Distinct Trauma Types in Military Service Members

Seeking Treatment for Posttraumatic Stress Disorder

Brett T. Litz and Ateka A. Contractor

VA Boston Healthcare System and Boston University School of Medicine

Charla Rhodes

VA Boston Healthcare System

Katherine A. Dondanville

University of Texas Health Science Center at San Antonio

Alexander H. Jordan

VA Boston Healthcare System and Boston University School of Medicine

Patricia A. Resick

Duke University Medical Center

Edna B. Foa

University of Pennsylvania

Stacey Young-McCaughan and Jim Mintz

University of Texas Health Science Center at San Antonio

Jeffrey S. Yarvis

Carl R. Darnall Army Medical Center, Fort Hood, Texas

Alan L. Peterson

University of Texas Health Science Center at San Antonio and

South Texas Veterans Health Care System

Abstract

We examined the frequency of trauma types in a cohort of service members seeking treatment for posttraumatic stress disorder (PTSD) and compared symptom profiles between types. In this observational study, 999 service members (9.2% women; mean age 32.91; 55.6% white) were evaluated with a standardized assessment procedure to determine eligibility for clinical trials. Participants were evaluated for *DSM-IV-TR*-defined PTSD using the PTSD Symptom Scale-Interview (all participants reported a Criterion A event). Independent evaluators rated descriptions of Criterion A as belonging to trauma types at a high degree of reliability (kappa = .80). Fifty-five percent of events were coded with one type; the rest were coded with a primary type. Aggregated non-life-threat primary trauma types were more frequently endorsed than the aggregated life-threat types (95% CI: 17.10%, 29.20%). Participants with moral injury-self had greater reexperiencing ($d = 0.39$), guilt (hindsight bias, $d = 1.06$; wrongdoing, $d = 0.93$), and self-blame ($d = 0.58$) relative to life-threat-self. Participants with traumatic loss had greater reexperiencing ($d = 0.39$), avoidance ($d = 0.22$), guilt (responsibility, $d = 0.39$), and greater peri- and posttraumatic sadness ($d = 0.84$, $d = 0.70$, respectively), relative to life-threat self. Moral injury other was associated with greater peri- ($d = 0.36$) and posttraumatic betrayal/humiliation ($d = 0.33$) and Aftermath of violence was associated with greater peri- ($d = 0.84$) and posttraumatic sadness ($d = 0.57$), each relative to life-threat self. Warzone traumas are heterogeneous and non-life-threat types are associated with distinct symptoms and problems, relative to life-threat to self.

Keywords: War-trauma, typology, PTSD

Distinct Trauma Types in Military Service Members

Seeking Treatment for Posttraumatic Stress Disorder

Warzone exposure is associated with extensive and enduring psychological, social, and behavioral problems (Kulka et al., 1990; Milliken, Auchterlonie, & Hoge, 2007) and evidence-based treatments shown to be effective for sexual assault and accident victims are less efficacious when applied to service members (SMs) and war veterans with posttraumatic stress disorder (PTSD; Steenkamp, Litz, Hoge, & Marmar, 2015). Consequently, it is critical to look for ways to improve the health and welfare of deployed SMs and veterans. We argue that etiological models can be refined and treatment outcomes can be improved if the heterogeneity of traumatic events within broad categories of trauma (e.g., combat, disasters, rape) and the distinct harms following from each is assessed and addressed.

The military/warrior culture, military training and preparation, and the interdependent bonds formed among SMs' affect the kinds of warzone events endorsed as traumatic (Adler & Castro, 2013; Litz, Steenkamp, & Nash, 2014). For example, SMs are trained to be resilient to personal threats, many of which are occupational hazards (e.g., tough realistic mock urban warfare and live fire training). By contrast, it is difficult to train and prepare for non-danger-based traumas, namely exposure to grave human suffering, traumatic loss, and morally injurious experiences. The latter entails purposeful, mistaken, or unplanned high stakes ethical transgressions by self or others (Litz et al., 2009).

For SMs, unprecedented exposure to severely injured, dying, or dead people is associated with mental health difficulties (Maguen, Litz, Wang, & Cook, 2004). SMs are duty bound to ensure the safety of unit members, which means that they can experience culpability that has no parallel in most victimization contexts (Nash, 2007), and loss entails the loss of intense critical

attachments and social support resources that otherwise mitigate the impact of warzone stressors (e.g., Currier & Holland, 2012; Toblin et al., 2012). In addition, moral injuries are associated with shame and guilt (Currier, Holland, Jones, & Sheu, 2014; Marx, Foley, Feinstein, Wolf, Kaloupek, Keane, 2010), anger (Maguen et al., 2010), problem drinking (Currier et al., 2014; Maguen et al., 2010) and parasuicide (Bryan, Bryan, Morrow, Etienne, & Ray-Sannerud, 2014).

To capture the heterogeneity of military traumas, Stein et al. (2012) created a scheme for categorizing traumatic military events based on SMs' reports of their worst and most currently distressing Criterion A event. Stein et al. (2012) typed the Criterion A events endorsed by 122 SMs diagnosed with PTSD and found that the typing scheme had high interrater reliability (kappas .78 - .90). The typology entailed six traumatic harms: Life-Threat to Self, Life-Threat to Other, Aftermath of Violence, Traumatic Loss, Moral Injury by Self, and Moral Injury by Other (see definitions and examples in Table 1). Stein et al. (2012) combined singly and multiply coded events to preliminarily examine the validity of the typology (*specific* types were not examined). Life Threat Self was associated with peri- and posttraumatic fear, peritraumatic horror, and posttraumatic sadness; Life Threat Other was associated with posttraumatic numbness; Aftermath of Violence was associated with greater negative cognitions about the world; Traumatic Loss was associated with peritraumatic anger and sadness; and Moral Injury Self was associated with reexperiencing, shame, and anger.

The first aim of this study was to determine the frequency of Criterion-A trauma types using the Stein et al. scheme in a large cohort of SMs seeking PTSD treatment. Based on interviewers' written accounts of Criterion-A events, we report the occurrence of single rated events, multiply rated events, and the overall rates (combining these two). Because DSM-IV Criterion-A-2 requires fear, helplessness, or horror, we hypothesized that Life Threat Self and

Life Threat Other would each be more frequently endorsed than each other trauma type. Because of the nature of guerilla wars of insurgency and the warrior ethos we also hypothesized that the aggregated non-life-threat trauma types would be more frequent than life-threat types.

