

Concomitant Mental Illnesses Diagnoses and Likelihood of Trauma Recidivism

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BACKGROUND: Trauma is the leading cause of death among persons aged 1–44 years. Trauma recidivism occurs when an individual experiences more than one significant injury in a 5-year period. The relationship between a trauma recidivist's perception of recurrent injury has been unclear.

OBJECTIVE: To describe the association between select sociodemographic and clinical variables, threat orientation, and the perceived likelihood of recurrent injury of individuals recently experiencing a significant injury.

METHODS: A prospective cross-sectional study was conducted with Level II trauma inpatients ($n = 84$) in Southern California from October 2021 to January 2022. Participants completed surveys prior to discharge. Clinical variables were extracted from the electronic health record.

RESULTS: The trauma recidivism rate was 31%. Mental illness and length of hospital stay were associated with trauma recidivism. In individuals with two or more mental illness diagnoses, the odds of trauma recidivism were approximately 6.5 times higher than in those with no mental illness (odds ratio = 6.48, 95% confidence interval: 1.7–24.6).

CONCLUSION: Trauma is a preventable health care concern with timely recognition of risk factors and intervention. This study confirms mental illness as a predominant factor in injury and should be addressed in clinical practice. This study builds upon previous research and emphasizes the necessity of targeting injury prevention and education in the mentally ill. Trauma providers seeking to practice with an upstream mentality have a responsibility in screening patients for mental illness to help prevent further injury and death.

KEY WORDS: Injury, Mental illness, Recidivism, Risk assessment, Risk behavior, Trauma

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Injuries and violence are the leading causes of death among persons aged 1–44 years in the United States (Centers for Disease Control and Prevention, 2020). Most people perceive physical injury as something to avoid, leading them to take prudent measures to prevent injury from occurring. Therefore, it is inexplica-

bly challenging to determine why some individuals resume behaviors that result in recurrent injuries, a phenomenon known as trauma recidivism.

In the early 1990s, the concept of trauma recidivism (TR) emerged after researchers observed a high frequency of recurrent injuries among a particular patient population (Reiner et al., 1990). Moreover, these repeat trauma offenders exhibited a gladiator syndrome: a composite of reckless lifestyle choices leading them to fall victim to their high-risk behaviors and revealing traumatic injury as a recurrent disease process (Poole et al., 1993). Therefore, the belief that traumatic injuries were primarily random events was debunked. Today, TR rates have reached as high as 44% of emergency department (ED) admissions (Kao et al., 2019) and remain a significant public health concern.

Mental illness is an independent risk factor for TR (Wan et al., 2006). Persons experiencing mental illness may experience an impaired ability to appraise risk and, therefore, are more vulnerable to injury. Impulsive behaviors involving sensation and risk seeking can also place a person at a greater risk for injury (Hamza et al., 2015). Other risk factors contributing to TR include being male, younger than 30 years, single, unemployed,

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KEY POINTS

- Trauma recidivism is a recurrent disease and growing public health concern.
- Trauma recidivism odds are 6.5 times higher for those with two or more mental illness diagnoses.
- Depression is the most prevalent mental illness diagnosis among trauma recidivists.
- Key study implications: targeted injury prevention for individuals with concomitant mental health diagnoses.

uninsured, and having a history of criminal behavior, substance abuse, and violent injury (Cordovilla-Guardia et al., 2014; McCoy et al., 2013; Wan et al., 2006). In addition, persons with a history of TR frequently experience a repeat injury within 5 years of their initial injury (McCoy et al., 2013; Reiner et al., 1990).

How individuals perceive and react to the threat or injury also plays a role in TR. Threat orientations are approaches individuals take in response to a potential danger as well as how they choose to protect themselves (Thompson et al., 2006). The perception of threat initiates a chain of injury prevention responses in most individuals. In some individuals, these responses are stronger than in others. Although not previously examined in TR research, in this study, threat orientations were hypothesized to help differentiate types of responses to the threat of recurrent injury. Similarly, perceived likelihood of recurrent injury was measured to determine how individuals viewed their susceptibility to TR.

