

# Treating Psychosocial Barriers in Patients with Traumatic Brain Injuries in a Transdisciplinary Biopsychosocial Therapeutic Community Model Program



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## Background & Purpose

**Background:**

- Psychosocial factors have been shown to hinder recovery in traumatic brain injury (TBI) and post-traumatic stress disorder (PTSD) patients. Pain catastrophizing is common and correlates with reduced function and self-efficacy. [1-2]
- A transdisciplinary program helps patients with cognitive, psychological and functional deficits due to TBI improve self-efficacy using a biopsychosocial therapeutic community approach.

**Purpose:**

Examine the association between treatment duration and post-treatment pain catastrophizing [3] in a population of patients with pain catastrophizing at treatment initiation receiving transdisciplinary biopsychosocial community model treatment for brain injuries.

## Materials & Methods

**Sample Selection:**

- Data Source:** Clinic data from a transdisciplinary biopsychosocial therapeutic community model brain injury treatment program.
- Inclusion Criteria:** Patient initiated care with the program between January 1, 2021, and September 30, 2024.
- Exclusion Criteria:** Patient lacked clinically significant pain catastrophizing (lacked Pain Catastrophizing Scale [PCS] score > 30) at program initiation.

**Variables:**

- Outcome:** Clinically relevant pain catastrophizing at completion (PCS > 30) vs. lack of clinically relevant pain catastrophizing at completion.
- Independent Variable:** Hours of program participation (log-transformed, base 2).
- Control Variables:** Initial PCS score, age, gender, treatment location, and first responder status.

**Analysis:**

- Descriptive Statistics:** Means, standard deviations, and frequencies were computed. Patients below the median duration of program participation (157 hours) were compared to those at or above it using Chi-square and t-tests.
- Pre/Post Analysis:** A paired t-test was used to compare pre-treatment and post-treatment PCS scores.
- Univariable Analysis:** A Chi-square test was conducted to evaluate the association between program participation (at or above median hours versus below median hours) and clinically significant pain catastrophizing at program completion.
- Multivariable Analysis:** Multivariable logistic regression was used to assess the association between program hours (log-transformed, base 2) and clinically relevant pain catastrophizing at completion.

## Results

- There were 149 patients included in the analysis. Overall, PCS scores decreased from 42.2 to 27.5, a significant change ( $p < 0.01$ ).
- When patients with at least the median number of program hours were compared to patients with fewer than the median number of program hours, patients had significantly ( $p < 0.01$ ) lower PCS scores at treatment completion if they completed at least the median number of program hours.
- Adjusted analysis found that longer treatment duration was significantly associated with lower likelihood of clinically relevant pain catastrophizing at completion (OR: 0.66; 95% CI: 0.47-0.93).
- Higher initial PCS scores were associated with greater likelihood of pain catastrophizing at completion (OR: 1.10; 95% CI: 1.04-1.17).
- There was no significant association between likelihood of clinically relevant pain catastrophizing at treatment completion and age, gender, treatment location, or first responder status.

## Conclusion

Patients with greater treatment duration had significantly lower likelihood of pain catastrophizing at completion. Given that pain catastrophizing has been shown to negatively impact functionality and self-efficacy, this suggests that the program may help patients overcome psychosocial barriers to recovery.

Adjusted analysis found that longer treatment duration was significantly associated with lower likelihood of clinically relevant pain catastrophizing at completion.

Odds Ratio: 0.66  
95% Confidence Interval: 0.47-0.93

### PCS Score at Treatment Completion by Hours of Program Participation

Hours of Program Participation	PCS Score at Treatment Completion
Below Median Hours	31.1
At Least Median Hours	24.1

A Pain Catastrophizing Scale (PCS) score over 30 is clinically significant. While the average patient with below the median number of hours of program participation had clinically significant pain catastrophizing at treatment completion, the average patient with at least the median number of hours did not. This difference was significant ( $p < 0.01$ ).

## Table 1. Descriptive Statistics (N=149)

	All (N=149)	Below Median Hours (n=73)	At Least Median Hours (n=76)	p-value for Difference
Program hours, mean ± SD	167.8 ± 111.2	81.3 ± 43.6	250.9 ± 91.1	<0.01
Initial PCS score, mean ± SD	42.2 ± 6.3	42.6 ± 6.5	41.7 ± 6.0	0.41
Final PCS score, mean ± SD	27.5 ± 15.2	31.1 ± 14.2	24.1 ± 15.5	<0.01
Patient age, mean ± SD	52.3 ± 11.2	52.8 ± 11.2	51.8 ± 11.3	0.57
Male patient, n (%)	96 (64.4)	43 (58.9)	53 (69.7)	0.23
Treatment in Riverside, n (%)	60 (40.3)	21 (28.8)	39 (51.3)	<0.01
Treatment in San Diego, n (%)	77 (51.7)	50 (68.5)	27 (35.5)	<0.01
Patient is a first responder, n (%)	18 (12.1)	10 (13.7)	8 (10.5)	0.73

- As shown in Table 1, the overall patient population had an initial mean PCS of 42.2 (SD: 6.3) and a final mean PCS of 27.5 (SD: 15.2) at the conclusion of treatment, a significant difference ( $p < 0.01$ ).
- When patients with at least the median number of program hours ( $\geq 157$ ) were compared with patients with fewer than the median number of program hours, there was a significant ( $p < 0.01$ ) difference in the PCS score at treatment completion; a mean of 31.1 (SD: 14.2) in patients with below the median number of program hours versus a mean of 24.1 (SD: 15.5) in patients with at least the median number of program hours.

## Table 2. Adjusted Logistic Regression: Predictors of Clinically Relevant Pain Catastrophizing at Completion

	Odds Ratio	95% Confidence Interval
Program hours (log-transformed, base 2)	0.66	(0.47-0.93)
Initial PCS score	1.10	(1.04-1.17)
Patient age	0.99	(0.96-1.03)
Male patient	1.19	(0.56-2.54)
Treatment in Riverside (vs. other)	1.57	(0.39-6.23)
Treatment in San Diego (vs. other)	0.58	(0.14-2.42)
Patient is a first responder (vs. not first responder)	0.63	(0.20-1.94)

- As shown in Table 2, adjusted analysis revealed a significant association ( $p = 0.02$ ) between program participation hours and clinically significant pain catastrophizing at treatment completion. Doubling program hours was associated with lower odds (OR=0.66, 95% CI: 0.47-0.93) of clinically significant pain catastrophizing.
- A higher initial PCS score was linked to greater odds of clinically significant pain catastrophizing at treatment completion ( $p < 0.01$ ); each point increase raised the odds by 10% (OR=1.10, 95% CI: 1.04-1.17).

**References**

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