Our second aim was to determine the discriminant validity of the typology, which requires a comparison of distinct trauma types. Because danger to the self produces putative fear conditioning and fear- and victimization-based learning and these processes are contrasted by the presumed phenomenology of non-threat-based trauma-types, in this paper, Life Threat Self provided a basis of comparison for our predictions We posited that Traumatic Loss and Moral Injury Self pose the greatest challenges to SMs' identity and well-being. These types are also noteworthy because they are associated with self-conscious affects (e.g., shame, guilt; Kubany et al., 1996) and can entail role and identity confusion, bitterness, and deficits in meaning and purposefulness (Fontana & Rosenheck, 1995; Maguen et al., 2011; Papa, Neria, & Litz, 2008; Pivar & Field, 2004). For SMs, the cause of the insult, namely the failure to secure the safety of others (including non-combatants) or moral transgressions, tarnishes resilience-promoting sources of purpose, goodness, connection, affirmation, and meaning. Consequently, we predicted that, relative to Life Threat Self, Traumatic Loss and Moral Injury Self would be associated with greater re-experiencing, and avoidance/numbing symptoms because these trauma types are more difficult for SMs to accommodate and manage, due to their unprecedented nature and the fact that these experiences conflict with military training and culture (we had no predictions about hyperarousal). We also hypothesized that Traumatic Loss and Moral Injury Self would entail (a) greater peri- and post-event non-fear-based emotions, principally sadness and anger; (b) more negative cognitions about self/world and self-blame; and (c) greater posttraumatic guilt.

Being the victim of others transgressions (Moral Injury Other) is potentially injurious

because of the betrayal of trust, which is associated with anger (Jordan, Eisen, Bolton, Nash, & Litz, 2017). We predicted that relative to Life Threat Self, Moral Injury Other would be associated with greater reports of peri- and posttraumatic betrayal and anger / aggressive behaviors. We predicted that relative to Life Threat Self, Aftermath of Violence would be associated with greater sadness and guilt; the latter putatively resulting from varying degrees of responsibility-taking. We had no predictions about Life Threat Self versus Life Threat Other.

Method

Participants and Procedure

Active duty military SMs and recently retired veterans were recruited to participate in clinical trials (prior to DSM 5) between 2008 and 2015 at the [edited out for blind review]. We combined baseline data for this cross-sectional observational cohort study from the three largest trials with the following inclusionary criteria: active duty status, deployment to Iraq and/or Afghanistan, aged 18 to 65, willing to participate in the research treatment, available for the duration of the study, and no recent medication changes. Participants were not compensated. This study was approved by the Institutional Review Boards of [edited out for blind review].

To establish a baseline for participants who would be randomized, SMs were given the PTSD Symptom Scale – Interview (PSS-I; Foa, Riggs, Dancu, & Rothbaum, 1993), which assessed PTSD according to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition-Text Revision (DSM-IV-TR,* American Psychiatric Association, 2000), and they filled out questionnaires (a subset was used for this paper). SMs were asked to describe a lifespan or warzone event that was the worst and most currently distressing and haunting, *with the caveat that the events needed to involve death or serious injury or the threat of the same*. If the event descriptions did not meet DSM-IV Criterion-A 1 and 2, the participant was not interviewed.

The written text describing each Criterion-A event was coded by blinded independent evaluators (IEs; 95% of the events were warzone-based). Two IEs separately coded index events for one of three trials and generated a consensus code for each case in consultation with an investigator. Then, one IE rated all cases in the other two trials and the other IE rated a random 20% of those cases. The kappa coefficients for trauma types were: Life Threat Self .81; Life Threat Other .77; Aftermath of Violence .86; Traumatic Loss .83; Moral Injury Self .77; Moral Injury Other .79. Fifty-five percent of events were coded with one type, 34% two types, and 9% three types (14 cases had 4 types). 29% of the double-coded events were Life Threat Other/Traumatic Loss and 22% were Life Threat Self/Life Threat Other, and 67% of triple-coded events entailed Life Threat Self and Life Threat Other.

Trauma-typing scheme. We considered testing the validity of the typology using only those SMs whose Criterion-A event was singly rated. However, inferences from those analyses would be constrained by the unspecified systematic biases dictated by Criterion-A that may have led these SMs to be circumscribed in their event descriptions. Furthermore, because testing only singly rated cases would leave out more than half the study group and because of the substantially smaller Ns in the low base rate types (Traumatic Loss, Moral Injury Self, Moral Injury Other) we chose instead to combine single rated events with events that were rated with more than one type by assigning a *primary* type for the latter. We rationally generated decision rules to generate this primary type for events coded with more than one type based on research about the phenomenology of warzone trauma (Adler & Castro, 2013; Adler, Wright, Bliese, Eckford, & Hoge, 2008; Litz, Steenkamp, and Nash, 2014), our understanding of military training and the warrior culture, and our clinical experience treating SMs with PTSD. We assumed that there is a most harming or impactful type within multiply typed traumas. Given the

Criterion-A instructions, SM's may report a personal life-threat context but it is often a subtext for other putatively more stressful and emotionally evocative experiences, namely failing to ensure the safety of others, moral compromise, and shattered expectations about humanity (de Rond & Lok, 2016; Nash, 2007). Consequently, if both Life Threat Self and Life Threat Other were coded, Life Threat Other was selected as the primary code. If Life Threat Self or Life Threat Other and Traumatic Loss were coded, Traumatic Loss was selected as the primary code. When an index event entailed Traumatic Loss and handling body parts of the dead person, Aftermath of Violence was selected as the primary code. If an event contained Life Threat Self or Life Threat Other and Aftermath of Violence, Aftermath of Violence was the primary code. If an event was Moral Injury Self or Moral Injury Other and another type, Moral Injury Self or Moral Injury Other was the primary code; however, in the rare case of a loved one's suicide, Traumatic Loss was selected over Moral Injury Other. When both Moral Injury Self and Moral Injury Other were coded, Moral Injury Self was selected as the primary code. The kappa for the primary trauma type assigned to these index events was .80.

Among the 1,105 evaluated participants, we excluded 106 who had insufficient index event information. The final sample of 999 included 707 participants randomized into clinical trials and 292 who were ineligible because they did not meet the diagnostic criteria for PTSD (all participants met Criterion A). Descriptive information is provided in Table 2.

Measures

Demographic Information. On a standard form, we obtained demographic and military service characteristics information (e.g., rank, age, number of years of service).

