

Depression Severity in Patients with Traumatic Brain Injuries: Violent vs. Non-Violent Causes

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Introduction

- Individuals who experience traumatic brain injuries (TBI) may suffer from a range of physical, cognitive, and psychological effects, with depression being a common outcome. Depression in TBI patients are often interrelated with other new or pre-existing mood disorders, sleep disturbances, and memory impairments¹.
- Depression in patients after TBIs has been previously investigated although the underlying cause is not completely understood at this time². This gap in knowledge introduces some complications into the formation of targeted therapy for patients who have sustained TBIs.
- Studies have shown that patients with violent injury etiologies for TBIs have less favorable outcomes than the general population³ and may benefit from more intensive psychiatric evaluation and treatment.
- Those who sustain TBIs from violent causes may have additional psychological trauma that could exacerbate depressive symptoms.³ Understanding this relationship may help physicians develop more thorough treatment plans for TBI patients.
- The Patient Health Questionnaire-9 (PHQ-9) is a survey that is an effective tool for both the detection and monitoring of depression severity. Studies have found this survey to be a valid and reliable screening tool for patients with TBIs.⁴

Aims and Objectives

- This study aims to compare depression severity, as measured by Patient Health Questionnaire-9 (PHQ-9) scores in patients who suffered TBIs in the last 1 to 30 years from violent and non-violent causes.
- Highlight the need for targeted mental health interventions in patients with TBIs to improve patient care and long-term outcomes in regards to mental health and psychiatric conditions.

Methods

- Cross-sectional, retrospective observational study utilizing published data from the *2018 TBI Model System Collaborative: Characterization and Treatment of Chronic Pain after Moderate to Severe Traumatic Brain Injury* study
- The 2018 study included 3,804 individuals with moderate-to-severe TBIs from 18 different centers, ranging from 1 to 30 years post-injury. A large survey was conducted at patient follow-up appointments and responses were recorded.
- The current study included 3,543 of the above participants who responded to the necessary survey questions (PHQ-9, causes of TBI). Data was categorized into patients who reported having violent versus non-violent etiology of their TBI.
 - Violent TBI: Gunshot wounds, assaults with blunt instruments, other violence
 - Non-violent TBI: motor vehicle, motorcycle, bicycle, All-Terrain Vehicles, other vehicular, water sports, field/track sports, gymnastic activities, winter sports, air sports, other sports, falls, hit by flying object, pedestrian, other
- Depression severity was assessed using the patients total PHQ-9 score based on survey responses.

PATIENT HEALTH QUESTIONNAIRE-9 (PHQ-9)				
Over the last 2 weeks, how often have you been bothered by any of the following problems? (Use "✓" to indicate your answer)	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3
FOR OFFICE CODING 0 1 2 3	* * * * * =Total Score:			

Figure 1: Patient Health Questionnaire-9⁵

PHQ-9 Score	Depression Severity
0-4	Non-minimal
5-9	Mild
10-14	Moderate
15-19	Moderately Severe
20-27	Severe

