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Published: November 30, 2023

**Citation:** Jackson H, Jackson C, et al., 2023. Investigating the Impact of Self-Criticism and Self -Reassurance on the Experience of Distress People with Traumatic Brain Injuries. Medical Research Archives, [online] 11(11).

<https://doi.org/10.18103/mra.v11i11.4684>

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**DOI:**

https://doi.org/10.18103/mra.v11i11.4684

ISSN: 2375-1924RESEARCH ARTICLE

Investigating the Impact of Self-Criticism and Self-Reassurance on the Experience of Distress People with Traumatic Brain Injuries

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ABSTRACT

**Objective:** To examine whether psychological processes involved in self-appraisal and responses to aversive internal experiences are significant factors in understanding the levels of distress experienced by people following Traumatic Brain Injury (TBI).

**Participants:** One hundred and fifteen people with TBI completed a set of questionnaires.

**Design:** A cross-sectional/observational design employing a multiple hierarchical regression analysis.

**Main Measures:** Emotional distress as measured by Depression Anxiety and Stress Scale – 21 item (DASS-21); self-criticism and self-reassurance as measured by Forms of Self-Criticism/Attacking and Self-Reassurance Scale (FSCRS); psychological inflexibility as measured by Flexibility of Responses to Self-Critical Thoughts (FoReST).

**Result:** Self-criticism, self-reassurance and psychological inflexibility explained an additional 30% of variance in emotional distress beyond demographic, clinical and injury-related factors, with only self-criticism making a significant independent contribution. Exploratory moderation analysis revealed that there was no significant effect on emotional distress when considering the interaction between self-criticism with self-reassurance and psychological inflexibility.

**Conclusion:** While emotional distress is common following TBI, there remains no demographic, clinical or injury-related factors that have demonstrated consistent associations with the level of emotional distress experienced. The present study demonstrates that psychological factors, relating to personal evaluations, explains considerable variance in emotional distress beyond demographic and injury-related factors. These processes may help identify those at risk of poorer emotional outcomes following TBI, and targeting these processes via psychological interventions may improve emotional wellbeing in these people.

**Keywords:**brain injury, emotional distress, self-criticism, self-reassurance, psychological inflexibility.

**Introduction**

The consequences of traumatic brain injury (TBI) are multifaceted, with survivors sometimes experiencing a cascade of lasting difficulties including cognitive, communication, physical, chronic pain, personality, mood and behavioural difficulties1. There are also many indirect consequences of TBI such as unemployment2 and greater incidence of relationship instability3. People who have sustained a TBI are at an elevated risk of experiencing psychological comorbidities with the prevalence of anxiety and depression significantly greater in people who have sustained a TBI compared with the general population4-6.

**Factors Associated with Psychological Distress in People with TBI**

Some studies have reported associations between demographic factors including age, gender and education with poorer psychological outcomes7-9, however other studies have reported no significant association in these factors10.

Previous studies have shown that pre-injury psychological difficulties, such as anxiety and depression, were significantly associated with post-injury psychological outcomes7,9. An early theoretical model proposed that cognitive difficulties have been implicated as impacting on an individual’s ability to adjust psychologically following TBI11. However, whilst some studies have reported a significant association between cognitive functioning and psychological outcomes12, others have not13. Other clinical factors have also been highlighted, such as pain and fatigue, although evidence for such has been debated14,15. Finally, there appears little association between injury severity and psychological outcomes10,16,17.

To date, there has been little consistency across studies in regards to the relationship between emotional distress and demographic and injury related factors. Therefore, it is likely that other processes are contributing to emotional distress in people with TBI.

People with TBI face a plethora of symptoms that often prevent, or complicate, the return to pre-injury life. Activities that individuals completed with little effort prior to their injury may be experienced as more challenging post injury due to acquired physical or cognitive difficulties. Qualitative research has highlighted that people report struggling with changes to self-identity, the loss of their pre-morbid self-identity18,19, feelings of shame and a sense of being a burden on society20, 21. Therefore, qualitative research has highlighted general themes regarding the content of aversive internal experiences often reported by people following traumatic brain injury.

**Psychological Therapies for People with TBI**

The most commonly reported psychological interventions for such experiences in people with TBI have largely been based on traditional Cognitive Behavioural Therapy22,23 (CBT) approaches. Research has consistently demonstrated strong empirical support for CBT in non-TBI populations24. In people with TBI however, the evidence base is more limited. A recent review25 identified three randomised controlled trials (RCTs) that had assessed the efficacy of psychological interventions for reducing symptoms of depression in people with TBI. Two studies assessed the efficacy of CBT4,26 and one study assessed the efficacy of Mindfulness-Based Cognitive Therapy27. The two studies that found favourable results in favour of psychological interventions however, reported small effect sizes4,27, with one study reporting results in favour of the waiting list control26.