Deployment Risk and Resilience Inventory (DRRI) Combat Experiences Subscale. The DRRI Combat Experiences subscale (King, King, Vogt, Knight, & Samper, 2006) assesses

exposure to dangerous deployment stressors. Participants provide responses on a 5-point Likert scale ranging from 1 (*never*) to 5 (*daily or almost daily*). A modified version of the subscale was used in which the items referenced only personal exposure to an event, and eight items were added to capture events commonly experienced in the Iraq and Afghanistan wars (Vasterling et al., 2010). The DRRI has very good construct validity and high internal consistency (.91 in the current study; Vogt et al., 2008).

PTSD Symptom Scale, Interview Version (PSS-I). The PSS-I (Foa, Riggs, Dancu, & Rothbaum, 1993) is a 17-item clinical interview that evaluates *DSM-IV-TR* based PTSD symptoms on a single, combined 4-point scale ranging from 0 (*not at all*) to 3 (*very much*), referencing the past 2 weeks. The PSS-I has good internal consistency (Cronbach's $\alpha = .79$ in the current study), test-retest reliability, and inter-rater reliability (Foa et al., 1993). We computed severity scores for the three *DSM-IV* Model symptom clusters: intrusions (B1-B5; Cronbach's $\alpha = .60$), avoidance/numbing (C1-C7; Cronbach's $\alpha = .69$), and hyperarousal (D1-D5; Cronbach's $\alpha = .55$).

State-Trait Anger Expression Inventory (STAXI). The STAXI (Spielberger, 1988) is a 44-item self-report measure assessing the experience of anger. In this study, we examined trauma-type differences in state anger only. Participants respond to items on a 4-point Likert scale ranging from 1 (*not at all*) to 4 (*very much so*). We summed 10 items that comprise the State-Anger (S-Anger) subscale. The STAXI has excellent internal consistency (Cronbach's $\alpha = .94$ in the current study), and very good convergent validity (Spielberger, 1988).

Posttraumatic Cognitions Inventory (PTCI). The PTCI (Foa, Ehlers, Clark, Tolin, & Orsillo, 1999) is a 36-item self-report measure that assesses trauma-related thoughts and beliefs following exposure to a traumatic event using a 7-point Likert scale ranging from 1 (*totally*

disagree) to 7 (*totally agree*). The PTCI has three subscales: Negative Cognitions about Self (PCTI-Self, 21 items, Cronbach's α = .95), Negative Cognitions about the World (PTCI-World, 7 items, Cronbach's α =.88), and Self-Blame (PTCI-Blame, 5 items, Cronbach's α = .77), which have strong psychometric properties (Foa et al., 1999).

Trauma-Related Guilt Inventory (TRGI). The TRGI (Kubany et al., 1996) is a 32-item scale that assesses feelings and attitudes associated with guilt about a traumatic event. Responses are rated on a 5-point Likert-type scale ranging from 4 (*extremely true*) to 0 (*not at all true*). We used a brief version of the scale (TRGI-brief; 16 items) to reduce participant burden. The TRGI-brief yields three averaged subscale scores: *Hindsight-bias/responsibility*, assessing self-blame and beliefs the event should have been prevented (7 items; Cronbach's α = .89); *Wrongdoing*, assessing perceived transgression in behavior, thoughts, and emotions (5 items; Cronbach's α =.73); and *Lack of Justification*, assessing the inability to justify actions (4 items; Cronbach's α =.83). The TGRI has high internal consistency and test-retest reliability (Kubany et al., 1996).

Revised Conflict Tactics Scale (CTS2S). We used a shortened version of the CTS2's Physical Assault (items 9-20; Cronbach's α = .86) and Psychological Aggression subscales (items 1-8; Cronbach's α = .81). Responses ranged from 0 (*never*) to 6 (*more than 20 times*). The CTS2 has good internal consistency and construct validity (Straus & Douglas, 2004).

Peritraumatic and Posttraumatic Emotions Questionnaire (PTEQ). The original PTEQ (Rizvi, Kayseen, Gutner, Griffin, & Resick, 2008) included 20 items that assessed peritraumatic experiences (ranging from 0 = *not at all* to 4 = *all of the time*). For these studies, 20 identical items were added to assess posttraumatic experiences. The revised scale was administered in two of the three clinical trials (N=729). Because total PTEQ scores are not interpretable (e.g., the scale has *calm*, *numb*, and *rage* items), we employed exploratory factor

analysis (EFA) to generate best fitting peri- and posttraumatic factors, and derived factor scores

using exploratory structural equation modeling, using standardized scores for analyses (see

Supplemental Tables 1 and 2 and their footnotes about model testing and factor selection).

Five peritraumatic factors (*fear*, *betrayal/humiliation*, *anger*, *sadness*, and *numbness*),

and four posttraumatic factors (*fear*, *sadness*, *anger*, and *betrayal/humiliation*) best fit the data.

The internal consistency coefficients for the peritraumatic factors of fear, numbing, anger,

betrayal/humiliation, and sadness were .76, .60, .73, .78, and .76 respectively. Further, the

internal consistency coefficients for the posttraumatic factors of fear, anger, betrayal/humiliation,

and sadness were .86, .51, .80, and .78 respectively. Factor scores were generated for the subset

of cases that had data (N=729; list-wise deletion was used to analyze PTEQ data).

Data Analysis

To test differences in the frequency of trauma types, we used a normal approximation of

the multinomial distribution. One-way ANOVAs and post-hoc Tukey's tests were used to assess

trauma-type differences, based on the combination of single coded and assigned primary coded

events, in age, number of marriages, number of children/step-children, months of service,

number of deployments, and combat experiences in an exploratory manner. Chi-square analyses

or Fisher's exact tests (with Cramer's V effect sizes) explored trauma-type differences in gender,

race, ethnicity, marital status, and educational status. One-way ANOVAs with planned

comparisons were used to test our hypotheses (based on the combination of single coded and

assigned primary coded events), and the Benjamini-Hochberg procedure (1995) was used to

correct for multiple comparisons (we report corrected *p*-values only). Zero-inflated Poisson

regression was used to model assault (65% reported no form of aggression). Post-hoc Tukey's

tests were computed to discover differences between Life Threat Self and Life Threat Other and

between Moral Injury Self and Traumatic Loss.

Prior to analysis, we tested for violations of normality and homoscedasticity. Results indicated no violations of normality except for the low base rates in CTS2S physical assault subscale scores. There were homoscedasticity violations in posttraumatic fear, posttraumatic anger, posttraumatic betrayal/humiliation, peritraumatic anger, peritraumatic betrayal/humiliation, responsibility and wrongdoing subscales of the TRGI, and the self-blame subscale of the PCTI. For these variables, unequal variances were tested. One-way ANOVAs, Fisher's exact tests, and chi-square analyses were conducted with SPSS version 20; and Poisson regressions were computed with R 3.2.4 (R Foundation, 2016). We used Cohen's d to index effect sizes for the pairwise comparisons (Cohen, 1998; 0.2 small; 0.5 medium; 0.8 large effects). There were minimal missing data (at baseline, all participants were present and technicians checked completeness). As a result, list-wise deletion was used to address missing data (there were minimal fluctuations in sample size; see Tables 2 and 3). Because the PTEQ was administered in only two of the three trials, the sample size for these factor scores was 729.

