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Event Centrality Following Treatment for Physical Injury in the Emergency Department: Associations with Posttraumatic Outcomes

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Abstract

Background: The relationship between event centrality (i.e., the degree to which a stressful event is integrated into one's identity) and acute posttraumatic outcomes after relatively minor physical injury is unknown. We examined pre-injury and Emergency Department (ED) predictors of event centrality at 6-weeks post-injury, and whether event centrality is uniquely associated with 6-week posttraumatic outcomes.

Methods: In the EDs of two Level I trauma centers, 149 patients completed surveys regarding demographic, psychological and injury-related factors within 24-hours post-injury; 84 patients (51% male) completed 6-week surveys of event centrality, posttraumatic stress symptoms (PTSS) and trauma-specific QOL (T-QoL). Data were analyzed using linear regression modeling.

Results: At least 20% of patients agreed or strongly agreed that the injury changed their life. Hospitalization status and peritraumatic dissociation were significant predictors of event centrality at 6-weeks. After controlling for demographics, ED-related factors and pre-injury PTSS, event centrality was uniquely associated with PTSS ($p < .001$) and T-QOL ($p < .001$) at 6 weeks.

Conclusion: Over and above the effects of the injury itself, event centrality conveyed important information for posttraumatic outcomes at 6 weeks post-injury. The centrality scale is brief and feasible to administer; future work is needed to determine the predictive utility of event centrality on post-injury outcomes.

Traumatic injury is a significant cause of mortality and distress in the United States (Center for Disease Control and Prevention, 2011). Although most Emergency Department (ED)

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Author Statement

Due to the sensitive nature of the questions asked in this study, survey respondents were assured raw data would remain confidential and would not be shared.

Data not available / The data that has been used is confidential

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visits for physical injury are mild and do not require hospitalization (Villaveces, Mutter, Owns & Barrett, 2010), injured patients are vulnerable to post-injury psychological distress and general health complaints (Au & Holdgate, 2010; Hours et al., 2014; Bryant et al., 2010). Specifically, symptoms of Posttraumatic Stress Disorder (PTSD) are associated with acute and chronic pain, physical health problems (Feinberg et al., 2017; Pacella, Hruska & Delahanty, 2013; Pacella et al., 2018), and poor quality of life and long-term disability (Kenardy, Heron-Delaney, Warren & Brown, 2015; Haagsma, Scholten, Andriessen, Vos, Beeck & Polinder, 2015; O'Donnell, Varker, Holmes et al., 2013). In the absence of hospitalization, patients at risk for persistent distress may be overlooked for further follow-up care and treatment (Jaramillo et al., 2019; Au et al., 2010). As such, it is critical to identify acute factors contributing to post-injury distress prior to the development of chronic symptomology.

Event centrality has received increased attention in the psychological trauma field given its robust association with PTSD symptoms (PTSS; e.g., intrusions or re-experiencing, avoidance of trauma-related thoughts or reminders; altered cognitions and mood; and hypervigilance) (Gehrt, Berntsen, Hoyle & Rubin, 2018). Event centrality refers to the extent to which a person interprets an event as central to their identity, a turning point within the story of their life, and/or a reference point for everyday events (Berntsen & Rubin, 2006). As such, event centrality includes appraisals that are involved in the development and maintenance of PTSD (Vermeulen et al., 2019). Further, centrality and PTSS may serve as mutually reinforcing constructs over time, such that initial distress may contribute to interpreting an event as central; in turn, the event becomes interconnected with autobiographical memories and is easily triggered by non-related events and memories, eventually leading to intrusions and symptoms consistent with PTSS (Boals, Griffith & Southard-Dobbs, 2020).

Within the broader trauma literature, knowledge of event centrality and posttraumatic outcomes largely stems from college student samples and cross-sectional study designs (see Gehrt et al., 2018 for review). Although centrality research is emerging among injured samples, extant studies are primarily limited to severe or chronic physical injuries and illnesses (spinal cord injury, Boals et al 2017; stroke, Kuenemund et al 2016; multiple sclerosis, Voltzenlogel et al., 2016; chronic pain, Perri & Keefe, 2008). To date, only one cross-sectional study conducted among recent survivors of spinal cord injury requiring inpatient rehabilitation has demonstrated acute relationships between event centrality, PTSS and disability. As such, it is unclear whether patients with acute physical injury interpret such events as central, and whether pre-injury or injury-related factors are associated with event centrality.

Current Study

Among a sample of acutely injured ED patients, we assessed a broad range of predictors relevant to both event centrality and PTSS (Gehrt et al., 2018) within 24-hours post-injury; at 6-weeks post-injury, patients self-reported their levels of event centrality and posttraumatic outcomes. We aimed to determine: 1) whether pre-injury (demographics, prior PTSS, and psychological treatment) and peri-injury characteristics (ED pain score,

hospitalization status, life threat; peritraumatic dissociation) predict event centrality at 6-weeks, and 2) after controlling for relevant factors, whether event centrality is uniquely associated with the primary outcome of 6-week PTSS and the secondary functional outcome of injury-related quality of life.

