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Brief Report

Increases in Retrospective Accounts of War-Zone Exposure Over Time: The Role of PTSD Symptom Severity

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Retrospective reports of the frequency of war-zone exposure are commonly used as objective indices in studies investigating the mental health consequences of exposure to such stressors. To explore the temporal stability of these types of reports, we obtained frequency estimates of exposure to war-zone stressors at two time points from 460 U.S. soldiers who had served in the peace-keeping mission in Somalia. On average, soldiers demonstrated a significant increase in their frequency reports from initial (postdeployment) to subsequent (follow-up) assessment. Severity of posttraumatic symptomatology was uniquely associated with this change, indicating a possible systematic bias in which severity of symptoms leads to increased reports of stressor frequency. The implications of these findings for research in the field of traumatic stress are discussed.

KEY WORDS: traumatic memory; recall bias; trauma; self-report; combat.

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A large body of evidence has accumulated in the field of traumatic stress linking negative mental health outcomes, particularly posttraumatic stress disorder (PTSD) to the frequency and severity of exposure to war-zone stressors (e.g., Kaylor, King, & King, 1987; Kulka et al., 1990). Although a variety of war-zone events are implicated in the etiology of combat-related PTSD (e.g., harsh environments; King, King, Gudanowski, &Vreven, 1995), the single best predictor is the frequency of exposure to potentially traumatic events in the war-zone (Kaylor et al., 1987). The repeated finding of a significant dose-response relationship between exposure to such extreme events and outcome has, in part, provided evidence for the construct validity of PTSD.

In this area of research, investigators have found significant correlations between veterans' estimates of the frequency of their exposure to war-zone events and their subjective report of PTSD symptom severity. Investigators often treat reports of the frequency of war-zone experience as an objective index of severity of exposure. That is, scores on war-zone exposure scales are regarded as free from the influence of subjective appraisal. Although adequate test-retest reliability has been demonstrated for some self-report measures of combat exposure (e.g., Keane et al., 1989), evidence for the validity of these measures has been limited to the finding of significant, but moderate correlations between exposure scales and objective measures found in military records (e.g., number of medals, Watson, Juba, & Anderson, 1989).

Conceptually, there is some reason to question the accuracy of retrospective accounts of the frequency of exposure to specific types of war-zone events. Studies have shown that individuals' report of the frequency of past events is subject to systematic sources of bias and error over time (Tversky & Kahneman, 1973). Sources of bias that covary with PTSD symptomatology would call into question the conclusion that correlations between reports of war-zone exposure and PTSD severity reflect a unidirectional, causal link between the two. For example, anxiety and depression, both common co-occurring conditions of war-related PTSD (e.g., Orsillo et al., 1996), are associated with systematic information-processing biases that may lead to higher frequency estimates of negative or threatening events (see Mathews, 1990, for a review), particularly over long time periods.

In addition to these general mood-related biases, specific features of PTSD are likely to lead to increased report of stressful war-zone events. Cognitive psychologists have demonstrated that, when making frequency judgments, respondents rely heavily on the ease with which they are able to recall examples of a type of event (availability heuristic; Tversky & Kahneman, 1973). That is, individuals judge events for which examples are more easily recalled as more frequent than those for which examples are

more difficult to recall. Veterans with PTSD are likely to more easily recall war-zone stressors because they are more easily accessed by a wide range of cues and more frequently rehearsed in the form of intrusive cognitions (Litz & Keane, 1989). Increased reports of exposure may therefore be particularly associated with intrusive posttraumatic symptomatology.

The present study is an exploratory investigation of the temporal stability of frequency judgments of war-zone exposure and the factors that may affect changes in these judgments over time. We used data from a large study that investigated the psychological sequelae of the peace-enforcement mission in Somalia for U.S. military personnel. The peace-enforcement mission in Somalia was associated with significant war-zone exposure, which resulted in posttraumatic symptomatology for some individuals (Litz, Orsillo, Friedman, Ehlich, & Batres, 1997). In the present study, we investigated the stability of reports of exposure to war-zone stressors among Somalia veterans and the association between variability in these reports over time and symptoms of anxiety, depression, and PTSD. We predicted that variability in retrospective accounts of frequency of war-zone exposure would be associated both with anxiety and depression and with PTSD-specific symptomatology.

Method

Participants

As part of a larger investigation, 460 individuals who served in Somalia completed a questionnaire battery within the first year of their return to the United States (Time 1) and a follow-up phone interview 1-3 years later (Time 2): average length of time between surveys was 21.3 months (SD = 4.5). Ninety-two percent of the participants were male and 71% were Caucasian. They reported an average age of 26.7 years (SD = 6.2) and an average of 12.9 years of education (SD = 1.5). For the Time 1 survey, all participants were still enlisted in the military; at Time 2, 37% of the sample had been discharged.