Results

Trauma Type Frequency

Figure 1 shows the frequency of trauma types for non-exclusively coded events, single coded events, multiply coded events, and the single plus primary-coded events (full sample). Threat-types were predominant for all the inclusive type codes. For the multiply coded events, Life Threat Other was more frequent than Life Threat Self ($\Delta = 14.50\%$, 95% CI: 8.50%, 20%, $p < .001$) and Life Threat Self and Life Threat Other were less frequent than the non-threat types ($\Delta = 5.20\%$, 95% CI: 0.02%, 10%, $p = .040$). For the single plus primary-coded events, Life Threat Self was more frequent than Life Threat Other ($\Delta = 9.20\%$, 95% CI: 3.10%, 15.30%, $p =$

.003) and Moral Injury Self (Δ = 17.50%, 95% CI: 11.60%, 23.40%, p =.001) but not Traumatic Loss, Aftermath of Violence, or Moral Injury Other, and, as predicted, non-life-threat types were more frequent than the life-threat types (Δ = 23.10%, 95% CI: 17.10%, 29.20%, p = .001).

Demographics, Military Characteristics, and Combat Exposure (see Table 2)

Participants with Life Threat Self were younger (Δ = 2.22, 95% CI: 0.14, 4.32, p = .029, Cohen's d = 0.29) and had fewer months in the military, (Δ = 9.47, 95% CI: 0.00, 43.37, p = .050, Cohen's d = 0.28), compared to Aftermath of Violence. Participants with Life Threat Other (Δ = -5.13, 95% CI: -0.58, 9.68, p = .017 Cohen's d = 0.34), Traumatic Loss (Δ = -6.21, 95% CI: 2.02, -10.40, p < .001, Cohen's d = 0.42), and Moral Injury Self (Δ = -10.25, 95% CI: 4.12, -16.38, p < .001, Cohen's d = 0.68) had significantly greater combat exposure scores, each compared to Life Threat Self. Participants with Aftermath of Violence had lower combat exposure scores, compared to Moral Injury Self (Δ = -7.09, 95% CI: -13.43, -0.74, p = .018, Cohen's d = 0.32) and Moral Injury Other (Δ = -10.47, 95% CI: 16.81, -4.13, p = .001, Cohen's d = 0.66). Compared to Moral Injury Other, Traumatic Loss had greater combat exposure (Δ = -6.43, 95% CI: 1.93, -10.93, p = .001, Cohen's d = 0.41).

Discriminant Validity of the Non-Life Threat Types (see model statistics in Table 3; descriptive statistics for each trauma type by comparison is provided in Supplemental Table 3).

Life Threat Self versus Traumatic Loss. The Traumatic Loss type was associated with greater reexperiencing (Δ = 0.60, 95% CI: 0.04, 1.17; Cohen's d = .39); greater guilt-related responsibility scores (Δ = 0.40, 95% CI: 0.20, 0.59; Cohen's d = .39); greater peritraumatic anger (Δ = 0.27, 95% CI: 0.04, 0.49; Cohen's d = .12); greater peritraumatic sadness (Δ = 0.77, 95% CI: 0.56, 0.98; Cohen's d = .84); and greater posttraumatic sadness (Δ = 0.65, 95% CI: 0.44, 0.86; Cohen's d = .70).

Life Threat Self versus Moral Injury Self. The Moral Injury Self type was associated with greater reexperiencing ($\Delta = 1.19$, 95% CI: 0.36, 2.02; Cohen's $d = .39$); more hindsight bias /responsibility ($\Delta = 1.09$, 95% CI: 0.78, 1.39; Cohen's $d = 1.06$); greater thoughts of wrongdoing ($\Delta = 0.92$, 95% CI: 0.62, 1.22; Cohen's $d = .94$); greater negative cognitions related to self ($\Delta = 0.42$, 95% CI: 0.06, 0.78; Cohen's $d = .32$); greater self-blame ($\Delta = 0.76$, 95% CI: 0.37, 1.15; Cohen's $d = .58$); and greater posttraumatic sadness ($\Delta = 1.29$, 95% CI: 0.98, 1.61; Cohen's $d = .49$).

Life Threat Self versus Moral Injury Other. The Moral Injury Other type was associated with greater peri- and post-traumatic betrayal/humiliation ($\Delta = 0.44$, 95% CI: 0.18, 0.70; Cohen's $d = .36$ and $\Delta = 0.44$, 95% CI: 0.18, 0.70, Cohen's $d = .33$). Moral Injury Other was also associated with more physical assault events per month ($\Delta = 3.51$, 95% CI: 2.42, 4.60).

Life Threat Self versus Aftermath of Violence. The Aftermath of Violence type was associated with greater wrongdoing scores ($\Delta = 0.19$, 95% CI: 0.02, 0.37; Cohen's $d = .06$); and peri- and post-traumatic sadness ($\Delta = 0.61$, 95% CI: 0.39, 0.83; Cohen's $d = .13$, and $\Delta = 0.58$, 95% CI: 0.36, 0.80; Cohen's $d = .13$, respectively).

Discussion

Although some *categories* of traumas, particularly combat, rape, and other forms of malicious violence, are associated with more severe and chronic PTSD (e.g., Breslau et al., 2004), in the *DSM-IV-TR* and *DSM-5*, events that meet Criterion A are nonetheless assumed to be comparable, clinically (e.g., with respect to treatment selection) and epidemiologically (e.g., with respect to disease). We tested an alternative model that assumes heterogeneity of distinct traumatic harms. Many of our hypotheses were supported, underscoring the multifarious quality of index traumas (see Stein, Wilmot, & Solomon, 2016) and the discriminant validity of the

trauma typology developed by Stein et al. (2012).