Method and Protocol

Study procedures were approved by the Human Research Protection Office of the University of Pittsburgh. This study was based on secondary data analyses from a parent study that examined the feasibility of screening ED patients for psychological distress (see Jaramillo et al., 2019 for methodological details). Briefly, injured ED patients were identified by a research assistant based on chief complaint via the ED's electronic tracking board, then a member of the treating team confirmed initial eligibility status and permission to contact the patient. The RA approached patients in their treating rooms, screened interested patients for full eligibility, obtained informed consent, and initiated completion of the baseline survey. Recruitment occurred primarily during weekday afternoon/evenings based on research assistant availability and ED volume. At 6-weeks post-injury, a link was emailed to participants to complete the follow-up survey. Participants were compensated \$10 for completing each survey at baseline and follow-up (\$20 total).

Participants

Between January 2016 and May 2017, we recruited adults (ages 18–60) seeking treatment for physical injury (sustained < 24 hours prior) in the EDs of two Level 1 Trauma Centers in Pittsburgh. Eligible patients were medically stable, met Criterion A of the PTSD diagnosis (i.e., self-reported life threat or exposure to actual or threatened serious injury) consistent with the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5) (American Psychiatric Association, 2013), and were not hospitalized for more than one day. Participants were excluded for: primary treatment for a mental health or substance use issue vs. physical injury; presenting with self-inflicted injury or suicidal thoughts; and presence of a neurological disease or a physical injury caused by a medical condition (e.g., motor vehicle crash caused by seizure).

Measures

Demographic and injury information.

At baseline, participants completed demographic information: age, sex, race (coded as white, African-American, and other), and educational attainment. Medical record review was also conducted to record the mechanism of injury and the pain score (from 0 to 10) reported in the ED. Pain score was missing for 13 participants; when available, we used the reported discharge pain score or admission pain score, resulting in 79 participants with a useable pain score.

Pre-injury psychological treatment.

At baseline, participants responded yes or no to the following question at baseline: “Has there ever been a point in your life when you received help for emotional or mental health problems?”

Pre-injury PTSS: 6-item PTSD Checklist – Short Version.

Pre-injury PTSS were assessed at baseline using a short version of the PTSD Checklist for DSM-IV with the introduction “Below is a list of problems and complaints that people sometimes have in response to stressful life experiences. ... choose the best response to indicate how much you have been bothered by that problem in the past month BEFORE YOUR INJURY” (a brief screener reflecting DSM-5 PTSS was not yet available at the time of study design). We utilized a 6-item screener consistent with DSM-IV PTSS (Lang & Stein, 2005). Item responses range from 0 (*not at all*) to 4 (*a lot*) and were summed together to provide a continuous measure of PTSS severity with a total score ranging from 0 to 24 (internal consistency was $\alpha = 0.93$). This measure has been previously used in injury samples (see Hruska et al., 2016; 2017).

Dissociation.

At baseline, the 10-item Peritraumatic Dissociative Experience Questionnaire (PDEQ, Marmar, Weiss & Metzler, 1997) was used to assess dissociative experiences (e.g., depersonalization, derealization, amnesia, out of body experiences, and altered time perception and body image) during the injury and in the minutes and hours to follow the injury. Items are scored on a 5-point Likert-type scale (from 1 *not at all true* to 5 *extremely true*) and are summed to create a total score; internal consistency in our sample was high ($\alpha = 0.91$). The PDEQ has been used extensively in injured samples (Brooks et al., 2009; Fullerton et al., 2000; for review, see van der Velden & Wittmann, 2008) and has been validated in French among injured ED patients (Birmes et al., 2005).

Criterion A.

At baseline, patients were asked to identify the event that brought them to the hospital, and whether it involved: “actual or threatened death?” and/or “actual or threatened serious injury?”; responses were “yes” or “no”.

Centrality of Events Scale (CES).

At 6-weeks post-injury, centrality was assessed with the short form of CES (Bernsten & Rubin, 2006). This 7-item self-report measure assesses the extent to which a traumatic event has become central to a person’s identity or self-story (see Table 2 for items). Responses are on a 5-point Likert-type scale ranging from 1 (*totally disagree*) to 5 (*totally agree*). Internal consistency in this sample was $\alpha = 0.92$.

Post-injury PTSS.

PTSS stemming from the index injury event were assessed at 6 weeks utilizing the 20-item self-report PTSD Checklist for DSM-5 (PCL; Weathers, Litz, Keane, Palmieri, Marx & Schnurr, 2013). The PCL has demonstrated specificity, sensitivity, and satisfactory

diagnostic accuracy in traumatically injured patients (Geier et al., 2019). Responses were anchored to “the event that recently brought you to the Emergency Room at xxxx”. Response options range from 0 (*not at all*) to 4 (*extremely*) and items were summed together to provide a continuous measure of PTSS severity with a total score ranging from 0 to 80 ($\alpha = 0.96$); a cut-point of 31 was used to describe those at high risk for probable PTSD (Blevins et al., 2015).

Trauma-Specific Quality of life (T-QOL).

