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Treatment of Anxiety Using Massage Therapy in a NeuroRehabilitation Program

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Abstract

Traumatic brain injury (TBI) has been considered a silent epidemic. The symptoms post-injury can be pervasive and impact individuals physically, emotionally, and socially. It also creates a financial burden on the individual and society. Finally, it can be challenging to the family and caregivers of these individuals because navigating the healthcare needs can be problematic. An enriched neurorehabilitation program may improve the quality of life and outcomes of the individual with TBI. The diagnosis of anxiety has been found to be a major factor that influences the prognosis. Cognitive behavior therapy (CBT) and pharmacology can assist in the management of anxiety. Massage therapy is an additional modality that may work to decrease anxiety in individuals diagnosed with TBI. This project reviews massage therapy for the efficacy in the treatment of anxiety in a neurorehabilitation program.

Keywords: brain injury, anxiety, massage therapy

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Background and Significance

In the United States, TBI exists as a healthcare crisis that impacts the lives of two million individuals every year (Farinde, 2014; Kline, Leary, Radabaugh, Cheng, & Bondi, 2016). This translates to $76 billion allocated to cover medical expenses annually (Gardner, Dams-O'Connor, Morrissey, & Manley, 2018). Globally, there are ten million individuals diagnosed with TBI each year (Tremblaye et al., 2018). The World Health Organization (WHO) anticipates that TBI will become the leading cause of death and disability (Tremblaye et al., 2018). The symptoms experienced after sustaining a TBI may alter functioning and impair the quality of life of the individual (Farinde, 2014).

The World Health Organization established the definition of TBI to include an injury to the head that was caused by a physical force that is external. One or more of the following must be present for the injury to be considered a TBI: (1) disorientation or confusion; (2) amnesia; (3) change in consciousness; (4) neurological abnormalities that may include seizure activity (Barker-Collo et al., 2018; Mallya et al., 2015). It is important to note that an injury to the head is an incident that may lead to the development of a disease but is not a disease process (Rapp et al., 2013).

Seventy-five percent of TBIs are considered mild and are also called diffuse TBIs. Mild TBIs are attributed to domestic violence, falls, and/or motor vehicle accidents (MVAs). Twenty-five percent of TBIs are focal or combined which includes diffuse and focal injuries. Focal injuries consist of hematomas and focal lesions that derive from gross tissue damage (Tremblaye

et al., 2019). Falls are the likely cause of TBIs for the older adult while TBIs in younger adults and teens are related to MVAs (Gardner et al., 2018).

Following injury, individuals with TBI are at a greater risk for anxiety and depression. A correlation between depression and anxiety and negative functional outcomes has been shown to exist (Ponsford et al., 2016). Research proposes functional capacity is influenced by factors that are both cognitive and emotional in nature (Berticsh et al., 2013). Furthermore, patients with psychiatric diagnoses are more likely to have functional deterioration when compared to patients without psychiatric distress (Mallya et al., 2015).

Individuals diagnosed with TBI are more likely to present with anxiety diagnoses. Anxiety in patients post TBI may present as Generalized Anxiety Disorder (GAD) (Mallya et al., 2015). According to the DSM-5, part of the criteria for the diagnosis of GAD indicates that on more days than not the individual must have three or more of six symptoms for six months. One of these six symptoms is muscle tension (APA, 2013).

Research indicates that as much as 44% of people with TBI develop anxiety in the first year after the injury (Randall, Thomas, Whiting, & McGrath, 2016). Symptoms of anxiety reinforce anguish and deterioration (Randall et al., 2016). It is imperative to understand the trajectory of the anxiety diagnosis in individuals with TBI so that opportunities for intervention can be explored (Alway, Gould, Johnston, McKenzie, & Ponsford, 2016).

