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Prevalence, Correlates, and Symptom Profiles of Depression among Men with a History of Military Service

Peter C. Britton, Ph.D.^{a,b}, Robert Bossarte, Ph.D.^{a,b}, Naiji Lu, Ph.D.^{a,c}, Hua He, Ph.D.^{a,c}, Glenn Currier, M.D.^{a,b}, John Crilly, Ph.D.^{a,b}, Tom Richardson, Ph.D.^{a,b}, Xin Tu, Ph.D.^{a,c}, and Kerry Knox, Ph.D.^{a,b}

^aCenter of Excellence, Department of Veterans Affairs, Canandaigua Medical Center

^bCenter for the Study and Prevention of Suicide, Department of Psychiatry, University of Rochester Medical Center

^cDepartment of Biostatistics, University of Rochester Medical Center

Abstract

Purpose—The purpose of this study was to examine the prevalence, correlates, and symptom profiles of depressive disorders in men with a history of military service.

Methods—Data was obtained from the 2006 Behavioral Risk Factor Surveillance System (BRFSS) survey. Multivariable logistic regressions were used to identify correlates of lifetime and current depression. Regularly occurring symptom profiles were identified via cluster analysis.

Results—Prevalence of lifetime and current depression was similar in men with and without a history of military service. Lifetime diagnosis was positively associated with younger age and negatively associated with black minority status, married or cohabitation, and self-reported good health. Current depression was positively associated with other minority status (non-Hispanic non-black) and negatively associated with older age, some college, being in a relationship, and self-reported good health. A cluster of younger men who experience significant depressive symptoms but may not report depressed mood or anhedonia was identified.

Conclusions—Depression is as prevalent in men with a history of military service as it is in men without a history. Research should examine subpopulations of men with a history of military service in which depression may be more prevalent or burdensome. Younger men with significant depressive symptoms may be missed by standard depression screens and still be at elevated risk for negative outcomes associated with depressive disorders.

Keywords

Depression; Prevalence; Military Personnel; Veterans

Introduction

Depressive disorders are associated with unemployment, poor productivity [1] and suicide [2], a leading cause of death and years of potential life lost [3], making them a public health burden. Psychotherapy, psychopharmacology, and joint psychotherapy and psychopharmacology have been found to be effective treatments for depression indicating the burden can be reduced [4, 5]. Research examining the prevalence, correlates, and symptom profiles of depression in populations believed to be at high-risk is needed for the effective and efficient distribution of clinical and programmatic resources.

Concern about the burden of depression attributable to a history of military service has led Department of Defense (DOD) and Department of Veterans Affairs Veterans Health Administration (VHA) researchers to study the prevalence of depressive disorders in their respective populations. In general, depression appears to be more prevalent in Veterans who receive primary care from the VHA [6, 7] than in military service members (i.e., active duty, Reserve, National Guard) [8] and the general population [9, 10]. An estimated 75% of all Veterans receive health care from non-VHA sources due to ineligibility or individual decisions not to access VHA services [11]. Ineligibility may be a result of type of discharge, length of service, presence of service-related disability, income level, or the availability of VHA services among other variables [12]. Studies conducted in the VHA exclude these Veterans. This gap in data prevents researchers from deriving an accurate estimate of the prevalence of depressive disorders across individuals with a history of military service, and determining whether the VHA, DOD, and clinicians who work with individuals with a history of military history should target the entire population or certain subpopulations in their outreach and intervention efforts.

The primary purpose of this study was to use the 2006 Behavior Risk Factor Surveillance System (BRFSS) database to examine the prevalence and correlates of depressive disorders among men with a history of military service. BRFSS is the largest nationally representative telephone health survey in the US, and has been conducted yearly since 1984. The 2006 database is appropriate for these analyses as it utilized items from a widely used measure of depressive symptoms (Patient Health Questionnaire; PHQ-9) [13, 14], and a common methodology across a representative sample of the general population, identified a large number of individuals with a history of military service (e.g., active military, National Guard, Reserves, Veterans who receive care from the VHA, Veterans who receive care from the community) who receive healthcare in the US, included a wealth of demographic data to examine as correlates, and offered an anxiety and depression module that was used by 36 states (names are available on the BRFSS website) [15]. To provide descriptive data on the clinical presentation of men with a history of military service who report significant depressive symptoms to administrators who guide intervention efforts and clinicians who provide treatment, a secondary purpose was to examine regularly occurring symptom profiles of depression. Because age is associated with the prevalence of depression in military service members [8] and Veterans in VHA care [6, 7], age was included in the analysis.