Quality of life was assessed at 6-weeks post-injury using the T-QOL survey, a 43-item self-report measure developed among injured Level 1 Trauma Center patients (Wanner, deRoos-Cassini, Kodadek, & Brasel, 2015). The T-QOL assesses emotional well-being, functional engagement, recovery and resilience, peritraumatic experience, and physical well-being. Responses are rated on a 4-point Likert-type scale (for 41 questions) and 5-point Likert-type scale (for 2 questions). For ease of administration we converted the 2 questions to the same 4-point Likert scale (Jaramillo et al., 2019). Responses were summed for a total score with higher scores corresponding to better T-QOL ($\alpha = 0.91$).

Data Analysis—We used SPSS version 24 for data analysis and a two-tailed alpha level of 0.05 to determine statistical significance. Descriptive statistics were used to characterize study participants: frequencies and percentages were reported for dichotomous data, and means and SDs were reported for continuous data. One-way ANOVAs were used to examine group differences (e.g., by sex; hospitalization status; life threat; prior psychological treatment) in continuous outcomes: centrality, PTSS, and T-QOL. Pearson correlation measured the bivariate association between continuous variables. Factors with univariate associations or theoretical associations with psychological outcomes were included in the primary models as covariates.

Regression modeling was used to determine predictors of event centrality, and to determine whether event centrality was associated with the primary outcome of 6-week PTSS, and the secondary outcome of T-QOL. Given a lack of theoretical justification to separate factors into covariates versus predictors, the initial regression model for the outcome of 6-week centrality included demographic, psychological, and injury-related predictors of the outcome in a single step. Hierarchical linear regression analyses were then conducted to determine whether event centrality is uniquely associated with posttraumatic outcomes after controlling for relevant covariates. In the first step of the analyses, all covariates were added to the model predicting the outcomes of interest (i.e., PTSS or T-QOL). In the second step, the predictor variable (i.e., event centrality) was added to the model. In these latter models, the change in the amount of variance accounted for (R^2) in the second model compared to the first model was used to examine the unique variance accounted for by the predictor. In total, 3 regressions were conducted with the outcomes of: 1) 6-week event centrality; 2) 6-week PTSS; and 3) 6-week T-QOL. Multicollinearity statistics for the predictors in the final regression models was examined using VIF statistics; all values were less than 1.7, indicating that multicollinearity was not a significant concern in this sample.

Results

Descriptive statistics.

Of the 386 ED patients who agreed to be screened for the study, 213 (55%) were not eligible due to a lack of Criterion A trauma (i.e., either self-reported life threat or actual or serious injury; $n = 201$; 94%), or to injury occurring 24 hours prior to ED admission ($n = 12$; 6%) (see additional details in Jaramillo et al., 2019). Of the 173 eligible patients, 154 completed baseline data prior to discharge, and 91 (59%) were retained at 6-weeks post-injury. Of the latter subjects, seven were excluded due to physical injury secondary to a medical condition ($n = 3$) and hospital admission >1 day ($n = 4$). See Table 1 for demographics and baseline information for the final sample ($n = 84$). Males (52% retained) were less likely than females (71% retained) to complete the 6-week assessment ($\chi^2(1) = 5.05$, $p = 0.025$). Retention rates did not differ by age, race, hospital admission, pre-injury PTSS, or peritraumatic dissociation.

The final sample was relatively young ($M_{\text{age}} = 33$; $SD = 11.88$), with approximately equal distributions of gender (51% women). Slightly more than half of the sample identified as Caucasian (55%), and half (50%) reported that they received help for a pre-injury emotional or mental health problem. Most patients (91%) were discharged home directly from the ED rather than requiring hospital admission; yet 31% perceived life threat during the event. Mechanism of injury was primarily non-interpersonal, consisting of general accidents (35%), motor vehicle crashes (24%), falls (24%) and work-related accidents (17%).

Although most injuries were not perceived as life threatening and did not result in hospitalization, pain score was high ($M = 6.90$), and 15 patients (18%) screened positive for probable PTSD at 6-weeks post-injury. Further, between 8.5 – 28% of the sample endorsed each item of the CES with a response of “agree” or “strongly agree” (see Table 2), and the average CES score at 6-weeks was 14.66 ($SD = 7.20$, range = 7 – 35). The most commonly endorsed item was “I often think about the effect this event will have on my future” and least common was “This event has become a central part of my life story”. Roughly 20% endorsed “This event has colored the way I think and feel about other experiences” and “This event permanently changed my life.” Notably, each individual scale item was independently associated with 6-week PTSS (Table 2).

In bivariate correlations, 6-week CES was significantly and positively correlated with peritraumatic dissociation ($r = 0.28$) and 6-week PTSS ($r = 0.55$), and negatively correlated with 6-week T-QOL ($r = -0.56$) (see Supplemental Table 1). CES was unrelated to demographic variables, ED pain score, and pre-injury PTSS. Those who were hospitalized were more likely to report that the injury was central ($F = 8.74$, $p = 0.004$; Supplemental Table 2); no other group differences emerged.

Predictors of event centrality.

