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Examining the impact of different types of military trauma on suicidality in women veterans

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ABSTRACT

Suicide rates amongst women veterans are significantly higher than rates for their civilian counterparts. However, risk factors for suicide among women veterans remain unclear. The current study examined the impact of exposure to a number of military stressors (e.g., perceived life threat, killing in combat, military sexual trauma) on suicidal ideation (SI) in women veterans. A total of 403 women veterans responded to mailed self-report surveys, 383 (ages 24–70 years) returned fully completed surveys and were included in analyses, and 16% of those included endorsed current SI. Rates of endorsement for military stressors were as follows: 43% being wounded, 34% loss of someone close, 36% perceived life threat, 30% witnessing a killing or injury, 4% seeing injured or dead bodies, 4% killing in combat, 65% military sexual harassment, and 33% military sexual assault. A logistic regression analysis was conducted with all of the military stressors entered simultaneously to determine the effect on SI. Life threat and sexual harassment had the strongest associations with SI compared to other military stressors. These findings suggest that particular military stressors may play an especially important role in SI in women veterans. Implications and future research considerations are discussed.

1. Introduction

Suicide rates are over two times higher among veterans compared to non-veteran U.S. adults (Office of Mental Health and Suicide Prevention, 2018). Much of the literature examining suicidality (ideation and behaviors) among veterans has focused primarily on men (e.g., Bossarte et al., 2012; Fanning and Pietrzak, 2013; Zivin et al., 2007). However, recent research suggests that suicidality among women veterans may be a significant public health issue. Similar to men, women Veterans Health Administration (VHA) users have higher rates of suicide (standardized mortality ratio 95% CI = 1.27–3.96) than their civilian counterparts across the lifespan (i.e., ages 18–64 years old; MacFarland et al., 2010). However, while age-adjusted rates of suicide among men VHA users has remained stable (i.e., 2006 rate per 100,000 = 37.3, OR = 1.59; 2015 rate per 100,000 = 39.4, OR = 1.66) compared to all US men over the past decade, rates among women VHA users has continued to increase (i.e., 2006 rate per 100,000 = 9.4, OR = 1.47; 2015 rate per 100,000 = 17.9, OR = 2.28; Office of Mental Health and Suicide Prevention, 2018). It is therefore prudent to better understand factors that may be associated with increasing suicidality among women veterans.

One reason for this elevated rate in suicidality may be related to the growing numbers of women in the military and their expanded combat roles. Currently, women comprise approximately 10% of the U.S. veteran population and 15% of the Active Duty force (National Center for Veterans Analysis and Statistics, 2017; Office of the Deputy Assistance Secretary of Defense, 2014). The expansion of military roles for women, most notably participation in combat, has led to greater exposure to different types and severities of military stressors (Street et al., 2009). Despite prior policies limiting combat roles, women have long been exposed to combat-related experiences during deployments (Maguen et al., 2012; Street et al., 2009). Yet, much of the extant research examining the impact of exposure to military stressors has focused primarily on men and there is some evidence to suggest that the impact of these stressors may vary by gender (Luxton et al., 2010; Maguen et al., 2012).

Increasing exposures to military stressors can have downstream mental health effects, including suicidality. For example, research has

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consistently shown that combat exposure, in general, is associated with increased suicidal ideation (SI; Beckham et al., 1998; Jakupcak et al., 2009; Pietrzak et al., 2010; Sareen et al., 2007; Yehuda et al., 1992). Specific types of military stressors, such as killing in combat and exposure to atrocities, have also been associated with SI and demonstrate stronger relationships with suicide outcomes than combat in general (Bryan et al., 2015; Maguen et al., 2012, 2011). In women, there has not been much research into the impact of military stressors and environment on SI, and much of the existing literature has primarily focused on the role of military sexual trauma (MST). Specifically, MST has been associated with elevated SI (Blais and Monteith, 2018; Monteith, Menefee, Forster, Wanner, & Behraini, 2015) and military sexual harassment has been associated with SI, even when accounting for mental health symptoms (Gradus et al., 2017; Gradus et al., 2013). Notably, military sexual assault and harassment have mostly been assessed within the same construct (MST). Monteith, Menefee, Forster, and Bahraini (2016) separately assessed the impact of these constructs on SI and found that sexual assault, but not sexual harassment, was associated with SI. This study utilized a primarily male sample of OEF/OIF veterans, so it is unclear whether this finding generalizes to women veterans. In sum, there remains a paucity of research investigating the relationship between a broad array of military stressors and SI in women veterans.