Behavioral choices greatly affect a person's injury risk. Because trauma does not always occur at random, there may be a strong relationship between a person's perspective on risk behavior and injury. Although there have been many studies addressing the risk factors and patterns of TR, no studies have examined the threat orientations and risk perceptions of trauma recidivists.

OBJECTIVE

This study aimed to describe the associations between select sociodemographic and clinical variables, threat orientation, perceived likelihood of recurrent injury, and TR of individuals admitted as trauma patients to a Level II trauma center.

METHODS

Following approval from the health care organization and university institutional review boards, a descriptive, correlational study utilizing a convenience sample was conducted.

Participants and Setting

Participant recruitment and data collection took place in a trauma progressive care inpatient unit in a

650-bed Southern California Level II trauma center that cares for an average of 250 trauma patients per month. After written informed consent was obtained, each participant completed the survey. Participants were 18 years of age or older, alert, and spoke English. High-risk behavior was defined as any physical act that increased risk of injury (e.g., speeding, drunk driving, unhelmeted motorcycle riding) more than normal activity of daily living (e.g., walking, driving a car). High-risk behavior was identified by the principal investigator after reviewing the trauma surgeon's dictation note, trauma triage activation form, and prehospital report. Excluded conditions included ground-level falls, car accidents without evidence of high-risk behavior, and self-inflicted injuries.

Data Collection**Sociodemographic and Clinical Variables**

Sociodemographic variables (e.g., ethnicity, education, annual household income) were included in the 29-item survey. Three other measures (Past Trauma History Questionnaire, Threat Orientation Scale, and Perceived Likelihood of Recurrent Injury) were also included in this 29-item survey. Finally, clinical variables (e.g., past medical history, type of injury, toxicology results) were retrieved from the trauma center's electronic health record. Injury Severity Scores (ISS) were retrieved from the hospital's trauma registry.

Past Trauma History Questionnaire

Trauma recidivism was defined as more than one unintentional traumatic injury requiring either ED admission or inpatient hospitalization within a 5-year time frame (McCoy et al., 2013). Trauma recidivism was captured using the Past Trauma History Questionnaire (McCoy et al., 2013), which measures the mechanism and frequency of injuries, ED visits, and hospital admissions using two items.

Threat Orientation Scale

Threat orientation was defined as an individual's perception of susceptibility to a particular danger. Threat orientation was measured using the Threat Orientation Scale, which consists of four dispositional threat responses: control-based, heightened sensitivity-based, avoidance denial-based, and optimistic denial-based (Thompson & Schlehofer, 2008). Those with a control-based orientation are motivated by personal control and are more inclined to health-promoting and harm-preventing behaviors (Thompson & Schlehofer, 2008; Thompson et al., 2006). Persons with hypersensitivity-based orientations often overestimate perceived susceptibility to threat, experience increased anxiety levels, implement overactive preventative health measures, and have pessimistic expectations for health outcomes. Individuals with optimistic denial-based

orientations have a disproportionate estimation of perceived susceptibility, self-deception, and denial of information, and tend to minimize concern that leads to a lack of preventative behavior (Thompson et al., 2011). Finally, those with avoidance denial-based orientations are often aware of potential threats, pessimistic toward personal risk, and avoid thoughts about the threat because it induces overwhelming anxiety (Thompson & Schlehofer, 2008).

Thompson et al. (2011) reported strong internal reliability for each subscale (control-based, hypersensitivity-based, optimistic denial-based, and avoidance denial-based) on the 20-item short-form version ($\alpha = .83, .89, .81, \text{ and } .84$). For this current study, the denial-based orientations were projected to be positively correlated with TR.

Perceived Susceptibility and Perceived Likelihood of Recurrent Injury

Perceived susceptibility and perceived likelihood of recurrent injury were defined as a person's acceptance of the subjective risks to a threat (Rosenstock, 1974). An adapted version of the Perceived Susceptibility to Sports Injury ($\alpha = .81$; Deroche et al., 2007) was used to measure perceived susceptibility and perceived likelihood of recurrent injury.