In predicting event centrality at 6-weeks post-injury (see Table 3), hospitalization status and peritraumatic dissociation were the only significant predictors to emerge (positively); other factors did not predict (age, sex, perceived life threat, pain score, and prior PTSS and treatment).

Associations between event centrality and posttraumatic outcomes.

See Table 4 for results of the hierarchical regression analyses on 6-week PTSS and T-QOL (only the final step of each models is depicted). Perceived life threat and pre-injury PTSS were uniquely predictive of 6-week PTSS, and the addition of centrality to the model resulted in a significant amount of additional variance explained ($R^2 = 0.11$; $B = 0.38$, $p < .001$). For the secondary outcome of T-QOL, age, ED pain score, and hospital admission were all significantly associated with 6-week T-QOL; again, adding centrality to the model resulted in accounting for additional variance in the outcome ($R^2 = 0.09$; $B = -0.36$, $p < .001$).

Discussion

To our knowledge, this study was the first to examine pre-injury and acute ED factors associated with event centrality following physical injury. Although most patients did not require hospitalization for their injuries, at least 20% of participants indicated that the injury changed how they thought about other experiences and the future. Additionally, event centrality was associated with unique variance among PTSS (11%) and T-QOL (9%) at 6-weeks post-injury.

Between 9–28% of patients endorsed event centrality items, and robust relationships emerged between centrality and acute post-injury outcomes; however, the average centrality score in our sample ($M = 14.66$) was lower than averages reported in other medical samples, including: recent spinal cord injury ($M = 22.86$; Boals et al., 2017), post-stroke patients ($M = 26.71$; Kuenemund et al., 2016), multiple sclerosis patients ($M = 23.8$, converted from item average; Voltzenlogel et al., 2016), and chronic pain patients ($M = 24.1$ adjusted from full scale CES; Perri & Keefe, 2008). Our lower average score is similar to the mean reported in relation to a self-identified stressful event by the healthy control group (vs. stroke patients) in Kuenemund and colleagues (2016). Further, our average is markedly lower than a treatment-seeking sample with chronic PTSD (pre-treatment $M = 31.5$, post-treatment $M = 27.1$; Grau et al., in press). It is important to note that these event centrality ratings are not directly comparable given that our assessment of centrality occurred acutely within 6-weeks of injury; sufficient time may not have elapsed for patients to observe significant life changes that only become apparent with time. Trauma type may also partially account for lower levels of centrality, as interpersonal traumas have been found to be more “central” than non-interpersonal accidents or unintentional injuries (Reiland & Clark, 2017; Wamser-Nanney et al., 2018). Longitudinal research is warranted to determine whether and how event centrality changes over time following traumas of varied types and severity.

In predicting event centrality, the only factors to emerge as significant were peritraumatic dissociation and hospitalization status; a recent systematic review similarly indicated that the factors that drive event centrality remain largely unknown (Gehrt et al., 2018). Although the relationship between centrality and dissociation is complex and poorly understood (Gehrt et al., 2018), dissociation during a trauma tends to lead to an incomplete processing of the event, which in turn is associated with PTSS; dissociation may also serve as a marker of more intensely experienced trauma. Further, although the injuries sustained in this sample were relatively minor (i.e. did not require lengthy hospitalization), the experience of seeking

treatment in the ED, with the additional stressor of hospital admission may have increased the salience of the injury, marking it as a notable life event (or shifting one's perception of the event as more severe). Requiring hospitalization (even for a day) may have also led to the receipt of additional follow-up care, potentially increasing event saliency, or may simply be a marker of a variety of complications (physical, emotional, or social).

Notably, other "objective" indicators of event severity (life threat, pain score) were not related to event centrality, consistent with findings that the emotional response to trauma is a stronger predictor of centrality than objective indicators of severity (Gehrt et al, 2018). In contrast, although perceived life threat is consistently related to PTSD severity (Tran & Beck, 2019), it was not associated with centrality in our sample. It is possible that life threat makes an event particularly salient in its immediate aftermath (for survival purposes), but as recovery processes are initiated and the threat dissipates, the initial threat they experienced in the ED may no longer be sufficient to impact event centrality at 6-weeks; particularly in this sample of injuries, the immediate reactions may be temporary and dissipate as patients return to their baseline functioning (Boals et al 2015). Further, pre-injury PTSS and psychological treatment were not predictive of centrality, which is consistent with prior research that centrality is event-specific (and interpretation-specific) rather than a characteristic or personality trait that causes a person to interpret all negative events as central (Boals et al., 2015; Gehrt et al., 2018).

Our findings also confirm prior studies that found centrality to be highly associated with PTSS, even after accounting for relevant and robust predictors of PTSD (e.g., life threat; Hunt et al., 2017 and prior PTSS; Boals & Ruggero, 2016), suggesting that even relatively minor injuries still contribute to event centrality and associated symptomology. Robust associations also emerged between centrality and T-QOL, a novel outcome reflecting emotional and physical quality of life specific to injured trauma survivors (Wanner et al., 2015).