More recent advances have highlighted limitations of CBT, particularly with researchers arguing that changing the content of thoughts is not always possible or necessary for clinical change28. In recognition of this, a range of novel interventions have been developed that are sometimes referred to as ‘third wave’ psychological interventions. Unlike CBT, these approaches seek not to change or eliminate negative thoughts, but to change the relationship individuals have with internal experiences to influence clinical change28-31. Compassion Focused Therapy29,30,32-34(CFT) and Acceptance and Commitment Therapy26,29,33 (ACT) are examples of third-wave CBT approaches and have been highlighted as potentially beneficial for people with TBI35,36.

**Compassion Focused Therapy and TBI**

CFT literature highlights the role of self-criticism and self-compassion in response to perceived failures or criticism, aiming to promote the self-compassionate response37.Theoretically, a CFT model would predict that someone with low self-compassion and high levels of self-criticism would experience higher levels of emotional distress. This is supported by empirical evidence from studies reporting significant associations between self-criticism, self-reassurance and emotional distress in non-clinical populations38 and clinical populations including people diagnosed with eating disorders and women diagnosed with cancer39. The relationship between self-criticism, self-reassurance and emotional distress has not been explored in people with TBI.

Evidence for CFT for people with TBI from intervention studies is limited. Ashworth et al.24 found positive results for a six-week mood group that had integrated CFT approaches in 12 participants with TBI. However this was part of a broader 18-week rehabilitation programme and it is therefore unclear whether this was due specifically to the CFT part of the total neurorehabilitation programme.

**Acceptance and Commitment Therapy and TBI**

ACT28,31,40 hypothesises that difficulties often emerge when people become experientially avoidant of aversive thoughts and emotions. In ACT, individuals are encouraged to broaden restrictive efforts aimed at controlling unwanted internal experiences to embrace a more expansive range of behavioural repertoires that are consistent with their values. This process is often referred to as becoming more psychologically flexible31. According to an ACT approach, people with greater psychological inflexibility will experience higher levels of emotional distress, which has been demonstrated in non-clinical samples41,42 and clinical samples such as people with chronic pain43.

Within a TBI population, one study44 reported data from 68 participants with acquired brain injury who completed a series of questionnaires. The results of this study indicated an association between psychological flexibility and health-related quality of life.

Evidence for the efficacy of ACT interventions for people with TBI is also extremely limited. One published case series45 reports pre- and post-intervention scores on measures of depression and anxiety for two male participants who had received seven sessions of ACT. One participant showed significant and reliable change on both measures of anxiety and depression whereas the other participant indicated no change.

**Aims of Present Study**

Process-focused approaches may be particularly advantageous for people with TBI as challenging the content of thoughts sometimes may not be appropriate. For example, “I cannot return to my old job” may be a valid and rational thought for someone who has sustained significant physical or cognitive difficulties and has been in an active or cognitively demanding role.

Gracey, Evans and Malley (2009)46 highlighted the importance of developing psychotherapeutic interventions for people with TBI based on empirically supported psychological models. As discussed, there remains only limited empirical support for the theoretical models of both CFT and ACT. Therefore, the present study aimed to explore the relationships between emotional distress and psychological constructs central to these theoretical models. Understanding the factors that contribute to emotional distress in people with TBI may provide important information to guide therapeutic targets and identify those at risk so support can be offered early in order to improve psychological outcomes.

**Hypotheses**

1. Higher levels of emotional distress will be associated with:
	1. Higher levels of self-criticism
	2. Lower levels of self-reassurance
	3. Higher levels of psychological inflexibility
2. Self-criticism, self-reassurance and psychological inflexibility will explain additional variance in levels of emotional distress beyond demographic and injury-related factors.
3. Self-reassurance and psychological inflexibility will moderate the association between self-criticism and emotional distress.

**METHOD**

**Design**

This study adopted a cross-sectional, observational design. The study assessments were available both online and were also offered as paper-based for participants recruited locally.

**Participants**

The inclusion criteria were as follows: (i) aged between 18-69 years (ii) history of TBI or concussion; (iii) able to read, understand and complete a questionnaire written in English.

Exclusion criteria are: (i) participants who have sustained a non-traumatic brain injury with an underlying organic cause (stroke, infection, tumours); (ii) unable to read and understand questionnaires written in English language.

An a priori analysis was calculated using G\*power47, using a multiple regression analysis with 15 predictors, a power of 80% and a conservative effect size of 0.25. This led to a sample of 89. The effect size of 0.25 was chosen as the minimum effect size which would be clinically relevant and therefore all effect sizes stronger than this would be adequately powered.

**Measures**

***Demographic Questionnaire***

A *Demographic and Clinical Questionnaire* was developed to collate information regarding: age, gender, time since injury, age at injury, nature of injury, severity of injury, epilepsy, previous or on-going litigation and who the respondent believed to be responsible for the injury. Participants were asked to report the duration of loss of consciousness on which judgements were made regarding the severity of injury in accordance with the US Department of Defense and Department of Veteran Affairs48 diagnostic criteria.

