

## PTSD symptoms, suicidality and non-suicidal risk to life behavior in a mixed sample of pre- and post-9/11 veterans

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### ABSTRACT

This study investigated relationships between symptom clusters of posttraumatic stress disorder (PTSD), suicidal ideation, suicide plan, and non-suicidal risk to life behavior (NSRB) behavior in a sample of 1,356 pre- and post-9/11-era military veterans. After controlling for a positive PTSD screen, results indicated that suicidal ideation was significantly associated with re-experiencing symptoms ( $OR = 1.12$ ), White race ( $OR = 1.82$ ) and use of pain medication ( $OR = 1.62$ ). Suicide plan was associated with avoidance symptoms ( $OR = 1.08$ ), and NSRB with hyperarousal symptoms ( $OR = 1.11$ ) and severe alcohol use ( $OR = 2.10$ ). Standardized coefficients indicated that re-experiencing symptoms ( $b = .38$ ) were a stronger predictor of suicidal ideation than White race ( $b = .16$ ) or pain medication ( $b = .12$ ) and that hyperarousal symptoms ( $b = .36$ ) were a stronger predictor of NSRB than severe alcohol use ( $b = .15$ ). The interpersonal–psychological theory of suicide was used to frame a discussion of military specific suicide risk as well as the risk of premature death among veterans who endorse NSRB but not suicidality. We suggest that this subset of veterans may be overlooked by traditional screening methods while nonetheless presenting with great risk for premature death.

### KEYWORDS

Mental health; prevention; PTSD; PTSD symptoms; risk behavior; social work; suicidality; veterans

Premature death by completed suicide is a significant problem among U.S. military veterans. The Department of Veterans' Affairs Suicide Prevention Program (Kemp & Bossarte, 2013) reported suicide rates between 39 and 35 per 100,000 for veterans seeking care within the department's system from 2001–2009. More recent epidemiological work suggests that veterans are at 41–61% greater risk of suicide than those in the general population (Kang et al., 2015). The current paper frames an investigation of relationships between suicidal behavior, non-suicidal risk to life behavior (NSRB), and specific symptom clusters of posttraumatic stress disorder (PTSD) in the context of the interpersonal-psychological theory of suicide (IPT; Joiner Jr., Van Orden,

Witte, & Rudd, 2009) in order to contribute to a more nuanced understanding of veterans' suicidality and NSRB.

Many military veterans struggle to cope with psychological and behavioral health challenges associated with their service. Evidence has accumulated in support of IPT, which suggests that individuals complete suicide in the context of perceived burdensomeness, thwarted belonging, and acquired capability for suicide. In this framework, military veterans may present with increased capability for suicide as a result of training and combat experiences which habituate them to psychological and physical pain (Bryan, Cukrowicz, West, & Morrow, 2010; Joiner et al., 2009). In addition, Castro and Kintzle (2014) have suggested that loss of military social connections associated with transitioning from military to civilian life presents a risk for development of a perception of thwarted belonging.

Recent work indicates that the prevalence of PTSD among veterans of the conflicts in Iraq and Afghanistan is between 13.5% and 15.8% in deployed veterans and 10.9% in nondeployed veterans (Dursa, Reinhard, Barth, & Schneiderman, 2014). PTSD has been associated with negative health outcomes and increased mortality among veterans (McFall & Cook, 2006); in one study, two thirds of veterans' deaths were attributed to preventable behavioral causes such as accidents and substance abuse (Drescher, Rosen, Burling, & Foy, 2003).

The relationship between PTSD and premature death in veterans thus extends beyond suicidality. Several studies have found evidence of increased mortality in veterans relative to nonveteran populations (Kang et al., 2015; Watanabe & Kang, 1996) where excess mortality was chiefly attributed to external causes, such as automobile accidents, which may reflect risk-taking behavior. Consistent with IPT, we suggest that some veterans may be at elevated risk for engaging in NSRB as a result of PTSD and habituation to danger acquired through military experience.

The current study seeks to contribute to a more nuanced understanding of PTSD-related risks faced by veterans in two ways. First, we examine associations between suicidal behavior and specific PTSD symptom clusters while controlling for overall PTSD severity. While previous research has demonstrated a link between re-experiencing symptoms and suicidality (Bell & Nye, 2007), this finding has not been replicated in a mixed sample that includes both pre- and post-9/11-era veterans.