Emerging literature indicates that centrality itself may be modifiable; specifically, centrality ratings have decreased following cognitive bias training (e.g., manipulating negative appraisals of centrality; Vermeulen et al., 2019) and interventions incorporating Acceptance and Commitment Therapy, a cognitive-behavioral exposure-based treatment that serves to decrease avoidance and focus on observing the self from the perspective of an observer (Boals & Murrell, 2016). Notably, interventions may also *increase* event centrality, a finding that emerged when subjects were asked to persuasively write about a stressful event in order to convince others about the significance and severity of that event (Lancaster & Erbes, 2016). To this end, it may be valuable to determine whether ED and acute care providers may interact with patients in ways that serve to either increase or decrease centrality (e.g., impacting how the event is encoded in memory due to event saliency or interpretation), and whether other more formal types of early intervention could be useful. On the other hand, it is important to consider that the directionality of the relationship between PTSD and centrality is not yet entirely clear. Though it is typically assumed that the construal of an event as central contributes to the development of PTSD, limited longitudinal, causal research is available to test the directionality of this relationship (see Boals, 2014; Boelen, 2014; Boals & Ruggero, 2016; Grau et al., in press; Ogle et al., 2016); moreover, a recent

study reported the opposite pattern, such that higher levels of PTSD may lead to higher levels of centrality (Glad et al., 2020); future research regarding directionality will serve to inform potential interventions.

This study should be viewed in the context of the following limitations, including the small sample size, low retention rate at 6-weeks, self-report of PTSS using a screening tool (versus the use of a diagnostic instrument), and limited range in event severity to detect potential relationships with centrality. Additionally, the assessment of pre-injury PTSS was not anchored to a specific event which would have made for a more stringent assessment of PTSD (vs. general distress); their current pain and distress level may have also biased and inflated these responses. Our assessment of pre-injury psychological treatment was also limited to a brief self-report question (which may reflect sex differences regarding behavioral health treatment), and did not capture a comprehensive history of mental health or substance use problems; future studies would benefit from assessing general pre-injury psychological functioning, treatment and substance use history. Further, due to our assessment of centrality occurring at the final (vs. baseline) time-point, we were unable to examine whether centrality predicted retention rates.

Regarding external validity, given that this was a convenience sample based on RA availability, we do not have a list of all potentially eligible ED patients, so it is unclear whether our sample is representative of the broader patient population. We also excluded those presenting due to primary mental health or substance use, self-inflicted injury, or suicidal thoughts, which would preclude generalization of results to the full ED population. The relationship between centrality and PTSS and T-QOL was also assessed in a cross-sectional design; stronger correlations between these measures may have emerged in part due to their assessment occurring at the same time point. Although there is potential overlap between dissociative symptoms and loss of consciousness among injured patients, dissociative symptoms remained a significant predictor of centrality; future research may aim to determine whether these effects are moderated by head injury or loss of consciousness. Finally, injury severity scores are not available for these patients, although the scores are likely low given the lack of hospitalization requirements.

Conclusion.

Whereas the primary focus of post-injury ED treatment is physical aspects of recovery, emotional recovery also plays a critical role in post-injury health and should not be overlooked. The CES is brief (7 items) and feasible to administer after injury as a marker of psychosocial symptoms and potential impairment. Despite the preliminary nature of this study, these findings warrant future research into the acute relationships among centrality and post-injury psychological and functional outcomes, and into methods to modify acute perceptions of negative event centrality.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

- Au EH & Holdgate A (2010). Characteristics and outcomes of patients discharged home from the emergency department following trauma team activation. *Injury*, 41(5), 465–469. [PubMed: 20015489]
- Berntsen D, & Rubin DC (2006). The centrality of event scale: A measure of integrating a trauma into one's identity and its relation to post-traumatic stress disorder symptoms. *Behaviour Research and Therapy*, 44(2), 219–231. [PubMed: 16389062]
- Blevins CA, Weathers FW, Davis MT, Witte TK, & Domino JL (2015). The posttraumatic stress disorder checklist for DSM- 5 (PCL- 5): Development and initial psychometric evaluation. *Journal of Traumatic Stress*, 28(6), 489–498. [PubMed: 26606250]
- Boals A (2014). Using event centrality to predict depressive symptoms after a romantic conflict: A prospective design. *Applied Cognitive Psychology*, 28(2), 259–265.
- Boals A, Griffith E, & Southard-Dobbs S (2020). A call for intervention research to reduce event centrality in trauma-exposed individuals. *Journal of Loss and Trauma*, 1–15.
- Boals A, & Murrell AR (2016). I am> trauma: Experimentally reducing event centrality and PTSD symptoms in a clinical trial. *Journal of Loss and Trauma*, 21(6), 471–483.
- Boals A, Murrell AR, Berntsen D, Southard-Dobbs S, & Agtarap S (2015). Experimentally reducing event centrality using a modified expressive writing intervention. *Journal of Contextual Behavioral Science*, 4(4), 269–276.
- Boals A, & Ruggero C (2016). Event centrality prospectively predicts PTSD symptoms. *Anxiety, Stress, & Coping*, 29(5), 533–541.
- Boals A, & Schuettler D (2011). A double- edged sword: Event centrality, PTSD and posttraumatic growth. *Applied Cognitive Psychology*, 25(5), 817–822.
- Boals A, Trost Z, Berntsen D, Nowlin L, Wheelis T, & Monden KR (2017). Event centrality as a unique predictor of posttraumatic stress symptoms and perceived disability following spinal cord injury. *Spinal Cord*, 55(11), 1023–1027. [PubMed: 28555662]
- Boelen PA (2012). A prospective examination of the association between the centrality of a loss and post-loss psychopathology. *Journal of Affective Disorders*, 137(1–3), 117–124. [PubMed: 22240087]
- Bryant RA, O'Donnell ML, Creamer M, McFarlane AC, Clark CR, & Silove D (2010). The psychiatric sequelae of traumatic injury. *American Journal of Psychiatry*, 167(3), 312–320. [PubMed: 20048022]
- Center for Disease Control and Prevention (2011). WISQARS (Web-Based Injury Statistics Query and Reporting System). 48(08): 48–4227.
- Chung MC, AlQarni N, AlMazrouei M, Al Muhairi S, Shakra M, Mitchell B, ... & Al Hashimi S. (2018). Posttraumatic stress disorder and psychiatric co-morbidity among Syrian refugees of different ages: The role of trauma centrality. *Psychiatric Quarterly*, 89(4), 909–921. [PubMed: 29981008]
- Feinberg RK, Hu J, Weaver MA, Fillingim RB, Swor RA, Peak DA, ... & Hendry PL (2017). Stress-related psychological symptoms contribute to axial pain persistence after motor vehicle collision: path analysis results from a prospective longitudinal study. *Pain*, 158(4), 682. [PubMed: 28030471]