***Emotional Distress***

The *Depression, Anxiety and Stress Scale49* (*DASS-21*)is a 21-item self-report measure used to measure the severity of depression, anxiety and stress symptoms. This measure displays strong internal consistency (Cronbach's α of 0.96 and 0.97 for depression, 0.84 and 0.92 for anxiety, and 0.90 and 0.95 for stress49,50). Normative data has been published for a nonclinical UK adult sample51; the reported mean score for total was 9.43 (9.66), for depression was 2.83 (3.87), for anxiety was 1.88 (2.95) and for stress was 4.73 (4.20).

***Quality of Life***

*Quality of Life after Brain Injury52* (*QOLIBRI*) consists of 37 items from six subscales: cognition, self, daily life and autonomy, social relationships, emotions and physical problems, which have strong internal consistency (Cronbach’s α of 0.75)43,52.

***Injury-Related Factors***

*Everyday Memory Questionnaire- Revised53* (*EMQ-R*)*:* The Everyday Memory Questionnaire (EMQ) was designed to assess individuals’ memory difficulties in everyday life for survivors of TBI. The original questionnaire included 28 items but this was reduced to 13 items in the revised version. The EMQ-R has been shown to have strong internal consistency54 (Cronbach’s α of 0.91).

*Brief Pain Inventory – short form53* (*BPI-SF*) is a 9 item self-report questionnaire developed to assess the severity of pain and has been shown to have greater internal consistency for patients with injury/trauma related pain54 (Cronbach’s α of 0.85 and 0.88 for severity and interference of pain).

*Fatigue Severity Scale55* (*FSS*) is a self-report, seven point likert questionnaire assessing fatigue severity, with strong internal consistency (Cronbach’s α = 0.90) within a TBI population56.

***Psychological Inflexibility***

The Flexibility of Responses to Self-Critical Thoughts Scale57 (FoReST) is a 12 item self-report questionnaire measuring individuals’ psychological flexibility around self-criticism. This measure has strong internal consistency57 (0.80 to 0.92). Higher scores indicate lower psychological flexibility and therefore greater psychological inflexibility. Therefore scores on the FoReST will be referred to as psychological inflexibility.

***Self-Criticism/Self-Reassurance***

*Forms of Self-Criticism/Attacking and Self-Reassurance Scale34* (*FSCRS*) is a 22 item self-report questionnaire, which measures both self-criticism and self-reassurance/self-compassion and has been shown to have strong internal consistency58 (0.87 to 0.94). A composite score for ‘self-criticism’ (FSCRS SC) can be obtained by combining scores on the ‘Inadequate self’ and ‘Hated Self’ subscales59.

**Procedure**

An online questionnaire was developed using the Qualtrics platform. This is a secure site that is routinely used for collecting research data from questionnaires. Paper copies of the questionnaires were also created and formatted consistently.

Participants were recruited from three sources: (1) the researcher attended neurotrauma clinics at The Walton Centre NHS Foundation Trust and patients attending clinics were provided with information and the opportunity to take part; (2) local and national charity organisations within Headway UK were contacted and information about the present study was circulated to members. Additionally, the researcher attended local headway groups to provide information to potentially interested participants; (3) private providers of neurorehabilitation services (4) advertisements were placed in social media support groups, providing a link to the online questionnaire.

Participants recruited locally were provided the opportunity to complete paper versions of the questionnaires or to complete the online questionnaires. Participants who were not local were provided only the opportunity to complete the questionnaires online.

**Ethics**

Research Ethics Committee (REC) approval was obtained prior to commencement of recruitment from non-NHS sites (Appendix I; reference number: 17/WS/0232). Further Health Research Authority (HRA) approval (Appendix L) and Documentation of Capacity and Capability (Appendix K) from The Walton Centre Research and Development Department was obtained prior to commencement of NHS recruitment. This was in accordance with guidance from the REC.

All participants were provided with a Participant

Information Sheet (PIS: Appendix C) which outlined the study aims, expected benefits and planned strategy for dissemination of results. Participants also completed a signed consent form (either electronically or paper form). All identifiable data was removed from the data when entered into the database to ensure anonymity. Participants were informed that participation was voluntary and were informed that they possessed the right to withdraw from the study at any time.

**Statistical Analysis**

Statistical analysis was completed using the Statistical Package for Social Sciences (SPSS) version 22. Pair-wise deletion was carried out for one participant who did not provide a response for duration of LoC. An alpha level of <0.05 was used to evaluate significance.

To test the first hypothesis, a preliminary correlation analysis was carried out to explore the relationship between emotional distress, self-criticism, self-reassurance and psychological inflexibility.