This new version of the Perceived Likelihood of Recurrent Injury instrument was adapted by the principal investigator and psychometrically tested for reliability and validity among a general community population who experienced a traumatic injury in the last 5 years. Next, after cognitive interview testing by the principal investigator, the Perceived Likelihood of Recurrent Injury questions were modified to improve the wording of items. For the final version used in this current study, item 1 measured the participant's awareness of their risk for TR. Item 2 measured the participant's awareness of their risk level for TR compared with someone else. Finally, item 3 measured the participant's likelihood of returning to the activity that led to their most recent injury. Each item is rated on a scale of 1–10, with 1 being "no likelihood" and 10 being "strong likelihood." Total scores are calculated by summing the responses for all three items and can range from 0 to 30.

Statistical Analysis

The minimum required sample size of 84 was calculated using G*power version 3.1.9.7 using a Cohen's effect size of 0.3, an α value of $p = .05$, and a β value of .80. The data were analyzed using SPSS v.28 (IBM Corp, Armonk, NY). Descriptive and multivariate statistics were used to address each of the research aims. Statistical significance was defined as p value of $< .05$.

RESULTS

Participant Characteristics

A total of 84 participants were surveyed between October 2021 and January 2022. Sociodemographic and clinical characteristics for these participants are described in Tables 1 and 2.

Twenty-six (31%) of the 84 participants had a history of TR. Eighteen of the 26 recidivists had one mental illness diagnosis, whereas 10 recidivists had two or more mental illness diagnoses. Recidivists were also noted to have a lower average ISS (11.5) than the nonrecidivism group (13.3); however, the difference was not significant ($p = .39$).

TR Factors

Four factors determined the significant group differences between the presence and absence of TR: presence of any mental illness ($\chi^2 [1, N = 26] = 6.29, p = .012$), number of mental illness diagnoses ($\chi^2 [2, N = 26] = 9.31, p = .010$), depression ($p = .012$), and length of hospital stay (LOS; $p = .014$; see Table 3). Those in the TR group were more likely to suffer from mental illness, specifically depression, and have twice as many mental illnesses as those in the nonrecidivism groups. Length of hospital stay for nonrecidivists (median = 5.00) was significantly higher than that for the TR group (median = 3.00; $U[N_{\text{nonrecidivists}} = 58, N_{\text{recidivists}} = 26] = 505.00, z = -2.45, p = .014$). In other words, the TR group had shorter hospital stays, spending an average of 3 days less than the nonrecidivism group. There were no significant differences between TR groups for either the Perceived Likelihood of Recurrent Injury items (see Table 4) or the Threat Orientation Scale mean scores.

Odds of TR

Binary logistic regression was performed to determine whether the total number of mental illnesses, LOS, and Perceived Likelihood of Recurrent Injury item number 1 explained the presence of TR. Although item 1 of the Perceived Likelihood of Recurrent Injury instrument was not statistically significant in the bivariate analysis with TR, it was considered clinically important to control for when measuring TR and was included in the model. The model was statistically significant ($\chi^2 [3, N = 84] = 15.82, p = .003$), explaining 17.2%–24.2% of the overall variance in TR. The variables correctly predicted the TR status of 79.8% of participants, including 42.3% of those with a history of TR and 96.6% of those without. The presence of two or more mental illness diagnoses was statistically significant when controlling for LOS and Perceived Likelihood of Recurrent Injury item number 1. In summary, the model suggested that for individuals with two or more diagnoses of mental illness, the odds of TR are approximately 6.5 times