- Gehrt TB, Berntsen D, Hoyle RH, & Rubin DC (2018). Psychological and clinical correlates of the Centrality of Event Scale: A systematic review. *Clinical Psychology Review*, 65, 57–80. [PubMed: 30138786]
- Glad KA, Czajkowski NO, Dyb G, & Hafstad GS (2020). Cross-lagged association between symptoms of posttraumatic stress disorder and perceived centrality of a terrorist attack. *Clinical Psychological Science*, 8(2), 295–305.
- Grau PP, Larsen SE, Lancaster S, Garnier-Villareal M & Wetterneck C (in press). Does change in centrality of a traumatic event predict PTSD symptom reduction during intensive treatment? *Journal of Traumatic Stress*.
- Haagsma JA, Scholten AC, Andriessen TM, Vos PE, Van Beeck EF, & Polinder S (2015). Impact of depression and post-traumatic stress disorder on functional outcome and health-related quality of life of patients with mild traumatic brain injury. *Journal of Neurotrauma*, 32(11), 853–862. [PubMed: 25320845]
- Hours M, Khati I, Charnay P, Chossegros L, Tardy H, Tournier C & Laumon B (2014). One year after mild injury: Comparison of health status and quality of life between patients with whiplash versus other injuries. *The Journal of Rheumatology*, 41(3), 528–538. [PubMed: 24334640]
- Hruska B, Pacella ML, George RL, & Delahanty DL (2017). The association between daily PTSD symptom severity and alcohol-related outcomes in recent traumatic injury victims. *Psychology of addictive behaviors*, 31(3), 326. [PubMed: 28263624]
- Hruska B, Pacella ML, George RL, & Delahanty DL (2016). Trajectories of daily PTSD symptoms in recent traumatic injury victims. *Psychological Trauma: Theory, Research, Practice, and Policy*, 8(6), 676.
- Hunt JC, Sapp M, Walker C, Warren AM, Brasel K, & deRoos-Cassini TA (2017). Utility of the injured trauma survivor screen to predict PTSD and depression during hospital admission. *Journal of Trauma and Acute Care Surgery*, 82(1), 93–101. [PubMed: 27787440]
- Jaramillo S, Suffoletto B, Callaway C, & Pacella- LaBarbara M (2019). Early screening for posttraumatic stress disorder and depression among injured emergency department patients: a feasibility study. *Academic Emergency Medicine*, 26(11), 1232–1244. [PubMed: 31179590]
- Kenardy J, Heron-Delaney M, Warren J, & Brown EA (2015). Effect of mental health on long-term disability after a road traffic crash: Results from the UQ Support study. *Archives of Physical Medicine and Rehabilitation*, 96(3), 410–417. [PubMed: 25450121]
- Kroenke K, Strine TW, Spitzer RL, Williams JB, Berry JT, & Mokdad AH (2009). The PHQ-8 as a measure of current depression in the general population. *Journal of Affective Disorders*, 114(1–3), 163–173. [PubMed: 18752852]
- Kuenemund A, Zwick S, Rief W, & Exner C (2016). (Re-) defining the self-enhanced posttraumatic growth and event centrality in stroke survivors: A mixed-method approach and control comparison study. *Journal of Health Psychology*, 21(5), 679–689. [PubMed: 24913010]
- Lancaster SL, & Erbes CR (2016). Convince me: The effects of persuasive writing on event centrality. *Applied Cognitive Psychology*, 30(6), 1106–1111.
- Lang AJ, & Stein MB (2005). An abbreviated PTSD checklist for use as a screening instrument in primary care. *Behaviour Research and Therapy*, 43(5), 585–594. [PubMed: 15865914]
- Marmar CR, Weiss DS, & Metzler TJ (1997). The Peritraumatic Dissociative Experiences Questionnaire In Wilson JP & Keane TM (Eds.), *Assessing Psychological Trauma and PTSD* (pp.412–428). New York: Guilford Press.
- O'Donnell ML, Varker T, Holmes AC, Ellen S, Wade D, Creamer M, & Forbes D (2013). Disability after injury: The cumulative burden of physical and mental health. *The Journal of Clinical Psychiatry*, 74, 137–143.
- Ogle CM, Rubin DC, & Siegler IC (2016). Accounting for posttraumatic stress disorder symptom severity with pre-and posttrauma measures: A longitudinal study of older adults. *Clinical Psychological Science*, 4(2), 272–286. [PubMed: 27004143]
- Pacella ML, Girard JM, Wright AG, Suffoletto B, & Callaway CW (2018). The association between daily posttraumatic stress symptoms and pain over the first 14 days after injury: An experience sampling study. *Academic Emergency Medicine*, 25(8), 844–855.