A hierarchical linear regression was completed to examine the second hypothesis that self-criticism, self-reassurance and psychological inflexibility would explain additional variance in distress (as measured by the DASS-21), beyond demographic and injury-related factors. Predictor variables were entered in the following order: Step 1. age, gender, education, time since injury and history of pre-morbid psychological difficulties; Step 2. severity of injury, cognitive complaints (EMQ), pain (BPI), fatigue (FSS) and litigation; Step 3. self-criticism (FSCRS), self-reassurance (FSCRS) and psychological inflexibility (FoReST).

Severity of injury was dummy coded as there were more than two categories reported: moderate (vs. mild and severe) and severe (vs. mild and moderate). For gender, litigation and psychiatric history, only one participant did not fall within the two main groups, therefore these variables were condensed: male or female, litigation or no litigation, psychiatric history of no psychiatric history. Education was also condensed into dichotomous variables: higher education (A-Levels, Bachelor’s, Master’s and PhD/Doctorates) and no higher education (no qualifications, GCSE/O-Levels, vocational qualifications). Where there was missing data, pairwise deletion was carried out.

To test the third hypothesis, a moderation analysis was completed in Step 4 of the multiple regression. Self-criticism (FSCRS), self-reassurance (FSCRS) and psychological inflexibility (FoReST) were mean centred and multiplied to produce two additional variables (FSCRS SC x FSCRS RS and FSCRS SC x FoReST PF).

**RESULTS**

**Descriptive Statistics**

A total of 118 participants completed the questionnaire; 115 participants completed the online version and three participants completed paper copies. The age of participants ranged from 18 to 69 years old. Time since injury ranged from 4 months to 67 years. Demographic, injury related and clinical characteristics are shown in Table 1 and Table 2.

Mean depression, anxiety and total DASS-21 (emotional distress) scores were over one standard deviation higher compared with published normative data49. Furthermore, 54% of participants scored within the *severe* range of the depression subscale, 20% of participants scored within the *moderate* range of the depression subscale and 26% scored within the *normal or mild range*. For the anxiety subscale, 70% of participants scored within the *severe* range, 13% scored in the *moderate* range and 17% scored in the *mild or normal range*.

**Table 1**. Demographic and Injury Characteristics of Participants (n=118)

|  |
| --- |
| **Demographic Characteristics** |
| **Age (years; mean, SD)** | 45.42 (11.75) |
| **Gender (%)** | Male | 39.9 |
| Female | 59.3 |
| Nonbinary | .8 |
| **Education (%)** | Higher education | 57.6 |
| No higher education | 42.4 |
| **Time Since Injury (years; median, IQR)** | 5.41 (2.41-17.24) |
| **Psychiatric History (%)** | Yes | 26.3 |
| No | 72.9 |
| Prefer not to say | 0.8 |

|  |
| --- |
| **Injury Characteristics** |
| **Duration of loss of consciousness (%)** | 0-30 minutes | 47.5 |
| 30minutes – 24 hours | 18.6 |
| Over 24 hours | 33.1 |
| Unknown | 0.8 |
| **Nature of Injury (%)** | RTA | 39.0 |
| Assault | 10.2 |
| Military incident | 0.8 |
| Sports injury | 5.1 |
| Fall | 24.6 |
| Struck by/against object | 5.1 |
| Other | 15.3 |
| **Litigation (%)** | Completed | 16.9 |
| Ongoing | 15.3 |
| No | 65.3 |
| Prefer not to say | 2.5 |
| **Others injured (%)** | Yes | 15.3 |
| No | 83.9 |
| Prefer not to say | 0.8 |
| **Fatalities (%)** | Yes | 4.2 |
| No | 94.9 |
| Prefer not to say | 0.8 |
| **Epilepsy (%)** | Yes | 8.5 |
| No | 90.7 |
| Prefer not to say | 0.8 |

**Table 2.** Clinical Characteristics of Participants (n=118)

|  |  |
| --- | --- |
| **Measures** | **Mean (SD)** |
| **DASS-21** | Total | 25.03 (12.65) |
| Depression | 6.14 (4.08) |
| Anxiety | 9.03 (5.39) |
| Stress | 9.85 (5.14) |
| **QOLIBRI** |  | 102.62 (24.93) |
| **FSS** |  | 47.52 (13.89) |
| **BPI Severity** | 12.20 (10.04) |
| **EMQ** | 32.88 (14.36) |
| **FoReST PI** | 39.83 (14.02) |
| **FSCRS** | Self-Criticism | 22.12 (12.57) |
| Self-Reassurance | 15.36 (7.12) |

*DASS-21=Depression, Anxiety and Stres Scale – 21 item; QOLIBRI=Quality of Life after Brain Injury; FSS=Fatigue Severity Scale; BPI=Brief Pain Inventory; EMQ=Everyday Memory Questionnaire; FoReST PI=Flexibility of Responses to Self-Critical Thoughts- Psychological Inflexibility; FSCRS=Forms of Self Criticising/Attacking and Self-Reassurance Scale*

**Bivariate Analysis**

Correlation analysis between the outcome and exploratory variables are displayed in Table 3. As can be seen, there were significant correlations between all variables, with all exploratory variables showing a moderate to strong association to the emotional distress outcome. A weak negative association was observed between psychological inflexibility and self-reassurance.