Anxiety may be present with apathy and act as an antecedent of decreased initiative and motivation which impacts productivity (Bajwa et al., 2016). Therefore, anxiety may impede progress during rehabilitation. Anxiety has been established as a considerable predictor of

negative psychosocial outcome post-TBI (Hart et al., 2016). It has been shown to negatively impact cognitive function (Hart et al., 2016). It should be noted that anxiety has also been found to be a stronger predictor than depression of functional deterioration post-injury (Bertisch et al., 2013). Treatment for anxiety for an individual with a TBI may include psychological therapies and/or a pharmacological regimen (Ponsford et al., 2016).

Treatments for Anxiety

The first line of treatment for individuals with anxiety are psychotherapy approaches that include Cognitive Behavioral Therapy (CBT), psychoeducation, and psychoanalysis. There are also behavioral therapies such as mindfulness and acceptance-based therapy that may be beneficial to individuals with neurological deficits. Mindfulness may be favorable for someone with anxiety and TBI because it focuses on acceptance of the unknown, being present, and deflecting judgement of thoughts (Mallya, Sutherland, Pongracic, Mainland, & Ornstein, 2015). Literature regarding the effectiveness of treatment for anxiety has demonstrated that CBT has been valuable in managing anxiety after post-TBI. However, it has also been found that individuals with moderate to severe TBI, anxiety, and cognitive impairment may not benefit from CBT (Mallya et al., 2015).

For the pharmacological management of anxiety, Selective Serotonin Reuptake Inhibitors (SSRIs) are considered the first line of treatment because of the comprehensive anxiolytic properties. Although most pharmacological agents are well tolerated, side effects such as insomnia, nausea, or nervousness may be experienced (Mallya et al., 2015). Some experts contend that the neurological variations that can be attributed to TBI alter the effectiveness of the

medication. Additionally, anticholinergic side effects of medications such as SSRIs may include sedation and memory impairment that may exacerbate the cognitive deficits related to the TBI (Mallya et al., 2015).

Horn et al. (2015) maintain that diverse interventions post-TBI may work with a synergistic effect. Treatment with a multi-disciplinary approach that includes physical therapy, occupational therapy, recreational therapy, and nursing may improve functional and cognitive outcomes (Horn et al., 2015). Massage therapy is an alternative therapy that may also be considered.

Massage Therapy

Massage therapy is a structured approach to manipulating soft tissue for the promotion of health and healing. It is relatively inexpensive and has minimal side effects (Chen et al., 2013). Massage can be applied as a single modality or in combination with other treatment modalities (Robertz & Rudolfsson, 2016). Research has shown that massage therapy may decrease anxiety and pain. There are several theories to illustrate why massage is helpful. One theory is that massage triggers a release of oxytocin which can contribute to a social experience that is positive (Lindgren et al., 2013). Another theory is that the parasympathetic nervous system is activated by pressure receptors (Lindgren et al., 2013).

Swedish massage is one of the most common types of massage therapy. Swedish massage techniques include tapotement (rhythmic tapping), petrissage (kneading), friction (circular movements), and effleurage (gliding movements). Swedish massage is generally used for the primary goal of relaxation (Ghoami-Motlagh, Jouzi, & Soleymani, 2016).

Individuals may experience anxiety in various healthcare settings. Massage has been utilized to diminish anxiety in diverse populations such as pre-operative patients and patients with congestive heart failure (Brand, Munroe, & Gavin, 2013; Chen et al., 2013). In a quasi-experimental design, Brand, Munroe, and Gavin (2013) concluded that massage significantly decreased self-reported anxiety levels in patients scheduled for aortic surgery. However, very little research exists regarding the use of massage for the TBI population.

In addition to the TBI, individuals may sustain cervical soft tissue damage that may present as symptoms of headache, pain, and dizziness. Headaches are considered the most debilitating symptom following a TBI (Polinder et al., 2018). Massage may be effectual in treating both physical and emotional symptoms of TBI. There are few random controlled trials that review the varied treatment options for managing symptoms post-concussion. In a single subject experimental design Burns (2015) established that 45-minute massage session worked to reduce headache.