Table 1. Sociodemographic Characteristics^a

| Variables | Mean (SD) or n (%) | | | p |
|---|-------------------------------|---|---------------------------------------|--------------------|
| | Total Trauma Sample n = 84 | Non-Trauma Recidivist Subsample n = 58 | Trauma Recidivist Subsample n = 26 | |
| Age (years) | 44.3 (17.2) | 45.4 (18.2) | 41.8 (21.2) | .140 ^b |
| Gender | | | | |
| Male | 61 (72.6%) | 43 (74.1%) | 18 (69.2%) | |
| Female | 23 (27.4%) | 15 (25.9%) | 8 (30.8%) | .641 ^c |
| Ethnicity | | | | |
| Caucasian | 47 (56.0%) | 34 (58.6%) | 13 (50.0%) | |
| African American | 12 (14.3%) | 7 (12.1%) | 5 (19.2%) | |
| Hispanic/Latino | 16 (19.0%) | 12 (20.7%) | 4 (15.4%) | |
| Asian or Pacific Islander | 3 (3.6%) | 2 (3.4%) | 1 (3.8%) | |
| Other or prefer not to say | 6 (7.1%) | 3 (5.2%) | 3 (11.5%) | .653 ^d |
| Marital status | | | | |
| Married | 27 (32.1%) | 19 (32.8%) | 8 (30.8%) | |
| Single | 46 (54.8%) | 39 (67.2%) | 18 (69.2%) | 1.000 ^c |
| Highest level of education ^e | | | | |
| Some high school | 5 (6.0%) | 4 (6.9%) | 1 (3.8%) | |
| High school or trade school | 51 (60.7%) | 35 (60.3%) | 16 (61.5%) | |
| Associates | 8 (9.5%) | 7 (12.1%) | 1 (3.8%) | |
| Bachelor's degree | 13 (15.5%) | 8 (13.8%) | 5 (19.2%) | |
| Master's degree | 6 (7.1%) | 4 (6.9%) | 2 (7.8%) | .808 ^d |
| Annual household income (\$) ^e | | | | |
| <25,000 | 20 (23.8%) | 16 (27.6%) | 4 (15.4%) | |
| 25,000–50,000 | 17 (20.2%) | 12 (20.7%) | 5 (19.2%) | |
| 50,000–100,000 | 19 (22.6%) | 13 (22.4%) | 6 (23.1%) | |
| 100,000–200,000 | 7 (20.2%) | 7 (20.2%) | 6 (23.1%) | |
| >200,000 | 5 (6.0%) | 2 (3.4%) | 3 (11.5%) | .363 ^d |
| Employment status | | | | |
| Employed | 58 (69.0%) | 39 (67.2%) | 19 (73.1%) | |
| Unemployed | 26 (31.0%) | 19 (32.8%) | 7 (26.9%) | .799 ^c |
| Hours worked per week (including unemployed) | 28.4 (22.0) | 27.5 (22.5) | 30.6 (21.2) | .548 ^b |
| Shift worked ^f | | | | |
| Morning | 45 (53.6%) | 33 (56.9%) | 12 (46.2%) | |
| Afternoon/evening/or varies | 15 (17.9%) | 7 (12.1%) | 8 (30.8%) | .111 ^c |
| Type of insurance | | | | |
| Commercial or military (VA, Tricare, TriWest) | 39 (46.4%) | 28 (48.3%) | 11 (42.3%) | |
| Medical or Medicare | 28 (33.3%) | 18 (31.0%) | 10 (38.5%) | |
| Uninsured | 17 (13.1%) | 12 (20.7%) | 5 (19.2%) | .450 ^d |
| Smoking status | | | | |
| Yes | 39 (46.4%) | 25 (43.1%) | 14 (53.8%) | |
| No | 45 (53.6%) | 33 (56.9%) | 12 (46.2%) | .478 ^c |
| History of traumatic injury requiring hospitalization in the past 5 years | 17 (20.2%) | 0 (0%) | 26 (100%) | |

(continues)

Table 1. Sociodemographic Characteristics^a (Continued)

| Variables | Mean (SD) or n (%) | | | p |
|--|-------------------------------|---|---------------------------------------|---|
| | Total Trauma Sample n = 84 | Non-Trauma Recidivist Subsample n = 58 | Trauma Recidivist Subsample n = 26 | |
| History of traumatic injury requiring ED visit in the past 5 years | 18 (21.4%) | 0 (0 %) | 26 (100%) | |
| Total trauma recidivism rate | 26 (31.0%) ^f | 0 (0%) | 26 (100%) | |

Note. ED = emergency department.

^aTwo-tailed *p* values reported.

^bIndependent *t* test.

^cPearson's χ^2 .

^dFisher's exact test.

^eMissing data; *p* values calculated using only reported data.