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **FSCRS SC** | **FSCRS RS** | **FoReST PI** |
| **DASS-21** | 0.64\*\*\* | -0.49\*\*\* | 0.55\*\*\* |
| **FSCRS SC** | **-** | -0.58\*\*\* | 0.62\*\*\* |
| **FSCRS RS** |  | **-** | -0.35\*\*\* |
| **FoReST PI** |  |  | **-** |

**Table 3**. Pearson’s Correlations Between Study Variables

*DASS-21=Depression, Anxiety and Stress Scale-21 Item; FSCRS-SC=Forms of Self Criticising/Attacking and Self-Reassurance Scale-Self-Criticism; FSCRS-RS, Forms of Self Criticising/Attacking and Self-Reassurance Scale-Reassured Self; FoReST PI= Flexibility of Responses to Self-Critical Thoughts Scale-Psychological Inflexibility.*

\*\*\*p<0.001

**Multiple Hierarchical Regression**

A hierarchical regression was used to assess the ability of self-criticism (FSCRS Inadequate Self), self-reassurance (FSCRS Self-Reassurance) and psychological inflexibility (FoReST) to predict additional variance in emotional distress in people with TBI, beyond demographic and injury-related factors. All residuals appeared independent as indicated by a Durbin Watson statistic of 2.17. The relationship between the dependent variable (DASS-21 Total) and each independent variable, and the relationship between the dependent variable and the independent variables collectively both appeared to be linear. There was assumed to be homoscedasticity as assessed visually. There was no indication of multicollinearity between continuous variables, with all variable inflation values (VIFs) below 0.1 and tolerance values below 10. No significant outliers, high leverage or influential points were identified and residuals were identified as normally distributed as assessed visually.

In step 1, demographic variables accounted for approximately 3% of the variance in DASS-21 Total scores (Adjusted R2=.03, F(5, 106)=1.71, p=0.137). With the addition of injury-related factors in step 2, an additional 16% of variance was explained. Demographic and injury-related factors therefore accounted for approximately 19% (Adjusted R2=.19, *F*(6, 100)=4.44, p=0.001). In this model, self-reported cognitive symptoms (EMQ) made a significant independent contribution to the model. The addition of self-criticism (FSCRS-SC), self-reassurance (FSCRS Reassured) and psychological inflexibility (FoReST) accounted for an additional 32% of variance in emotional distress, with the model Step 3 accounting for a total of 51% of variance (Adjusted R2=.51, *F*(3, 97)=23.08, p<0.001). However, only self-criticism had a significant independent contribution in this model. Step 4 revealed no indirect effect of self-reassurance and psychological inflexibility on emotional distress through the interaction with self-criticism.