Purpose

TBI exists as a diversified condition that impacts multiple facets of the individual. It is this diversity that may respond to a complimentary therapeutic approach (Kline et al., 2016). The purpose of this project is to evaluate a complimentary modality to treat anxiety in patients with TBI.

Objective

The profession of nursing emphasizes the importance of caring. Integrating massage therapy into a treatment plan endorses caring through the promotion of patient comfort (Chen et al., 2013). The objective of this project is to examine the efficacy of massage therapy as a treatment modality to decrease symptoms of anxiety for participants diagnosed with TBI in a neurorehabilitation program.

Theoretical Framework

Jean Watson initiated the Theory of Human Caring. The theory recognizes the importance of transpersonal caring relationships. It sees value in the cultivation and preservation of relationships that are authentic. The transpersonal nurse has the capacity to focus on caring and healing as opposed to the illness and disease process (Watson, n.d.).

Watson's Theory of Human Caring affirms that initiation of the caring relationship between the nurse and the patient promotes healing. The heightened awareness of the nurse of the factors that either decrease or increase the patient's anxiety can improve patient outcomes (Brand, Munroe, & Gavin, 2013). Individuals with TBI may not recognize symptoms of anxiety due to cognitive deficits. The nurse in the neurorehabilitation program can recognize the increasing symptoms of anxiety and incorporate massage therapy into the individual's treatment plan. Therefore, the Theory of Human Caring provides the conceptual framework for the implementation of massage as a treatment modality for individuals with TBI.

Case Study Design

Setting

The setting for this project was a residential neurorehabilitation program with two locations in Louisville, Kentucky. Both locations have a twenty-four bed capacity. There are 26 states with this neurorehabilitation program. In 1977, the parent company established the first neurorehabilitation program as a post-acute program in Carbondale, Illinois and became a pioneer in neurorehabilitation. Funding is often from the Kentucky Acquired Brain Injury Waiver, Workers Compensation, and private pay.

The majority of the patients have been diagnosed with a brain injury but also treat patients with spinal cord injuries and Cerebral Palsy. Upon admission to this program, the individual works with an interdisciplinary team to initiate a treatment plan. The interdisciplinary team consists of nursing, physical therapy, speech therapy, occupational therapy, counseling, behavioral therapy, and case management. Massage therapy has not been included in the interdisciplinary team.

Sample

The participants were volunteers from the residential and day program at a neurorehabilitation program. The estimated stay in the program is 2.3 years. 58.3% of the population are men and 41.6% are women. The cause of brain injury varies: 40% are related to MVA, 20 % from falls, 20% from gunshot wounds, 10% from cerebral vascular attack, and 10% from drug overdose. It is important to note that the neurorehabilitation program did not differentiate between TBI and acquired brain injury. The average age is 45 years old. Eighty

percent are prescribed psychiatric medications. An inquiry was made about prior psychiatric history and education level but this information was not available.

The inclusion criteria included participants diagnosed with TBI and anxiety as established by the medical chart. Participants who spoke English and had the ability to answer questions of a questionnaire was also part of the inclusion criteria. The exclusion criterion was diagnosis of inappropriate sexual behavior (ISB). ISB is a prevalent concern for individuals with TBI that requires behavioral interventions (Clay, Bloom, & Lambert, 2018).

TBI exists as a diversified condition that impacts multiple facets of the individual. It is this diversity that may respond to a complimentary therapeutic approach (Kline et al., 2016). The massage was provided in private and the massage may have been misinterpreted by the individual with ISB. Consent was obtained from the participants or guardians.

