Predictors of Depression Diagnoses and Symptoms in United States Female Veterans: Results from a National Survey and Implications for Programming

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Abstract

Background and Purpose: Research suggests that female veterans of the United States military are more likely than their male counterparts to report mental health concerns such as posttraumatic stress, depression and suicidal thoughts. The purpose of this study was to explore the interaction of service era (time period during which active duty service occurred), social support, and beliefs about mental health care utility as they relate to depression in female veterans in the hope of improving health programming for this priority population.

Materials & Methods: Secondary analysis of data from the 2012 Behavioral Risk Factor Surveillance Survey (BRFSS) conducted by the Centers for Disease Control and Prevention (CDC) involved logistic regression analysis of a large, nationally-sourced sample of 54,060 veterans, of whom 8.5% were women (n = 4,544). Correlations were found between social support, service era, and treatment stigma variables as they predicted outcome variables of diagnosed and undiagnosed depression.

Results: Of the nationally-sourced sample of 4,544 female veterans, 25.5% reported a medically-diagnosed depression condition of mild, moderate, or major severity. Of veterans in the sample who did not already have a depression diagnosis, 12% indicated the presence of symptoms that indicate undiagnosed depression of mild, moderate, or major severity. Female veterans from recent wars in Iraq and Afghanistan were more likely than older peers to be struggling with symptoms that may indicate undiagnosed depression or to have a depression diagnosis.

Conclusion: The findings of this study aided in identifying three demographic and behavioural health predictors of diagnosed depression and one predictor of undiagnosed depression in the female military veteran population that demonstrated both practical and statistical significance.

Keywords: military, mental health, veteran, veterans' health, women's health, female veterans, warrior culture, stress, posttraumatic stress, depression, suicide, resilience, programming.

Background

Suicide is a major health problem in the military community, and depression and stress injuries are known contributors to this public health problem.[1] Conservative estimates indicate that the numbers of suicide attempts and completions have increased since 1995, and are currently hovering at 22 veterans taking their own lives each day, along with one active duty service member per day.[2] Suicide risk is almost four times higher in the veteran population than in non-veterans1. Military deployment to a war zone elevates the risk of long-term physical, psychological, and social problems and reduces overall health.[3] In addition, reintegration into new roles and loss of community felt when leaving the military contribute to depression among recently discharged veterans.[4] As the United States completes troop drawdowns in Iraq and Afghanistan, the mental health ramifications for the all-volunteer military are an important concern for health professionals.[5] Research has shown that female veterans are six times more likely to commit suicide than civilian women. Rates seem to be higher among younger veterans between the age ranges of 18-29; they are twelve times more likely to commit suicide than non-veterans.[6] The purpose of this study was to examine the relationship between three

key predictor variables (service era, relationship status, and opinions about mental health treatment) and rates of diagnosed depression and symptoms indicating undiagnosed depression in a national sample of female military veterans in order to generate predictive models for the condition in women who have served.

Women constitute approximately 15% of the armed services and represent a growing segment in the veteran population.[7] Female service members and veterans have complex healthcare needs.[8] Studies indicate that female veterans returning from deployment are more likely than their male counterparts to report mental health concerns such as posttraumatic stress (PTS), depression, and suicidal thoughts.[9-10] Koo (10) reported that women were more likely to screen positive for depression both before and after deployments.

Targeting programs towards women must take into consideration several facets of the female military experience that differ from their male counterparts. Women are more likely to face issues of discrimination and belonging, and are at a disproportionately high risk for Military Sexual Trauma (MST). MST is under-studied and under-reported, but between 20-40% of female veterans report experiencing MST during their time in service.[11] During mental health screenings, one in five women report MST, which is sexual violence and defined as sexual coercion, sexually threatening behaviour, and/or sexual assault experienced during their military service.[12] Additionally, the majority of female veterans report having endured ongoing sexual harassment.[13-14] Historical discrimination against women in the service branches combined with cultural issues that linger in the present day can make issues of social support and unit cohesion uniquely salient for military women.[15-16] Many servicewomen report feelings of alienation and decreased feelings of unit cohesion while serving.[17] These women are at increased risk for mental health problems, including depression and PTSD.[18]