In the current study, we sought to examine the impact of exposure to a number of military stressors (e.g., killing in combat, witnessing killings or injury, life threat, military sexual harassment, military sexual assault) on SI in women veterans. Given that SI is an established correlate of death by suicide (e.g., Rossom et al., 2017), a better understanding of how military traumas affect SI may help improve the identification of at-risk women veterans. We made no specific predictions regarding stressors, given the limited literature exploring the impact of a composite of military stressors on SI in women veterans across varying ages.

2. Method

2.1. Participants and procedures

Potential participants were identified from a database of women veterans ages 18–70 years old whom had attended at least one VHA appointment across any clinic at an urban VA Medical Center and its associated community-based outpatient clinics. Women with any history of psychosis or a suicide attempt within the last five years per medical record (based on ICD codes) were excluded. Identified veterans were sent a packet in the mail with a description of the study and a pre-stamped postcard to be returned if interested in participating. Five hundred ninety-four women were interested in participating in the study and were mailed a survey packet that included demographic, military service, and mental health symptom questionnaires, all of which were self-report. The questionnaires were primarily multiple-choice with some options for fill in the blank (e.g., age, number of times deployed). Completed surveys were returned via US mail (N = 403), and participants were compensated $30. The study was approved by the University of California, San Francisco Institutional Review Board and San Francisco VA Medical Center Human Research Protection Program.

2.2. Measures

2.2.1. Demographic and military variables

Demographic and military variables were assessed as part of the self-report questionnaire packet. Demographic variables assessed included age, gender, race, education, marital status, household income, and employment status. Military variables assessed included service branch, service rank, years in the military, and times deployed to war zone. See Table 1 for full demographics.

Table 1
Baseline demographics, psychiatric, and military stressor variables across sample, correlated with suicidal ideation.

Characteristic	N (%)	Mean (SD)	Min-Max	*r*
Age		49.00 (13.00)	24–70	0.03
Ethnicity				0.04
Caucasian	242 (59.5%)			
African American	57 (14.0%)			
Asian	30 (7.4%)			
Hispanic	32 (7.9%)			
Other	45 (11.1%)			
Missing	1 (0.3%)			
Education				0.07
≤ High school	26 (6.4%)			
College	275 (67.6%			
Graduate school	106 (26.0%)			
Marital status				0.07
Married/partnered	135 (33.2%)			
Separated/Divorced/Widow	156 (38.3%)			
Never married	112 (27.5%)			
Missing	4 (1.0%)			
Household income				-0.12
$0–$25K	38 (9.3%)			
$25.1–$50K	42 (10.3%)			
≥ $50K	91 (22.4%)			
Missing	236 (58.0%)			
Employment				0.08
Full-time	123 (30.2%)			
Part-time	42 (10.3%)			
Looking for work	25 (6.1%)			
VA service-connected	67 (16.5%)			
On SSI/SDI	21 (5.2%)			
In school (full time)	30 (7.4%)			
Retired	54 (13.3%)			
Other	34 (8.4%)			
Missing	11 (2.7%)			
Service branch				-0.00
Air Force	88 (21.6%)			
Army	177 (43.5%)			
Marine corps	23 (5.7%)			
Navy	97 (23.8%)			
Other	15 (3.7%)			
Missing	7 (1.7%)			
Service rank				0.00
Enlisted	348 (85.8%)			
Warrant officer	4 (1.0%)			
Officer	48 (11.8%)			
Missing	6 (1.5%)			
Time deployed to war zone				0.04
0	270 (66.3%)			
1	85 (20.9%)			
2	26 (6.4%)			
3	7 (1.7%)			
≥4	6 (1.5%)			
Missing	13 (3.2%)			
PCL-5		26.11 (20.44)	0–78	0.46*
PHQ-8		7.5 (6.2)	0–26	0.55*
PHQ-9 suicidal ideation item				
No ideation	339 (83.3%)			
Ideation	65 (16.0%)			
EMSS total score		2.6 (1.9)	0–8	0.19*
Wounded or injured	166 (43.4%)			0.09
Loss of someone close	131 (34.2%)			0.00
Perceived life threat	138 (36.0%)			0.17*
Witness someone else killed or injured	116 (30.3%)			0.05
Seeing injured/dead bodies	15 (3.9%)			0.07
Kill others in combat	15 (3.9%)			0.09
Military sexual harassment	250 (65.3%)			0.17*
Military sexual assault	127 (33.2%)			0.12*

Note. * = $p < .05$. PCL-5 = Posttraumatic Stress Disorder Checklist for DSM-V; PHQ-8 = Physician Health Questionnaire depression subscale minus the SI item. PHQ-9 = Physician Health Questionnaire 9-item depression subscale. EMSS = Exposure to Military Service Stressors.