Assessment Measures

The Depression Anxiety Stress Scales (DASS) is a 42 item self-report screening tool (Lovibond & Lovibond, 1995). There are three scales that include depression, anxiety, and stress. The depression scale looks at symptoms such as hopelessness, inertia, and anhedonia. The anxiety scale measures musculoskeletal effects of anxiety that is situational and autonomic in activation. The anxiety scale has two subscales, measuring somatic and panic type complaints. The stress scale measures worry, discomfort, and agitation (Wong, Dahm, & Ponsford, 2013).

The DASS-21 is an abridged version of the DASS (See Appendix B). Each of the three scales has seven items using a four-point scoring system ranging from 0 (“did not apply”) to 3

("applied very much or most of the time"). Ten to fifteen minutes are needed to administer the tool (Randall et al., 2016).

The three scales of the DASS-21 have favorable psychometric qualities and display strong internal uniformity in the clinical sample and general population. The Cronbach α for the depression scale is 0.90, 0.82 for the anxiety scale, and 0.89 for the stress scale. The DASS-21 has been used extensively in the TBI rehabilitation setting (Randall et al., 2016). Randall et al. (2016) established that the internal consistency of the DASS-21 was reliable in a large clinical sample of individuals with moderate to severe TBI. The DASS-21 may capture anxiety that may be otherwise missed. Please refer to Appendix A and B for the DASS-21 questions and score interpretation guide.

Project Plan/Method

Fifteen minutes of massage was provided once a week for four weeks total to two sections of participants. Anxiety was measured using the Depression Anxiety Stress Scale-21 (DASS-21) at baseline prior to initiating treatment and at the completion of the treatment after four weeks. The massage therapist is a nurse practitioner who is also a Licensed Massage Therapist (LMT) in the state of Kentucky.

The massage was provided while the participant was seated in a massage chair. The primary focus of massage was on the back, neck and shoulders. The techniques from Swedish massage, such as effleurage, petrissage, friction and tapotement were used. The massage routine was consistent for every session. The participants were clothed and the massage was in a room

with privacy provided. Soothing massage music was played during the massage. This helped to create a more relaxing environment.

Timeline

The massage therapist completed a checklist for independent contractors that was issued by the neurorehabilitation facility. This list included signing a consulting agreement, HIPPA compliance form, and submitting a background check. The professional license and liability insurance were also presented to the facility. This was to be completed before the massage therapist could start the sessions. The time frame for completion was six weeks.

The massage therapist attended a clinical meeting to provide information about the project. The clinical meeting is held monthly at the facility and is a time where the interdisciplinary team meets to receive education and discuss upcoming events. The massage therapist also spoke with staff individually if it was indicated and answered questions or addressed concerns.

The participants were recruited in a four-week period. The intervention was two sections that were four weeks in length. The time for post analysis was one week.

Resources

A massage chair and an I-pad to play calming music was needed. A private room was provided at the facility. Paper towels were used to protect the face cradle and were thrown away between each participant.

The massage chair cost $200 and the I-pad was a personal item. The massage therapist donated the time to the project. The estimated cost for the massage therapist is $1040.

Key Stakeholders

The participants are the key stakeholders in this project because they are directly impacted by the massage therapy. The other stakeholders are the interdisciplinary team that work with the participants. They are indirectly impacted because the addition of massage therapy in the treatment plan may influence the cooperation in the other therapies.

Ethical Considerations

Prior to the implementation, this project was reviewed and approval received by the Institutional Review Board (IRB) at Bellarmine University. The administrators of the facility gave approval for the project. Consent was obtained from the participants and guardians. The data obtained in the project was protected by keeping the records in a locked file cabinet at the facility.

Evaluation Plan

The objective of this project is to analyze massage therapy as a treatment modality to diminish symptoms of anxiety for participants in a neurorehabilitation program. The design originally planned for this project was to be a pretest-posttest evaluation of the DASS-21 scores. Unfortunately, due to decreased participation, the evaluation plan was modified.

Results

There were seven individuals who initially agreed to participate. One individual stated that he had changed his mind and did not wish to participate. Six received a massage for at least one session out of the four sessions offered.