Suicide is positively correlated with depression, of which stress and anxiety are symptoms.[5,19-20] Depressive conditions are closely related to trauma and stress-related disorders like PTS; the two often co-occur.[21-22] Depression in veterans can be categorised as both diagnosed and undiagnosed.[20] Statistics on PTS in veteran communities are uncertain, with estimates out of the Veteran's Administration sitting at 15-50%.[23] A RAND corporation study reported numbers hovering at about 20%.[24]

Resilience is the ability to become strong, healthy, or successful again after something stressful happens. Military service is stressful for a variety of reasons, from deployments, family stress, and transitions from active duty to civilian status in a community where only a small percentage of the population has served.[22-23] The relationship between exposure to traumatic stressors and poor post-service health is well documented.[22] Still, some individuals are more psychologically resilient than others, and increasing understanding of resilience within given communities and populations may help target programming.[25] Case studies of existing programs that have worked to build resilience in different populations provide the foundation upon which savvy programmers must build; and health promotion professionals working to prevent and treat mental health problems like depression and stress illness must understand the confluence of warrior culture and mental health issues in the veteran community.[14,26]

Method

Study Design and Sample

The research team coded data from the 2012 Behavioral Risk Factor Surveillance Survey (BRFSS), which is conducted by the Centers for Disease Control and Prevention (CDC) annually; it is administered via telephone across the country by state health departments. The BRFSS inquires about a number of demographic, health, and behavioural issues and provides comprehensive analysis opportunities for a broad range of health topics.[27]

Data from veteran respondents were extracted from the BRFSS survey at large. The resulting respondent pool included a large, nationally-sourced sample of 54,060 veterans, of whom 8.5% were women (n = 4,544). This percentage closely aligns with national estimates that women comprise 10% of the American veteran population.[28-29]

Study Variables

Covariates. Predictor variables were chosen to highlight the ways in which age, social support, and opinions about mental health care impact the mental health of women who have served in the military.

Age. Veterans were grouped into service eras according to their age in Bureau of Labor Statistics tabulations, because Department of Defense manpower numbers indicate that most service members fall within a given demographic age range.[28] Recoding age involved taking the BRFSS continuous age variable and assigning it to categories. Veterans serving in the most recent conflicts in Iraq and Afghanistan are those between the ages of 18-34, and were coded Operations Enduring Freedom and Iraqi Freedom (OEF/OIF). These data also include veterans who

served during Operation New Dawn, the American operations in Iraq after 2010. Respondents between the ages of 35-55 were assigned the Gulf War era category, veterans 55-78 years were assigned to the Vietnam era, and over 78 years to Korea.[20] Veterans' experiences in a given era are coloured by the conflict that dominated their time in service and the government resources and policies prevalent during service and the transitory period immediately after leaving.[30]

Relationship Status/Social Support. A BRFSS question asking about marital status and partner relationships provided insight into the social support a respondent enjoys. Social relationships play an important role in promoting better health and alleviating diseases.[14,31] While not all kinds of social interactions produce similar health consequences, intimate partnerships are considered a reliable indicator of social support.[32-33] Some female veteran respondents had close partnerships while others did not, making possible analysis of relationship status (which indicates social support) as a predictor of veteran depression. Participants were classified as partnered or non-partnered.

Stigma Against Mental Health Care. Of particular interest was a question asking respondents to offer opinions on the usefulness of seeking mental health care. This question sheds light on issues of patient-stigma in the veteran population.[34] Many veterans feel that care-seeking is a sign of weakness, is not useful, or that care providers do not understand their needs.[5,26] The BRFSS assesses respondents' attitudes about the effectiveness of mental health care, asking specifically in Question 9 of Module 17 whether the respondent believes such care can be positive and helpful. It asks respondents to agree on a scale with the statement "treatment can help people with mental illness lead normal lives." To simplify the categories for analysis, the variable was recoded to include all respondents that are answering to agree strongly or slightly as 'yes' responses, all disagreeing slightly or strongly, or neutrally as 'no' responses. Researchers have found that contact with the existing care system impacts opinions, and veterans with symptoms indicating undiagnosed depression may also suffer from negative beliefs about mental health care in general.[35-36]