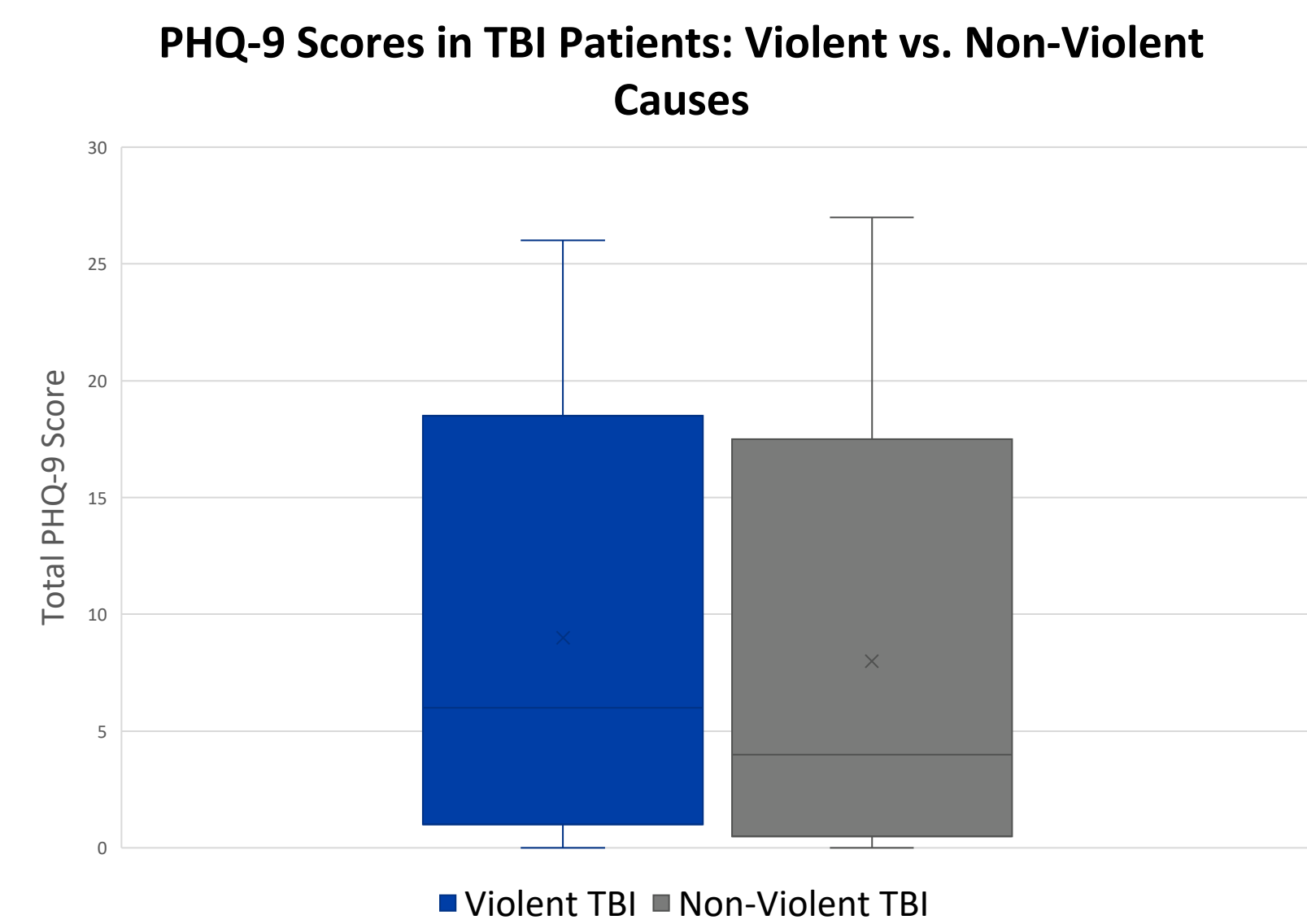
Table 1: Patient Health Questionnaire-9 Grading⁵

Results

- A total of 3,543 TBI patients were included (violent: 429, non-violent 3,114).
- Wilcoxon two-sample tests and chi-squared tests revealed significantly higher median PHQ-9 scores in violent injury patients (6.0, IQR 2-11) compared to non-violent injury patients (4.0, IQR 1-8) with p<0.0001.
- Additionally, the mean PHQ-9 score was higher in the violent injury group (7.2± 6.1) compared to the non-violent group (5.4 ± 5.7)
- Despite statistical significance, both violent and non-violent injury groups fell within the “mild” depression range given their PHQ-9 scores, indicating less clinical significance.

Cause of Injury	Frequency
Motor vehicle	1334
Motorcycle	447
Bicycle	145
ATV	73
Other vehicular	36
Gunshot wound	139
Assaults with blunt instrument	168
Other violence	141
Water sports	8
Field/track sports	6
Gymnastics	1
Winter sports	54
Air sports	3
Other sports	47
Fall	876
Hit by falling/ flying object	58
Pedestrian	242
Other	19
Unknown	6

Table 2: Cause of TBI as reported on patient survey



Graph 1: Comparison of Depression Severity in TBI Patients

Conclusions

- The mechanism of injury of a TBI may play a role in depression severity as patients who experienced violent causes of TBI had higher mean and median PHQ-9 scores.
 - This may be partially due to the possibility of additional psychological trauma from violent events, although the influence of injury etiology on depression severity is not completely understood.
 - Further research is needed to explore longitudinal mental health outcomes and effective treatment strategies for TBI-related depression in both patient groups.
- ## Limitations
- Factors such as pre-existing mental health conditions were not accounted for in the patient survey which may have influenced depression severity at the time of the survey.
 - As an observational study, we are unable to evaluate changes in depression severity over time. The original study included patients who sustained their injuries between 1 and 30 years ago. However, we did not examine the relationship between time since injury and changes in depression severity.
 - Surveys were conducted by a number of different clinicians which could impose bias in data collection.

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