A convenience sample of six voluntary participants was utilized. The mean age of the participants was 46 years old. The mean years since time of admission to the neurorehabilitation program was 4.6 years. The mean years since injury was 13.5 years. There were four males and two females who participated. All participants were Caucasian. Three participants had a previous psychiatric diagnosis. Please see Appendix C for Sociodemographic information.

Two participants were consistent in coming weekly and completed both the Pre-DASS 21 and Post-DASS 21. Both of these scores indicate that the anxiety level decreased post-massage therapy. Please refer to Appendix D.

Participant Information

Participant one is a 46-year old Caucasian male with a diagnosis of Bipolar Disorder and GAD. He was diagnosed with hypertension (HTN) and diabetes mellitus, type II (DM). The patient is single and is not employed. According to the nursing department, he was on the waiting list for an initial appointment with the psychiatrist. He had been prescribed an atypical anti-psychotic for mood stability. He was also prescribed two anti-depressants for mood and insomnia. He was diagnosed with a TBI following surgery for a ventral peritoneal shunt in 2018. He was admitted to the program in 2019.

He finished the four-week sessions and was asked questions by the massage therapist about his experience with the sessions. He said that he felt more relaxed. The Occupational Therapist working with this participant stated that even though he had deficits with short term memory, he did remember the day and time of the massage session each week. The participant agreed that he looked forward to the massage session and it was the highlight of his day. He said that he often had body aches and the massage helped him to feel better physically. He also had been very worried about an upcoming surgery and the massage helped decrease this worry. It is important to note, that this participant had difficulty participating in other therapies but was consistent with coming to the massage session. He scored a six for the pre-massage therapy assessment and the post-massage therapy score was a one.

Participant two is a 51-year old Caucasian female with a diagnosis of Bipolar Disorder and GAD. She is also diagnosed with HTN. She does have a history of alcohol use disorder. She is single with one son. She is not employed. She sustained a TBI in 2011 after a motor vehicle accident. She was admitted to the neurorehabilitation program a few months after the TBI diagnosis. A psychiatrist manages her medication regimen which includes an atypical antipsychotic for mood stability. She is also prescribed a cholinesterase inhibitor to enhance memory and a sedative for insomnia.

She completed the four-week sessions and discussed with the massage therapist her experience. She stated that she felt that the massage was beneficial. She reported experiencing anxiety daily. One of her biggest worries was related to her son that did not live with her. She would often talk about him with the therapist. She stated that she noticed that when she was

anxious, she felt more tension in her shoulders. The massage helped her to relax and she did think this helped her to feel less anxious. She was also interested in continuing massage therapy after the project was complete. She had difficulty with participation with other therapies and would often not attend the day program. However, she did attend every session for the massage therapy. Her pre-massage therapy score was nine and decreased to four on the post-massage therapy assessment.

Discussion

Barriers

There was limited participation in this project. Albrecht, O'Hara, Moser, Mullins, and Rao (2017) also found that recruitment of individuals with TBI was challenging and proposed that varying levels of cognition may be an important aspect of participation. There is a lack of education of TBI to health care providers, caregivers, and patients which may contribute to a deferment in the diagnosis and treatment. This in turns may lead to feelings of hopelessness and dissatisfaction (Albrecht et al., 2017).

Hsieh et al. (2012) suggest that anxiety in individuals with TBI may have a mixed and atypical presentation which may impede comparison of treatment outcomes with other patient populations. It was also established that flexibility in the treatment modality is helpful to encourage participation (Hsieh et al., 2012; Ponsford et al., 2016). There is a continued need to find a balance between that flexibility and necessary structure (Hsieh et al., 2012).

It has been noted that individuals with moderate to severe TBI have diminished attention span, executive function, and self-awareness. This can alter their capacity to participate and benefit from treatment options that may be successful for other patient populations (Ponsford et al., 2016). Identifying the barriers that may impede participation in this patient population is imperative and may call for a comprehensive approach (Albrecht et al., 2017).

