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Sex Differences in Suicide-Related Symptoms in a Large Military Sample

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Abstract

Little research has focused on suicide-related symptoms in female servicemembers, despite high rates of suicidal behaviors. This study examined sex differences in suicide-related risk factors in 3,374 U.S. Army Recruiters (91.9% male). Female servicemembers had a greater number of past major depressive and suicidal ideation episodes than males; there were no differences in suicide attempt histories or mental health visits. Females reported significantly fewer symptoms of current suicidal ideation, perceived burdensomeness, and acquired capability. No significant sex differences emerged for thwarted belongingness, insomnia, or agitation. Our findings provide evidence for sex differences in rates of suicide-related symptoms among military personnel.

Keywords

suicide; suicidal ideation; military; sex differences; perceived burdensomeness; thwarted belongingness; acquired capability

Suicide among military personnel has become a growing concern in the United States, as evidenced by the rise in suicide rates of 10.3 per 100,000 in 2001 (Ramchand, Acosta, & Burns, 2011) to 19.9 per 100,000 for all Active Component Servicemembers, 21.9 per 100,000 for all Reserve Component servicemembers, and 19.4 per 100,000 for all National Guard servicemembers (U.S. Department of Defense, 2014). This concerning trend has prompted researchers to investigate the underlying mechanisms that may contribute to the rise of suicide rates in the military.

Most studies to date have examined demographic variables, psychopathology, and unique stressors affecting military personnel (Gadermann et al., 2012; LeardMann et al., 2013; Nock et al., 2014). For instance, current and former servicemembers may experience unique stressors that predispose them to suicide risk. A systematic review and meta-analysis by Bryan and colleagues (2015) found that exposure to specific combat experiences, particularly experiences of death or killing, were significantly associated with more severe

suicidal ideation and suicide attempt histories. A positive association between post-deployment stressors and suicidal ideation has also been established (Griffith & West, 2010): National Guard servicemembers with three or more post-deployment readjustment stressors had higher levels of suicidal ideation than those with fewer stressors (Kline, Ciccone, Falca-Dodson, Black, & Losonczy, 2011). In addition to combat experiences and post-deployment stressors, military personnel may also experience stigma and barriers to care (Greene-Shortridge, Britt, & Castro, 2007). Military culture emphasizes mental toughness, resiliency, high pain tolerance, and personal sacrifice (Bryan & Morrow, 2011), which results in increased stigma and barriers toward receiving mental health care due in part to both decreased perceived unit support (Pietrzak, Johnson, Goldstein, Malley, & Southwick, 2009) and concerns about how the disclosure of mental health issues may impact one's military career (Warner et al., 2011). Given these findings, it appears that military personnel experience unique stressors, which may not only increase their vulnerability to suicide, but also discourage them from disclosing suicidal thoughts and seeking treatment.

Other risk factors, particularly the constructs of the interpersonal theory of suicide (Joiner, 2005; Van Orden et al., 2010), have also garnered support across military samples. The interpersonal theory posits that the simultaneous occurrence of thwarted belongingness (i.e., social disconnection, loneliness), perceived burdensomeness (i.e., feeling as though one is a liability on others), and acquired capability (i.e., fearlessness about death and physical pain tolerance) leads to heightened risk for a lethal or near-lethal suicide attempt. Specifically, the theory proposes that thwarted belongingness and perceived burdensomeness contribute to an increased desire for suicide, whereas the acquired capability enables one to enact lethal or near-lethal self-harm. Evidence suggests that the interaction between perceived burdensomeness and acquired capability is most strongly supported among military personnel (Bryan, Clemans, & Hernandez, 2012; Bryan, Morrow, Anestis, & Joiner, 2010). Moreover, though not well-examined in military samples, agitation and insomnia have both been consistently linked to suicidal ideation and attempts (see Pigeon, Piquart, & Conner, 2012; Rogers, Ringer, & Joiner, under review, for meta-analyses), necessitating replication and extension of research supporting these factors in military populations.