We hypothesize that individual PTSD symptom clusters will be associated with suicidal ideation and suicide plan after controlling for clinically significant PTSD symptoms, the use of pain medication, and severe alcohol use. Additionally, we hypothesize that NSRB will be positively associated with an individual PTSD symptom cluster after controlling for current use of pain medication and severe alcohol use.

## Method

### *Participants and procedure*

Data for these analyses were drawn from a survey of veterans living in Southern California. The survey was completed between August 2013 and March 2014 by a total of 1,356 veterans. In order to capture the diversity of the veteran population in the area, survey participants were identified through a mixed, non-probability sampling strategy. Contact information data from a state agency was leveraged to capture veterans who reported California residency at separation from military service. Via an e-mail containing a link to the survey, the state agency invited veterans living within one large Southern California county to participate. Further, a local information center was enlisted to recruit participants from among the individuals who called the center and identified as veterans. Those who were willing to be contacted about the study received a call from a member of the research team and were sent a link to the survey or a paper copy if they agreed to participate.

Additionally, the research team partnered with a national veterans agency, local agencies serving the county veteran population, and college veterans agencies and organizations. The national agency identified veterans in the target area using zip codes; these veterans were invited to participate using an online survey link. Several local agencies also participated in the recruitment process through two different approaches. These agencies emailed a link to the survey to their clients or invited research team members to agency events where participants completed paper and pencil instruments. Similarly, college veteran organizations also recruited participants through the online survey link or at data collection events. Finally, participants were recruited through advertising, a public service announcement and social media campaigns. All surveys were completed online or in paper-and-pencil format. Participants received a \$15 gift card for completing the survey, which took 30–90 minutes. Participants' demographic characteristics are presented in [Table 1](#).

### *Measures*

Consistent with previous studies investigating psychological factors and behavioral risk in veterans (Boscarino, 2006; Hooper et al., 2006), rank at separation and pre or post 9/11 service era were included as dichotomous control variables. Rank was computed based on veteran report of pay grade at time of discharge and dichotomized to account for enlisted personnel and officers assessed using a 0 (*no*) 1 (*yes*) format. The dichotomous control variables current use of pain medication and severe alcohol use were also included due to their empirical links to PTSD symptoms in veteran populations (Beckham et al., 1997; Calhoun, Elter, Jones, Kudler, & Straits-Tröster, 2008; Lew et al.,

**Table 1.** Sample characteristics.

Characteristic	<i>n</i>	%	Mean ( <i>SD</i> )	Min	Max
<b>Age</b>	1,353				
18–20		0.07			
21–25		3.92			
26–30		13.97			
31–40		20.77			
41–50		16.41			
51–60		26.53			
61–70		13.75			
Over 71		4.58			
<b>Race</b>					
American Indian/Alaska native		3.69			
Asian		5.31			
African American		31.86			
Hawaiian/Pacific Islander		1.84			
White		34.00			
Latino		26.03			
Other		4.06			
<b>Taking pain medication</b>	1207	38			
<b>Severe alcohol use</b>	1112	17.27			
<b>Post 9/11 enlistment</b>	1188	43.35			
<b>Enlisted (vs. officer)</b>	1267	93.92			
<b>Clinical criteria met for PTSD</b>	1165	43.95			
Re-experiencing	1212		12.10 (6.30)	5.00	25.00
Avoidance	1206		17.42 (8.67)	7.00	35.00
Hyperarousal	1209		13.20 (6.39)	5.00	25.00
<b>Threat to life behavior</b>					
Suicidal ideation	1223	13.41			
Suicide plan	1226	9.14			
Unnecessary risk to life	914	19.69			

2009; Stecker, Fortney, Owen, McGovern, & Williams, 2010). Consistent with scoring guidelines for the Alcohol Use Disorders Identification Test (AUDIT; Babor et al., 1989), severe alcohol use was computed by dichotomizing the consumption subscale with scores above 6 representing severe use.