Massage therapy is not presently included in the treatment plan at the neurorehabilitation facility. This was the first time that massage therapy had been provided as an option for the participants and there may have been limited time to allow for this in the pre-determined schedule. The schedule for the participants includes speech therapy, occupational therapy, and physical therapy. As well, these are billable services. Miccio & Cowen (2018) asserted that there are limits from reimbursement by insurance for massage therapy. Therefore, providing an option for a non-billable service may have presented another barrier for participation.

Limitations

There was limited participation and therefore minimal data. There was not a control group and it is difficult to ascertain if the results were related to other factors, such as the relationship with the therapist. Also, longitudinal data is not available, so making the conclusion that the results are lasting is problematic.

Strength

The strength of this project was the accessibility to this patient population. The massage therapist was granted approval for this project because of being previously employed by the

facility as the nursing supervisor. There was also an established relationship with therapists, nursing staff, and executive director. Another strength is that massage is considered as a treatment option for anxiety that is non-invasive and non-pharmacological.

Implications

Practice

Barriers should be considered prior to initiation and during the execution of a project with individuals with TBI. Overcoming barriers to working with this patient population is instrumental in the success of implementing the addition of massage therapy to the treatment plan. Flexibility does seem to be a key factor in strengthening participation. There is a complexity component to consider when working with this patient population. This may be related to cognitive abilities and guardianship. Some individuals are able to make decisions for themselves and some are not.

According to the therapists at the neurorehabilitation program, participation in therapies is a constant concern. Incentive plans are initiated by the behavior therapists to help encourage participation. These plans are individualized and take into consideration what motivates each person. For example, if an individual participates in a therapy every day, they can have a treat such as going out for dinner at the end of the week. This incentive plan may be valuable in strengthening participation in a massage therapy program.

Policy

One important implication for policy is to work towards increasing reimbursement of massage therapy by insurance providers. This would help massage to be more accessible to individuals for management of anxiety. Reimbursement would also work to promote massage therapy as a viable option in the neurorehabilitation program.

The limited participation did impact the outcome. However, two participants did seem to benefit from the massage therapy. Participant one asks the nursing staff frequently if she can continue working with the massage therapist even though the project was three months ago. An option for continued massage therapy would be for the massage therapist to work with participants on a volunteer basis. This would work to promote massage therapy in the neurorehabilitation program.

Finally, massage was used in the training for nurses until the 1930s and 1940s when the primary focus for symptom relief became pharmacological interventions. As early as 1860, the early nursing curricula was directed by Florence Nightingale and incorporated instructions for performing massage on patients (Westman & Blaidsell, 2016).

Recently, massage regimens have been re-integrated into nursing care. Beginning in 1992, the National Association of Nurse Massage Therapists have worked to bring massage therapy into the nursing curricula (Ruffin, 2011). Massage impacts both the patient and the nurse by supporting the nurse-patient relationship. The implementation of massage therapy into the treatment plan may include the nurse providing the massage or a certified massage therapist giving an hour-long therapeutic massage (Westman & Blaisdell, 2016).

Research

Unfortunately, research that examines the efficacy of complimentary modalities to manages symptoms of anxiety in the TBI population is currently deficient (Mallya et al., 2016). Future research that explored the barriers when working this patient population would be essential for other studies. It would be essential to look at other patient populations, such as veterans with TBIs, to determine if this intervention is also helpful in other settings. Finally, this intervention may be expanded to other neurorehabilitation programs in other cities and states.

Conclusion

The neurobehavioral symptoms, such as anxiety, that develop post-TBI have been shown to strongly impact the trajectory for recovery (Bertisch et al., 2013; Hsieh et al., 2012). Hart et al. (2016) postulate that the treatment of anxiety may work to improve cognitive outcomes. Therefore, treatment of anxiety is advantageous in supporting positive outcomes. There is a growing need for alternative modalities to treat emotional distress post-TBI. Massage therapy is beginning to emerge as a treatment modality for anxiety in diverse patient populations (Chen et al., 2013; Lindergren et al., 2013). The findings of this case study illustrate the potential benefits of massage therapy for participants with TBI.

