



## Review

## Suicide and substance use among female veterans: A need for research



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## ABSTRACT

**Background:** The number of female veterans is increasing. Veterans Administration (VA) enrollment increased over 40% from past eras. However, little research has focused on their mental health. We reviewed literature to examine associations of substance use with suicide in female veterans, identify research gaps, and inform future studies.

**Methods:** Google Scholar, Pub Med, and PsychINFO were searched using: substance use, female veteran, and suicide. Exclusion criteria (e.g., not discussing U.S. veterans) left 17 articles.

**Results:** Nine studies examined completed suicide among veterans. In most recent years, rates of deaths were greater for veterans than nonveterans, including females. Completed suicide was associated with past trauma, young age, and a mental disorder. Studies have often not addressed substance use. Three studies examined completed suicide among VA treated veterans without examining substance use as an associated factor. Rates of completed suicides were also higher among veterans than nonveterans, including females. A large proportion of females also had a mental diagnosis. Five studies examined substance use and attempted or completed suicide among VA treated veterans. Veterans in poor mental health had increased odds of suicide mortality; women with a substance use disorder (SUD) had a higher hazard ratio for completed suicide than men with a SUD. Engagement in substance abuse treatment decreased odds of suicide attempt among veterans.

**Conclusion:** Available data suggest that suicide rates are higher among female veterans than women in the general population. Substance use may increase the likelihood of suicidal behaviors among female veterans, particularly those with a mental diagnosis.

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## Contents

1. Introduction.....	1
1.1. Female military service and substance use.....	2
1.2. Suicide and substance use.....	2
1.3. Methodological challenges.....	2
2. Methods.....	3
3. Results.....	3
3.1. Summary of identified studies.....	3
3.2. Suicide among veterans (Table 1).....	3
3.3. Suicide among VA treated veterans (Table 2).....	4
3.4. Suicide and substance use among female veterans (Table 3).....	5
4. Discussion.....	7
Role of funding source.....	9
Contributors.....	9
Conflict of interest statement.....	9
References.....	9

## 1. Introduction

Women with military service are a growing population. They currently make up 11.3% of military personnel and 8% of veterans in the United States (U.S.; Batuman et al., 2011). Modern

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warfare increases women's exposure to trauma (Murdoch et al., 2006), and the mental health needs of female veterans are increasing (Goldberg, 2008). However, veteran's mental health research has traditionally focused on men, creating disparity in knowledge about women (Goldzweig et al., 2006). The psychiatric status of women who served in Operation Iraqi Freedom (OIF), Operation New Dawn (OND), and Operation Enduring Freedom (OEF) ( $N=299,548$  as of February 28, 2013) requires research to inform female veteran's mental health needs (Nunnink et al., 2010). Given the reported increase of suicide and substance use among veterans (Nunnink et al., 2010; Kang and Bullman, 2009) and identified associations between substance use and completed suicide (Allen et al., 2005), there is a compelling need to investigate suicide and substance use in the understudied female veteran population. To aid efforts, we conducted a literature review to:

- Examine the extent of suicide measures (ideation, suicidal behavior, completed suicide) among veterans, with a particular focus on female veterans,
- Examine the potential for an association between substance use and suicide measures in female veterans,
- Discuss reasons female veterans may be particularly likely to misuse substances and endorse suicide measures, and
- Identify research gaps for future research.

To provide context for this review, we begin with a background on substance use among female military personnel, the role substance use might play in increasing suicide, and the challenges in studying substance abuse and suicide among female veterans. We then review available findings on male and female veteran suicide, including suicide among those who use Veterans Administration (VA) services, with an emphasis on females and gender differences. We also review studies on associations between suicide and substance use, including substance use disorder (SUD), among veterans. Finally, we discuss factors that increase female veteran's vulnerability to suicide and substance use.

### 1.1. Female military service and substance use

Problematic substance use is prevalent in the military. In 2008, prevalence of binge drinking ( $\geq 5$  drinks in men;  $\geq 4$  drinks in women on  $\geq 1$  day in the past 30 days) ranged from 39% in the Air Force to 57.6% in the Marine Corp (Bray et al., 2009). Although problematic drinkers were more often male (Bray et al., 2009), Jacobson et al. (2008) assessed alcohol use among 48,481 active duty personnel (30% female) and found that women were 1.21 times more likely than men to begin heavy weekly drinking between baseline (July, 2001–June, 2003) and follow-up (June, 2004–February, 2006). In addition, 32% of women reported binge drinking, 8% heavy weekly drinking, and 7% alcohol related problems (Jacobson et al., 2008). Further, a 2005 survey of 1200 Army soldiers found that women engaged in unsafe drinking at a rate nearly twice that of men (9.1% vs. 5.1%; Lande et al., 2007).