Importantly, however, many of the aforementioned military and veteran samples consist primarily of males, likely due to the fact that only approximately 14.9% of those in the military are female (U.S. Department of Defense, 2013). Sex differences are less studied, though they may influence risk factors and rates for suicide in military populations. Previous research has found that male active duty servicemembers are more likely to die by suicide than female active duty servicemembers (Black, Shayne, Bell, & Ritchie, 2011; Ramchand et al., 2011). However, other findings indicate that the suicide rate, proportional to gender distributions in the military among those who are deployed, is more pronounced among female servicemembers (Street et al., 2015; Ursano et al., 2016). A recent study by Nock and colleagues (2014) also found that female Army servicemembers had significantly higher rates of suicidal ideation and suicide attempts than their male counterparts. Moreover, among veterans, rates of fatal and non-fatal suicide attempts are elevated among female, in comparison to male, veterans (Hoffmire, Kemp, & Bossarte, 2015; Kemp & Bossarte, 2012). Given elevations among both female servicemembers and veterans, these findings have led to legislation advocating for further research of suicide risk among female veterans (H.R.

2915 – Female Veteran Suicide Prevention Act) and highlight the need to examine sex differences in suicide risk and risk specifically among female military personnel further.

Notably, sex differences may emerge within various suicide risk factors in military populations that may explain the differences in suicide rates. In addition to being physically separated from family and friends, women may experience greater levels of social disconnection, or thwarted belongingness, due to internalized sensations of not belonging with their male counterparts in a male-dominated military population. This may also extend to feelings of burdensomeness, as women may feel the need to “measure up” to men’s performance in an environment that emphasizes mental toughness, resiliency, and high pain tolerance (Bryan & Morrow, 2011). In contrast, men consistently demonstrate higher levels of capability for suicide across populations (Kerbrat et al., 2015; Witte, Gordon, Smith, & Van Orden, 2012). Sex differences in other risk factors, including insomnia and agitation, have not been studied within military populations.

Overall, there is a paucity of research regarding suicide risk among female servicemembers; further analysis of sex differences within a military sample may be an important avenue for determining how male and female servicemembers may differ in risk, thereby identifying avenues for future research that lead to intervention and treatment. As such, the purpose of the current study was to examine sex differences in suicide-related outcomes and risk factors in a military population, both retrospectively and cross-sectionally. Specifically, we examined differences in the prevalence of past major depressive episodes (MDEs), episodes of suicidal ideation, suicide attempts, and mental health visits between male and female servicemembers according to medical chart reviews. We also tested for sex differences in self-reported current symptoms, including suicidal ideation, perceived burdensomeness, thwarted belongingness, acquired capability, agitation, and insomnia. Regarding medical chart reviews, we expected that men would have more past suicide attempts than women, but that women would have more past MDEs, suicidal ideation, and mental health visits than men. With regard to current symptoms, we predicted that men would endorse higher levels of acquired capability than women, but that women would endorse higher levels of suicidal ideation, perceived burdensomeness, thwarted belongingness, and insomnia—the latter hypotheses as an explanation for heightened suicidality found in female servicemembers and veterans. No specific predictions were made for agitation, as a recent meta-analysis found no sex differences in agitation across a number of samples (Rogers et al., 2016).

Methods

Participants

Participants were 3,374 military personnel (91.9% male, 8.1 % female) attending the U.S. Army Recruiting and Retention school at an Army Installation in the southeastern United States, who were administered a battery of questionnaires related to psychological health as part of their standard orientation battery. Ages ranged from 20 to 57 years ($M = 29.92$; $SD = 4.94$). The majority of the sample (2,216; 65.7%) self-identified as non-Hispanic White, with 500 (14.8%) participants identifying as Black/African American, 453 (13.4%) as Hispanic/Latino, 91 (2.7%) Asian, 53 (1.6%) as Native Hawaiian/Pacific Islander, 37 (1.1%) as American Indian/Alaskan Native, and 24 (.7%) choosing not to identify with any of the

above racial/ethnic backgrounds. Regarding marital status, the majority of participants were Married (2,590; 76.8%), 435 (12.9%) were Single, 272 (8.1%) were Divorced, 52 (1.5%) were Engaged, and 25 (.8%) individuals declined to respond.