Methods

Data were obtained from the 2006 BRFSS survey. Coordinated by the Centers for Disease Control and Prevention (CDC), BRFSS uses a nationally-representative sample of non-institutionalized adults to collect data from all US states, Washington D.C., Guam, the US Virgin Islands, and Puerto Rico. It is a state-based study that includes a core questionnaire, optional modules, and state added questions. In 2006, 51 of the 53 states, commonwealths, and territories used a disproportionate random sampling design and US Virgin Islands and Puerto Rico used a random sampling design. To promote standardization, all states use a computer-assisted telephone interviewing system. The 2006 median response rate was 51.4% (range: 35.1%–66.0%). Additional information about survey design and administration is available from the data quality summary report [16]. All analyses that were conducted used information from the de-identified dataset available from the CDC website [17]. Missing data were managed using listwise deletion. The demographics of men with a history of military in the BRFSS sample was similar to that of the National Survey of Veterans which is available from Department of Veteran Affairs website [11]. Females with a history of military service were excluded from the analyses as less than one percent of women reported having been in the military, and the small number of women prevented us from conducting identical analyses in men and women. Internal IRB approval for the use of BRFSS data was obtained from the Department of Veterans Affairs.

Dependent variables

Outcomes for this study were self-reported lifetime diagnosis of a depressive disorder, current depression, and depression symptom profiles. A lifetime diagnosis of depression was assessed with the screening question “Has a doctor or other healthcare provider EVER told you that you have a depressive disorder?” Participants who answered “yes” were identified as having a lifetime depressive disorder.

The PHQ-8 (Patient Health Questionnaire), which is identical to the validated PHQ-9 [13, 14] but does not include the death and suicidal ideation item, was used to screen for a current depressive disorder in this study. The PHQ-8 was used because the suicidal ideation item was excluded from the 2006 BRFSS anxiety and depression module. Most BRFSS items inquire about the number of days symptoms are experienced. To match other BRFSS rating scales, participants were asked the number of days they experienced each symptom in the past two weeks rather than the standard PHQ-9 scale. For analyses with current depression as the outcome, responses were converted to the PHQ-9 scale, a 4-point scale ranging from “not at all” (converted to 0–1 day), “several days” (2–6 days), “more than half the days” (7–11 days), to “nearly every day” (12–14 days). Items were summed for a total score. A score of ten, the accepted cutoff for moderate depression for the PHQ-9 [14], was used as the cutoff for a positive screen. The PHQ-8 is validated [18], has been used previously with BRFSS data [19], and case identification is virtually identical to the PHQ-9 ($r = .998$, $p < .001$, $N = 1004$) [20]. The PHQ has additional significance for men with a history of military service. Both the VHA [20] and the DOD [21, 22] use the anhedonia and sadness items as a depression screen (PHQ-2).

Independent variables

History of military service was assessed with the question “Have you ever served on active duty in the United States Armed Forces, either in the regular military or in a National Guard or military reserve unit?” Participants who answered “yes” were categorized as having a history of military service. Dichotomized explanatory variables included relationship status (married or member of an unmarried couple vs. living alone, divorced, or widowed), education (some college or more vs. less than college), and health status (good or better health vs. less than good health). Explanatory variables with more than two categories included age (24–34, 25–44, 45–54, 55–64, 65–74, 75–84, and 85 + years of age) and race (non-Hispanic white, non-Hispanic black, non-Hispanic Other, Hispanic).

Analyses

Prevalence estimates and descriptive statistics were computed to compare men with a history of military service to men without a history in the full and analytical samples. Multivariable logistic regressions were used to identify correlates of a lifetime diagnosis and current depression among men with a history of military service. The full analytic sample included 24,892 men with a history of military service, and 24,392 with complete information were included in the multivariable analyses. Estimates were calculated using sampling weights to adjust for non-response and survey design. Regression analyses and prevalence estimates were conducted using STATA, version 10 [23] and the S-Post package [24].