Depression. The research team coded two outcome variables. A BRFSS question asking specifically whether a respondent had ever been diagnosed with depression of any severity level provided an outcome variable indicating medically-diagnosed depression. In order to broaden the utility of analyses, this study also sought indicators of depression that could be coded to indicate undiagnosed cases of depression in respondents. A question in the 2012 BRFSS addressed symptom presence and offered sufficient responses to present statistically useful possibilities. This continuous variable was recoded to eliminate respondents who were already medically-diagnosed with a depressive condition. Respondents that were coded as "yes" included those who answered whether undiagnosed depression may be present. Question 2.2 specifically asks, "thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?" Self-reported symptom presence anywhere from 5-30 days was coded to indicate the presence of symptoms that may indicate undiagnosed depression. Previously-diagnosed respondents were dropped to simplify analysis, leaving 3,385 cases.

According to the Adult Severity Measure for Depression (PHQ-9) from the American Psychological Association, variables indicating depression of mild, moderate, or major severity include both the frequency of depression symptoms and the presence of feelings like nervousness, hopelessness, restlessness, depression, low interest in normal activities, and/or feelings of worthlessness as well as the severity of perceived poor mental health.[21,37] Depression symptoms are varied and present themselves differently in each individual, so perception of overall poor mental health is a useful indication of undiagnosed depression.[38] Self-report of symptoms is a common method for diagnosing depression in clinical settings, and grouping mild, moderate, and major levels of symptom presence together invited comparability with the variable indicating diagnosed depression, which also grouped severity levels together.[39]

Data Analysis

All assumptions for logistic regression were checked and data were analysed using the Statistical Package for the Social Sciences (SPSS) version 23 for Mac.

The independent variables were tested and logistic regression modeling demonstrated that diagnosed depression was significantly related to all predictor variables including: service era, relationship status, and beliefs about mental health care using a threshold of $p < .05$.

To provide macro-level practical significance information, crosstab analysis checked for the practical significance of independent variables on dependent variables.[40] Correlations resulting from univariate logistic regression analysis then screened the effect of these independent variables (service era, relationship status, and beliefs about mental health care) on dependent variables including: diagnosed

depression and symptoms indicating undiagnosed depression. Significance levels were set a priori at $p < .0541\text{-}42$.

Results

Descriptive statistics were calculated for all predictor variables (see Table 1). Of the nationally-sourced sample of 4,544 female military veterans, 48.8% were partnered, with 51.2% having less social support in a non-partnered status. Six hundred and forty-five served during the OEF/OIF era (14.2%); 1,935 served during the Gulf War era (42.6%); 1,509 served during the Vietnam War era (33.2%); and 455 served during the Korea War era (10.0%). Almost all female veterans (95.8%) held a negative view of mental health treatment and its usefulness for an individual (male or female) in mental health distress.

Logistic regression analysis explored linkages between two depression variables in female veteran respondents: diagnosed depression and undiagnosed depression, predicted by service era, relationship status, and beliefs about mental health care's usefulness.

For the outcome variable of diagnosed depression, all three variables were statistically significant ($p < .001$). Predictor variables that were both statistically significant and important to the individual in terms of effect (odds ratios of 1.5 or higher) were not found. However, relationship status was high with an odds ratio of 1.310 (see Table 2).

Table 1 Summary of Predictor Frequency Statistics for Sample of Female Veteran Respondents

Variable	n	%
Veteran Service Era	4544	
• Operations Enduring/Iraqi Freedom	645	14.2%
• Gulf	1935	42.6%
• Vietnam	1509	33.2%
• Korea	455	10.0%
Relationship Status	4544	
• Partnership	2219	48.8%
• No partnership	2325	51.2%
Beliefs About Mental Health Care	4544	
• Favourable	193	4.2%
• Unfavourable	4351	95.8%

The variable coded to show symptoms indicating undiagnosed depression was significantly related to the variable of service era using a threshold of $p < .05$ while relationship status and beliefs about mental health care were not. The service era variable was both statistically significant and important to the individual in terms of effect; veterans of OEF/OIF were 3.62 times more likely than the reference category of Korean War veterans to be displaying symptoms that may indicate undiagnosed depression (see Table 3). This category was chosen as a reference because it was the smallest in terms of respondent representation and female veteran representation.