**Table 4**. Hierarchical regression analysis for predicting emotional distress (DASS-21 Total)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Model** | **Adjusted R2** | ***F*** | ***p*** | **b (95% CI)** | **β** | ***p*** |
| **Step 1** | .03 | 1.72 | .137 |  |  |  |
| Age (years) |  |  |  | -.19 (-.40, .12) | -.17 | .081 |
| Female |  |  |  | 1.06 (-3.98, 6.11) | .04 | .677 |
| Higher education |  |  |  | -4.00 (-9.03, 1.03) | -.16 | .117 |
| Psychiatric history |  |  |  | 4.85 (-.78, 10.49) | .17 | .091 |
| Time since injury |  |  |  | .13 (-.06, .32) | .13 | .191 |
| **Step 2** | .19 | 4.44 | .001 |  |  |  |
| Age (years) |  |  |  | -.16 (-.36, .04) | -.15 | .105 |
| Gender: female |  |  |  | -.24 (-5.04, 4.57) | .01 | .923 |
| Higher education |  |  |  | -3.77 (-8.52, .98) | -.15 | .118 |
| Psychiatric history |  |  |  | 1.40 (-4.16, 6.96) | .05 | .618 |
| Time since injury |  |  |  | .08 (-.10, .26) | .08 | .373 |
| Severity: moderate |  |  |  | .33 (-5.86, 6.53) | .01 | .915 |
| Severity: severe |  |  |  | -3.13 (-8.36, 2.09) | -.12 | .237 |
| EMQ\* |  |  |  | .25 (.08, .43) | .28 | .005 |
| BPI Severity |  |  |  | .17 (-.08, .42) | .13 | .190 |
| FSS |  |  |  | .16 (-.01, .33) | .18 | .068 |
| Litigation |  |  |  | -.71 (-5.44, 4.02) | -.03 | .767 |
| **Step 3** | .51 | 23.08 | <.001 |  |  |  |
| Age (years) |  |  |  | -.04 (-.20, .12) | -.04 | .601 |
| Gender: female |  |  |  | -.69 (-4.44, 3.05) | -.03 | .716 |
| Higher education |  |  |  | -3.56 (-7.30, .19) | -.14 | .062 |
| Psychiatric history |  |  |  | .70 (-3.62, 5.03) | .02 | .748 |
| Time since injury |  |  |  | .04 (-.10, .18) | .04 | .584 |
| Severity: moderate |  |  |  | -.64 (-5.47, 4.18) | -.02 | .792 |
| Severity: severe |  |  |  | -4.95 (-9.05, -.86) | -.18 | .018 |
| EMQ |  |  |  | .10 (-.05, .24) | .11 | .189 |
| BPI Severity |  |  |  | .06 (-.14, .26) | .05 | .572 |
| FSS\* |  |  |  | .14 (-.01, .27) | .16 | .043 |
| Litigation |  |  |  | .54 (-3.23, 4.30) | .02 | .778 |
| FSCRS SC |  |  |  | .40 (.20, .61) | .41 | <.001 |
| FSCRS RS |  |  |  | -.25 (-.56, .05) | -.14 | .103 |
| FoReST PF |  |  |  | .15 (.02, .32) | .17 | .079 |
| **Step 4** | .50 | .22 | .804 |  |  |  |
| Age (years) |  |  |  | -.04 (-.20, .12) | -.04 | .636 |
| Gender: female |  |  |  | -.66 (-4.48, 3.14) | -.03 | .729 |
| Higher education |  |  |  | -3.55 (-7.32, -.23) | -.14 | .065 |
| Psychiatric history |  |  |  | .54 (-3.91, 4.98) | .02 | .811 |
| Time since injury |  |  |  | .04 (-.11, .18) | .03 | .626 |
| Severity: moderate |  |  |  | -.95 (-5.98, 4.07) | -.03 | .707 |
| Severity: severe |  |  |  | -5.08 (-9.24, -.93) | -.19 | .017 |
| EMQ |  |  |  | .09 (-.05, .24) | .11 | .211 |
| BPI Severity |  |  |  | .06 (-.14, .27) | .05 | .537 |
| FSS |  |  |  | .14 (.01, .28) | .16 | .041 |
| Litigation |  |  |  | .51 (-3.30, 4.32) | .02 | .791 |
| FSCRS SC |  |  |  | .39 (.18, .60) | .39 | <.001 |
| FSCRS RS |  |  |  | -.29 (-.61, .04) | -.16 | .083 |
| FoReST PF |  |  |  | .15 (-.02, .32) | .17 | .082 |
| FSCRS SC x FSCRS RS |  |  |  | -.01 (-.02, .01) | .05 | .550 |
| FSCRS SC x FoReST PI |  |  |  | <-.01 (-.01, .01) | -.03 | .692 |

*EMQ=Everyday Memory Questionnaire; BPI=Brief Pain Inventory; FSS=Fatigue Severity Scale; FSCRS-SC=Forms of Self-Criticising/Attacking and Self-Reassurance Scale- Self Criticism; FSCRS-RS= Forms of Self-Criticising/Attacking and Self-Reassurance Scale- Reassured Self; FoReST PI= Flexibility of Responses to Self-Critical Thought Scale- Psychological Inflexibility.*

**Discussion**

To the author’s knowledge, this is the first study to explore the contribution of self-criticism, self-reassurance and psychological inflexibility to levels of emotional distress in people with TBI. Levels of emotional distress reported by participants in this sample appeared elevated compared with published normative data49. Consistent with previous literature5,6,60, this provides additional evidence that people with TBI have an increased risk of experiencing psychological difficulties.

Initial correlations indicated that higher levels of emotional distress were associated with higher levels of self-criticism, higher levels of psychological inflexibility and lower levels of self-reassurance and therefore supported the first hypothesis.

Within the multiple regression analysis, overall, 51% of variance in emotional distress could be explained by demographic, injury-related and psychological constructs. The addition of self-criticism, self-reassurance and psychological inflexibility appeared to make the biggest contribution explaining an additional 32% of variance in emotional distress beyond injury-related or clinical factors and therefore supported the second hypothesis. In this model (Step 3), self-criticism was the only construct to make an independent contribution. Self-reassurance and psychological inflexibility did not make a significant independent contribution, nor was there a significant interaction effect between these variables and self-criticism (Step 4). This final step did not support the third hypothesis predicting that self-reassurance and psychological inflexibility would moderate the relationship between self-criticism and emotional distress.