As predicted, relative to Life Threat Self, Moral Injury Self and Traumatic Loss were associated with more severe reexperiencing, greater guilt (and, greater self-blame for Moral Injury Self), and sadness. This suggests that Traumatic Loss and Moral Injury Self are more haunting and self-consciously painful for SMs seeking treatment for PTSD than danger-based trauma. Aftermath of Violence was also associated with reports of greater peri- and posttraumatic sadness and Moral Injury Other was distinguished by greater betrayal/humiliation and more frequent aggressive behaviors. These results raise the question of whether treatment should target not only core PTSD symptoms but type-specific problems, ideographically. The *DSM-5* added symptoms that may help clinicians conceptualize trauma type-based clinical presentations (e.g., beliefs about oneself or the world). However, *distorted blame of self or others* may not capture the suffering caused by attributions of culpability that some SMs experience in light of Moral Injury Self and Traumatic Loss that is not due to distorted appraisal. In addition, for *negative trauma-related emotions* to be useful clinically for SMs seeking treatment for PTSD, in light of trauma-type distinctions, each applicable emotion would need to assessed separately (i.e., fear, horror, anger, guilt, or shame), rather than the existing categorical (any) rating scheme.

Given that we adhered strictly to DSM-IV Criterion A, it is noteworthy that SMs endorsed more non-threat events as their worst and most currently distressing warzone experience than threat events. Although exploratory, SMs who endorsed Life Threat Self were younger, were in the service fewer years, and had lower exposure to warzone stressors, suggesting that with greater experience and training and greater exposure to warzone stressors, SMs may be less likely to endorse danger to themselves as their worst and most currently

distressing experience.

About half of the study group's Criterion-A events were multiply typed. This is noteworthy given that in most instances a single sentence was used to describe the event. We cannot know whether SMs would have agreed with our decision-rules to derive primary types, which is a limitation. Ideally, when interviewed, we would have asked SMs to rate the most impactful type if multiple types were present. We reran the analyses on only the singly rated cases and the results changed minimally (see Supplemental Table 3). Nevertheless, although the findings suggest that the combined single and primary types have discriminant validity, the findings are potentially biased by the decision rules used to determine primary type for multiply rated events. Functionally, SMs' post-deployment mental and behavioral health outcomes are ultimately affected by the gestalt of many powerful events (as well as positive, if not growth-promoting, experiences). Yet, the assumption that guides research and clinical care is that if we ask SMs to endorse a single worst and most currently distressing experience the event's impact is bounded around a specific discreet episodic narrative and this is sufficient to determine posttraumatic mental and behavioral health impact and to establish a valid target for psychotherapy. These are unaddressed empirical questions and research is needed to determine the types of event and experience parameters that affect functioning and treatment outcome.

Our evaluation of the discriminant validity of the trauma types was not exhaustive; we did not compare all trauma types with each other. Consequently, for example, we do not know if Life Threat Self and Life Threat Other can be distinguished by distinct outcomes. We also do not know if exposure to Aftermath of Violence, which could readily be construed as a moral injury, is distinct from morally injurious traumas. There were also many outcome variables not assessed in this study that could further shed light on the validity of various types of warzone traumas.

Chief among these are shame, demoralization, physical health, spirituality, beliefs about faith, beliefs about the military, intimacy, social resources, and family relationships.

Our findings may not be applicable to non-treatment-seeking SMs and VA healthcare users. Future research will also need to determine whether our typology is applicable to civilian trauma contexts that are not chiefly fear-based or whether other types are indicated in unique contexts. Unfortunately, little prior research sheds light on this matter. Rather, epidemiological studies have focused on the differences in conditional risk for PTSD based on broad *categories* of traumas, such as rape (e.g., Breslau, Peterson, Poisson, Schultz, & Lucia, 2004), or early neglect and abuse (e.g., Cloitre et al., 2009). When studies have examined putative type differences in PTSD symptom burden and comorbid problems, the focus has been chiefly on degree of danger or victimization (e.g., King, King, Foy, Keane, & Fairbank, 1999; King, King, Vogt, Knight, & Samper, 2006). The results of our study suggest that both broad categorizations of trauma contexts (e.g., combat, political violence, sexual abuse) and the categorical nature of the Criterion A signification can conceal salient and meaningful dimensions of exposure and posttraumatic experience (e.g., role, culture, transgression, loss) that have the potential to yield improved etiological models and clinical treatments.

References

Adler, A. B., & Castro, C. A. (2013). An occupational mental health model for the military. *Military Behavioral Health, 1*, 41-45.

Adler, A. B., Wright, K. M., Bliese, P. D., Eckford, R., & Hoge, C. W. (2008). A2 diagnostic criterion for combat-related posttraumatic stress disorder. *Journal of Traumatic Stress, 21*, 301-308.

Armour, C., Mullerova, J., & Elhai, J. D. (2016). A systematic literature review of PTSD's latent structure in the Diagnostic and Statistical Manual of Mental Disorders: DSM-IV to DSM-5. *Clinical Psychology Review, 44*, 60-74. doi: 10.1016/j.cpr.2015.12.003

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: Author.

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Beck Depression Inventory-II.* San Antonio, TX: Psychological Corporation.

Benjamini, Y., & Hochberg, Y. (1995). Controlling the false discovery rate: a practical and powerful approach to multiple testing. *Journal of the royal statistical society*. Series B (Methodological), 289-300.

Breslau, N., Peterson, A. L., Poisson, L. M., Schultz, L. R., & Lucia, V. C. (2004). Estimating post-traumatic stress disorder in the community: Lifetime perspective and the impact of typical traumatic events. *Psychological Medicine, 34*(05), 889-898. doi:10.1017/S0033291703001612

Bryan, A. O., Bryan, C. J., Morrow, C. E., Etienne, N., & Ray-Sannerud, B. (2014). Moral injury, suicidal ideation, and suicide attempts in a military sample. *Traumatology, 20*(3), 154-160. doi:10.1037/h0099852

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale, NJ:

    Lawrence Earlbaum Associates.