Table 2
Pearson correlations amongst exposure to military trauma variables.

	1.	2.	3.	4.	5.	6.	7.	8.
1. Being wounded or injured	–	.21**	.17**	.20**	.11*	.12*	.16**	.23**
2. Loss of someone else		–	.16**	.31**	.32**	.20**	.07	.06
3. Perceived life threat			–	.33**	.37**	.24**	.11*	.16**
4. Witness killings or injury				–	.53**	.36**	.09	.14**
5. Seeing injured or dead bodies					–	.27**	.07	.07
6. Killing in combat						–	.09	.14**
7. Military sexual harassment							–	.43**
8. Military sexual assault								–

Note. ** = $p \leq 0.01$, * = $p \leq 0.05$. Variables taken from the Exposure to Military Service Stressors questionnaire.

2.2.2. Military service stressors

This measure (referred to in this study as the Exposure to Military Service Stressors) is an expanded version of another military stressor exposure questionnaire (Luxton et al., 2010; Maguen et al., 2012). The original measure consisted of four questions (which were retained in the current study) and did not include perceived life threat, loss of someone close, military sexual harassment, or military sexual assault. These are face-valid items that have been used by the military to assess exposure to combat stressors upon return from deployment. The current measure consists of eight dichotomously (yes/no) rated items and participants rate if they experienced different stressors during their military service including killing others in combat, witnessing someone killed or severely injured, seeing dead bodies or severely injured persons, being wounded or injured, losing someone close, feeling in danger of being killed, being sexually harassed (i.e., "did you experience any unwanted sexual attention, like verbal remarks, touching, or pressure for sexual favors?"), and being sexually assaulted (i.e., "did anyone use force, threat of force, or coerce you to have sex against your will?"). See Table 2 for inter-item correlations.

2.2.3. Physician health questionnaire-9 (PHQ-9)

The PHQ-9 (Kroenke et al., 2001) is a 9-item self-report scale from the larger PHQ measure that assesses depression symptom severity. Participants rate the frequency with which they have experienced each symptom over the past two weeks. Items are rated on a 5-point Likert scale (0 = not at all; 4 = nearly everyday). The PHQ-9 has been found to demonstrate good reliability and validity (Kroenke et al., 2001). For the purposes of this study, the item regarding SI was removed from the scoring of this scale, as the item was our primary outcome (see description below), and therefore depression severity scores henceforth reflect PHQ-8 throughout document.

2.2.4. Posttraumatic stress disorder checklist-5 (PCL-5)

The PCL-5 (Weathers et al., 2013) is a 20-item scale that assesses self-reported symptoms of PTSD based on DSM-5 diagnostic criteria. Items are not linked to a specific event, but rather, the questions refer to "a stressful experience." Participants rate the extent to which they have been bothered by each symptom over the past month. Items are rated on a 5-point Likert scale (0 = not at all; 4 = extremely). The PCL-5 has demonstrated good test-retest reliability and internal consistency (Bovin et al., 2015; Wortmann et al., 2016).

2.2.5. Suicidal ideation (SI)

SI was measured by PHQ-9 item nine score and was dichotomized (0 = no ideation, 1 = ideation based on rating of at least 1 on PHQ-9). Score on item nine ("*Thoughts that you would be better off dead or of hurting yourself in some way*") was used to assess SI. Despite the limitations of single item measurement of SI, research has shown that the PHQ-9 SI item is a robust predictor of suicide attempts and deaths (Rossom et al., 2017) and is a valid approach to assessing SI (Desseilles et al., 2012; Louzon et al., 2016; Pietrzak et al., 2017). Furthermore, VHA has recently started to use this item as a nationwide screen for SI (Department of Veterans Affairs, 2018).

