions surrounding head injuries amongst professionals and patients is critical in understanding the symptoms an individual is facing. In this, professionals should be cognizant of not categorizing patients into a generic treatment plan. For example, informing a patient that they should avoid light or overstimulation for the next month and see their family doctor as necessary is not affirming.

This approach does not honour the struggle that the individual is about to face, and therefore does not support the psychological recovery for the individual.

As was discussed in chapter 2, following a TBI, declines and deficits in many areas of functioning suffer, such as satisfaction with life scores, increased cognitive deficits, and quality of relationships with both family and friends. The fact that up to 80% of individuals who suffer from a TBI experience at least one PCS symptom at 6- and 12- month follow ups speaks to the long road which highlights symptom management and TBI recovery (MacMahon et al., 2014). Physical and cognitive symptoms tend to deteriorate over time in individuals with a TBI or multiple TBIs. A difficulty in recognizing what this may look like for an individual is that it highly depends on the individual; there are no scans or scales that will predict the recovery trajectory for an individual because it is not that simple. While DTI, MRI and CT scans are important pieces of the puzzle, especially regarding the risk for brain bleeds following a TBI, these only have the potential to provide information on physical changes to the brain following a TBI, but do not necessarily give information on related symptoms the individual will deal with. As discussed, the degeneration of neural tracts and white matter from a diffuse axonal injury following TBI, and the continual degeneration following a TBI, is well documented, although not usually considered when coming up with recovery plans. It is safe to assume that most individuals who suffer a TBI will not have a brain scan done, as these are difficult to obtain and usually used to rule out brain bleeds only (Senecal & Whitehead, 2021). However, when thinking about how degeneration of neural networks would impact an individual's ability to function, it logically makes sense that as degeneration occurs, more severe symptoms will be felt by the individual, especially cognitively. It has been found that the area in the brain where structural changes

occur will result in cognitive disfunction following a TBI; the specific brain region which is impacted by a TBI can dictate the cognitive deficits which will occur (Moriera de Silva et al., 2020). For example, white matter degeneration in the left and right rostral anterior cingulum has been correlated with changes in memory and attention (Moriera de Silva et al., 2020; Zhu et al., 2013).

As discussed, health professionals will often provide reassurance and “hope” for a recovering individual that time will heal their symptoms (Permenter et al., 2023), but when “hope” starts to fade in the individual, and day-to-day life and functioning is forced to be renegotiated by the individual, how can mental health professionals best help them cope? When thinking of the changes that will inevitably occur to an individual following a TBI, it will impact life circumstances of the individual, and often includes major changes and adjustments. For example, there are many individuals who will suffer from post-concussion symptoms such as fatigue, poor memory, headaches, depression, and impulsivity (Ahman et al., 2013). For an individual who works full-time to support a family, there may not be an option to take time off to recover from a TBI; this individual will be in a precarious position where they will likely engage in their typical daily routines, but experience one or more of the noted symptoms above. What makes this challenging is even if the individual can make it through the first initial days following a TBI, there is a compounding effect which will likely delay recovery, especially when an individual pushes their brain and body outside of their threshold that they can handle due to the TBI.

A major area of concern in TBI recovery is accessibility to services, especially services that are not covered by health care insurance. For individuals who identify as homeless or

vulnerably housed, the rate of TBI is almost 3 times higher than the rate found in the general population (6.9% vs. 2.3%) (Schmitt et al., 2017). Further, more than 50% of the TBIs which were incurred by this population were due to an assault, and many victims were women who were abused by a partner (Schmitt et al., 2017). This population of victims have more barriers to accessing medical and psychological help, and often have other comorbid issues such as alcohol or drug dependence (Schmitt et al., 2017). In various studies on the general population, TBIs have been linked to an increased risk of alcohol use disorder and using alcohol as a coping mechanism for a TBI (Hoxha et al., 2024). While this is exacerbated in lower income populations, it is plausible that in general, increased alcohol use can be found during TBI recovery, especially in younger male subjects who are in their 20s (Hoxha et al., 2024). It has also been found that females tend to suffer more severe cognitive and emotional deficits following a TBI (Hoxha et al., 2024). In current research, this capstone focused mostly on diffuse axonal injuries, and did not elaborate further on molecular and cellular changes which can occur over time following a TBI (Hoxha et al., 2024). Additionally, much research was focused on adult populations; however, there is increasingly more research available on TBI effects on youth and adolescence, and the subsequent symptoms, changes in behaviour, and recovery processes which are more specific to that age range.