The majority of the sample held a rank of Staff Sergeant (SSG; 1,573; 46.6%), followed by 1,328 (39.4%) Sergeants (SGT), 231 (6.8%) Sergeants First Class (SFC), 173 (5.1%) Captains (CPT), 59 (1.7%) First Sergeants/Master Sergeants (1SG/MSG), 4 (.1%) Commanding Sergeants Major/Sergeants Major (CSM/SGM), 4 (.1%) Second Lieutenants (2LT), and 2 (.1%) individuals that did not report rank. Deployment data were available for only 1,564 (46.4%) participants. Of this subset, the majority reported two deployments (598; 38.2%), followed by one deployment (392; 25.1%), three deployments (342; 21.9%), four deployments (104; 6.6%), no deployments (90; 5.8%), and five or more deployments (38; 2.5%).

Procedures

All participants completed questionnaires after providing informed consent; no compensation was given. Each of the questionnaires described below were completed as part of a 15-minute, computerized survey of various mental health indicators. The survey was administered as a voluntary and confidential add-on to mandatory orientation training, all of which was conducted in a generic classroom/training environment. Abbreviated measures derived from empirically supported questionnaires were included in the battery to reduce burden on participants due to time constraints. All procedures were approved by the relevant Institutional Review Boards (IRB).

Measures

Acquired Capability for Suicide Scale (ACSS; Bender, Gordon, Bresin, & Joiner, 2011)—The ACSS was originally a 20-item self-report instrument used for measuring fearlessness about death and physical pain tolerance on a 5-point scale (0 = *Not at all like me* to 4 = *Very much like me*). Previous research supported the validity and reliability of this measure (Bender et al., 2011), the newer revision of the scale as a 7-item scale (ACSS-Fearlessness About Death [FAD], Ribeiro et al., 2014), and an abbreviated 5-item version of the scale (Van Orden, Witte, Gordon, Bender, & Joiner, 2008). The present study used a 4-item abbreviated measure due to the time constraints involved in sampling Army recruiters during orientation. This version was derived from the 5-item version, omitting only a reverse-coded item that has been previously shown to load onto a different, reverse-coded factor from the other four items (Smith, Wolford-Clevenger, Mandracchia, & Jahn, 2013). Psychometric properties of this abbreviated version of the ACSS are discussed in detail by Silva and colleagues (in press). Higher total scores on the ACSS reflect elevated levels of acquired capability for suicide. Internal consistency was moderate ($\alpha = .76$) in the present sample.

Interpersonal Needs Questionnaire (INQ; Van Orden, Cukrowicz, Witte, & Joiner, 2012)—The INQ is a 15-item self-report measure that assesses perceived burdensomeness (PB) and thwarted belongingness (TB). Respondents rated each item on a 7-point scale (1 = *Not at all true for me*) to 7 = *Very true for me*). Due to time constraints, an

abbreviated 8-item version (4 items assessing perceived burdensomeness, 4 items assessing thwarted belongingness) of the INQ was used in the present study. Higher scores indicate higher levels of PB and TB. Studies have consistently found that the INQ demonstrates strong psychometric properties (Van Orden et al., 2012, 2008). Further, these abbreviated measures demonstrated strong psychometric properties in relation to the INQ (see Silva et al., in press). In the present sample, internal consistency of both the PB ($\alpha = .87$) and TB ($\alpha = .91$) subscales was excellent.

Depressive Symptom Inventory – Suicidality Subscale (DSI-SS; Metalsky & Joiner, 1997)—The DSI-SS is a 4-item self-report measure that assesses the presence and severity of suicidal ideation and urges. Respondents use a 4-point scale with varying response options to indicate the severity of suicidal thoughts and urges, with higher scores indicating more severe thoughts and behaviors. The DSI-SS has been shown to have strong psychometric properties in previous research (Joiner, Pfaff, & Acres, 2002; Ribeiro, Braithwaite, Pfaff, & Joiner, 2012). Internal consistency was fair in the present sample ($\alpha = .70$).