Cloitre, M., Stolbach, B. C., Herman, J. L., van der Kolk, B., Pynoos, R., Wang, J., & Petkova,

    E. (2009). A developmental approach to complex PTSD: Childhood and adult cumulative

    trauma as predictors of symptom complexity. *Journal of Traumatic Stress, 22*(5), 399-

    408. doi:10.1002/jts.20444

Currier, J. M., & Holland, J. M. (2012). Examining the role of combat loss among Vietnam War

    veterans. *Journal of Traumatic Stress, 25*(1), 102-105. doi:10.1002/jts.21655

Currier, J. M., Holland, J. M., Jones, H. W., & Sheu, S. (2014). Involvement in abusive violence

    among vietnam veterans: Direct and indirect associations with substance use problems

    and suicidality. *Psychological Trauma: Theory, Research, Practice, and Policy, 6*(1), 73-

    82. doi:10.1037/a0032973

Dozois, D. J., Dobson, K. S., & Ahnberg, J. L. (1998). A psychometric evaluation of the Beck

    Depression Inventory-II. *Psychological Assessment, 10*(2), 83-89. doi:10.1037/1040-

    3590.10.2.83

de Rond, M., & Lok, J. (2016). Some things can never be unseen: the role of context in

    psychological injury at war. *Academy of Management Journal*

    https://doi.org/10.5465/amj.2015.0681

Foa, E. B., Ehlers, A., Clark, D. M., Tolin, D. F., & Orsillo, S. M. (1999). The posttraumatic

    cognitions inventory (PTCI): Development and validation. *Psychological Assessment,*

    11(3), 303-314. doi:10.1037/1040-3590.11.3.303

Foa, E. B., Riggs, D. S., Dancu, C. V., & Rothbaum, B. O. (1993). Reliability and validity of a

    brief instrument for assessing post-traumatic stress disorder. *Journal of Traumatic Stress,*

    6(4), 459-473. doi:10.1002/jts.2490060405

Fontana, A., & Rosenheck, R. (1995). Attempted suicide among Vietnam veterans: A model of

    etiology in a community sample. *The American Journal of Psychiatry, 152*(1), 102-109.

    doi:10.1176/ajp.152.1.102

Jordan, A. H., Eisen, E., Bolton, E., Nash, W. P., & Litz, B. T. (in press). Distinguishing war-

    related PTSD resulting from perpetration- and betrayal-based morally injurious events.

    Psychological Trauma: Theory, Research, Practice, and Policy.

King, D. W., King, L. A., Foy, D. W., Keane, T. M., & Fairbank, J. A. (1999). Posttraumatic

    stress disorder in a national sample of female and male Vietnam veterans: Risk factors,

    war-zone stressors, and resilience-recovery variables. *Journal of Abnormal Psychology,*

    108(1), 164-170. doi:10.1037/0021-843X.108.1.164

King, L. A., King, D. W., Vogt, D. S., Knight, J., & Samper, R. E. (2006). Deployment Risk and

    Resilience Inventory: A collection of measures for studying deployment-related

    experiences of military personnel and veterans. *Military Psychology, 18*(2), 89-120.

    doi:10.1207/s15327876mp1802_1

Kubany, E. S., Haynes, S. N., Abueg, F. R., Manke, F. P., Brennan, J. M., & Stahura, C. (1996).

    Development and validation of the Trauma-Related Guilt Inventory (TRGI).

    Psychological Assessment, 8(4), 428-444. doi:10.1037/1040-3590.8.4.428

Kulka, R. A., Schlenger, W. E., Fairbank, J. A., Hough, R. L., Jordan, B. K., Marmar, C. R., &

    Weiss, D. S. (1990). *Trauma and the Vietnam War generation: Report of findings from*

the National Vietnam Veterans Readjustment Study. New York, NY: Brunner Mazel

Publishers.

Litz, B. T., Steenkamp, M. M., & Nash, W. P. (2014). Resilience and recovery in special

populations: The military. In L. Zoellner & N. Feeney (Eds.), *Facilitating resilience and*

recovery following traumatic events (pp. 113-136). New York, NY: Guilford Press.

Litz, B. T., Stein, N., Delaney, E., Lebowitz, L., Nash, W. P., Silva, C., & Maguen, S. (2009).

Moral injury and moral repair in war veterans: A preliminary model and intervention

strategy. *Clinical Psychology Review, 29*(8), 695-706. doi:10.1016/j.cpr.2009.07.003

Maguen, S., Litz, B. T., Wang, J. L., & Cook, M. (2004). The stressors and demands of

peacekeeping in Kosovo: Predictors of mental health response. *Military Medicine,*

169(3), 198-206. doi:10.7205/MILMED.169.3.198

Maguen, S., Lucenko, B. A., Reger, M. A., Gahm, G. A., Litz, B. T., Seal, K. H., . . . Marmar, C.

R. (2010). The impact of reported direct and indirect killing on mental health symptoms

in Iraq war veterans. *Journal of Traumatic Stress, 23*(1), 86-90. doi:10.1002/jts.20434

Maguen, S., Luxton, D. D., Skopp, N. A., Gahm, G. A., Reger, M. A., Metzler, T. J., & Marmar,

C. R. (2011). Killing in combat, mental health symptoms, and suicidal ideation in Iraq

war veterans. *Journal of Anxiety Disorders, 25*(4), 563-567.

doi:10.1016/j.janxdis.2011.01.003

Marx, B. P., Foley, K. M., Feinstein, B. A., Wolf, E. J., Kaloupek, D. G., & Keane, T. M. (2010).

Combat-related guilt mediates the relations between exposure to combat-related abusive

violence and psychiatric diagnoses. *Depression and anxiety, 27*, 287-293.

Milliken, C. S., Auchterlonie, J. L., & Hoge, C. W. (2007). Longitudinal assessment of mental health problems among active and reserve component soldiers returning from the Iraq war. *Journal of American Medical Association, 298*, 2141-2148.

Nash, W. P. (2007). Combat/operational stress adaptations and injuries. In In C.R. Figley & W.P. Nash (Eds.)., *Combat stress injuries: Theory, research, and management* (pp. 33-64). New York, NY: Routledge.

Papa, A., Neria, Y., & Litz, B. T. (2008). Traumatic bereavement in war veterans. *Psychiatric Annals, 38*(10), 38-52. doi:10.3928/00485713-20081001-07

Pivar, I. L., & Field, N. P. (2004). Unresolved grief in combat veterans with PTSD. *Journal of Anxiety Disorders, 18*(6), 745-755. doi:10.1016/j.janxdis.2003.09.005

R Foundation. (2016). R (Version 3.2.4) [Computer software].

Rizvi, S. L., Kayseen, D., Gutner, C. A., Griffin, M. G., & Resick, P. A. (2008). Beyond fear: The role of peritraumatic responses in posttraumatic stress and depressive symptoms among female crime victims. *Journal of Interpersonal Violence, 23*(6), 853-868. doi:10.1177/0886260508314851

Spielberger, C. D. (1988). Manual for the State-Trait Anger Expression Scale (STAXI). Odessa, FL: Psychological Assessment Resources.