Biopsychosocial Approach to TBI Recovery and Quality of Life

Based on the compiled research, a major gap in the research surrounding traumatic brain injuries is the recovery trajectory, mostly because research on the topic is quite new and therefore, longitudinal studies are only now being completed and published. It is clear that a variety of negative effects can stem from a TBI or incurring multiple TBIs. Further, research is

showing that the most common lingering symptoms of post concussion syndrome are related cognitive deficits, and this often leads to dysfunctions in regulating emotions. As a result, individuals are navigating life with a brain injury while also overextending their limited cognitive resources. This leads to difficulties navigating family dynamics, romantic and friendly relationships, work obligations, extracurricular activities, and so on. When looking at analogy of marbles (or water) in a beaker, maintaining mental and physical stamina post TBI is not realistic and does not honor the severity of the injury in many cases.

Current research around brain injuries continue to open doors and avenues for new discoveries in neurological research and concussion recovery, however, much research is still focused on the “what” and “why” behind what leads to persistent post-concussion syndrome, however, a missing gap is in the “how” domain. Specifically, how do we as mental health professionals, or health professionals in all realms, help someone who is suffering from a TBI? Often, a buffer for the ill-effects of a TBI is a support system. In a therapeutic or medical professional setting, a patient is often asked about their support system (Boeing et al., 2010). Boeing et al. (2010) posit that support is needed in four primary domains: emotional, practical, intellectual, and spiritual. Mamman et al. (2024) have proposed that when it comes to quality of life (QOL) ratings in individuals with a TBI, there are three different realms which influence perceived QOL. The first area of QOL that can be affected by TBI is biological; this includes aspects such as sex, TBI severity, cognition, age, time since injury, mobility, length of hospital stay, symptom severity and global functioning (Mamman et al., 2024). Not surprisingly, cognitive functioning and related cognitive impairments, such as deficits in attention, memory and executive function, were correlated with lower QOL scores independent of sex or age (Mamman

et al., 2024). An important note that was found in this study was that females who were recovering from a TBI generally reported lower QOL scores compared to males; this was predicted to be the case because females may have more pressure to return to caregiving or household duties while receiving minimal support (Mamman et al., 2024). This speaks to the need for support for all individuals who may be primary caregivers, because an individual's ability to function as a caregiver during a TBI recovery will be diminished as their cognitive resources are limited.

When it come to psychological factors and QOL ratings, it was found that aspects such as depression/anxiety and other psychiatric disorders played a role in psychological functioning and QOL ratings (Mamman et al., 2024). It was also found that aspects such as coping styles, self-efficacy, perception of positive changes, self-awareness, positive view of self, somatic impairments and motivation/locus of control were important factors in determining QOL. The most consistent finding was that depression and anxiety were most correlated with lower QOL scores. Coping styles and self-efficacy play a major role in determining quality of life; this is likely because when an individual has a positive view or approach to recovery, or they have reason for optimism in the TBI recovery process, higher scores in QOL are seen both during recovery and post-recovery. This supports the notion that when a patient has a degree of predictability or control over their TBI, whether that is factors related to recovery/daily functioning and their own perceived ability to cope, there is more hope for positive recovery and a return to previous functioning. Interestingly, it was found that higher self-awareness ratings were correlated to lower QOL ratings. This likely occurs because when an individual becomes self-aware of deficits

and consequent changes in functioning related to TBI recovery, perception of functioning decreases and therefore perceived QOL also decreases (Mamman et al., 2024).

