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## Psychiatry Research

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# Gender differences in suicide and suicide attempts among US Army soldiers <sup>☆</sup>



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## ARTICLE INFO

### Article history:

Received 25 September 2014

Received in revised form

19 November 2014

Accepted 25 November 2014

Available online 5 December 2014

### Keywords:

Suicide  
Military personnel  
Female  
Mental Health  
Risk

## ABSTRACT

In order to best tailor suicide prevention initiatives and programs, it is critical to gain an understanding of how service members' suicide risk factors may differ by gender. We aimed to better understand gender differences in suicide and suicide attempts among soldiers, including demographic, military, mental health, and other risk factors. We also examined risk factors uniquely associated with suicide and suicide attempts. We conducted a retrospective study of 1857 US Army soldiers who died by suicide or attempted suicide between 2008 and 2010 and had a Department of Defense Suicide Event Report. Female and male soldiers had more similarities than differences when examining risk factors associated with suicide. The only gender difference approaching significance was workplace difficulties, which was more strongly associated with suicide for female soldiers, compared to their male counterparts. Among suicide decedents, the most common risk factor was having a failed intimate relationship in the 90 days prior to suicide. Among those who attempted suicide, the most common risk factor was a major psychiatric diagnosis. Better understanding both gender differences and risk factors uniquely associated with suicide has critical prevention and public health implications as we work to better understand preventable mortality in our youngest generation of service members.

Published by Elsevier Ireland Ltd.

## 1. Introduction

Rates of suicide among US military service members and veterans have recently reached unprecedented levels (Kuehn, 2009; Nock et al., 2013). Suicide rates are higher for both male and female veterans, compared to non-veterans; male veterans have double the risk of suicide, compared to male non-veterans; female veterans have over triple the risk of suicide, compared to their non-veteran counterparts (Kaplan et al., 2007). A recent study examined female veterans of varying ages and found that for all age groups, veterans had higher rates of suicide than non-veterans, with females who were 18–34 years having the highest suicide rates (McFarland et al., 2010), which is a particular concern

for the newest generation of veterans. Furthermore, although male service members and veterans have higher suicide rates than their female counterparts (LeardMann et al., 2013), little is known about demographic, military and other risk factors that may differ among male and female service members who have attempted or completed suicide.

A gap in research on suicidal behaviors in female service members is of particular importance given that suicide rates among Operation Enduring Freedom (OEF), Operation Iraqi Freedom (OIF), and Operation New Dawn (OND) service members and veterans are a growing public health concern, with the Department of Defense (DoD) and the Veterans Administration (VA) conducting several initiatives to help decrease rising suicide rates (Weiderhold, 2008). In order to best tailor suicide prevention initiatives and programs, it is critical to gain an understanding of how service members' suicide risk factors may differ by gender. The current research was designed to shed light on gender differences in suicide and suicide attempts, including demographic, military, mental health, and other risk factors that have been found to be associated with suicidal behaviors in service members and veterans. Other risk factors include both distal antecedents—history of abuse (Bryan et al., 2013; Tiet et al., 2006) and self-injurious behavior (Bryan et al., 2014; Nock et al., 2013) and

<sup>☆</sup>The opinions or assertions contained herein are the private views of the authors and are not to be construed as official or representing the views of the Department of the Army, the Department of Defense, or the Department of Veterans Affairs. None of the authors have any conflicts of interest to report.

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proximal antecedents—relationship problems, work problems, and legal issues (Bush et al., 2013; Crawford et al., 2009; Holmes et al., 1998; Kaplan et al., 2007, 2012; Logan et al., 2012; Nock et al., 2013; Skopp et al., 2012). We predicted that there would be more similarities than differences across risk factors, particularly for mental health diagnoses, which are stable predictor of suicide across studies (Bossarte et al., 2012; Bush et al., 2013; Ilgen et al., 2012; LeardMann et al., 2013; Luxton et al., 2013; Nock et al., 2013; Skopp et al., 2012). However, gender differences in suicide risk factors are not well understood. This is the first known study to examine gender differences in suicides and suicide attempts in a national military sample. We also examined risk factors uniquely associated with suicide and suicide attempts.

## 2. Methods

### 2.1. Participants

Participants in this study included US Army soldiers who died by suicide or attempted suicide between 2008 and 2010 and had a Department of Defense Suicide Event Report (DoDSER; Gahm et al., 2012) submitted ( $N=1857$ ). The DoDSER system is the surveillance tool used by all services in the Department of Defense (DoD) to collect data on demographics, service characteristics, and psychosocial factors associated with a suicide event. When an event occurs, a designated service member is tasked with compiling information from personnel and medical records and interviews. The findings from the data review are uploaded into the DoDSER system by answering a series of questions about known or suspected risk and protective factors. All suicide events (suicide or attempt) are required to be reported for active-duty service members and activated Guard and Reserve. The DoD began collecting standardized data on suicide decedents through the DoDSER system for all services in 2008. Prior to 2008, each service had separate systems for suicide surveillance. The DoDSER contains Army suicide attempts from 2008 forward; data collection for suicide attempts expanded to all services in 2010. To have comparable data over the 2008–2010 period, we restricted the analysis to US Army soldiers. This study was conducted under a protocol approved by the Institutional Review Board at Madigan Army Medical Center.