In men with a history of military service who screened positive for current depression, age-related symptom profiles were identified using cluster analysis [25]. Cluster analysis identifies clusters or groups of subjects with similar characteristics (age and depressive symptoms in our context). Clusters were generated using Ward’s hierarchical method of cluster formation, and the clusters that best fit the data were identified using pseudo-F, pseudo-T, and cubic clustering criterion statistics [26–28]. Variables for symptom profiles used in the analysis included the eight items from the PHQ-8 and age. All variables were simultaneously entered into the analysis. To allow for greater variability, the original BRFSS rating scales and a continuous age variable were used. As the cluster analysis was conducted using the subsample of depressed men with a history of military service, sampling weights were not used. The variation across the clusters identified for each the symptoms and age was modeled using multiple linear regression with inference based on generalized estimating equations. This approach provides robust inference regardless of the data distributions [29]. As the generalized estimating equations were used, inferences were based on Chi Squares statistics resulting from the asymptotic normal distribution of the estimate, rather than F statistics obtained from the normal data assumption. Cluster analysis was conducted using SAS, version 9.1 [30].

Results

Prevalence of lifetime and current depression

Descriptive statistics of correlates and outcome variables are reported for the full and analytical sample in Table 1. The prevalence of lifetime and current depression was similar in men with and without a history of military service. Approximately 11.56% (95%

confidence interval: 10.81, 12.31) of men with a history of military service reported a lifetime diagnosis, compared to 10.81% (95% confidence interval: 10.20, 11.41) of men without a history. Current depression was found in 13.47% (95% confidence interval: 12.65, 14.29) of men with a history of military service, compared to 13.05% (95% confidence interval: 12.37, 13.40) of men without a history.

Correlates of lifetime and current depression

Correlates of a lifetime diagnosis and current depression are reported in Table 2. In the logistic regression for a lifetime diagnosis of a depressive disorder, men 25–74 years were more likely to report a lifetime diagnosis than men over 75. Black minority status, being in a relationship, and self-reported good health were inversely associated with a lifetime diagnosis.

In the logistic regression for current depression, men in the 65–74 year old cohort were more likely to screen positive than men 75 and older. Men in 18–24 year old cohort were the most likely to screen positive for current depression, but the difference was not statistically significant. History of some college or more, being in a relationship and self-reported good health were inversely associated with current depression. Membership in other (non-white, non-black, and non-Hispanic) minority groups increased the odds of current depression.

Symptom profiles of current depression

Results suggested that both a thirteen and four cluster solution provided good fit. Because nine variables were entered into the analyses, the four cluster solution was determined to be the most parsimonious solution. The four-cluster solution was replicated with the same data using the standard PHQ scoring and age categories. Table 3 shows the mean score for each of the subscales for each cluster.

The first and largest cluster was named the “Standard Depression” cluster. This cluster had an average age of 54.24 years, and was used as the reference group for the chi-squares reported in Table 3. Cluster two, the “Older Anhedonic,” was the smallest cluster. In comparison to the “Standard Depression” cluster, the “Older Anhedonic” cluster had an older average age (75.87), higher anhedonia, and lower sleep, appetite, worthlessness, and concentration symptoms. The third grouping, the “Younger Anhedonic” cluster, was the second largest cluster. When compared to the “Standard Depression” cluster, the “Younger Anhedonic” cluster had a younger average age (39.33), higher anhedonia, and lower energy, appetite, and psychomotor symptoms. We named the fourth and second smallest cluster the “Younger Distressed” cluster. The “Younger Distressed” cluster was younger (25.33), reported higher concentration and psychomotor symptoms, and fewer anhedonia, sadness, and energy symptoms, when compared to the “Standard Depression” cluster.

Discussion

A lifetime diagnosis of a depressive disorder was found to be as prevalent in men with a history of military service as it was in men without a history. Prevalence estimates of a lifetime diagnosis are not directly comparable to previous studies of men with a history of military service as it is rarely assessed [6–8].