Looking at the social factors surrounding QOL scores, aspects such as employment, income, productive activities, education, community integration, social support and participation, intimate relationships, living with others interpersonal functioning and environmental setting all play factors in determining QOL for individuals with a TBI (Mamman et al., 2024). It was interesting to note that those individuals who were employed and had higher incomes generally had higher ratings of QOL (Mamman et al., 2024). This is not necessarily surprising, as having employment and higher than average income would likely result in lower barriers to access different medical or mental health resources during TBI recovery. An important finding in this study is that community integration, social participation, having many friends, and living with others served as positive buffers when considering social aspects and ramifications during TBI recovery (Mamman et al., 2024). This speaks to the importance of having social support and interactions during recovery, especially because TBI recovery can be an isolating experience. It has been explained that when community and social integration occurs during TBI recovery, it can facilitate new and meaningful activities that are crucial for building new connections and creating new life roles (Mamman et al., 2024). This also speaks to the positive influence of having social interactions and predictability from friends and family, as well as the power that support groups for individuals who have had a brain injury can have in maintaining a positive quality of life.

Additionally, Ware et al. (2020) have shown in research that cerebral blood flow (CBF) is a crucial biomarker of cognitive function and dysfunction in both aging and neurodegenerative

diseases, since declines in CBF often coincides with cognitive decline. This point is especially poignant because of the recognition that TBI is associated with biophysiological changes which are also observed in neurodegenerative disorders, and therefore could provide valuable information for those with long-term TBI or PPCS injuries (Ware et al., 2020). In their research, it was found that assessing and analysing TBI-related volumetric changes showed that diffuse brain atrophy can be apparent as early as three months after a TBI injury (Ware et al., 2020). I think it is important to note that there are vast similarities in brain degeneration between neurodegenerative diseases and TBI. When thinking of a holistic approach to TBI recovery, the more pieces of the puzzle that an individual has to help understand their psychological or physical symptoms, the better they will hopefully be able to cope.

TBI Symptom Management and CBT

When thinking about both prognosis and interventions for TBIs, a lack of external injuries and absence of detectable brain abnormalities speak to the support that TBIs can develop at cellular and biochemical levels (Kan et al., 2012). However, this still does little to support the treatment of TBI rehabilitation, since there are no pharmacological treatments for the treatment or prevention of cognitive and behavioural problems following a TBI (Kan et al., 2012). This speaks to the notion that when it comes to TBI recovery, an important aspect is psychoeducation about what changes may be occurring in the brain and body, and how that can impact related feelings of emotion and subsequent behaviour. An approach to therapy, such as Cognitive Behaviour Therapy (CBT), can provide information for an individual in understanding the potential structural changes or impact that the TBI has had on their brain functioning, and what/how that may impact their general functioning, especially emotionally and behaviourally.

Zelecich et al. (2020) explain that CBT is considered best-practice for the treatment of depression and anxiety following a TBI and has been mildly associated with improvement in anxiety and depression symptoms. A major challenge and factor in determining improvement in mental health functioning following a TBI is executive functioning. It has been researched that TBI-specific cognitive education can be effective in reducing depression or anxiety symptoms; however, more improvement is generally found in participants who were older in age, who's injuries less impacted executive functioning, and were engaged in client homework in-between sessions (Zelecich et al., 2020). Furthermore, it was found that the level of therapist competence both in session and in homework review was associated with improvements in overall anxiety (Zelecich et al., 2020).