2.3. Statistical analyses

In order to identify relevant covariates, Pearson correlations were performed between demographic and military variables and SI. All demographic and military variables were considered as possible covariates, given that we did not have any a priori hypotheses about demographics. We planned to enter demographic variables that were correlated at the $p < .10$ as covariates in the regression. Pearson correlations amongst the items on the exposure to military stressors questionnaire that were to be added to the regression were also performed and there was no evidence of multicollinearity ($r < 0.50$, see Table 2). We conducted a binary logistic regression with each of the eight military stressor items entered simultaneously in the model in order to determine the best predictors of self-reported SI. Analyses were conducted using STATA version 14.0 (StataCorp, 2015).

3. Results

A total of 403 women veterans returned surveys and 383 returned fully completed surveys (see Table 1). Average age was 49.33 years (SD = 13.02, range 24–70) with 60% identifying as Caucasian and most (68%) reporting college education. Approximately half of the sample (48%) reported having children and over 40% were employed. Almost half of the sample served in the Army (44%), enlisted (86%), and spent an average length of 8.0 years (SD = 7.3) in the service. Although the majority of the sample (66%) had not deployed to a war zone, 30.5% had deployed at least once. Sixteen percent of women veterans endorsed experiencing SI over the past two weeks. Military sexual harassment, being wounded or injured, perceived life threat, loss of someone close, military sexual assault, and witnessing someone killed were the highest endorsements whereas seeing injured/dead bodies and killing others in combat were the lowest (see Table 1).

No demographic or military (non-stressor) variables were correlated at the $p < .10$ with SI, so no covariates were entered into the regression (see Table 1 for correlations). Total military stressor exposure ($r = 0.19$, $p < .001$) was significantly positively associated with suicidal ideation, as was perceived life threat ($r = 0.17$, $p < .001$), military sexual harassment ($r = 0.18$, $p < .001$), and military sexual assault ($r = 0.12$, $p = .02$). Binary logistic regression revealed that only perceived life threat and military sexual harassment were significantly predicted SI (see Table 3 for full results). Specifically, women veterans who experienced perceived life threat had 2.2 times (95% CI = 1.2, 4.1, $p = .01$) greater odds of endorsing SI and women who experienced military sexual harassment had 2.7 times (95% CI = 1.2, 5.8, $p = .01$) greater odds of endorsing SI.

4. Discussion

This study examined the impact of exposure to different military stressors on suicidal ideation (SI) in women veterans. The current

Table 3
Logistic regression predicting suicidal ideation from military stressors exposure.

Variable	Odds ratio	95% CI for Odds ratio		*p*
		Lower	Upper	
Being wounded or injured	1.3	0.7	2.4	0.35
Loss of someone close	0.7	0.4	1.3	0.27
Perceived life threat	2.2	1.2	4.1	0.01*
Witness killings or injury	0.9	0.4	2.1	0.74
Seeing injured or dead bodies	1.2	0.6	2.5	0.61
Killing in combat	1.6	0.4	5.7	0.49
Military sexual harassment	2.7	1.2	5.8	0.01*
Military sexual assault	1.2	0.6	2.2	0.60

Note. * = $p \leq 0.01$. Variables taken from the Exposure to Military Service Stressors questionnaire.

findings suggest that particular military stressors may play an important role in SI among women veterans. Specifically, perceived life threat and military sexual harassment were the strongest factors associated with SI amongst women veterans. These findings collectively suggest the unrelenting nature of chronic life threat and harassment may deplete emotion regulation resources over time (King et al., 1995), leading to an increase in SI. This finding is broadly consistent with one study that found the general milieu of a threatening environment was the strongest predictor of PTSD amongst combat exposure and exposure to atrocities (King et al., 1995).

This study is the first to identify perceived life threat as a factor strongly associated with SI in the context of a variety of other traumatic military stressors in women veterans. Perceived threat and duration of perceived threat have been considered as critical as the objective characteristics of the traumatic event (Baum et al., 1990; Vogt and Tanner, 2007). Prior work has found perceived life threat to play an important role across multiple aspects of mental health and functioning (e.g., PTSD, anxiety, mental health functional status; King et al., 2008). In fact, perceived threat was a significant predictor of these outcomes, while combat exposure was not. Interestingly, a prior study of OEF/OIF veterans found endorsement of combat or aftermath exposure did not increase the probability of SI in women (Gradus et al., 2017), which in conjunction with our results, may suggest that examining individual versus cumulative experiences may be especially important for assessing risk. Our work expands on these prior findings by highlighting the association between perceived life threat and SI specifically. Using the same sample as the current study, Goldstein et al. (2017) found perceived life threat to strongly predict PTSD symptom severity in women veterans. In a predominantly male Operation Enduring Freedom and Operation Iraqi Freedom (OEF/OIF) sample, perceived life threat was also significantly associated with SI (Lemaire and Graham, 2011), suggesting there may not be gender differences with this particular military stressor. Perceived life threat may therefore be an especially important suicide risk factor for both men and women veterans.