Current depression was found to be as prevalent in men with a history of military service as it was in men without a history. In comparison to previous studies, the estimate of current depression in men with a history of military service was lower than in Veterans receiving care from the VHA [6, 7]. This finding suggests that depression may be more prevalent in certain subpopulations of men with a history of military service, such as men who receive their healthcare from the VHA. Additional studies suggest that men with a history of military service who were deployed to combat zones [21, 31–33], exposed to traumatic experiences [34], in the Reserves [21], utilized mental healthcare, or discharged early [33] may be other important subpopulations.

Over the life course, black minority status, being in a relationship, and good health were inversely associated with a lifetime diagnosis in men with a history of military service. It is not known whether the inverse association with black minority status was due to a protective effect or the under-assessment or diagnosis of depression sometimes observed with minorities [22]. The associations between being in a relationship and good health and depression are in agreement with general population studies [9, 10]. Men 25–74 years old were more likely to have received a lifetime diagnosis than those 75 or older. The 18–24 year old cohort was also more likely, but the difference was not statistically significant. Lifetime depression peaked in the 55–64 year old cohort, some of who may have served during Vietnam. Lower lifetime prevalence in older men with a history of military service may be a result of the association between depression and mortality [35], which may have reduced the number of older men with depression, or a cohort effect as depression may be more readily diagnosed than it was in the past.

Education, living with a partner, and good health were inversely associated with current depression, supporting findings from research in the general population [9, 10]. Intervention efforts may benefit from targeting men with lower education, relationship difficulties, and men with poor health, as these variables may be malleable. Although depression was highest in the 18–24 cohort the elevation was not significant, contrary to previous studies [6, 7]. This may, however, have been a result of limited statistical power associated with the small number of men in the 18–24 year old cohort. Depression was less prevalent among the 65–74 year old cohort than in those 75 and older, perhaps due to the associations among physical and cognitive decline and depression in individuals 75 and older [36, 37].

To inform intervention efforts, we conducted cluster analyses to identify age-related symptom profiles. The “Standard Depression,” “Older Anhedonic,” and “Younger Anhedonic” clusters appeared to reflect symptom profiles that would be identifiable through routine screening and assessment. Elevations in anhedonia have been found to be associated with greater social impairment and withdrawal, mood reactivity, rumination about the past, diurnal mood variation, fewer increases in appetite, and thoughts about death [38], suggesting there may be other differences among the three clusters. The “Younger Distressed” cluster reported higher concentration and psychomotor symptoms, and lower anhedonia, sadness, and energy symptoms. An individual must have anhedonia or sadness most of the day every day to meet DSM-IV criteria for a diagnosis of major depressive disorder. Moreover, the anhedonia and sadness items are included in the PHQ-2, which is used as a depression screen by both the VHA [20] and the DOD [21, 22]. Members of the

“Younger Distressed” group could screen negative on the PHQ-2 and not meet criteria for a depressive disorder, despite experiencing significant depressive symptoms. Their reports of less anhedonia and depressed mood may be accurate, or reflect underreporting due to stigma associated with those symptoms [21]. Elevations in concentration and psychomotor symptoms may reflect the presence of other psychiatric disorders such as PTSD, substance use, attention deficit disorder, traumatic brain injury, or sub-threshold depression, all of which may increase risk for death by suicide or other causes [2, 35, 39–44]. Although these individuals may screen positive for one or more of these disorders, it is possible that their depressive symptoms are untreated, which may increase their risk for mortality [45]. Given the young age of this cluster, researchers studying the increase in suicides in the active military may want to expand their studies beyond depression to consider the potential impact of underreported depression, sub-threshold depression, and other potential psychiatric precipitants of suicide in this population (e.g. PTSD, substance use, attention deficit disorder, traumatic brain injury) [46]. This cluster analysis, however, was exploratory and requires replication.

