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Sociodemographic Risk Factors for Serious Psychological Distress among U.S. Veterans: Findings from the 2016 National Health Interview Survey

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Abstract

Serious Psychological Distress (SPD) is a measure of mental health associated with poor functioning. This study identified sociodemographic risk factors for SPD, among veterans using Veterans Health Administration (VHA), TRICARE or the Civilian Health and Medical Programs for Uniformed Services (CHAMP) (all referred herein as VA coverage) and compared risk factors for SPD to non-veterans. VA coverage offers preventative care and treatment for illnesses and injuries to veterans with the aim of improving their quality of life. Veterans with and with no SPD, using VA coverage aged 18 to 64 years were sampled from the 2016 National Health Interview Survey (NHIS) ($n = 525$ total, $n = 48$ veterans with serious psychological distress) were compared to each other and to non-veterans sampled from the NHIS ($n = 24{,}121$ total and $n = 1055$ with serious psychological distress), by sex, age group, race/ethnicity, education level, living arrangements, education level, number of chronic health conditions, and region of residence. The greatest proportion of veterans with SPD were female, middle aged (45–64 years), white, had less than a high school education, and lived alone or with other adults (compared to those living with a spouse/partner). The greatest proportion of veterans with SPD lived in the Southern and Western U.S. regions, and the smallest proportion lived in the Northeastern U.S. region. Hispanic and white veterans were at increased risk for SPD relative to black veterans, and relative to their same race/ethnic counterparts in the non-veteran civilian population. Additional analyses suggest that veterans with SPD experience greater barriers to care compared to veterans without SPD. Further research is warranted to examine access to mental and physical health care providers in U.S. regions with the greatest proportions of veterans with SPD. Particular attention is needed for female veterans due to their high rates of SPD relative to male veterans.

Keywords Mental health · Veteran · Serious psychological distress · Healthcare

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Introduction

Veterans face increased risk for poor mental health compared to civilians because of exposure to warfare [1]. Participating in the military as a soldier has been associated with suicide, post-traumatic stress disorder (PTSD) and depression [1]. However, few studies have examined sociodemographic risk factors for poor mental health among veterans using Veterans Health Administration coverage (VHA). Not all veterans are eligible for VHA. Basic eligibility requires that veterans be separated from active military service under any condition other than dishonorable. Enrollment is based on income, disability status, and periods of service. Veterans with the most severe service disabilities get the broadest coverage. A veteran must enroll to have VHA. Once enrolled, however, a veteran can have access to VHA for life (https://www.va.gov/healthbenefits/apply/active_duty.asp).

Serious psychological distress (SPD) is a measure of poor mental health that has been validated for use in community surveys. The presence of SPD indicates a limitation in ability to function due to poor mental health in either school or work [2, 3]. SPD has also been found to be associated with suicide in the U.S. [4, 5]. Recent VHA mandates to reduce suicide among veterans have spurred efforts to identify veterans at risk. The VHA has moved forward by conducting data-driven efforts using national VHA medical record data and predictive modeling to guide clinicians who are treating and screening veterans for poor mental health [6, 7]. The risk indices have been motivated by a concern about increasing suicide rates in veterans, and the need to provide tools for clinicians to identify, screen and treat veterans based on risk [6, 7]. Risk factor indices have been used to predict opioid risk, safety and mitigation and to prevent overdoses and suicide [6, 7].

A recent study drawing on data collected from the National Health Interview Survey (NHIS) during the period from 2000 to 2016 demonstrated a decrease in private insurance participation and tripling in the number of veterans using the VHA, TRICARE and Civilian Health and Medical Program of the uniformed services health care systems (CHAMP also known as CHAMPUS) [8]. These coverage types are collectively referred to herein as VA coverage (https://www.va.gov/healthbenefits/apply/active_duty.asp). This increasing entry into VA coverage among veterans suggests that there may be a greater need for healthcare coverage among veterans. These trends suggest the need to examine risk profiles for poor mental health among veterans.