Steenkamp, M., Litz, B. T., Hoge, C. W., & Marmar, C. R. (2015). Psychotherapy for military-Related PTSD: A review of randomized clinical trials. *Journal of the American Medical Association, 314*(5), 489-500. doi:10.1001/jama.2015.8370

Stein, N. R., Mills, M. A., Arditte, K., Mendoza, C., Borah, A. M., Resick, P. A., …. STRONG STAR Consortium. (2012). A scheme for categorizing traumatic military events. *Behavior Modification*, *36*(6), 785-805. doi:10.1177/0145445512446945

Stein, J. Y., Wilmot, D. V., & Solomon, Z. (2016). Does one size fit all? Nosological, clinical,

    and scientific implications of variations in PTSD Criterion A. *Journal of Anxiety*

    Disorders, 43, 106-117.

Straus, M. A., & Douglas, E. M. (2004). A short form of the Revised Conflict Tactics Scales, and

    typologies for severity and mutuality. *Violence and Victims, 19*(5), 507-520.

    doi:10.1891/vivi.19.5.507.63686

Toblin, R. L., Riviere, L. A., Thromas, J. L., Adler, A. B., Kok, B. C., & Hoge, C. W. (2012).

    Grief and physical health outcomes in U.S. soldiers returning from combat. *Journal of*

    Affective Disorders, 136(3), 469-475. doi:10.1016/j.jad.2011.10.048

Vasterling, J. J., Proctor, S. P., Friedman, M. J., Hoge, C. W., Heeren, T., King, L. A., & King,

    D. W. (2010). PTSD symptom increases in Iraq-deployed soldiers: Comparison with

    nondeployed soldiers and associations with baseline symptoms, deployment experiences,

    and postdeployment stress. *Journal of Traumatic Stress, 23*(1), 41-51.

    doi:10.1002/jts.20487

Vogt, D. S., Proctor, S. P., King, D. W., King, L. A., & Vasterling, J. J. (2008). Validation of

    scales from the Deployment Risk and Resilience Inventory in a sample of Operation Iraqi

    Freedom veterans. *Assessment*, *15*(4), 391-403. doi: 10.1177/1073191108316030

Table 1

Description of Trauma Typology

Category	Description	Example
Life Threat to Self	Personal exposure to the threat of death or actual or threatened serious injury.	SM was awakened at night because his base was under attack.
Life Threat to Others	Personal exposure to the actual or threatened death of others.	SM saw truck behind him explode. He assisted in treating the injured service members.
Aftermath of Violence	Personal exposure to grotesque/haunting images, sounds, or smells of dead or severely injured humans or animals.	SM saw many dead bodies while on patrol.
Traumatic Loss	Witnessed or learned about the death of a family member, friend, or unit member.	SM received news that a good friend was killed in action when her vehicle was hit by an IED.
Moral Injury Self	Committing an act that is perceived to be a gross violation of moral or ethical standards (e.g., killing or injuring others); an SM who nearly committed these acts could also experience moral injury.	SM gave an order to fire on attacking insurgents that resulted in a civilian being shot.
Moral Injury Other	Witnessing or being the victim of an act that is perceived	SM witnessed a police officer go through the

to violate moral/ethical standards (e.g., rape, atrocities);   pockets of a man who had just been shot and

events can also be indirectly experienced (i.e., learned   throw his body in the back of a truck.

about) if they are directly relevant to the individual.

Note. SM = service member; IED = improvised explosive device. For primary event coding, if both Life Threat Self and Life Threat

Other were present, Life Threat Other was the primary code. If Life Threat Self or Life Threat Other and Traumatic Loss were present,

Traumatic Loss was the primary code. If Traumatic Loss entailed handling body parts of the dead person, Aftermath of Violence was

the primary code. If and Life Threat and Aftermath of Violence were present, Aftermath of Violence was the primary code. If any

Moral Injury and any other type was present, the Moral Injury was the primary code. When both Moral Injury Self and Moral Injury

Other were coded, Moral Injury Self was the primary code.

Table 2

Demographic, Military Service Characteristics, and Combat Experience

Variables	Life Threat Self		Life Threat Other		Aftermath of Violence		Traumatic Loss		Moral Injury Self		Moral Injury Other	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Age (*n* = 992)	32.06	7.28	33.67	6.87	34.28	7.97	32.14	7.47	32.68	6.66	32.99	7.33
Length of service (*n* = 995)	120.42	74.91	139.95	79.89	142.10	81.55	129.89	76.19	124.10	71.12	128.04	72.29
Number of Deployments (*n* = 993)	2.16	1.04	2.29	1.20	2.32	0.99	2.34	1.00	2.33	1.16	2.15	1.02
DRRI CES (*n* = 989)	46.26	14.02	51.38	15.85	49.42	14.57	52.47	15.51	56.51	16.22	46.04	15.65
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Gender (*n*=997)												
Male	215	90	141	96	158	88	183	93	59	93	149	84
Female	23	9	5	3	20	11	12	6	4	6	28	15
Race (*n*=987)												

Variables	Life Threat Self		Life Threat Other		Aftermath of Violence		Traumatic Loss		Moral Injury Self		Moral Injury Other	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
African American	69	29	33	22	51	29	48	24	8	13	41	23
White	120	51	83	57	97	55	113	57	39	63	103	58
Ethnicity (*n*=993)												
Hispanic	52	21	30	20	31	17	35	17	11	17	39	22
Non-Hispanic	185	78	116	79	145	82	160	82	52	82	137	77
Marital Status (*n*=995)												
Married	166	70	115	78	120	67	133	68	43	68	117	66
Separated/ Divorced	45	18	18	13	33	18	49	29	14	22	38	21
Educational Status (*n*=994)												
GED/High School	78	32	42	28	41	22	70	35	21	33	51	28
Some College	118	49	77	52	94	53	96	49	31	49	89	50
4-year degree	16	6	6	4	14	7	7	3	5	7	20	11

Note. DDRI CES = Deployment Risk and Resilience Inventory, Combat Experiences Scale.