This study did have limitations. BRFSS is a telephone survey, and the 2006 median response rate was low. The decline in BRFSS participation rates, however, is consistent with that of other telephone-based epidemiological studies and is unlikely to have a substantial impact on prevalence estimates [47]. BRFSS also relies on self-report, and it is not possible to certify that men with a history of military service were accurately identified. Similarly, the depression screens only identified cases that had knowledge of and were willing to disclose their diagnostic history and current symptoms. In addition, important service-related variables that may be associated with depressive disorders were not assessed. Veteran or active duty, dates of service, branch of service, combat exposure, trauma exposure, receiving care from VHA, mental health care utilization, and early discharge may be critical correlates of depressive disorders in men with a history of military service.

Several important subpopulations were excluded or underrepresented in the sample, including women with a history of military service, a nascent area of research. Men currently serving in combat zones were also excluded, although BRFSS did extend across the population of men with a history of military service who currently receive healthcare in the US. There is also no information on men with a history of military service that chose not to participate in the survey and may represent a distinct subpopulation. The small number of men in the 19–24 year old cohort may have prevented differences from achieving statistical significance.

The question that was used to assess a history of depression asked about a lifetime diagnosis and is likely to produce a lower estimate than diagnostic measures due to the need for knowledge of a previous diagnosis. It may also be confounded by differences in access to and use of mental health services.

Results from this study indicate that the prevalence of depression is similar in men with and without a history of military service. Subpopulations of men with a history of military service may account for a greater proportion of depression-related burden. Future studies should cover the full population of men with a history of military service, and assess veteran

or active duty status, dates of service, branch of service, combat exposure, trauma exposure, VHA or community care, utilization of mental health care, and early discharge. Understanding the burden of depression among these groups may facilitate more efficient and effective treatment. There may also be important differences in age-related symptom profiles among men with a history of military service. A “Younger Distressed” cluster may not be identified by the brief depression screens currently in use, and yet be at risk for negative outcomes that are associated with depressive disorders.

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Table 1

Comparison of Men with and without a History of Military Service in the Full and Analytic Sample

	Full Sample (N = 134,290) Percentage (95%CI)		Analytic Sample (N = 71,911) Percentage (95%CI)	
	Military Service (N = 46,493)	No Military Service (N = 87,797)	Military Service (N = 24,892)	No Military Service (N = 47,019)
Age				
18–24	2.57 (2.04–3.11)	17.80 (17.07–18.56)	2.77 (1.99–3.56)	18.30 (17.26–19.33)
25–34	7.16 (6.60–7.72)	22.66 (22.01–23.31)	7.43 (6.67–8.19)	23.09 (22.18–23.99)
35–44	12.32 (11.61–13.03)	22.54 (21.20–23.12)	12.23 (11.24–13.23)	22.34 (21.53–23.15)
45–54	14.16 (13.49–14.82)	20.49 (19.978–21.01)	14.89 (13.97–15.81)	20.21 (19.49–20.94)
55–64	25.28 (24.51–26.04)	9.89 (9.55–10.22)	25.26 (24.50–26.62)	9.54 (9.08–10.00)
65–74	19.48 (18.83–20.13)	4.51 (4.31–4.71)	19.31 (18.44–20.19)	4.45 (4.17–4.72)
75+	19.02 (18.38–19.66)	2.12 (1.96–2.27)	17.80 (16.95–18.65)	2.08 (1.86–2.29)
Race/Ethnicity				
Non-Hispanic, White	79.59 (78.69–80.50)	65.46 (64.67–66.25)	77.61 (76.33–78.88)	62.99 (61.88–64.09)
Non-Hispanic, Black	8.49 (7.92–9.07)	8.61 (8.22–9.01)	8.42 (7.66–9.17)	8.60 (8.08–9.11)
Non-Hispanic, Other	5.60 (5.10–6.09)	7.86 (7.41–8.31)	6.16 (5.46–6.86)	7.71 (7.11–8.30)
Hispanic	6.32 (5.64–6.99)	18.07 (17.32–18.81)	7.81 (6.79–8.85)	20.71 (19.61–21.81)
Some College or More	64.46 (63.59–65.34)	56.72 (55.97–57.47)	66.31 (65.14–67.48)	55.31 (54.26–56.35)
Marital Status				
Married or cohabit	74.91 (74.11–75.70)	64.13 (63.39–64.87)	75.40 (74.30–76.51)	64.48 (63.45–65.51)
Health Status				
Good or Better	81.06 (80.37–81.74)	85.73 (85.21–86.27)	80.88 (79.93–81.82)	85.21 (84.46–85.96)
Depression				
Lifetime Depression, Yes			11.56 (10.81–12.31)	10.81 (10.20–11.41)
Current Depression, Yes			13.47 (12.65–14.29)	13.05 (12.37–13.40)