^fMissing 24 participants due to unemployment (*n* = 60).

^gSeveral participants had multiple hospital admissions, visits to the emergency department, or a combination of both within the past 5 years.

higher (odds ratio = 6.48, 95% confidence interval = 1.7–24.6; see Table 5).

DISCUSSION

To our knowledge, this is the first study measuring the threat orientation and perceived susceptibility and likelihood of recurrent injury in a trauma patient sample. For this research study, among the total sample, the TR rate was 31% falling within a low range of 1% (Hedges et al., 1995) and a high range of 44% (Kao et al., 2019) of previous TR studies. Several recidivists had more than one injury within the past 5 years. Multiple other studies have shown that recidivists are prone to more than two traumatic injuries within a 5-year period (Hedges et al., 1995; McCoy et al., 2013; Poole et al., 1993).

Comparison Between Recidivist and Nonrecidivists

In this study, mental illness, depression, and LOS were the only statistically significant variables when examining the difference between those with a history of TR and those without. The presence of mental illness was significantly higher in recidivists than in the nonrecidivist group. More specifically, depression was present in 35% of trauma recidivists compared with 10% in the non-TR group. Depression was the most prevalent mental illness diagnosis and resembled the results found by Koleszar et al. (2016) and Wan et al. (2006).

Depression and injury have demonstrated a bidirectional relationship in which depressive states can provoke harmful behavior, and injury can induce depressive episodes leading to a recurring injury sequence (Patten et al., 2010; Shadloo et al., 2016) and may help explain the patterns observed in this study. Acknowledging the impact of mental health on trauma and vice versa, the American College of Surgeons (ACS) released

a statement in 2018 conveying the critical importance of hospital-based mental health screening and intervention programs in conjunction with a recommendation of more robust research centered on better understanding posttraumatic stress disorder and depression following injury (ACS, 2018). To support trauma centers in caring for these subpopulations, the ACS recently released the best practice guidelines for screening and intervention for mental health disorders and substance abuse and misuse in the acute trauma patient (ACS, 2022).

The average LOS was 3 days longer for the nonrecidivism group than for the recidivism group. Although Kao et al. (2019) found no difference between LOS among TR groups, Rogers et al. (2014) and Nygaard et al. (2018) found longer average LOS among recidivism groups. Differences between the nonrecidivism and recidivism groups in the current study may suggest that LOS impacts an individual's outlook and ability to return to high-risk behavior. Shorter LOS in this study's sample may also indicate less severe injuries, as reflected by the lower ISSs noted in the recidivism group compared with the nonrecidivism group. Nygaard et al. (2018) and Reiner et al. (1990) also found lower ISSs among recidivists and contributed it to recidivists sustaining a higher frequency of penetrating injuries causing isolated injuries, compared with blunt injuries that cause more systemic bodily injury.

Although there were no other significant differences between nonrecidivism and recidivism groups, a few trends were noted in threat orientations. The total sample and both recidivism groups scored highest in the control-based orientation, suggesting that some participants were oriented toward preventative health behaviors, regardless of their recidivist grouping. The fact that control-based orientation did not differentiate the two recidivist groups is interesting and should be followed up with further research.