Brief Agitation Measure (BAM; Ribeiro, Bender, Selby, Hames, & Joiner, 2011)—The BAM is a 3-item self-report measure that assesses psychomotor and emotional agitation. Participants rated their degree of agreement with each statement on a 3-point scale (1 = *Not at all true for me*) to 7 = *Very true for me*); higher scores reflected more severe agitation. The BAM has previously demonstrated strong psychometric properties (Ribeiro et al., 2011) and demonstrated strong internal consistency ($\alpha = .85$) in the present sample.

Insomnia Severity Index (ISI; Bastien, Vallières, & Morin, 2001)—The ISI is a 7-item self-report measure that assesses the severity of an individual's sleep difficulties over the course of the past month. Respondents are asked to rate insomnia, sleep satisfaction, noticeability of impairment, sleep problem-related worry/distress, and interference with daily functioning on a five-point Likert scale ranging from 0 to 4. Higher scores represent greater sleep problems. Previous research has shown that the ISI has strong psychometric properties (Bastien et al., 2001; Morin, Belleville, Bélanger, & Ivers, 2011). An abbreviated, 5-item version of the ISI was used in the present study, omitting the items pertaining to noticeability and worry/distress about symptoms; this abbreviated version of the ISI had strong concurrent validity in relation to the full ISI (Silva et al., in press). The 5-item ISI demonstrated excellent internal consistency in the present sample ($\alpha = .87$).

Medical Records—Participants' medical records were reviewed to determine lifetime number of major depressive episodes (MDEs), episodes of suicidal ideation, past suicide attempts, and mental health visits. MDEs were defined according to the DSM-IV-TR (American Psychiatric Association, 2000) as periods of at least 2 weeks during which an individual experiences depressed mood or loss of interest in enjoyable activities, accompanied by other symptoms including, but not limited to, sleep and appetite problems, feelings of guilt or worthlessness, and/or thoughts of suicide. Lifetime MDEs, episodes of suicidal ideation, and suicide attempts were determined for each participant based on medical chart information from previous clinical interviews with mental health professionals

(e.g., psychologists, psychiatrists, clinical social workers). Mental health visits were determined based on medical chart documentation of visits with such mental health professionals.

Data Analytic Strategy

Missing data were minimal (~0.2%) and handled via listwise deletion. Descriptive statistics were first conducted to examine the prevalence of past mental health outcomes (dichotomized due to low prevalence rates as presence/absence of past suicide attempt, episode of suicidal ideation, and MDEs) and normality of risk factors for suicide (i.e., current suicidal ideation, perceived burdensomeness, thwarted belongingness, acquired capability, agitation, and insomnia). Current suicidal ideation, perceived burdensomeness, thwarted belongingness, and agitation were positively skewed and leptokurtic; thus, these variables were log transformed to correct for non-normality. Cross-tabulations were conducted to examine prevalence rates of past mental health outcomes by sex, and chi-squared tests were calculated to examine the significance of group differences.

Next, independent samples *t*-tests were conducted to examine group differences in suicide risk factors by sex. Sample sizes and variances differed greatly between sexes, and as a result, Levene's test of equality of variances was used to examine equality of variances. We examined *t*-test results as appropriate depending on the results of this test. Specifically, in the case of a significant Levene test, equal variances were not assumed; when Levene's test was non-significant, equal variances were assumed.

Results

Prevalence Rates Based on Chart Review

Based on review of medical charts, 16 participants (.47%) had at least one previous suicide attempt. Thirteen (.41%) of these participants were male, and three (1.11%) were female. There were no significant sex differences in the proportions of participants who did and did not report a past suicide attempt ($\chi^2 = 2.49, p = .115$) though the direction of the non-significant effect was such that females reported more past attempts. There were 61 males (1.97%) and 11 females (4.06%) who had previous episodes of suicidal ideation on their medical charts (total proportion: 2.14%). Women were significantly more likely to have a past episode of suicidal ideation than males ($\chi^2 = 5.20, p = .023$). Similarly, 338 males (10.92%) and 55 females (20.30%) had at least one past MDE (total proportion: 11.67%). Again, women were significantly more likely to have had at least one past MDE than males ($\chi^2 = 21.26, p < .001$).