Table 2

Correlates of Lifetime Diagnosis of Depression and Current Depressive Disorders among Men with a History of Military Service (Multivariable Logistic Regression)

Variables	Lifetime Depression OR _{adj} (95%CI)	PHQ-8 OR _{adj} (95%CI)
Age		
18–24 years	1.84 (.86–3.95)	1.46 (.60–3.56)
25–34 years	3.14 (2.02–4.88) ***	.94 (.64–1.39)
35–44 years	3.05 (2.19–4.26) ***	.98 (.74–1.31)
45–54 years	3.30 (2.50–4.35) ***	1.02 (.81–1.28)
55–64 years	3.83 (2.97–4.96) ***	1.07 (.87–1.32)
65–74 years	1.66 (1.27–2.17) ***	.80 (.66–.97) *
75 years	1.00	1.00
Race/Ethnicity		
Non-Hispanic Black	.65 (.46–.92) *	1.16 (.88–1.52)
Non-Hispanic Other	1.21 (.89–1.65)	1.37 (1.02–1.84) *
Hispanic	.93 (.62–1.37)	.79 (.52–1.18)
Non-Hispanic White	1.00	1.00
Relationship Status		
Married or Cohabit	.60 (.51–.72) ***	.65 (.56–.76) ***
Living alone, Divorced, Widowed	1.00	1.00
Education		
Some College or More	1.01 (.86–1.17)	.69 (.59–.80) ***
Less than College	1.00	1.00
Health Status		
Good Health or Better	.29 (.24–.34) ***	.23 (.20–.27) ***
Less than Good Health	1.00	1.00

 $P < .001$

**
 $P < .01$

*
 $P < .05$

Table 3

Age-Related Depression Symptom Profiles According to Cluster Analysis

	Standard Depression		Older Anhedonic		Younger Anhedonic		Younger Distressed	
	1 (N=801)		2 (N=116)		3 (N=350)		4 (N=125)	
	Mean (SD)	Mean (SD)	Mean (SD)	X²	Mean (SD)	X²	Mean (SD)	X²
Q1 Anhedonia	10.63 (5.03)	11.72 (4.28)	5.51 *		11.46 (3.82)	7.73 **	9.37 (4.71)	7.95 **
Q2 Sadness (Hopeless)	12.09 (3.57)	12.77 (3.16)	3.71		12.20 (3.28)	0.21	10.54 (4.16)	20.93 ***
Q3 Sleep (Insomnia/hypersomnia)	12.62 (3.63)	11.30 (5.02)	13.59 ***		12.64 (3.23)	0.01	12.79 (2.70)	0.25
Q4 Low Energy	13.31 (2.19)	13.44 (2.36)	0.25		12.74 (3.10)	11.74 ***	12.10 (3.46)	23.53 ***
Q5 Appetite (too much/too little)	11.09 (4.93)	10.09 (5.54)	4.04 *		10.15 (5.10)	8.65 **	11.42 (4.53)	0.46
Q6 Felt like a Failure	10.68 (5.40)	8.40 (6.30)	18.91 ***		10.81 (4.86)	0.16	10.91 (4.61)	0.22
Q7 Concentration	10.75 (5.22)	7.07 (6.25)	51.46 ***		10.69 (4.96)	0.04	11.80 (4.35)	4.44 *
Q8 Psychomotor (retardation/agitation)	7.68 (6.20)	7.56 (6.48)	0.04		6.50 (6.06)	9.15 **	9.94 (5.42)	14.63 ***
Age	54.24 (7.00)	75.87 (6.84)	995.31 ***		39.33 (7.22)	1135.73 ***	25.33 (5.33)	1897.04 ***

*** $P < .001$

** $P < .01$

* $P < .05$