Table 2. Clinical Variables

| Variables | Mean (SD) or n (%) | | | p |
|-------------------------------------|-------------------------------|---|---------------------------------------|---------------------|
| | Total Trauma Sample n = 84 | Non-Trauma Recidivist Subsample n = 58 | Trauma Recidivist Subsample n = 26 | |
| Number of chronic illness diagnoses | | | | |
| 0 | 39 (46.4%) | 28 (48.3%) | 11 (42.3%) | |
| 1 | 19 (22.6%) | 11 (19.0%) | 8 (30.8%) | |
| ≥2 | 26 (31.0%) | 19 (32.8%) | 7 (26.9%) | .486 ^a |
| Presence of MI | 41 (48.8%) | 23 (39.7%) | 18 (69.2%) | .012 ^{a,b} |
| Number of MI diagnoses | | | | |
| 0 | 43 (51.2%) | 35 (60.3%) | 8 (30.8%) | |
| 1 | 24 (28.6%) | 16 (27.6%) | 8 (30.8%) | |
| ≥2 | 17 (20.2%) | 7 (12.1%) | 10 (38.4%) | .010 ^{a,b} |
| Type of MI | | | | |
| SA or SI | 2 (2.4%) | 1 (1.7%) | 1 (3.8%) | .526 ^c |
| Schizophrenia or | | | | |
| Psychosis | 4 (4.8%) | 3 (5.2%) | 1 (3.8%) | 1.000 ^c |
| Bipolar | 4 (4.8%) | 3 (5.2%) | 1 (3.8%) | 1.000 ^c |
| ADHD | 5 (6.0%) | 2 (3.4%) | 3 (11.5%) | .169 ^c |
| Anxiety/panic attack | 12 (14.3%) | 6 (10.3%) | 6 (23.1%) | .176 ^c |
| Depression | 15 (17.9%) | 6 (10.3%) | 9 (34.6%) | .012 ^{a,c} |
| PTSD | 5 (6.0%) | 3 (5.2%) | 2 (7.7%) | .643 ^c |
| Substance abuse or addiction | 22 (26.2%) | 13 (22.4%) | 9 (34.6%) | .240 ^a |
| Other | 1 (1.2%) | 1 (1.7%) | 0 (0.0%) | .255 ^c |
| Positive toxicology | 51 (60.7%) | 34 (58.6%) | 17 (65.4%) | .557 ^a |
| Type of toxicology ^d | | | | |
| Amphetamines | 19 (22.6%) | 12 (20.7%) | 7 (26.9%) | |
| Cannabis | 24 (28.6%) | 15 (25.9%) | 9 (34.6%) | |
| Alcohol | 17 (20.2%) | 10 (17.2%) | 7 (26.9%) | .959 ^a |
| Mechanism of injury ^e | | | | |
| High-risk MVA ^f | 22 (26.2%) | 16 (27.6%) | 6 (23.1%) | |
| Motorcycle or dirt bike | 18 (21.4%) | 12 (20.7%) | 6 (23.1%) | |
| Bicycle/mountain bike or ATV | 10 (11.9%) | 5 (8.6%) | 5 (19.2%) | |
| Electric scooter | 5 (6.0%) | 5 (8.6%) | 0 (0.0%) | |
| Fall from height | 10 (11.9%) | 8 (13.8%) | 2 (7.7%) | |
| Injury sustained from animal | | | | |
| Stabbing or GSW | 3 (3.6%) | 2 (3.4%) | 1 (3.8%) | |
| Other assault | 6 (7.1%) | 4 (6.9%) | 2 (7.7%) | |
| Surfing or sporting | 4 (4.8%) | 2 (3.4%) | 2 (7.7%) | |
| Pedestrian versus auto | 1 (1.2%) | 1 (1.7%) | 0 (0.0%) | |
| Other | 5 (6.0%) | 3 (5.2%) | 2 (7.7%) | |
| LOS | 6.8 (6.4) | 7.9 (6.9) | 4.9 (4.1) | .014 ^{b,g} |
| ISS | 12.7 (6.4) | 13.3 (9.2) | 11.5 (6.2) | .387 ^f |
| PLRI item 1 | 2.3 (3.1) | 1.9 (2.5) | 3.3 (3.9) | .095 ^g |
| PLRI item 2 | 2.4 (2.7) | 2.2 (2.4) | 2.9 (3.2) | .344 ^g |
| PLRI item 3 | 4.8 (4.4) | 4.9 (4.4) | 4.5 (4.4) | .716 ^g |

(continues)

Table 2. Clinical Variables (Continued)

| Variables | Mean (SD) or n (%) | | | p |
|------------------|-------------------------------|---|---------------------------------------|-------------------|
| | Total Trauma Sample n = 84 | Non-Trauma Recidivist Subsample n = 58 | Trauma Recidivist Subsample n = 26 | |
| PLRI total score | 9.7 (8.4) | 9.3 (7.7) | 10.7 (9.8) | .489 ^a |
| TOS mean scores | | | | |
| CB | 5.5 (1.3) | 5.6 (1.2) | 5.4 (1.5) | .649 ^f |
| HSB | 3.0 (1.5) | 2.9 (1.3) | 3.2 (1.8) | .500 ^f |
| ODB | 4.5 (1.3) | 4.6 (1.3) | 4.5 (1.3) | .730 ^f |
| ADB | 2.8 (1.5) | 2.7 (1.3) | 3.1 (1.8) | .340 ^f |