The results highlight the importance of self-criticism in understanding levels of emotional distress in people with TBI. This is something that has not been empirically tested previously. However, qualitative research has highlighted the role of shame and guilt in people with TBI20,21 which appears in keeping with the present findings. It could be argued that significant life changes associated with a TBI, and the associated loss of potentially protective factors (e.g. employment and relationships) may potentially contribute to the strength of the relationship between self-criticism and emotional distress 2,3.

Whilst increasing self-reassurance and psychological flexibility (through the use of ‘third wave’ therapies such as CFT and ACT respectively) is purported to reduce distress associated with self-criticism, the current study found that neither reassurance, nor psychological flexibility, had either a significant direct or indirect effect on levels of emotional distress. Future longitudinal research is required to determine if changes in self-reassurance and/or psychological flexibility are associated with changes in distress.

Although previous research has highlighted the role of demographic factors contributing to psychological outcomes in people with TBI7-9, the present findings appear inconsistent in that demographic factors alone (Step 1) did not predict levels of emotional distress.

The clinical factors (Step 2) assessed in the current study appeared to be more effective in predicting levels of emotional distress. Previous research exploring the association between psychological outcomes and pain, fatigue and cognitive functioning has yielded mixed results12-15. In the present study, only self-reported cognitive complaints (EMQ) made a significant independent contribution when all injury-related factors were entered into the model.

**Limitations**

There are a number of limitations to the present study. Firstly, as the study design is cross-sectional, causality cannot be assumed. In addition, despite the regression model being significant, there remains a large proportion of variance that was not explained. Therefore, there are likely to be additional factors, beyond those explored in the present study, that contribute to emotional distress in people with TBI. The present study does not include systemic factors, such as changes in employment status2 and social relationships3,59, which are widely recognised as indirect consequences of brain injury and are likely to impact on psychological outcomes. Additionally, information regarding social economic status and location of injury was not collected and therefore not included in the present analysis. It may be that, should these factors have been included, a more robust model explaining a larger proportion of variance may have been identified.

The data collected in the present study consisted solely on self-report measures. This relies on individuals to accurately report the details of their injury and to assess each domain they are responding to. Due to the design of the study, demographic and injury-related factors such as injury severity (as measured by duration of loss of consciousness), nature of injury and time since injury could not be verified and were dependent on individuals’ retrospective reporting. Additionally, self-report measures are vulnerable to bias. This may be particularly true of the self-criticism and self-reassurance scales used in the current study that derived from the same scale, and therefore may be more correlated due to similar wording and timing of included items.

Despite achieving adequate power for the regression analysis, the present study includes a relatively small sample of people with TBIs. Furthermore, people with TBI are often considered a heterogeneous population as there are a plethora of symptoms and difficulties that are reported in this population. Within the present study, there was variation regarding the nature of injuries with the majority of people sustaining a TBI due to road traffic accidents. A small proportion (12%) of participants reported non-traumatic brain injuries, such as stroke or encephalitis, however it was unclear whether these were secondary to TBI. A larger sample size would allow for further exploration of various subgroups, which may be stratified by nature and severity of injury. Additionally, a larger sample size would allow for alternative statistical modelling analyses such as structural equation modelling, which are often considered more robust and may provide a more in depth picture of the unique role of psychological constructs and emotional distress in people with TBI.

The present study recruited participants from a variety of sources including a hospital, rehabilitation settings, national charity organisations and online social media support groups. It was not possible to identify where participants were recruited from due to the design of the questionnaire. Therefore, potential differences in outcomes, depending on where participants were recruited from could not be explored. It was also noted that all participants who took part were actively engaged in help seeking, whether it be from online support groups, charities or healthcare services. Many people who sustain a mild TBI are likely to make a full recovery with little or no intervention and therefore, there is likely to be a proportion of people with TBI who do not continue contact with services or support groups. Therefore, people who do not seek support following TBI are likely to be underrepresented in the present study.

Whilst there are a number of limitations, the present study also has a number of strengths. A considerable number of demographic and injury-related factors, which have been indicated as impacting on psychological outcomes in previous research, were included in the multiple regression analysis. This provides a robust exploration of whether the psychological constructs predicted levels of emotional distress, even when controlling for demographic and injury related factors. This allows to clearer evaluation of the contribution of psychological constructs.

Similarly, the present study is the first to quantitatively explore the role of self-criticism in people with TBI. Whilst previous qualitative literature has highlighted the role of shame and guilt, the present study highlights the process of self-criticism and how this relates to the experience of emotional distress. Unlike injury-related factors, which may be a direct result of structure damage to the brain, psychological processes may be more amenable to change and therefore provide promising theoretical grounding for psychological therapies being effective treatments for reducing emotional distress.