However, previous efforts aimed at profiling risk factors among veterans have relied solely on VHA electronic medical records (EMR) and did not include important factors such as living arrangements and educational level [6, 7]. Our study examines and identifies sociodemographic variables such as age, sex, education level, living arrangements, and region of residence at the time of the interview. Moreover, no studies to date have examined self-reported access to health care and challenges to using health care among veterans with VA coverage solely. Disparities have been found in the civilian population with SPD compared to those without SPD in access and utilization of healthcare [9]. Further, adults with SPD report greater barriers in achieving health coverage and affording needed prescription medications [9]. However, these disparities have not yet been examined in the veteran population with SPD. In this cross-sectional survey study our models will compare veterans with SPD to veterans without SPD while adjusting for number of chronic health conditions. By adjusting for chronic health conditions, we will ensure that severity of physical health does not confound the differences in utilization of VA coverage [9].

Our main hypothesis is that there are veterans who are at increased risk for SPD and that can be identified by sociodemographic characteristics such as younger age and living in the Southern region of the U.S. Secondly, we hypothesize that veterans with SPD who use VA coverage solely may be more likely to report barriers to accessing and using health care compared to veterans without SPD who use VA coverage solely. Identifying veterans at risk for poor mental health could aid efforts aimed at expanding outreach and reducing barriers to care for this population. These veterans could be offered potentially life-saving interventions such as counselling and 24-h suicide lines [10].

Methods

Data Source and Analytic Sample

The National Health Interview Survey (NHIS) is conducted by the Centers for Disease Control and Prevention (CDC) National Center for Health Statistics (NCHS) and collects information through home-based interviews. The NHIS yields estimates representative of the civilian non-institutionalized US population [11, 12]. Data weighting procedures are described in more detail elsewhere [11, 12]. This analysis is based on the sample adult questionnaire administered to one randomly selected adult in each family [11, 12]. Informed consent was obtained prior to the interview. Approval from an Internal Review Board (IRB), an Institutional U.S. board that reviews studies for ethical standards, was not required for this study because the data were previously de-identified and made publicly available. Our analytic sample included veterans aged 18 to 64 years who screened positive for SPD ($n = 48$). The number of veterans in the sample who did not have SPD ($n = 461$) was smaller than the combined sample of veterans ($n = 525$) possibly due to missing measures for SPD. Our analytic sample was a subset of the total sample of veterans with and without VA coverage ($n = 1514$), which was a subset of the total sample of veterans and non-veterans ($n = 24,121$). We excluded respondents aged 65 years and older because of Medicare eligibility in all samples. Medicare is a U.S. government insurance program that is primarily restricted to older adults and those with disabilities (Table 1).

Definition of Veteran

A positive response to the question "Have you ever served on active duty in the U.S. Armed Forces, Military Reserves, or National Guard?" was used to define the sample of veterans in our dataset. It is possible that active duty members of the military were included among the veterans. TRICARE was included although it is designated for army reserves and active duty military. TRICARE is designed to cover active duty members, retirees and their families.

Table 1 Sample descriptions and numbers: NHIS 2016

Total sample	$N = 24,121$
Total U.S. sample with no SPD	$N = 1,055$
Total U.S. sample without SPD	$N = 22,262$
Total sample of Veterans with or with no VA coverage	$N = 1,514$
Sample of Veterans with VA coverage solely	$N = 525$
Sample of Veterans with VA coverage solely with SPD	$N = 48$

CHAMP coverage is a VA health plan that pays part of the costs of health services for eligible beneficiaries such as a surviving spouse or child.

Serious Psychological Distress

SPD is measured using the Kessler K6, a validated scale that identifies persons with a high likelihood of having a diagnosable mental health problem severe enough to cause moderate to serious impairment in social or occupational functioning requiring treatment [2, 3]. The K6 asks respondents to indicate the frequency of six symptoms, below: during the PAST 30 days, how often did you feel, as follows: so Sad that nothing could cheer you up; Nervous; Restless or Fidgety; Hopeless; that everything was an Effort; and Worthless. The following options are given for frequency: ALL of the time; MOST of the time; SOME of the time; A LITTLE of the time; and NONE of the time. In keeping with this methodology, we reversed the coding so that "none of the time" was scored as "0" and "all of the time" was scored as "4", with a total possible score from "0" to "24". Prior studies used a score of "13" or above as a validated cut-point for SPD. Scores of "13" or above were coded "1" for SPD and lower scores were coded "0" representing no SPD [2, 3].