Note. ADB = avoidance denial-based orientation; ADHD = attention deficit hyperactivity disorder; ATV = all-terrain vehicle; CB = control-based orientation; GSW = gunshot wound; HSB = hypersensitivity-based orientation; ISS = Injury Severity Score; LOS = length of hospital stay; MI = mental illness; MVA = motor vehicle accident; ODB = optimistic denial-based orientation; PLRI = Perceived Likelihood of Recurrent Injury; PTSD = posttraumatic stress disorder; SA = suicide attempt; SI = suicidal ideation; TOS = Threat Orientation Scale.

^aChi-square.

^bp < .05 two-tailed for differences between nontrauma and trauma recidivists.

^cFisher's exact χ^2 .

^dTop three most common toxicology findings; p value does not reflect other toxicology groups.

^eMechanism of injury not included in statistical analyses.

^fMVA: includes high speed, reckless behavior, positive toxicology result, and/or distracted driving.

^gMann-Whitney U test.

Regarding the Perceived Likelihood of Recurrent Injury responses, recidivists conveyed an awareness of their susceptibility to injury and recorded a higher average score of awareness compared with nonrecidivists. Initially, this appeared paradoxical because why would someone, aware of their risk for injury continue to take risks? However, after reviewing the types of injury among trauma recidivists, most were related to sporting activities. Because these repeat injuries occurred during adrenaline-based recreations (e.g., motorcycle riding), recidivists may realize that they are at risk but not possess the desire to change their behavior. Similarly, Van Horn (2005) found that 57% of trauma patients

perceived themselves as likely to have another injury in the next 5 years, whereas Claassen et al. (2007) reported that only 33% of high-risk trauma patients acknowledged their risky behavior and were significantly more likely to return to trauma services. These findings suggest that an individual may be impervious to high-risk behavior modification regardless of their awareness or acceptance of their risk for potential injury.

Item 2 of the Perceived Likelihood of Recurrent Injury revealed that the recidivism group considered themselves more likely to get injured than someone else and scored higher than the nonrecidivism group. These results were consistent with the pattern seen in item 1 of the Perceived Likelihood of Recurrent Injury.

Finally, Perceived Likelihood of Recurrent Injury item 3 measured how likely a participant would return to the high-risk behavior that led to their current hospitalization. Nonrecidivists reported themselves as more likely to return to high-risk behavior than recidivists. However, recidivists recorded a higher total Perceived Likelihood of Recurrent Injury score than nonrecidivists, suggesting that recidivists were more aware of their subjective risk than nonrecidivists. In previous perceived risk research, Weinstein (1980) found that most people expect others to fall victim to the misfortune of specific actions whereas they remain immune from the consequences of that same action. Perhaps this is the phenomenon seen within the nonrecidivism group. Concerning the recidivism group, Rutter et al. (1998) found that increased risk perception led to subsequent reckless behavior. In other words, as risk perception increased, it appeared to compel individuals to further

Table 3. Between-Group Analysis

| Variable | Non-TR n = 58 | TR n = 26 | Test Score | p |
|------------|------------------|--------------|-------------------|------|
| Any MI | 23 (39.7%) | 18 (69.2%) | $\chi^2 = 6.29$ | .012 |
| Total MI | – | – | – | – |
| 0 | 35 (60.3%) | 8 (30.8%) | – | – |
| 1 | 16 (27.6%) | 8 (30.8%) | – | – |
| ≥ 2 | 7 (12.1%) | 10 (38.4%) | $\chi^2 = 9.31$ | .010 |
| Depression | 6 (10.3%) | 9 (34.6%) | $\chi^2 = 7.21^a$ | .012 |
| LOS | 7.9 (6.9) | 4.9 (4.1) | $z = -2.45$ | .014 |
| PLRI no. 1 | 1.9 (2.5) | 3.3 (3.9) | $z = -1.63$ | ns |
| TOS-CB | 5.6 (1.2) | 5.4 (1.5) | $t = 0.458$ | ns |

Note. LOS = length of hospital stay; MI = mental illness; ns = nonsignificant; PLRI no. 1 = Perceived Likelihood of Recurrent Injury Item no. 1; TOS-CB = Threat Orientation Scale-Control-Based threat orientation; TR = trauma recidivism.