These individuals were a subsample of the 3,461 participants in the Time 1 assessment who agreed to follow-up and were able to be reached by phone. [1,987 soldiers agreed to follow-up contact: 671 provided phone numbers and comprised our initial phone sample. The remaining soldiers were mailed a brief version of the survey. Soldiers who did not respond to the mailed survey (n = 566) were added to our phone sample. Of the combined phone sample, 523 were successfully contacted and 522 agreed to the interview. Sixty-two of those interviewed did not have complete data

from Time 1 and are therefore omitted from these analyses.] This sample is comparable to the sample of individuals who completed Time 1 but did not complete this Time 2 assessment in age, education level, level of war-zone exposure and posttraumatic symptomatology (all effect sizes <.01). Gender proportion in the two groups is also comparable (χ^2 (1, N = 3,231) = .38, p > .54). However, there was a smaller proportion of nonCaucasian participants in this sample than in the nonresponding sample (28% versus 42%).

Measures

War-zone exposure. Both surveys included an identical 7-item subscale measuring the frequency with which participants reported being exposed to very stressful experiences related to peacekeeping duty while in Somalia. Respondents were asked to report frequency on 0-4 Likert-type scales with the following anchors: "not at all," "1–3 times," "4–12 times," "13–50 times," "over 50 times." [Item 1 used anchors of 0%, 25%, 50% 75%, and 100% due to the differing nature of the experience it assessed.] Subscale items and their anchors were adapted from the Combat Exposure Scale (Keane et al., 1989), the most commonly used measure of combat exposure in studies of combat-related PTSD. Items measured frequency of: (a) time spent in contact with sick, hungry people, (b) going on patrols and performing other dangerous duties, (c) managing Somalis in chaotic, unpredictable situations, (d) being fired at, (e) having rocks thrown at unit, (f) seeing Somalis dying, and (g) experiencing rejecting, hostile reactions from Somalis. Overall scores on this measure were derived by taking the mean of responses to the seven items. The alpha for this scale in this sample was .76.

Psychological Functioning Subscales

Several measures of psychological functioning were also included in both surveys. The Brief Symptom Inventory (BSI; Derogatis, 1993) is a widely used measure of psychological distress which includes subscales measuring depressive and anxious symptomatology. The Mississippi Scale for Combat-Related PTSD (M-PTSD; Keane, Caddell, & Taylor, 1988), a 35-item test that evaluates the frequency of PTSD symptoms and associated features (e.g., guilt, suicidality) on 5-point Likert-type scales, was specially adapted to index Somalia experiences. The PTSD Checklist (PCL; Blanchard, Jones-Alexander, Buckley, & Forneris, 1996; Weathers, Litz, Herman, Huska, & Keane, 1993), a measure of PTSD that evaluates the

severity of each of the 17 symptoms of PTSD on 5-point Likert-type scales, was also specially adapted to index Somalia experiences. Participants were asked to rate the severity of their symptoms over the last month for all three measures of psychological functioning at both time points. A Time-2 PTSD composite score was created from the mean of the *z*-scores for the PCL and the Mississippi, which were correlated .86 with each other and .96 with the composite score.

Results

Scores on the War-zone Exposure Scale (WZES) at Time 1 and Time 2 were correlated .66, suggesting a degree of variation in report over time. A repeated measures ANOVA conducted on the WZES score for each time period revealed a significant increase in scores from Time 1 to Time 2, $F(1,459) = 188.14, p < .001$, eta^2 = .29. (Time 1: $M = 1.88$, $SD = .72$; Time 2: $M = 2.23$, $SD = 0.72$). ANOVAs conducted on the individual items revealed significant increases in each exposure item from Time 1 to Time 2, smallest $F(1, 435) = 4.48, p < 0.05$. Table 1 presents the mean responses to each item, along with scores on the psychological functioning measures, at each time point.

To test the hypothesis that psychological symptomatology is associated with variations in report of frequency of war-zone events, a hierarchical multiple linear regression analysis was conducted predicting WZES scores at Time 2. Since we were interested in predicting unique variance in Time

Table 1. Means, Standard Deviations, and Univariate Tests of Significant Change Over Time of War-Zone Exposure and Psychological Functioning Variables at Time 1 and Time 2

Measures	Time 1	Time 2	$F(1,435)$
WZES#1 (contact with sick/hungry Somalis)	1.15 (1.10)	1.54 (1.17)	47.75**
WZES#2 (going on patrols; dangerous duties)	2.59 (1.19)	3.06 (1.00)	88.14**
WZES#3 (chaotic/unpredictable situations)	1.62 (1.22)	2.03 (1.24)	62.59**
WZES#4 (being fired at)	2.06 (1.18)	2.32 (1.12)	27.12**
WZES#5 (rocks thrown at unit)	2.43 (1.13)	2.75 (1.07)	37.83**
WZES#6 (seeing Somalis dying)	1.16 (1.04)	1.81 (1.14)	158.23**
WZES#7 (rejecting/hostile reactions from Somalis)	1.89 (1.19)	2.02 (1.13)	4.40*
BSI-anxiety	0.51 (0.62)	0.52 (0.62)	0.13
BSI-depression	0.59 (0.76)	0.53 (0.67)	2.75
PTSD checklist	29.45 (12.99)	29.72 (12.20)	0.29
M-PTSD	66.19 (16.47)	67.82 (18.35)	6.09*

*$p < .05$.
**$p < .001$.