Table 2 Univariate Logistic Regression Analysis of Predictor Variables: Diagnosed Depression

Variable	B	SE	Odds Ratio	95% CI	P	% Variance Nagelkerke
Veteran Service Era (likelihood of 'yes' diagnosis)			n/a		< .001	2.7%
• Operations Enduring/Iraqi Freedom*	-.887	.181	0.412	.289, .587	< .001	
• Gulf	-1.253	.162	0.286	.208, .393	< .001	
• Vietnam	-1.192	.164	0.304	.220, .419	< .001	
• Korea						
Relationship Status	.270	.068	1.310	1.145, 1.498	< .001	0.5%
• Likelihood of 'yes' diagnosis for Non-Partnered						
• Likelihood of 'yes' diagnosis for Partnerships						
Beliefs About Mental Health Treatment	-2.901	.202	0.055	.037, .081	< .001	9.8%
• Likelihood of 'yes' diagnosis for Favourable						
• Likelihood of 'yes' diagnosis for Non						

**Odds ratios from univariate regression with smallest category as reference (Korea)*

Table 3 Univariate Logistic Regression Analysis of Predictor Variables: Symptoms Indicating Undiagnosed Depression

Variable	B	SE	Odds Ratio	95% CI	P	% Variance Nagelkerke
Veteran Service Era (symptom presence)			n/a		< .001	3.5%
• Operations Enduring/Iraqi Freedom*	1.285	.224	3.615	2.329, 5.610	< .001	
• Gulf	.718	.211	2.050	1.355, 3.103	.001	
• Vietnam	.208	.196	1.231	.793, 1.911	.354	
• Korea						
Relationship Status	-.137	.106	0.872	.709, 1.073	.196	0.1%
• Symptom presence for Non-Partnered						
• Symptom presence for Partnered						
Beliefs About Mental Health Treatment	-.206	.611	0.814	.246, 2.695	.736	0.0%
• Symptom presence for Favourable						
• Symptom presence for Non						

**Odds ratios from univariate regression with smallest category as reference (Korea)*

In univariate analysis, the percent of variance explained by each variable was small, though statistical significance existed between all independent variables and diagnosed depression (Nagelkerke R2 = 0.5-9.8%) with all cases correctly classified. Statistical significance existed between the service era variable and symptoms indicating undiagnosed depression (Nagelkerke R2 = 3.5%). With an alpha level greater than 0.05, the variables of relationship status and opinions on mental health treatment both lacked significance. Researchers also noted models were fit for both diagnosed depression (χ^2 (DF, N = 5) = 460.259, $p \leq .001$) and symptoms indicating undiagnosed depression (χ^2 (DF, N = 5) = 71.473, $p \leq .001$).

Discussion

Gaining a better understanding of depression in the veteran population is vital to health promotion programming in the military community and to suicide prevention efforts.[19,34] A number of studies have attempted to explore the issue of depression and PTS in women veterans, but ranges and rates vary widely and predictive models that could guide program decisions are lacking.[43-45] The findings of this study aid in identifying demographic and behavioural health predictors of depression (both diagnosed and undiagnosed) in the female military veteran population. Such findings can be used to support programming aimed at reducing suicidal ideations, attempts, and completions.

Limitations

When considering the findings of this exploratory report, a number of limitations must be acknowledged. Secondary analysis of 2012 BRFSS survey data, while providing a large, randomly-selected sample of veteran respondents, limited the scope of questions that could be asked about predictive variables and veteran depression. The sample was delimited to veterans not in institutions, homeless, or those who had already completed suicide attempts, which potentially resulted in an under-representation of depression rates in veterans. Data were self-reported, which could be problematic due to respondent recall or reluctance to truthfully answer sensitive, personal questions. However, the use of self-report in survey-based research in the field is both accepted and common.[46]

The variable of veteran service era is limited. Veterans are grouped into service eras according to their age in Bureau of Labor Statistics tabulations, because Department of Defense manpower numbers indicate that most service members fall within a given demographic age range. Seventy-two percent of service members are between 18 and 30 years old, and most serve only one four-year tour on active duty.[28] However, some veterans may fall into more than one service era.