^aFisher's exact test.

Table 4. Comparison of Trauma Recidivism Groupings on Perceived Likelihood of Recurrent Injury Items^a

| PLRI Item | Median | | U | z | p |
|--|---|---------------------------------------|--------|-------|------|
| | Non-Trauma Recidivist Subsample n = 58 | Trauma Recidivist Subsample n = 26 | | | |
| Item 1: In the next 5 years, how likely do you believe you will experience another injury requiring a hospital visit? | 0.50 | 1.00 | 594.50 | -1.63 | .104 |
| Item 2: In the next 5 years, how likely do you believe you will experience another injury requiring a hospital visit compared with another person engaging in the same activity that led to your most recent injury? | 2.00 | 1.00 | 689.00 | -0.64 | .520 |
| Item 3: In the next 5 years, how likely are you to return to the activity that led to your most recent injury? | 5.00 | 3.50 | 753.00 | -0.01 | .992 |
| Total score: | 9.50 | 7.00 | 701.00 | -0.52 | .607 |

Note. PLRI = Perceived Likelihood of Recurrent Injury.

^aMann-Whitney U test.

risky behaviors leading to recurrent injury and may help explain the phenomenon among recidivists.

Odds Results

This study revealed that the odds for TR were 6.5 times higher for individuals with two or more mental illness diagnoses when controlling for LOS and Perceived Likelihood of Recurrent Injury item 1. Similarly, Wan et al. (2006) found that mental illness placed an individual at 4.5 times the risk for injury recidivism than those with no mental illness when controlling for substance abuse, homelessness, and gender. Alghnam et al. (2016) found that depression was associated with almost 1.5 times higher odds of TR than in those with no depression. In summary, mental illness is the strongest indicator for TR in this study and aligns with previous research.

Moving forward, the trauma community would benefit from prospective research studies exploring the intricacies of injury risk perception in those diagnosed with mental illness, specifically depression. Furthermore, as this gap in the research is addressed, specific interventional studies to decrease traumatic injuries among patients with certain types of mental illness should be tested. Additional studies should explore the best injury prevention education methods for individuals who may

be disadvantaged in perceiving and understanding their recurrent injury risk.

LIMITATIONS

This study presents several limitations. The first was a small sample size ($n = 26$) for the TR group. As a result, tests of association were underpowered, possibly leading to inflated relationships and type II errors. Second, the population served by the designated trauma center was restricted by preset trauma catchment boundaries and, therefore, decreased the generalizability of the findings to other geographic locations. Finally, the study instruments were validated only among English speakers; hence, the data cannot be generalized to non-English speakers.

CONCLUSION

Injury and TR are significant public health concerns that are preventable with timely recognition of risk factors and interventions. This study highlights the importance of concentrating injury prevention efforts on individuals with mental illness, specifically those with concomitant diagnoses and those with depression.

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Table 5. Binary Logistic Regression: Trauma Recidivism Odds

| Variables in Equation | OR (95% CI) | p |
|-----------------------|----------------------|------|
| 1 MI | 1.739 (0.531–5.703) | .361 |
| 2+ MI | 6.480 (1.708–24.585) | .006 |
| LOS | 0.884 (0.772–1.011) | .072 |
| PLRI item 1 | 1.103 (0.938–1.297) | .236 |

Note. CI = confidence interval; LOS = length of hospital stay; MI = mental illness diagnoses; OR = odds ratio; PLRI Item 1 = in the next 5 years, how likely do you believe you will experience another injury requiring a hospital visit?

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