Healthcare Utilization Indicators

A positive response to the following indicators demonstrated that the veterans experienced their medical care as described:

1.   During the past 12 months,

A.   did you have to wait too long to see the doctor (waited too long in the doctor's office);
B.   did you have any trouble finding a general doctor or provider who would see you? (trouble finding a general provider);
C.   the clinic/doctor's office wasn't open when you could get there (delay in care because the doctor's office was not open);
D.   you didn't have transportation (could not get care because of lack of transportation).
E.   did you change the place(s) to which you usually go for health care? (changed usual place of healthcare);
F.   were you told by a doctor's office or clinic that they would not accept you as a new patient? (doctor would not accept any new patients);
G.   you couldn't get through on the telephone (could not get through to the doctor by telephone);
H.   you couldn't get an appointment soon enough (could not get an appointment soon enough).

Chronic Health Conditions

The number of chronic health conditions (0, 1 and 2 or more) included: chronic obstructive pulmonary disease (COPD), diabetes, heart disease, stroke and cancer [13]. Respondents were asked if they had been told by a health professional they had coronary heart disease, angina, a

heart attack or any other heart condition and a "yes" reponse indicated heart disease. Diabetes and stroke were based on "yes" responses about being told they had these conditions. Cancer was based on questions about being told they had a malignancy excluding non-melanoma skin cancer [14]. COPD was based on questions about being told they had emphysema or chronic bronchitis in the past 12 months. There was no missing data except for one question about stroke ($n = 1$). Records with missing data were excluded from multivariable analyses but retained in the overall study population.

Demographic Characteristics

Race/ethnicity was categorized as Hispanic, non-Hispanic white (white), non-Hispanic black (black) and other race/ethnicities. Age groups included 18 to 44 and 45 to 64 years. These categories were created to make comparisons between younger adults and middle-aged adults; previous studies using NHIS data have employed similar groupings [10]. We excluded adults 65 years and older because the majority in that age group were insured through Medicare. Sex was defined as male and female. Living arrangements included living alone, living with a spouse/partner, living with a roommate, living with adult family members, and living with children. Three categories of living arrangements were collapsed in the multivariable regression model to reduce complexity: living with a spouse or partner, living alone and living with others. Four U.S. regions of respondent residence were distinguished: Northeastern, Midwestern, Southern and Western.

Statistical Analysis

Point estimates and 95% confidence intervals were calculated using SUDAAN [15]. Categorical variables were evaluated using Rao Scott chi-square statistics for weighted surveys at alpha (α) = 0.05 level (two-sided). Comparison were made as follows: Table 2. Proportions of veterans with SPD were reported and were compared for proportional differences between veterans with and without SPD. In Table 3, the proportions of the total U.S. sample with SPD were compared to the total U.S. sample without SPD. Table 4 presented the comparisons of the proportion of veterans and with serious psychological distress to the proportion of veterans with and without serious psychological distress on eight indicators of health care utilization. For Tables 2, 3 and 4, Rao Scott chi-square was used instead of a Pearson chi-square because it adjusts for equal probability across responses in survey data. A multivariable logistic regression model was also conducted as shown in Table 5 to estimate associations between SPD (present vs. absent) as a dependent variable with age-group, sex, race/ethnicity, education level, number of chronic health conditions and region of residence at the time of the interview, as the independent variables.

Results

Comparison of Proportions of Veterans with and with no SPD

The sample of 525 veterans represented a weighted number of 3,535,246 U.S. veterans nationwide. Among all veterans approximately 84.2% veterans were male and 15.7% veterans were female. However, 17.6% of the female veterans had SPD, while only 7.5% of male veterans had SPD ($P < .05$) (Table 2). The highest prevalence of SPD was observed among

Table 2 Veterans with VA coverage solely and serious psychological distress compared to Veterans with VA Coverage with no serious psychological distress aged 18–64 years by sociodemographic characteristics, NHIS: 2016