- Pacella ML, Hruska B, & Delahanty DL (2013). The physical health consequences of PTSD and PTSD symptoms: a meta-analytic review. *Journal of Anxiety Disorders*, 27(1), 33–46. [PubMed: 23247200]
- Perri LM, & Keefe FJ (2008). Applying centrality of event to persistent pain: A preliminary view. *The Journal of Pain*, 9(3), 265–271. [PubMed: 18096438]
- Reiland SA, & Clark CB (2017). Relationship between event type and mental health outcomes: Event centrality as mediator. *Personality and Individual Differences*, 114, 155–159.
- Tran HN, & Beck JG (2019). Are peritraumatic perceptions of fear/life threat and posttraumatic negative self-conscious appraisals/emotions differentially associated with PTSD symptoms? *Cognitive Therapy and Research*, 43(1), 272–283.
- Vermeulen M, Brown AD, Raes F, & Krans J (2019). Decreasing event centrality in undergraduates using cognitive bias modification of appraisals. *Cognitive Therapy and Research*, 43(1), 214–225.
- Villaveces A, Mutter R, Owens PL, Barrett, & M. L. (2013). Causes of Injuries Treated in the Emergency Department, 2010: Statistical Brief #156. Rockville (MD): Agency for Healthcare Research and Quality (US), 2006–2013 May. Available at: <http://www.ncbi.nlm.nih.gov/pubmed/24006548> Accessed November 16, 2018.
- Voltzenlogel V, Ernst A, De Seze J, Brassat D, Manning L, & Berna F (2016). Giving meaning to illness: An investigation of self-defining memories in patients with relapsing-remitting multiple sclerosis patients. *Consciousness and cognition*, 45, 200–209. [PubMed: 27656786]
- Wanner JP, deRoos-Cassini T, Kodadek L, & Brasel K (2015). Development of a trauma-specific quality of life measurement. *The Journal of Trauma and Acute Care Surgery*, 79(2), 275–281. [PubMed: 26218697]
- Wamser-Nanney R, Howell KH, Schwartz LE, & Hasselle AJ (2018). The moderating role of trauma type on the relationship between event centrality of the traumatic experience and mental health outcomes. *Psychological Trauma: Theory, Research, Practice, and Policy*, 10(5), 499.
- Weathers FW, Litz BT, Keane TM, Palmieri PA, Marx BP, & Schnurr PP (2013). The PTSD Checklist for DSM-5 (PCL-5). Scale available from the National Center for PTSD at www.ptsd.va.gov.
- Weathers FW, Blake DD, Schnurr PP, Kaloupek DG, Marx BP, & Keane TM (2013). The Life Events Checklist for DSM-5 (LEC-5). Instrument available from the National Center for PTSD at www.ptsd.va.gov

Table 1.

Baseline characteristics of the descriptive statistics of the final sample (N = 84)

Demographics	N (%) or Mean (SD)
Age	33 (11.88); Range 18–60
Sex	
Male	43 (51%)
Female	41 (49%)
Race	
Caucasian	46 (55%)
African American	27 (32%)
Other	11 (13%)
Education	
High school/GED or less	35 (42%)
Some college/technical or vocational school	33 (39%)
College degree or higher education	13 (15%)
Declined to answer	3 (4%)
ED Pain Score	6.90 (2.64); Range 1–10
Hospital Admission	
Admitted to hospital	8 (9%)
Discharged from ED	76 (91%)
Mechanism of Injury/Chief Complaint variables	
Motor-vehicle crash	20 (24%)
Falls	20 (24%)
Work-related accident	14 (17%)
General Accidents	30 (35%)
Life Threat During Injury	26 (31%)
Received pre-injury help for emotional or mental health problems	42 (50%)
Pre-injury PTSS	7.92 (7.12)

Note. Continuous variables are presented as *Mean (SD)*; dichotomous variables are presented as *n (%)*. SD = Standard deviation; ED= Emergency Department; GED= General Education Diploma; PTSD= Posttraumatic Stress Disorder.