It is crucial that therapists have experience and knowledge when providing post-TBI support through exploring emotions, cognitions, and changes in function. It is evident that a competent therapist, combined with a positive therapeutic alliance and buy-in from the client, can lead to positive improvement through CBT sessions. It is also apparent that the more sessions a client engages in, the more improvement is seen (Zelecich et al., 2020). The concept of giving homework to a client may be an opportunity for clients to see changes that occur post-TBI in their daily lives, especially when it comes to depression, anxiety or other mental health changes. It can also be used as a way for clients to think about changes and feelings surrounding changes in life in environments which are outside of therapy session. CBT can be utilized to provide a sense of comfort for a client that is dealing with mental health changes due to TBI symptoms (Zelecich et al., 2020); while can be daunting and challenging, it is also a "normal" part of the recovery process. I also believe that using CBT with a narrative therapy approach can

be useful in a) understanding what is going on structurally within the brain and body following a TBI, and b) working towards externalizing these issues and focusing on the problem being the problem, and not the individual (Hawkins et al., 2019).

CBT Treatment Plan

When considering how a therapist can apply CBT principles to TBI and PPCS recovery, there is research to support that the number of sessions, as well as mode of delivery for therapy, are important considerations for clients. Fann et al. (2015) found during their 16-week trial of utilizing CBT for PPCS patients that the minimum number of recommended sessions were four. It was found that eight sessions were an ideal number of sessions to help reduce major depressive disorder symptoms as reported using various life satisfaction scales (Fann et al., 2015). It was also found that when comparing CBT sessions in-person versus over the phone, positive results for change in depressive symptoms were highest for in-person counseling, but not far behind was counseling over the phone; this was compared to “usual care” for TBI and PPCS, which yielded a much lower recovery over 16 weeks (Fann et al., 2015). A crucial point to make is that CBT resulted in lower depressive symptoms compared to before therapy, and engaging in either CBT in-person or over the phone not only helped sustain an improved mood over the 16-weeks, but was continued at the 24-week follow up; this compares to the usual care group, who did show signs of improvement at 16-weeks, but declined by 24-weeks (Fann et al., 2015).

Research shows that whether in-person, online or telephone delivery of CBT is utilized for an individual recovering from a TBI, utilizing CBT yields greater improvement from the psychological effects of TBI and PPCS compared to non-CBT groups. It is important to consider,

from the perspective of a therapist, what sessions may look like or include for both the client and the therapist. First and foremost, therapeutic alliance is crucial to develop rapport with the client. This may include understanding the client's presenting PPCS symptoms, understanding what life was like for the client before the TBI injury, and where they are experiencing challenges. It is also important to talk about strengths that the client possesses, both before and after injury. These can include questions to gauge how the client views their TBI, defining what the biggest challenges are that they are facing, and how they feel about their recovery or adaptations. These questions can also include understanding how often challenges are experienced and the situation(s), how the individual feels these issues are impacting them, and understanding what they have tried to mitigate these symptoms. It is also important to understand the support system the client has, as family and social support are important buffers in TBI recovery (Senecal & Whitehead, 2021). These questions can help the therapist understand the environment in which the client is situated, while also gaining insight into their cognitions and understandings of their experiences with a TBI.

The following sessions would be spent on focusing on the individual's cognitive processing of these experiences, and working to re-structure how they perceive these challenges. One way to do this would be through cognitive restructuring. The idea of cognitive restructuring is to help clients identify automatic thoughts and associated emotions, with the goal being to identify and question these automatic thoughts when they do not serve a functional purpose in the client's life (Furukawa et al., 2023). A CBT tool which is often utilized is the CBT triangle; this metaphor helps clients understand how each point of the triangle interacts with one-another. The three points of the triangle are thoughts, emotions, and

behaviours/action (Assigana et al., 2014); another way to phrase this could be “what I think,” “what I feel,” and “what I do.” With these understandings, the therapist and client can work to develop new skills through skills training which can provide tangible ways for the client to manage their PPCS symptoms. For example, these could include skills related to communicating needs, changing needs, and feelings. Skills training can include strategies for identifying negative or faulty thoughts and ways to challenge these cognitions. Over time, this can help rewire, through neuroplasticity, the automatic reactions which the client experiences through thoughtful attention and positive processing (Yang, 2022).