Bray and Hourani (2007) analyzed 1980–2005 survey data collected from >150,000 active duty service members and found that, while illicit drug use declined in the general military population from 1980 to 1998 before leveling off, past-month prevalence of illicit drug use among female soldiers increased from 1998 to 2002 (from 1.9% to 2.9%). Bray et al. (2009) further found that nonmedical prescription drug use increased through 2008 and that past-month prevalence of any illicit or nonmedical drug use was higher among females than males (13.3% vs. 11.7%, respectively).

Data from the 2004–2006 National Survey on Drug Use and Health (NSDUH) found that 5.8% of female veterans had a SUD (SAMHSA, 2007b). While lower than the 9.2% in the general population (individuals aged 12+ years) with a SUD in 2006

(SAMHSA, 2007a), the proportion of female veterans who engage in problem substance use is likely higher than estimated. Although more recent data were not available, a 1998 survey found that, among 1259 female Veterans Health Affairs (VHA) patients, 24% of respondents engaged in binge drinking. Of respondents who drank, 11% binge drank  $\geq 1$  time a month (Bradley et al., 2001). Similarly, 31.1% of female veterans treated by the VHA and surveyed in 1998 reported hazardous or problem drinking, and 4.9% reported past-year drug use (Davis et al., 2003).

### 1.2. Suicide and substance use

Depending on the study measures, suicide variables may include *ideation* (suicidal thoughts and contemplation), *behavior* (attempted suicide), or *completed suicide* (Kaplan et al., 2007a,b). Studies show an association between substance use (e.g., alcohol, opiates, inhalants) and increased odds of suicidal behaviors in the samples of general populations (Borges et al., 2000; Cherpitel et al., 2004; Wilcox et al., 2004). In 2009, almost one third of US Army suicide deaths involved prescription drug abuse; from 2003 to 2009, 45% of unsuccessful suicidal attempts were reported to involve alcohol or drug use (US Army, 2010).

Joiner (2005) proposed that, to commit suicide, people must perceive themselves a burden to others, feel they do not belong, and be physically capable of self-harm. Substance use may improve the likelihood of these factors. Substances may alter neurological pathways to increase impulsivity, triggering suicidal behavior (Braquehais et al., 2010). Veterans suffering from posttraumatic stress disorder (PTSD) may also use substances to relieve PTSD symptoms (Leeies et al., 2010; Jakupcak et al., 2009), and the situations that contribute to PTSD may decrease veteran's fear of harm, habituate them to pain and violence, and allow them to acquire the ability to self-harm (Joiner, 2005). Inability to reintegrate into civilian life may lead to social alienation and a failed sense of belonging (Brenner et al., 2008). Finally, substances, such as opiates, work as a mechanism of death through overdose (Best et al., 2000). If substance use triggered or increased odds of suicide ideation, attempted suicide, or completed suicide, interventions on substance use might improve mental health, reduce suicide ideation, and help prevent or reduce suicide attempt and completion.

### 1.3. Methodological challenges

Several methodological challenges are present when studying female veterans, the first being small numbers of service women that make it difficult to accrue sufficient samples for generating meaningful results. Because of the demographic makeup of the military, unweighted rates calculated using military populations (e.g., active duty, veterans) for the denominator tend to disproportionately represent males and mask their associations with women's health indicators (Kaplan et al., 2007a,b). Additionally, veteran suicide research has traditionally used samples identified through the Department of Veterans Affairs system (VA); however, only one quarter of veterans have historically received care through these facilities (Kaplan et al., 2007a,b). Studies that consider illicit drug use also often include only small subsamples of women, limiting the analysis of associations between drug use and suicide variables (Wilcox et al., 2004). Because events of suicide attempt or death are often rare in a given study, analyses of suicidal events are constrained by a relatively small number of cases (Allen et al., 2005). Men are more likely than women to complete suicide and women tend to attempt it (Cibis et al., 2012). Thus, studies that use completed suicide as an outcome measure miss some women at risk for suicide related injury. Because female veterans and people who commit or attempt suicide are difficult to study, the influence of one behavior over another (e.g., substance abuse increasing potential

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