**Clinical Implications**

The present research provides further evidence for elevated emotional distress in people with TBI and highlights the importance of providing psychological support for people experiencing such difficulties. Whilst there may be a temptation within clinical settings to focus on the cognitive and physical symptoms reported by many people with TBI, the present study highlights the importance of understanding psychological processes that may contribute to emotional distress. Similarly, effective identification of those most at risk may include screening of psychological processes, particularly measures of self-criticism.

The present study is the first to explore the relationship between self-criticism and self-reassurance and emotional distress in people who have sustained a TBI. The findings indicate that higher self-criticism is associated with increased levels of emotional distress, even when controlling for many demographic and injury related factors. Psychological processes are often more modifiable than demographic of injury-related factors, specifically those caused directly by damage to the brain. Therefore, targeting self-criticism in psychological interventions may lead to more effective support for those experiencing significant emotional distress following TBI.

**Further Research**

Whilst self-criticism, self-reassurance and psychological inflexibility explained an additional 30% of variance in emotional distress than demographic and injury-related factors alone, there remains a considerable degree of variance in distress unexplained. Further exploration of the key factors, including psychological processes which underlie the development and maintenance of emotional distress following TBI, will allow for more effective identification of those at risk of poor psychological outcomes and may guide development of appropriate intervention.

Although being adequately powered, the present study includes a relatively small sample of people with TBI. Replication of the current findings utilising a longitudinal design to determine how changes in self-criticism, self-reassurance and psychological inflexibility are associated with changes in distress across time.

Research has consistently demonstrated that people with TBI experience elevated levels of psychological difficulties and emotional distress7-9, whilst evidence for effective psychological interventions remains limited25. Future research should continue to evaluate how existing therapy models (CBT and ‘third-wave’ approaches) compare with appropriate control groups. Different psychotherapy interventions that demonstrate good efficacy for reducing psychological distress in people with TBI relative to control groups can then be compared with each other via clinical trials to determine which approaches are superior for reducing distress in people with TBI.

For more severe TBIs, the efficacy of direct psychotherapeutic interventions may be limited. Neurobehavioural approaches are based on environmental modifications to create a therapeutic milieu in which individuals with neurocognitive and/or neurobehavioural difficulties can be successful.

Neurobehavioural interventions are a broad range of psychological therapies based on a paradigm that incorporates methods of associational learning within a structured environment that emphasizes clear and consistent feedback, pre-emptive cuing, and positive reinforcement to raise awareness of behaviour, in a way that improves social cognition and self-regulation, to promote community independence 61. Such interventions often utilise errorless learning approaches that maximise success. Jackson, et al 201462 emphasised the importance of structure and the learning process of self-structuring to develop and maintain anchors, scaffolding and strategies that would promote compensatory and functional coping strategies for greater independence. It is suggested that such neurobehavioural processes may improve the individuals’ experience of success, influence and control that may ameliorate the emergence of negative self-evaluation and self-criticism. Future research into the effects of neurobehavioural interventions on emotional wellbeing and self-criticism for people with acquired brain injuries where cognitive impairments may be restricting.

**Conclusion**

In summary, the present study highlights the role of psychological factors, specifically those relating to personal evaluation in understanding levels of emotional distress in people with TBI. It is common for professionals supporting people following TBI to target the physical and cognitive sequelae as they are often easily observed. Emotional difficulties, on the other hand, may be less immediately apparent and/or seen as secondary to physical and neurocognitive factors. Whilst the present study found that clinical factors may be significant predictors of emotional distress, particularly with self-reported cognitive functioning, self-criticism appeared to explain the largest proportion of variance. After controlling for many demographic and injury-related factors, self-criticism explained an additional 30% of variance in emotional distress. Therefore, self-criticism should be a specific treatment target for therapies supporting people experiencing emotional distress following TBI. It is acknowledged that different approaches may target self-criticism in different ways with traditional CBT approaches challenging the content and third wave therapies aiming to change the relationship one has with self-criticism. Whilst the present study does not specifically support CFT and ACT approaches, it demonstrates that psychological processes significantly contribute to levels of emotional distress, beyond demographic and injury related factors. This is promising in that psychological processes are more amenable to change and therefore levels of emotional distress could be improved through psychological therapies focusing on these processes.

Through longitudinal research, psychological therapies including third wave therapies, can be better evaluated to assess clinical effectiveness for people with TBIs who are experiencing significant levels of emotional distress. Third wave therapies, such as ACT and CFT, are likely to be important approaches for people whose self-criticism may be valid to their situation, such as “my memory isn’t as good as it used to be”, and therefore challenging the content would be inappropriate. Changing the relationship one has with their self-criticism, through developing self-reassurance successful experiences and/or psychological flexibility, may in turn reduce the intensity or frequency of self-criticism and reduce emotional distress.

**Conflict of Interest Statement:**

None

**Acknowledgement Statement:**

None

**Funding Statement:**

None

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