While not all kinds of social interactions produce similar health consequences, intimate partnerships are considered a reliable indicator of social support.[32] However, a more recent study showed that family conflict and partner stress can lead to a reduction in adherence.[47] Also, in a study examining the benefits of marriage to the risk factors associated with cardiovascular disease, researchers found that marriage was not beneficial if the partners were dissatisfied.[48] This limits the utility of the relationship status variable as a method of defining

social support, specifically in female veterans who also deal with issues of discrimination and unit cohesion. Future research should more deeply explore social support in this sub-population.

Transitions are a Problem

Research suggests that both military-connected men and women have increased rates of interpersonal conflict and behavioural health risk within the first six months that they separate from the military.[49] Interestingly, the notion that deployment and combat trauma are the primary causes of stress injury and depression in veterans has been largely discredited by recent research.[50] A far more important predictor of such conditions appears to be the process of separating from service. Some difficulties that veterans have upon separating from the military include sharing their feelings, staying in touch with friends and their families, living in civilian society, pursuing and maintaining a job, taking care of all aspects of their health, and finding a sense of meaning in their life as a civilian.[22, 51]

Not only do veterans struggle with returning home, but their partners also struggle. The following statistics highlight the issue sharply: 83 percent of military spouses have feelings of anxiety and depression while their spouse is deployed, and 28 percent have difficulties with readjustment upon their spouse's return.[52] Military children also struggle with readjustment in various ways, which frequently includes increased levels of anxiety and behavioural problems at home and at school.[22, 51]

Depression is a Problem

The findings of our study support the broader research literature that the prevalence of depression is a significant problem for military-connected women.[53-55] Almost 26% of the female veterans in our study sample had a depression diagnosis, and an additional 12% showed symptoms of the undiagnosed condition.

It is important to include the service era of female veterans so that program developers and administrators are able to make efficient and data-driven decisions for targeted program development. The most likely female veterans to receive a depression diagnosis are of the OEF/OIF era followed by veterans of the Gulf War and Vietnam. Korean War veterans were the least likely to have a diagnosis. The most likely group to present symptoms that indicate undiagnosed depression included younger veterans of OEF/OIF, followed by veterans of Gulf War I and Vietnam. Korean War veterans were the least likely group to present symptoms. The findings indicated practical significance for veterans of OIF/OEF and suggested targeting interventions towards these younger groups.[56]

Relationship status was associated with diagnosed depression with both statistical and practical significance. Veterans not in partnerships (i.e., divorced, widowed, or single) were 1.3 times more likely than those in partnerships (i.e., married, cohabiting, or seriously-dating) to receive a depression diagnosis. These findings support the extant literature.

Social support is a known contributor to health and longevity, with recent studies indicating that high levels add 7.5 years to the average American life expectancy.[31,57] Studies have shown that there is an inverse correlation between lack of social support and increased depression symptoms, comorbid depression and anxiety, decreased scores for health measures, and more suicidal attempts reported specifically for homeless female veterans.[58] Many military service members are subjected to repeat deployments, which can result in compromised intimate relationships with spouses and children, gender shifts in role responsibilities, financial concerns, and diminishing community support.[59] The current study's finding is important because it suggests expanding the scope of programming to prevent depression beyond the current focus on social support at the unit level; it suggests a new urgency to family programming that is integrated and prioritised.

Gender norms in military family life must be considered in such programming. Approximately two million children have a military-connected parent or caregiver with many having deployed in support of OEF and/or OIF.[60] Research suggests that parental deployment is a risk factor for military-connected children and places them at higher risk for psychosocial problems than civilian children.[61] Parental depression may exacerbate those problems.[62] Given the dearth of school-based interventions to improve the well-being of military-connected children, many children do not have extra-familial supports and might be at increased risk with a depressed parent.[63] More research is needed on the impact of female service members' deployment, potential subsequent depression, and effects on the well-being of children and families.

Beliefs about the usefulness of mental health treatment were associated with diagnosed depression at statistically significant levels. Within the military community, much of the issue lies neither in lack of screening for depressive disorders, nor in the medical care available to service members suffering from depression. The problem is getting veterans to avail themselves of treatment services.[5, 64-66] Veterans who

held favourable views were slightly more likely to also have a depression diagnosis than those respondents who were undiagnosed. Previous research found that respondents who had received professional diagnoses were more likely to agree that mental health care was effective than undiagnosed peers; a smaller number of non-diagnosed respondents agreed that it was effective.[35]

Challenges in suicide prevention are many and include: stigma surrounding mental illness, negative perceptions of treatment, and concerns about confidentiality in the military setting. These challenges result in the majority of service members not accessing care when needed or dropping out prematurely.[66] Programming should consider cultural norms and recognise the issue of care-seeking stigma. Simply noticing that less than five percent of female veteran respondents somewhat or strongly agreed with the statement that mental health treatment could help a person is important; stigma is both strong and rampant in the culture of women warriors.