Another aspect of CBT is when working with TBI clients is activity scheduling. Activity scheduling allows the client and therapist to develop a schedule or routine which can help the client initiate positive activities such as going for a walk or spending time with a family member or friend. Activity scheduling is an important aspect of TBI recovery because in many cases, clients become less active and more prone to social isolation, which increases the risk of depression (Senecal & Whitehead, 2021). Jolien et al. (2015) found that for individuals who have suffered a TBI, planning and execution of a plan was hindered due to the brain activation which is required to changes in executive functioning. As a result of altered function in various brain areas responsible for planning and execution, individuals with a TBI will have more challenges following through on plans, especially when related to physical movement (Jolien et al., 2015). Therefore, the role of a therapist in helping create activity plans and scheduling is to build confidence in the client by having a predetermined schedule which includes activities the client desires to engage in that are meaningful to them and within their TBI threshold. This process can include another CBT strategy which is called successive approximation. The goal

behind this is for the therapist to help the client break down tasks into smaller chunks in order to build up to a difficult task which the client may have low motivation to do; this provides an opportunity for success. This planning may include aspects such as independence, prior knowledge, goals, problem solving, and intrinsic motivation (Schmidt et al., 2020).

TBI Symptom Management and Narrative Therapy

When dealing with post-TBI symptoms and changes, it can be a scary and trying time for a client who is navigating many changes in daily life and functioning. While post-TBI recovery is possible over time, there is a potential gap of months to years before the journey of recovery reaches a place where the client feels they have successfully recovered or adjusted to their new normal. It was found that after three years post-injury, only 44% of clients were able to fully return to work (Mamman et al., 2024). During this time, narrative therapy can provide an individual with the ability to externalize the problem, in order to create new perspectives surrounding the problem and focusing on functional outcomes through these new experiences (Hawkins et al., 2019). When an individual struggles with anxiety, depression, apathy or impulsivity post-concussion, it can be difficult for both the individual and those around them to separate these new behaviours and actions of the individual apart from the injury; it may feel like these mental health challenges will take over the essence of what made the individual who they are. It is important that the individual does not start to “become” their injury, and instead are separated as TBI being the problem, not the individual being the problem (Hawkins et al., 2019).

For many couples or families who are navigating a TBI of a loved one, changes in relationship dynamics often occur post-TBI. It was previously discussed that following a TBI, up

to 40% of individuals will face significant difficulties with recognizing negative facial affect, such as sadness, anger, fear and disdain (Hawkins et al., 2019). The potential development of Alexithymia post-TBI speaks to a prevalent issue that brain function and cognitions are affected post-TBI, and that it may result in misperceptions of negative affect for a TBI individual; this can lead to other relationship problems, especially when the individual is viewed as the problem, instead of the injury being the problem. Through narrative therapy and both in individual and couples or family counseling, it is imperative that the behaviours of the TBI individual are teased apart from the individual.

It is important to note that commonly, a TBI survivor's recovery becomes the main focus of therapy and recovery. When this is at the forefront of therapy or medical recovery, the hardships and transition to a "new normal" for a couple or a family unit is often neglected (Hawkins et al., 2019). This speaks to the importance of narrative therapy counseling for not just the recovering individual, but for other support systems in their life too. Partners and family members may be experiencing their own hardships navigating changes in their partner, father/mother, sibling, etc., and narrative therapy can work towards externalizing these challenges as being the result of the brain injury, not the individual. This type of "team" mentality can further help externalize the problem while bringing together the couple or family unity to navigate challenges that are being faced and working together to minimize the impact it has on relationship dynamics (Hawkins et al., 2019). Therapists must remember that while the TBI individual is facing a plethora of daily changes, so are the support systems of the individual; they may also need a counseling space to navigate and explore these emotions, as caregiver burnout can be a realistic result of taking care of someone who is recovering from a TBI.