Sex differences on Self-Report Measures

Group differences were examined through a series of independent samples *t*-tests. Levene's test of equality of variances revealed that variances were unequal across sexes for current suicidal ideation, perceived burdensomeness, and thwarted belongingness ($F_s = 10.69, 12.95, \text{ and } 4.30, p_s < .001, < .001, \text{ and } = .038, \text{ respectively}$). Variances were equal across sexes for acquired capability, agitation, insomnia, and mental health visits ($F_s = 2.83, 2.07, 1.53, \text{ and } .20, p_s = .092, .150, .216, \text{ and } .654, \text{ respectively}$).

See Table 1 for a presentation of group differences, means, and standard deviations parsed apart by sex. Males reported higher levels of current suicidal ideation ($t[819.62] = 3.64, p < .001$), perceived burdensomeness ($t[342.29] = 2.21, p = .028$), and acquired capability ($t[3371] = 10.96, p < .001$) than did females. Males also endorsed marginally higher levels of thwarted belongingness ($t[327.53] = 1.95, p = .053$) than females. There were no sex differences in agitation ($t[3372] = 1.26, p = .209$), insomnia ($t[3372] = .35, p = .729$), or number of mental health visits ($t[3365] = -.42, p = .677$).

Discussion

There is a paucity of research regarding suicide risk among female military personnel and veterans, though risk within this demographic is further elevated in comparison to their male counterparts and female civilians (Hoffmire et al., 2015; Nock et al., 2014). Thus, the purpose of the present study was to examine sex differences in a variety of suicide-related outcomes and risk factors for suicide in a sample of United States Army recruiters. Consistent with previous research, we predicted that men would report more past suicide attempts and higher acquired capability for suicide, but women would report more past MDEs and suicidal ideation, current suicidal ideation, perceived burdensomeness, and thwarted belongingness. Contrary to our expectations, however, men reported higher levels of current suicidal ideation, perceived burdensomeness, and acquired capability, and marginally higher levels of thwarted belongingness, than women. This is despite medical chart reviews revealing that women had more past episodes of depression and suicidal ideation. There were no significant sex differences in past suicide attempts, agitation, insomnia, or number of mental health visits.

Our findings suggest two possibilities. First, female military personnel may tend to underreport their current symptoms on self-report measures, even beyond the general tendency of servicemembers to underreport symptoms (Kim, Britt, Klocko, Riviere, & Adler, 2011). It may be that female servicemembers are *especially* likely to underreport suicide-related symptoms, due to pressures of being compared to their male counterparts. Indeed, female servicemembers tend to structure their gender identities according to masculine gender roles (Sasson-Levy, 2002); thus, they may experience increased pressure to conform to the mentally tough, warrior culture of the military (Bryan & Morrow, 2011). In contrast, agitation and insomnia may be less stigmatized in the military, perhaps in part due to the fact that these constructs do not appear related to suicide to those without training. Further, symptoms of insomnia were more common in our sample than the low base rate exhibited by many of our variables (e.g., suicidal ideation, agitation), indicating that military personnel in general, not only women, may feel more comfortable disclosing sleep difficulties than other mental health symptoms.