### 2.2. Measures

The measures used in this study included demographic/military service (gender, age, race/ethnicity, education, marital status, rank and grade) and psychosocial risk factors. For many of the items about specific risk factors, follow-up questions probed the time prior to the event in which the factor occurred. We used the information on the time prior to the event for several of the risk factors to limit the presence of a risk factor to the 90 days prior to the event. For risk factors with the potential for long-term influence on suicidal behavior (e.g., a major psychiatric diagnosis) we did not limit the time of exposure to just the 90 days prior to the event.

The risk factors included in this study were history of deployment (at any time), known or alleged abuse victimization (at any time), failed intimate relationship (within 90 days of the event), military or civil legal problems (within 90 days of the event), prior history of self-harm (at any time), major psychiatric diagnosis (at any time), separation proceedings (within 90 days of the event), history of substance abuse (at any time), and workplace difficulties (within 90 days of the event). We used a series of binary indicators to indicate the presence or absence of the specific risk factors. Known or alleged abuse victimization was asked as three separate items: physical, emotional, and sexual; given the low prevalence for these items, they were pooled so that a positive response to any was equated to presence of any abuse victimization. The presence of military or civil legal problems was defined as evidence of Courts Martial, civil legal proceedings, Article 15 (non-judicial punishment), or being in an absence without leave status (AWOL) in the 90 days prior to the event. A major psychiatric diagnosis was indicated by a recorded diagnosis of any mood, anxiety, personality, or psychotic disorder. Separation proceedings included records of undergoing administrative separation proceedings or a medical evaluation board during the 90 days prior to the event. The presence of workplace difficulties was defined as a positive response to any of the following items: nonselection for promotion, job problems, coworker issues, poor performance evaluation, or workplace hazing, all within the 90 days prior to the event. The remaining risk factors—failed intimate relationship, prior history of self-harm, and history of substance abuse—were all single items asked in the DoDSER. Data on suicide methods were also collected and are examined in this study (i.e., guns vs. other).

### 2.3. Statistical methods

We used a series of logistic regression models to test the null hypothesis of no difference in the association between suicide and the included risk factors by gender. For the purposes of these analyses, our comparison group was individuals who attempted suicide, given that those without a suicide or suicide attempt were not included in the DoDSER dataset. Initial models included all demographic/military variables and risk factors as well as a single multiplicative interaction term between gender and one of the risk factors. We chose this approach given the small sample size of female suicides and convergence problems with multiple two-way interaction terms entered into a single model. From these models, any interaction terms that achieved a statistical significance of  $p < 0.10$  were selected to be included in the final model. After identifying any possible effect measure modification, we estimated two final models stratified by gender to elucidate the differences in the associations suggested by the identified interaction terms. Prior to estimating the logistic regression models, we used *proc mi* in SAS 9.2<sup>®</sup> to generate 50 multiply imputed datasets to account for the large amount of data unavailable on risk factors (see Table 2). We chose 50 datasets to allow for sufficient variability in the imputed variables (Enders, 2010). Results from the multiple imputation analysis were compared to a complete cases analysis to identify any large departures in the overall conclusions of the analysis. We also examined relationships between suicide method (guns vs. other) and suicide type (suicide vs. attempt) as well as suicide method and gender.

## 3. Results

We display the demographic characteristics of suicide decedents and soldiers who attempted suicide between 2008 and 2010 (Table 1). The distribution of gender differed substantially between the two outcome groups with women comprising a

**Table 1**  
Characteristics of suicide decedents and individuals with suicide attempts, US Army, 2008–2010.

Variable	Suicide		Suicide attempt	
	n	%	n	%
Gender				
Female	20	4.72	341	23.80
Male	404	95.28	1092	76.20
Age				
17–20	97	22.88	506	35.31
21–24	114	26.89	414	28.89
25–29	102	24.06	276	19.26
30–39	76	17.92	182	12.70
≥ 40	30	7.08	46	3.21
Missing	5	1.18	9	0.63
Race/ethnicity				
Non-Hispanic White	265	62.50	960	66.99
Non-Hispanic African American	50	11.79	213	14.86
Hispanic	6	1.42	29	2.02
Non-Hispanic Asian American/Pacific Islander	8	1.89	16	1.12
Other	24	5.66	108	7.54
Missing	71	16.75	107	7.47
Education				
Up to high school	194	45.75	798	55.69
Some college	55	12.97	398	27.77
4-year college degree or more	32	7.55	75	5.23
Missing	143	33.73	162	11.30
Marital status				
Never married	151	35.61	595	41.52
Married	200	47.17	629	43.89
Separated/divorced/widowed	49	11.56	177	12.35
Missing	24	5.66	32	2.23
Rank and grade				
E1–E4	249	58.73	1077	75.16
E5–E9	139	32.78	297	20.73
Officer	36	8.49	59	4.12
Year of event				
2008	126	29.72	564	39.36
2009	151	35.61	476	33.22
2010	147	34.67	393	27.42

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