Table 2.

Individual item responses on the Centrality of Events Scale.

CES Item	N	Correlation with PTSS	T3	M (SD)	Disagree/Strongly Disagree	Neutral	Agree/Strongly Agree
1. This event has become part of my identity	83	0.50		1.96 (1.24)	59 (71.1%)	11 (13.2%)	13 (15.7%)
2. This event has become a reference point for the way I understand myself and the world	83	0.39		1.96 (1.19)	61 (73.6%)	12 (14.5%)	10 (12.0%)
3. This event has become a central part of my life story	82	0.41		1.88 (1.07)	60 (73.1%)	15 (18.3%)	7 (8.5%)
4. This event has colored the way I think and feel about other experiences	83	0.40		2.25 (1.26)	48 (57.8%)	18 (21.7%)	17 (20.5%)
5. This event permanently changed my life	82	0.49		2.23 (1.31)	48 (58.5%)	18 (22.0%)	16 (19.5%)
6. I often think about the effect this event will have on my future	83	0.51		2.36 (1.38)	48 (57.8%)	12 (14.5%)	23 (27.7%)
7. This event was a turning point in my life	83	0.46		2.06 (1.28)	56 (67.5%)	13 (15.7%)	14 (16.7%)

Note: Please see Bemtsen & Rubin (2006) p. 229–230 for all scale items. All correlations significant at $p < .001$

Table 3.

Summary of hierarchal regression analysis demonstrating the association of demographic, psychological, and injury-related factors with the centrality of events scale at 6-weeks (N = 84).

Variables	<i>B</i>	<i>SE B</i>	95% CI	p-value	R ²
Outcome: 6-week CES					
Step 1:					0.25
Age	0.17	0.07	[-0.03,0.24]	0.120	
Sex	0.00	1.56	[-3.09,3.15]	0.984	
Prior psychological treatment	-0.15	1.87	[-5.88, 1.58]	0.255	
Pre-injury PTSS	0.04	0.14	[-0.23,0.32]	0.751	
ED Pain	0.01	0.31	[-0.59,0.65]	0.921	
Life Threat	0.14	1.81	[-1.31,5.91]	0.217	
Peritraumatic Dissociation	0.27	0.11	[-0.02,0.46]	0.033	
Hospital Admission	0.32	2.69	[2.83,13.56]	0.003	

Note: *B*= standardized beta coefficient; *SE B* = standard error of *B*. PTSS= Posttraumatic Stress Disorder Symptoms; ED= Emergency Department; PTSD + Screen= PTSD Positive screen.

Table 4.

Summary of hierarchal regression analyses demonstrating the association of the centrality of events scale with PTSD Symptoms and QOL at 6-weeks post-injury ($n = 84$).

Variables	<i>B</i>	<i>SE B</i>	95% CI	p-value	R ²
Outcome: 6-week PTSD Symptoms					
Step 1:					0.520
Step 2:					0.106
Age	0.14	0.10	[-0.02, 0.40]	0.071	
Sex	0.11	2.41	[-1.29, 8.33]	0.148	
Prior Psychological Treatment	-0.02	2.91	[-6.41, 5.20]	0.835	
Pre-injury PTSS	0.36	0.21	[0.37, 1.23]	0.000	
ED Pain	0.11	0.48	[-0.30, 1.61]	0.178	
Life Threat	0.27	2.82	[3.65, 14.89]	0.002	
Peritraumatic Dissociation	0.11	0.17	[-0.14, 0.55]	0.244	
Hospital Admission	-0.01	4.41	[-9.24, 8.38]	0.923	
6-week Centrality	0.38	0.19	[0.44, 1.19]	0.000	
Variables	<i>B</i>	<i>SE B</i>	95% CI	p-value	R ²
Outcome: 6-week Quality of Life					
Step 1:					0.493
Step 2:					0.095
Age	-0.23	0.14	[-0.66, -0.11]	0.007	
Sex	-0.07	3.19	[-9.04, 3.68]	0.403	
Prior Psychological Treatment	0.03	3.84	[-6.53, 8.82]	0.767	
Pre-injury PTSS	-0.165	0.28	[-1.03, 0.10]	0.106	
ED Pain	-0.35	0.63	[-3.87, -1.33]	0.000	
Life Threat	-0.06	3.72	[-10.19, 4.67]	0.461	
Peritraumatic Dissociation	-0.11	0.23	[-0.72, 0.20]	0.266	
Hospital Admission	-0.21	5.84	[-26.45, -3.15]	0.014	
6-week Centrality	-0.36	0.25	[-1.47, -0.48]	0.000	

Note: For brevity, we present only the results of Step 2 for each regression.

B= standardized beta coefficient; *SE B* = standard error of *B*. PTSD= Posttraumatic Stress Disorder; ED= Emergency Department; PTSD + Screen= PTSD Positive screen.