A second possibility is that despite a history of more severe psychopathology, including depression and suicidal ideation, serving in the military may have a protective function for females and/or render males relatively more vulnerable. For instance, males more frequently report exposure to combat during deployments (Street, Gradus, Giasson, Vogt, & Resick, 2013), and combat exposure, particularly violent combat, results in increased risk for suicide-related outcomes (Bryan et al., 2015). This explanation is somewhat unlikely,

however, given recent meta-analytic evidence that female servicemembers were more likely to develop combat-related PTSD and related psychopathology (Xue et al., 2015). Furthermore, female servicemembers and veterans have higher rates of suicidal ideation and suicide attempts than both male servicemembers and female civilians (Hoffmire et al., 2015; Nock et al., 2014). Finally, although pre-enlistment lifetime prevalence rates of suicidal ideation and attempts were lower across servicemembers than those of civilians, post-enlistment onsets of ideation and plans were higher, and attempts were equal, to civilian rates across both male and female servicemembers (Nock et al., 2014). However, this possibility should be explored in future research across a variety of active duty and reserve military samples.

Limitations, Strengths, and Future Directions

This study has several strengths, namely, that we examined sex differences in well-established risk factors for suicide in a large sample of Army recruiters, providing preliminary insight as to how suicide risk may differ across sex within the military. However, as with any study, several limitations should be noted. First, the design of this study was cross-sectional. As such, we were only able to examine these servicemembers' functioning at a single point in time. This limits our ability to examine how these risk factors might develop and manifest differently over time for male and female servicemembers. However, we established that differences in these risk factors exist across sexes, thereby providing an avenue for future research to examine these associations longitudinally, with additional risk factors unique to the military (e.g., combat and post-deployment stressors, stigma due to military culture), and with varying subsets of military personnel (e.g., active duty, National Guard).

Furthermore, our sample had significantly lower base rates of past suicidal ideation and attempts than many other recently reported samples (Nock et al., 2014; Ramchand et al., 2011; U.S. Department of Defense, 2014). Thus, our findings may not generalize to more severe populations. Moreover, our self-report data were also, in many cases, positively skewed even after logarithmic transformations. Of note, however, these lower rates are consistent with the stringent screening procedures and criteria required to become an Army recruiter (United States Army, 2011). On the other hand, as noted throughout, mental health stigma in the military may have resulted in underreporting of current symptoms (Kim et al., 2011; Warner et al., 2011). Examining reasons for the differences in these reported rates, however, will be an important avenue for future research.

Future military research should also take a longitudinal approach to determine differences in risk between men and women servicemembers for future suicidal thoughts and attempts. Implicit measurements of suicide through measures such as the Implicit Association Task (Nock et al., 2010) may also be helpful to identify risk differences between females and males by bypassing the limitations of self-report measures and those imposed by stigma. Additionally, future studies that test how stigmatization of mental illness and suicide risk factors in the military may impact women differently than men would be beneficial. Finally, as this study was focused on United States Army recruiters, it would be beneficial to replicate and extend these findings to other military and veteran populations.

In sum, we present findings that provide evidence for sex differences in suicide-related outcomes and symptoms among a large sample of United States Army recruiters. Specifically, although medical charts revealed greater prevalence of MDEs and suicidal ideation among female servicemembers, they self-report fewer current symptoms of suicidal ideation, perceived burdensomeness, and acquired capability. Future research endeavors are needed to better understand the nature of and reasons behind these findings in order to guide suicide prevention in the military.

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Table 1

Differences between Males and Females on Suicide-Related Measures

Variable	<i>t</i>	Males		Females	
		Mean	SD	Mean	SD
DSISS	3.64***	.03	.27	.00	.06
INQ-PB	2.21*	4.44	1.71	4.29	1.68
INQ-TB	1.95	7.25	4.62	6.74	4.18
ACSS	10.96***	9.71	3.18	7.50	3.37
BAM	1.26	4.34	2.51	4.18	2.40
ISI	.35	4.44	3.70	4.36	4.06
MH Visits	-.42	5.39	11.58	5.69	8.63

Note:

* $p < .10$,

* $p < .05$,

*** $p < .001$.

DSISS = Depressive Symptoms Inventory – Suicidality Subscale; INQ-PB = Interpersonal Needs Questionnaire – Perceived Burdensomeness; INQ-TB = Interpersonal Needs Questionnaire – Thwarted Belongingness; ACSS = Acquired Capability for Suicide Scale; BAM = Brief Agitation Measure; ISI = Insomnia Severity Index; MH = Mental Health