TBI, Narrative Therapy, and the Role of the Therapist

When a therapist utilizes narrative therapy to aid in the symptom management following a TBI, the goal is to provide the client an opportunity to tell their own unique story in order to build a deeper understanding of how this challenge is impacting their life. Often times, a TBI event or navigating PPCS will leave the client feeling like their voice is silent, while also diminishing the desire for social or familial interactions (Hawkins et al., 2019). Therefore, the goal of the therapist is to help in create space for new stories through story development, thickening the plot and relaying this to other important people in client's life (Freedman & Combs, 1996; Hawkins et al., 2019). While the process of what this looks like is less studied than TBI and CBT, the concepts of narrative therapy are applicable to TBI survivors.

As with any therapeutic modality, the first sessions with a client who is navigating a TBI is building the therapeutic alliance. Much like in CBT, this allows the therapist to gain an understanding of the client's life before the injury, and how the injury has impacted their life. Building rapport may mean asking clarifying and extending questions to the client which helps build their story and adds layers which help the client understand the unique challenges they are facing. In the following sessions, the goal for the therapist is to sit along side the client in actively listening and helping make meaning of their saturated story. Storytelling has been shown to be an effective aspect of narrative therapy in providing an avenue for TBI survivors to tell their story of their experiences, challenges, and life changes (Candlish, Fadyl & D'Cruz, 2023). Through these stories, the aim is for the therapist to help the client realize that they are not the problem, but instead, the problem is the problem (Hawkins et al., 2019). In this case, the problem for the client is the TBI; the therapist is responsible for providing a path for the

client to tease apart challenges they are facing from the TBI in order for the client to see the problem as the problem and not their “being” or themselves as being the problem. Morris (2003) explains that often, a client who is navigating a TBI may struggle to find their footing because of the dissonance they experience when viewing their new selves versus the way they previously viewed themselves. The new view of self has shattered the old view, and this distortion can create much angst in the client as they navigate this complicated and convoluted journey. Through this cognitive restructuring, clients can create a narrative that defines and externalizes the problem as being separate from their self (Morris, 2003). As a therapist, this can provide an avenue to help the client see the problems created by the TBI more clearly in the hopes of building confidence and self-efficacy in navigating these challenges. By empowering the client through therapy sessions, these interventions can help the client understand their own experiences while having the vocabulary to explain their experiences to other loved ones of social support systems in their life (Hawkins et al., 2019). In the end, the goal of narrative therapy and the role of the therapist is to help the client recognize new perspective in how they view their story. Through this, the therapist can work with the client to make adaptations in how the client interacts with and responds to life events that differ from the problem saturated story which currently impacts their life (Hawkins et al., 2019).

TBI and Medication

One avenue which can provide support for TBI survivors is medication. It was found in one study that pre-TBI, four of ten individuals used psychotropic medications; post-injury, three out of ten individuals who had not previously used psychotropic medications started to use them as part of their recovery process (Vehvilainen et al., 2021). In terms of prevalence of

mental disorder, depression and anxiety were the most common, with major personality disorders and bipolar disorder being next sequentially (Vehvilainen et al., 2021). While it has been posited in past research that moderate and severe TBI individuals will have a higher likelihood have using medication, this notion has been challenged in more current research (Vehvilainen et al., 2021). Furthermore, it has been found that psychotropic medication use is more prevalent in TBI individuals who suffered from a diffuse axon injury (Vehvilainen et al., 2021). This corresponds to previous research referenced, which supports that diffuse axon injuries tend to have long-lasting detrimental effects through neuronal degeneration of white matter. It is important to note that psychotropic medication is not just limited to antidepressant medication; it can include medications such as anxiolytics, antipsychotics, and mood stabilizers (Albrecht et al., 2020). Overall, medication use post-TBI tends to be higher, 2-3x, than the general population without TBI, according to Albrecht et al (2020).