Suicide ideation, and plan, and NSRB in the previous 12 months were assessed with 0 (*no*) 1 (*yes*) dichotomous items. The item “Have you engaged in any of the following activities in the last 12 months: took unnecessary risks to life” was part of a previously validated risk behavior measure created (Adler, Bliese, McGurk, Hoge, & Castro, 2011) and was used to assess NSRB.

The PTSD Checklist (PCL; Weathers, Litz, Herman, Huska, & Keane, 1993) was used to capture PTSD symptoms. The PCL is a 17-item measure querying how much respondents were bothered by symptoms in the last 5 days on a 5-point Likert scale ranging from 0 (*not at all*) to 5 (*extremely*). The PCL demonstrates robust psychometric properties (Chronbach’s  $\alpha = .974$ ; Weathers et al., 1993). Consistent with other studies (Blanchard, Jones Alexander, Buckley, & Forneris, 1996) a clinical cut-point score of 45 was used to generate a dichotomous variable operationalizing the diagnostic threshold for PTSD. The PTSD subscales avoidance, re-experiencing, and hyperarousal were computed by summing subscale items to generate new continuous variables.

## Data analysis

We employed three multivariate logistic regression models to test associations between the independent variables re-experiencing, avoidance and hyperarousal, and suicidal ideation, suicide plan, and NSRB outcomes. Control variables comprised age, race, rank at discharge, and pre- or post-9/11 military service as well as severe alcohol use, use of medication to manage pain, and the clinical cut point for PTSD. The link function was logit transformation, which is the natural parameter of the binomial distribution used in the logit model and is appropriate for models without interactions or nonlinearities (Agresti, 1996). The estimation method was maximum likelihood. All analyses were conducted in SAS 9.4.

All three models were affected by missing data. Missingness was chiefly located in outcome variables. We ran additional models which included missingness as a response category for both independent and dependent variables; missingness among independent variables was significantly associated only with missingness in outcomes. For the continuous variables reexperiencing, avoidance and hyperarousal, proportions of missingness at the scale rather than item level were .93, .89, and .91.

## Results

Results of logistic regression models are shown in Table 2. Model fit was assessed first through examination of the likelihood ratio chi-square. Second, we employed The Hosmer-Lemeshow (HL) test (Hosmer & Lemeshow, 1980), where data is grouped according to predicted values from the logistic regression model and a Pearson's chi-square is applied to compare observed and expected events, to test appropriateness of a linear model without interactions. For this test the null hypothesis is that the model provides a good fit to the data, and *p*-values above .05 indicate appropriate fit.

**Table 2.** Logistic regression models.

	Suicidal ideation		Suicide plan		Unnecessary risks to life	
	OR	95% CI	OR	95% CI	OR	95% CI
Age	0.93	0.75, 1.15	0.95	0.73, 1.23	0.81	0.64, 1.05
White race	1.82	1.18, 2.81	1.60	0.95, 2.70	1.03	0.63, 1.70
Pain medication	1.60	1.04, 2.45	1.45	0.86, 2.46	0.82	0.50, 1.35
Severe alcohol use	0.94	0.55, 1.62	0.83	0.42, 1.65	2.10	1.20, 3.70
Post 9/11 status	0.89	0.48, 1.66	0.97	0.45, 2.07	0.87	0.42, 1.81
Enlisted	1.60	0.53, 4.83	1.75	0.40, 7.75	1.91	0.50, 7.74
PTSD	0.82	0.35, 1.90	0.60	0.21, 1.70	0.77	0.30, 1.92
Re-experiencing	1.12	1.04, 1.19	1.07	0.99, 1.17	1.05	0.98, 1.12
Avoidance	1.03	0.97, 1.09	1.08	1.01, 1.16	1.05	0.99, 1.12
Hyperarousal	1.01	0.94, 1.08	0.98	0.89, 1.07	1.11	1.02, 1.20
ML pseudo R <sup>2</sup>	.183		.123		.324	
<i>n</i>	853		855		617	

Multicollinearity among PCL subscales was assessed through linear regression diagnostics and yielded variance inflation factors (VIFs) <10 for independent variables including PCL subscales and the PTSD clinical cut-point.