2 WZES, Time 1 WZES scores were entered first as a covariate. The following demographic variables were entered as a block for the second step, in order to control for their combined effect: age, years of education, race (0 = minority, 1 = Caucasian), gender (0 = female, 1 = male), current military status (0 = still in service, 1 = discharged from service; to control for variance in report that might be a function of continued affiliation with the military) and number of months between post- and follow-up assessment. The anxiety and depression subscales of the BSI administered at Time 2 were entered next, in order to examine the association between these symptom categories and changes in the report of war-zone exposure. Finally, to test the unique contribution of concurrent PTSD symptomatology, Time 2 PTSD composite score was entered. Only the addition of the PTSD composite score significantly improved the model beyond Time 1 WZES, $R^2change = .02$, $p < .001$. In the final step, Time 1 WZES and Time 2 PTSD emerged as significant predictors of WZES at Time 2. The overall model was significant, $F(10, 449) = 39.36$, $p < .0001$; Adjusted $R^2 = .46$ (see Table 2).

To further elucidate the nature of the relationship between specific clusters of posttraumatic symptoms and changes in retrospective report of war-zone exposure, the preceding regression analysis was conducted again, this time entering mean scores for intrusive (B), avoidant (C), and arousal

Table 2. Hierarchical Regression Analysis to Predict War-Zone Exposure at Time 2

Predictors	R^2Change	p	Beta (at Final Step)
Step 1			
Time 1 WZES	.436	.0000	.607
Step 2			
Demographics	.005	.716	
Gender			.042
Age			.010
Race			.026
Education			.050
Military status			−.047
Weeks between surveys			.054
Step 3			
BSI scales	.005	.129	
Time 2 BSI-anxiety			−.094
Time 2 BSI-depression			−.080
Step 4			
Time 2 PTSD	.021	.000	.292

(D) symptom clusters separately (derived from responses to the PCL). This final step still significantly improved the model; however, only the contribution of the intrusive cluster was significant (beta = .14, $p < .01$; betas for avoidant and arousal symptoms were .06 and .07, respectively).

Discussion

This preliminary investigation indicates that retrospective accounts of the frequency of war-zone exposure are variable over time. Although a correlation of .66 does indicate a substantial degree of consistency in reports, a large proportion of variance in report at Time 2 is left unaccounted for by report at Time 1. Participants in our study reported a significant increase in retrospective accounts of frequency of exposure to war-zone stressors over time, across each type of exposure assessed. We found concurrent reports of PTSD symptom severity, particularly intrusive symptoms, to be positively associated with changes in frequency reports. Demographic characteristics, military status, length of time between assessments, and symptoms of anxiety and depression at the time of testing were not significantly associated with changes in reports of frequency of exposure. Contrary to our prediction, these data do not indicate a general mood-related reporting bias in frequency reports. The unique association between intrusive symptomatology and change in reports of exposure over time is particularly salient and should be explored in future research. It could be that access to intrusive traumatic memories or images is the mechanism through which post-traumatic symptomatology impacts reports of frequency of war zone exposure.

The findings of this study should be interpreted with caution. These data do not speak to the accuracy of frequency reports. Participants' reports may have become inflated over time; conversely, individuals may have underestimated their reports initially and later given more accurate appraisals. Also, participants initially completed paper-and-pencil measures, whereas the Time 2 assessment reported here was conducted by phone. This method variance could potentially account for the observed differences across time. However, as part of the larger Somalia project, we have compared this phone sample to subjects who received only mail surveys, and no significant differences in level of PTSD symptomatology at Time 2 emerged (Roemer, Orsillo, Ehlich, Friedman, & Litz, 1996). In addition, an alternative interpretation of these findings should be noted: the correlation found between WZES at Time 1 and Time 2 could be construed as evidence for the temporal stability of these reports, rather than their instability.

Finally, the generalizability of these findings remains undetermined. Participants in this study experienced a particular type of military mission associated with a unique class of stressors and these findings may not generalize to other types of missions or to non-war-related stressors (Litz, 1996). Similarly, these data only speak to the accuracy of reports of *frequency* of exposure to a class of extreme stressors. They do not speak to broader issues regarding the accuracy of traumatic memories.

Although the magnitude of the relationship found between PTSD symptom severity and change in report of war-zone exposure is small, we feel this relationship is noteworthy. Any significant contribution of symptom severity to retrospective accounts of exposure calls into question the commonly assumed unidirectional relationship between appraisal of the frequency and severity of war-zone exposure and PTSD and thus has important implications for research in this area.

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