Table 3. Trauma Type Comparisons

Variables	Life Threat Self vs. Aftermath of Violence	Life Threat Self vs. Traumatic Loss	Life Threat Self vs. Moral Injury Self	Life Threat Self vs. Moral Injury Other	F(df), p	Partial Eta^2
	t (df), p value	t (df), p value	t (df), p value	t (df), p value		
Posttraumatic Symptom Scale-Interview						
Reexperiencing (n = 984)	.63(978), .531	2.10(978), .036	2.82(978), .005	N/A	2.16(5, 978), .056	.06
Avoidance/Numbing (n = 981)	1.46(975), .144	1.12(975), ..263	.71(975), .475	N/A	.59(5, 975), .708	.003
Hyperarousal (n = 982)	.14(976), .892	0.90(976), ..367	.39(976), .701	N/A	0.29(5, 976), ..917	.002
Trauma-Related Guilt Inventory						
Responsibility (n = 979)	0.44(973), 0.663	3.93(973), <.001	7.35(973), <.001	N/A	14.27(5, 973), <.001	.01

Wrongdoing (*n* = 979)	2.16(973), .030	0.87(973), .383	7.14(973), <.001	N/A	12.27(5, 973), <.001	.03
Justification (*n* = 979)	1.94(973), .053	0.42(973), .676	0.94(973), .346	N/A	4.82(5, 973), <.001	.001
Posttraumatic Cognitions Inventory						
Negative Cognitions Self (*n* = 981)	.09(975), .925	0.13(975), .881	2.26(975), .024	N/A	1.47(5, 975), .197	.01
Negative Cognitions World (*n* = 981)	.41(975), .685	.43(975), .667	1.17(975), .243	N/A	1.71(5, 975), .130	.01
Self-blame (*n* = 981)	.14(975), .892	1.43(975), .151	4.29(975), <.001	N/A	6.46(5. 975), <.001	.03
Peritraumatic Emotions Questionnaire Factor Scores						
Fear (*n* = 729)	.58(723), .562	2.05(723), .040	1.34(723), .182	N/A	1.78(5, 723), .114	.012
Numbness (*n* = 729)	2.27(723), .023	.90(723), .368	.70(723), .481	N/A	2.51(5, 723), .029	.017
Anger (*n* = 729)	1.15(723), .25	2.41(723), .016	.75(723), .456	N/A	1.57(5, 723), .165	.011
Betrayal/humiliation (*n* = 729)	.09(723), .932	.88(723), .378	1.25(723), .212	3.81(723), <.001	4.86(5, 723), <.001	.033
Sadness (*n* = 729)	5.50(723), <.001	7.19(723), <.001	1.84(723), .066	N/A	13.81(5, 723), <.001	.087

Posttraumatic Emotions Questionnaire Factor Scores

Fear (*n* = 729)	.99(723), .321	2.87(723), .004	1.16(723), .246	N/A	3.56 (5, 723), <.001	.024
Anger (*n* = 729)	2.34(723), .019	1.69(723), .091	1.91(723), .056	N/A	2.71(5, 723), .028	.018
Betrayal/humiliation (*n* = 729)	.77(723), .439	1.58(723), .114	1.45(723), .146	3.85(723), <.001	6.15(5, 723), <.001	.041
Sadness (*n* = 729)	5.12(723), <.001	5.99(723), <.001	3.00(723), .003	N/A	10.13(5, 723), <.001	.065

State-trait Anger Expression Inventory

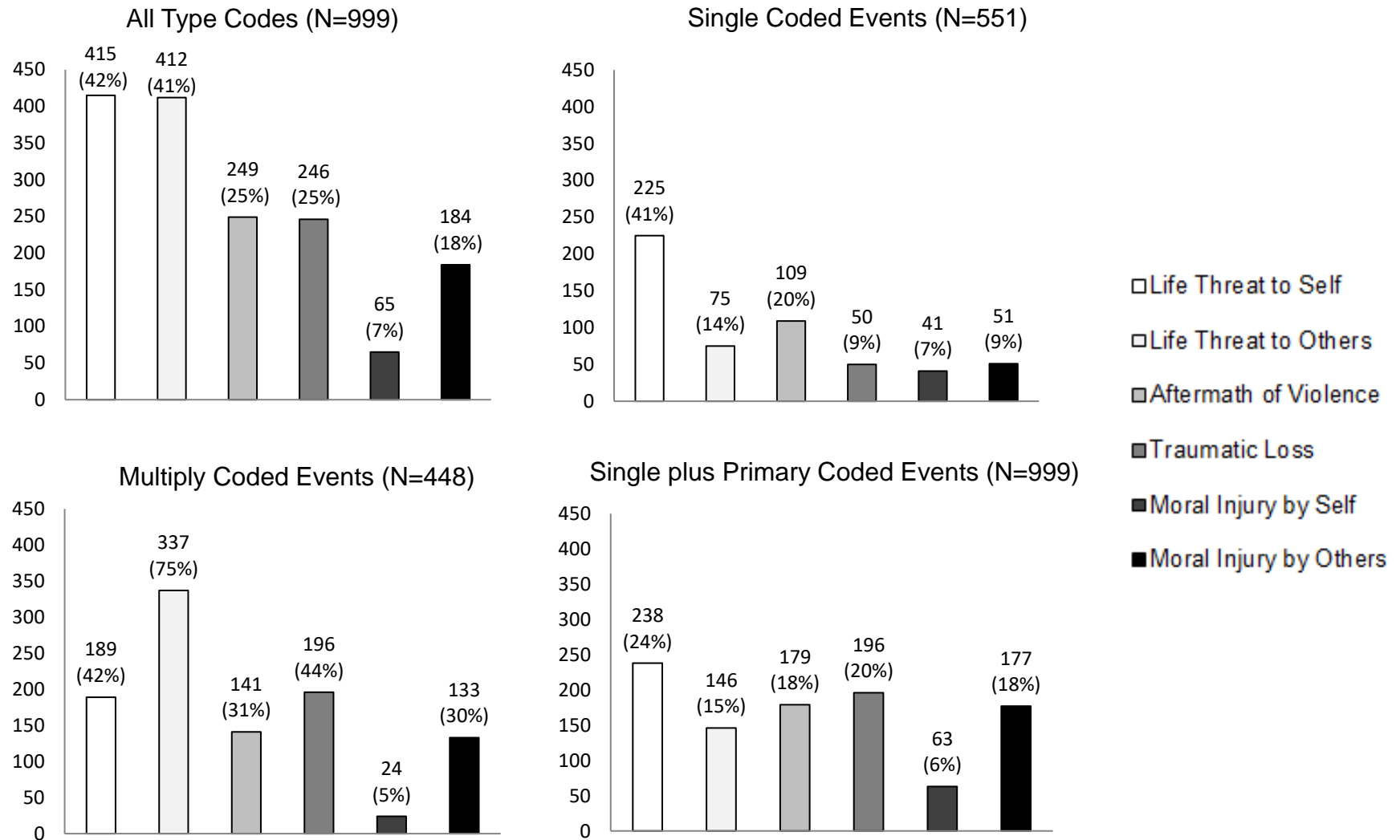|						
State-trait Anger (*n* = 988)	N/A	N/A	N/A	.57(982), .571	.77(5, 982), .571	.004

Figure 1. The frequency of trauma types by all type codes (full sample), single coded events (subsample), multiply coded events (subsample), and single plus primary coded events (full sample).