The discussion surrounding medication is an interesting one, mainly due to the intricate nature of TBIs. Research by both Vehvilainen et al. (2021) and Albrecht et al. (2020) support the notion that while medication can be an effective help in managing various mental disorders that can occur following a TBI, especially depression and anxiety, there needs to be a multidisciplinary approach when forming TBI recovery and treatment. Vehvilainen et al. (2021) says: a “high proportion of new [medication] users among TBI survivors and the increased risk of late mortality highlight the need for multi-professional collaboration between fields of neurosurgery, neurology and psychiatrics during follow-up and rehabilitation of survivors of a TBI” (p. 2915). As has been highlighted in this capstone, there is a need for more professionals to be involved in the TBI recovery process. Where medication can be beneficial will depend on

the individual and their symptoms. For example, for an individual who is suffering from depression or anxiety, antidepressant medication can help take the “edge” off feeling vastly overwhelmed by these emotional and somatic experiences. In this case, if an antidepressant medication can help slightly ease the burden of TBI symptoms, it can allow the individual to engage in other beneficial treatment, such as therapy. It can be difficult for an individual to engage in CBT, narrative therapy, or other sorts of therapy when other biological factors, such as brain function, are being impacted by the TBI. Psychotropic medication can provide an avenue for TBI survivors to engage in the counseling process, as well as potentially reduce depression/anxiety symptoms for daily functioning. For partners or families of a TBI individual, it may be a pivotal decision if they decide to use medication as part of the recovery process. It is possible that it may help open different paths for conversation, especially when combined with couples or family therapy. It may also, at a basic level, help the TBI individual feel, at least slightly, more like “themselves” in their sense of self and security, while navigating such difficult changes.

Another use for medication is for sleep-wake disturbances which can occur following a TBI. It has been found that up to 60% of individuals who incur a TBI will suffer from sleep disturbances very similar to insomnia (Ouellet et al., 2015). Astonishingly, at 8-year follow ups, it was found that 29% of the TBI individuals studied still met clinical diagnostic criteria for insomnia (Ouellet et al., 2015). When a lack of sleep, especially good-quality deep and REM sleep, occur in individuals with a TBI, it can lead to other issues such as excessive daytime sleepiness, narcolepsy, sleep-related breathing disorders, and circadian rhythm disorders (Ouellet et al., 2015). When thinking about the impact a lack of quality sleep can have on a TBI

individual, who's brain is in the process of healing and recovering, it can lead to enhanced cognitive deficits and mood disturbances such as depression, anxiety and impulsivity (Ouellet et al., 2015). It has been reported that medications for sleep can be beneficial. Benzodiazepine-receptor agonists have generated the most research in support of its benefits for sleep aid following a TBI; it is important to note that sleep medications are only intended to be used as part of a short-term treatment program (Ouellet et al., 2015). Other classes of drugs such as sedating antidepressants or atypical antipsychotics have not been researched extensively as to their potential for sleep benefits for TBI survivors (Ouellet et al., 2015).

Reflections on Personal Learning

Engaging in this capstone has given me the opportunity to reflect and process my own experiences navigating TBI recovery. What is intriguing is that while there is more and more research becoming available surrounding what a TBI is and how it impacts the brain and subsequent behaviours, there is still little researched information regarding best practices or approaches to working with an individual with a TBI, especially when it comes to devising multidisciplinary treatment plans. Avenues such as family doctors, neurologists, various brain scans, occupational therapy, physiotherapy for neck/spine, vestibular rehabilitation, medication, counseling, and so on, can all play roles in aiding recovery for TBI and PPCS survivors. There are many barriers that exist for individuals who need support in their TBI recovery, and this can be a frustrating experience. In the meantime, I ask myself: how can I help individuals who are going through the scary experiences of TBI recovery. How can my story help shine light on what recovery can look like, while not taking away from the client the uniqueness of their own experiences and ultimately, trauma which will stem from a TBI incident and recovery? I also

think about the experience that each counsellor brings to the forefront through studied and lived experiences, and the value that can have for a struggling client. What is evident through studies is that when someone is struggling mentally, having a reliable means to support is crucial, and as a future clinician, it makes me optimistic about creating change.

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