For model one, the likelihood ratio  $X^2 = 92.98(10)$ ,  $p < .001$ , HL test  $X^2 = 4.73(8)$ ,  $p < .79$  suggested good fit to the data. Model one indicated a significant positive association between suicidal ideation and White race, the use of pain medication, and re-experiencing symptoms after controlling for PTSD at the clinical cut-point. Standardized coefficients were examined to facilitate comparison between independent and control variables and indicated that re-experiencing symptoms ( $b = .38$ ) were a stronger predictor of suicidal ideation than use of pain medication ( $b = .12$ ) or White race ( $b = .16$ ). Neither severe alcohol use nor number of deployments were significantly associated with suicidal ideation.

Model two fit statistics also indicated good fit to the data, with likelihood ratio  $X^2 = 47.62(10)$ ,  $p < .001$  and HL test  $X^2 = 7.82(8)$ ,  $p < .45$ . Model two yielded significant positive associations between suicide plan and avoidance symptoms.

Finally, results of model three suggested a good fit to the data with likelihood ratio  $X^2 = 141.30(10)$ ,  $p < .001$  and HL test  $X^2 = 4.39(8)$ ,  $p < .82$ . Model three indicated significant positive associations between severe alcohol use and hyperarousal symptoms. Analysis of standardized coefficients showed that symptoms of hyperarousal ( $b = .36$ ) were more than twice as strong a predictor of NSRB as severe alcohol use ( $b = .15$ ).

## Discussion

As hypothesized, we found significant associations between re-experiencing symptoms and suicidal ideation as well as avoidance symptoms and suicide plan after controlling for PTSD at the clinical cut-point. This finding confirms previous research linking re-experiencing symptoms and suicidal ideation in Vietnam veterans (Bell & Nye, 2007) in a mixed sample including both pre- and post-9/11-era veterans. Our results also support previous findings linking White race and use of pain medication to elevated risk for suicidal ideation among veterans (Kang & Bullman, 1996; Kaplan, Huguet, McFarland, & Newsom, 2007).

The current study suggests that a distinct relationship may exist between symptoms of avoidance and suicide plan. To our knowledge this finding is unique in the literature but is consistent with previous work linking avoidance symptoms, particularly psychological numbing, to chronic PTSD in veterans (Marshall et al., 2006). It may be that in the context of chronic PTSD characterized by avoidance symptoms, constructing a plan for suicide serves to regulate distress. This interpretation is congruent with the IPT argument that behavioral avoidance and loneliness interact to generate a sense of thwarted belonging which contributes to veterans' suicide risk.

Our results indicate that NSRB was significantly associated with hyperarousal symptoms after controlling for PTSD at the clinical cut-point. This

finding is to our knowledge a novel one, but it is consistent with previous research demonstrating a relationship between hyperarousal, alcohol use, and interpersonal violence (Savarese, Suvak, King & King, 2001). In the context of IPT, we suggest that habituation to pain and violence acquired through military experience may heighten risk for NSRB when accompanied by hyperarousal symptoms and heavy alcohol use. This finding merits further investigation in light of veterans' elevated mortality due to preventable behavioral causes (Drescher et al., 2003) and the fact that nearly 20% of the current sample endorsed NSRB.

The current study was subject to a number of limitations. The survey data used was cross-sectional and causal explanations of relationships between variables cannot be assumed. Veteran status could not be independently assessed by the research team beyond verification procedures conducted by individual agencies involved in sample recruitment. In addition, generalizability of results may be reduced by sampling procedures, the lack of data pertaining to specific trauma experiences, and missingness among dependent variables.

Nonetheless, we suggest that relationships between veterans' PTSD symptoms, suicidality, and NSRB merit more investigation. In particular, the constellation of hyperarousal symptoms, alcohol use, and NSRB may point to a subset of traumatized veterans who do not evince suicidality but may be at risk for premature death from preventable causes. The complex relationships between PTSD symptom clusters, suicidality, and NSRB argue for a more nuanced approach to diagnosis and treatment of PTSD in order to adequately address the risk of veterans' premature death. We argue that these findings are of particular relevance to social workers, who often comprise the majority of front-line clinical staff responsible for screening and treating veterans both in Veterans Health Administration clinics and in the community.

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