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Appendix A

DASS-21

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you *over the past week*. There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:

0 Did not apply to me at all
1 Applied to me to some degree, or some of the time
2 Applied to me to a considerable degree, or a good part of time
3 Applied to me very much, or most of the time

1. I found it hard to wind down:

   Did not apply to me 0 1 2 3 Applied to me very much

2. I was aware of dryness of my mouth:

   Did not apply to me 0 1 2 3 Applied to me very much

3. I couldn't seem to experience any positive feeling at all:

   Did not apply to me 0 1 2 3 Applied to me very much

4. I experienced breathing difficulty:

   Did not apply to me 0 1 2 3 Applied to me very much

5. I found it difficult to work up the initiative to do things:

   Did not apply to me 0 1 2 3 Applied to me very much

6. I tended to over-react to situations:

   Did not apply to me 0 1 2 3 Applied to me very much

7. I experienced trembling (e.g. in the hands):

   Did not apply to me 0 1 2 3 Applied to me very much

8. I felt that I was using a lot of nervous energy:

   Did not apply to me 0 1 2 3 Applied to me very much

9. I was worried about situations in which I might panic and make a fool of myself:

   Did not apply to me 0 1 2 3 Applied to me very much

10. I felt that I had nothing to look forward to:

    Did not apply to me 0 1 2 3 Applied to me very much

11. I found myself getting agitated:

    Did not apply to me 0 1 2 3 Applied to me very much

12. I found it difficult to relax:

    Did not apply to me 0 1 2 3 Applied to me very much

13. I felt down-hearted and blue:

    Did not apply to me 0 1 2 3 Applied to me very much

14. I was intolerant of anything that kept me from getting on with what I was doing:

    Did not apply to me 0 1 2 3 Applied to me very much

15. I felt I was close to panic:

    Did not apply to me 0 1 2 3 Applied to me very much

16. I was unable to become enthusiastic about anything:

    Did not apply to me 0 1 2 3 Applied to me very much

17. I felt I wasn't worth much as a person:

    Did not apply to me 0 1 2 3 Applied to me very much

18. I felt that I was rather touchy:

    Did not apply to me 0 1 2 3 Applied to me very much

19. I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat):

    Did not apply to me 0 1 2 3 Applied to me very much

20. I felt scared without any good reason:

    Did not apply to me 0 1 2 3 Applied to me very much

21. I felt that life was meaningless:

    Did not apply to me 0 1 2 3 Applied to me very much

Appendix B

DASS-21 Severity Ratings

	Depression	**Anxiety**	**Stress**
Normal	0-4	0-3	0-7
Mild	5-6	4-5	8-9
Moderate	7-10	6-7	10-12
Severe	11-13	8-9	13-16
Extremely Severe	+14	+10	+17

Appendix C: Sociodemographic Data

1. **Mean age:** 46.6
2. **Mean years since admission:** 4.6
3. **Mean years since injury:** 13.5
4. **Gender**

   M_4_____ **F**_2_____
5. **Ethnicity:**

   Caucasian__6_____
6. **Employment Status:**

   Unable to work__5_____ **Student**____1____
7. **Children:**

   No__5____**Yes**___1___
8. **Cause of Brain Injury:**

   MVA ___3_____ **Fall** ____1___ **CVA**___2____ **Other** _____
9. **Previous Brain Injury:**

   Yes _____**_No** ___6____
10. **Psychiatric History Pre-Injury: _____**3**_____**

Appendix D: DAS-21 Scores

Participant	**PRE**	**POST**
1	9 (Severe)	4 (Mild)
2	6 (Moderate)	1 (Normal)