Female veterans face unique health issues related to rampant Military Sexual Trauma rates and a host of issues related to access to health care through the Veteran's Administration, both stigma-related and structural.[7] Easing access burdens for Department of Veteran Affairs (VA) benefits and health care must be a top priority; female veterans do not need additional barriers. Some of the available services that are offered through the VA are psychological assessment and evaluations, psychotherapy, inpatient and outpatient care, and psychosocial rehabilitation. There are several VA facilities that have established women-only programs and specialised women's treatment teams to serve those female veterans that are not comfortable in a mixed-gender environment.[7,67]

Enabling care access for younger female veterans is important. Older female veterans are more likely to access VA health care than their younger peers from Afghanistan and Iraq.[68] The largest sub-population of women that use VA services are between the ages of 45 and 64; women veterans that are 65 and older make up 14% of those that use VA services.[67] With that said, more research is needed on mental health challenges, including depression, experienced by women across the life span.[7]

Another category of female veterans that needs targeted outreach is the lesbian and bisexual community. Sexual and gender minority women veterans struggle with unique challenges both during active service and during transition.[7] One cohort study performed on 365 women veterans within two large VA facilities showed that for those who self-identified as lesbian or bisexual, there were higher likelihoods of having experiencing military and/or childhood sexual trauma and becoming hazardous drinkers. Statistically and practically, their mental health was in a worse state in relation to heterosexual women.[68] Additionally, younger lesbian and bisexual veterans attending college may be at increased risk for problematic mental health symptoms, which is of increasing concern given many younger veterans are using educational benefits from the Post 9/11 Veterans Educational Assistance Act of 2008.[69,70] Health care providers need to be aware of this community of veterans, and ensure they are referring them to appropriate and culturally sensitive support groups and services.[71-73]

Studying mental health can be a complicated process, as symptoms manifest on multiple levels and vary greatly from one patient to the next. In the military, understanding mental health is important from two key angles. Prevention of illness and stress disorders saves the military services money and training time, and treatment of conditions accrued during service is an ethical responsibility.[73] The Department of Defense and VA have prioritised combatting both diagnosed and undiagnosed depression specifically because it is a known predictor of suicide.[1]

Military subculture is unique and requires culturally-palatable programming, and understanding the uniquely liminal space occupied by female veterans is necessary. The challenge for health professionals looking to stem the tide of service suicides and improve quality of life for female veterans lies in shifting the paradigm away from a focus on health and mental health problems and towards theories and methods of resiliency cultivation, preparation, and self-care practices.[34]

Resilience-training methods have been demonstrated to reduce stress and emotional reactivity and promote mental health and emotional well-being; framing this as promotion of combat fitness, resilience, and mental endurance may render it culturally-palatable to the military population.[65] Receiving training to cultivate resilience in the pre-deployment interval may help protect against the deleterious effects of the high-stress military context on physical and psychological health.[36,74-75]

The results of our study suggest targeted programming is needed for female veterans in treating and preventing depression and in select sub-populations of female veterans. A need exists for further research that explores the attitudes, beliefs, and opinions of veterans toward programming that is focused on resilience-building, particularly in

veteran populations in postsecondary educational settings given the high numbers of younger veterans attending postsecondary institutions and the potential to introduce targeted interventions early in their life trajectories. The advancement of veteran mental health from a health promotion and education perspective could benefit tremendously from qualitative research, specifically case studies of successful resilience programming.[23] This should involve rigorous program evaluation of culturally-sensitive content that focuses on predictor variables of interest, designing and validating program exemplars that provide the best opportunity to make a difference in the mental health of veterans. Using information about significant predictors of depression in veterans to target programming is a needed first step.[20] Tailoring programs for relevance in order to resonate with veterans and rigorously evaluating them is the next.[26]

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