Our findings are also in line with research examining the impact of sexual harassment on psychopathology in women veterans. For example, sexual harassment has also been previously associated with both PTSD and depression symptom severity in women veterans (Goldstein et al., 2017). Sexual harassment has been found to directly predict SI in women veterans, even after accounting for mental health symptoms (Gradus et al., 2013). Additionally, sexual harassment during deployment has been associated with SI, after accounting for combat exposure (Monteith et al., 2015). Our results extend these prior findings on SI in OEF/OIF samples to women veterans across the lifetime in a sample with an older average age. That military sexual harassment, but not military sexual assault, was strongly associated with SI in the current study, suggests that in addition to the deleterious impact of sexual assault on women veterans, the cumulative effect of harassment may be especially important in women veterans when understanding factors associated with SI (e.g., Sutker et al., 1991). Our results are in contrast to two findings from predominantly male OEF/OIF samples, in which military sexual harassment was not significantly associated with SI (Lemaire and Graham, 2011) and military sexual assault, but not harassment, was associated with SI (Monteith, Menefee, Forster, & Bahraini, 2016). Possible reasons for these differences include gender differences in both rates of military sexual harassment and in the labeling of experiences as harassment (e.g., Dardis et al., 2018). One possible interpretation of these findings is that in a work environment like military service, in which interpersonal connection and trust are paramount, sexual harassment may be more deleterious for women than male veterans. However, more research is needed to further examine these relationships. Collectively, these results highlight the need to investigate gender differences to better understand military stressors associated with SI.

Some limitations to this study include use of self-report surveys rather than diagnostic interviews, and relatively low endorsement of SI and combat exposure in the sample. Given the changes in combat roles post-9/11, it will be especially critical for future research to examine the impact of these changing roles (i.e., likely higher rates of combat exposure) on women's mental health, especially suicidality. Also, the current study was cross-sectional and thus temporal inferences about causation cannot be made. Future research should also aim to examine pathways to suicidality in women veterans across the lifespan via various mental health diagnoses (e.g., PTSD, depression) and theoretical mechanisms (e.g., perceived burdensomeness). Given that this was a cross-sectional study, it is possible that individuals who report SI may be more likely to remember their warfare experiences as more intense. Additionally, despite previous validation of this methodology (Desseilles et al., 2012), SI assessment was limited since we used a one-item measure of SI and were not able to capture suicidal behaviors or attempts. Future research should utilize comprehensive assessments of suicidality in women to better understand how these factors are impacted by military stressors. Moreover, due to the limitations of using a mail-based design for managing risk, women with a history of suicide attempt in the last five years were excluded, limiting generalizability to a recently suicidal population. Future research should focus on including a range of intensity in suicidal ideation and behaviors to better examine the relationship between these variables and military stressors. Additionally, we measured exposure to military stressors dichotomously, which limited our ability to assess the extent and degree of these experiences. Future research could deepen our understanding of specific military stressors on SI by using more comprehensive measures that include a wider range of pre-, peri-, and post-deployment stressors.

Despite these limitations, we found two important factors associated with SI in women veterans, a population at risk for suicide that has been understudied. Both perceived life threat and sexual harassment are gender-specific factors associated with SI that deserved further investigation. Consequently, these stressors may be important to identify in suicide risk assessments and target in prevention efforts among women veterans. Given that veterans may be hesitant to disclose to SI (Vannoy et al., 2016), life threat and sexual harassment may be salient factors to consider in identifying subgroups of women veterans who may be at a higher risk for suicidality. However, future research is needed to better elucidate the pathways between these specific military stressors and SI in women veterans across the lifespan. Similarly, investigating protective factors for women veterans will be prudent in considering SI prevention and treatment development for this population. This will be particularly important as the numbers of women in the military continue to rise over the next several decades (Department of Veterans Affairs, Office of Public Affairs Media Relations, 2010).

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Conflict of interest

The authors declare no conflicts of interest.

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