Characteristic	Veterans with VA coverage (Total Unweighted Number) (Weighted Percent) with Serious Psychological Distress	Veterans with VA coverage (Total Unweighted Number) (Weighted Percent) with No Serious Psychological Distress	Rao Scott Chi-square P- value (Veterans with SPD vs. No SPD)
Overall	48	461	<.0001
Sex			
Male	33(7.5%) (4.3%–10.6%)	370(92.4%) (89.3%–95.6%)	<.05
Female	15(17.6%) (8.1%–27.1%)	91(82.3%) (72.8%–91.8%)	
Age-Group (years)			
18–44	21(.30%) (0.0%–.99%)	152(88.0%)(81.8%–94.2%)	Not significant.
45–64	27(9.6%) (6.3%–12.9%)	309(92.4%)(4.1%–11.0%)	
Rao Scott Chi-square P- Value	Not significant.	<.0001	
Race/Ethnicity			
Hispanic	3(8.9%) (0.0%–21.8%)	37(91.0%) (78.1%–100%)	Not significant.
Non-Hispanic white	37(10.5%) (6.3%–14.7%)	318(89.4%) (85.2%–93.6%)	
Non-Hispanic black	6(5.3%) (.89%–9.7%)	78(94.6%)(90.2%–99.1%)	
All other races and ethnicities	1(4.6%) (0.0%–13.6%)	18(95.3%) (86.3%–100%)	
Education Level			
No high school diploma	2(30.2%) (0.0%–69.5%)	14(69.7%)(30.4%%-100%)	<.05
High school graduate	7(12.1%) (2.4%–21.8%)	79(87.8%) (78.1%–97.5%)	
Some college	27(10.4%) (5.7%–15.0%)	207(89.5%) (84.9%–94.2%)	
College degree and more	11(4.1%) (1.4%–6.8%)	147(95.8%) (93.1%–98.5%)	
Living Arrangements			
Living alone	19(8.3%) (3.9%–12.8%)	175(91.6%) (87.1%–96.0%)	Not significant.
Living with a spouse/-partner	8(5.0%) (1.0%–9.0%)	117(94.9%) (90.9%–98.9%)	
Living with a roommate	1(3.1%) (0.0%–9.2%)	14(96.8%) (90.7%–100%)	
Adult only families	6(10.4%) (0.0%–21.1%)	35(89.5%) (78.8%–100%)	
Living with children	15(13.1%)(5.6%–20.6%%	120(86.8%) (79.3%–100%)	
Number of Chronic Health Conditions			
0	16(7.5%) (2.7%–12.3%)	235(92.4%) (87.6%–97.2%)	Not significant.
1	17(.9%) (3.4%–12.4%)	140(92.0%) (87.5%–96.5%)	
2 or more	15(15.1%) (6.4%–23.7%)	84(84.8%) (76.2%–93.5%)	
United States Regions			
North East	5(2.2%) (0.0%–4.4%)	51(97.7%) (95.5%–100%)	<.05
Midwest	9(7.8%) (1.4%–14.1%)	88(92.1%) (85.8%–98.5%)	
South	17(7.7%) (3.8%–11.7%)	182(92.2%) (88.2%–96.1%)	
West	17(16.0%) (7.6%–24.5%)	140(83.9%) (75.4%–92.3%)	

Table 3 The total sample with no and without serious psychological distress aged 18–64 years by sociodemographic characteristics, NHIS: 2016

Characteristic	Total sample (Total Unweighted Number) (Weighted Percent) with Serious Psychological Distress	Total sample (Total Unweighted Number) (Weighted Percent) With No Serious Psychological Distress	Rao Scott Chi-square P- value (Total sample SPD vs. No SPD)
Overall	1055	22,262	<.0001
Sex			
Male	398(3.1%) (2.6%–3.5%)	10,457(96.8%)(96.4%–97.3%)	<.0001
Female	657(5.5%) (4.0%–5.1%)	11,805(95.4%)(94.8%–95.9%)	
Age-Group (years)			
18–44	440(3.2%) (2.8%–3.7%)	12,075(96.7%)(96.2%–97.1%)	<.0001
45–64	615(4.7%) (4.1%–5.2%)	10,187(95.2%)(94.7%–95.8%)	
Race/Ethnicity			
Hispanic	137(3.3%) (2.5%–4.1%)	2995(96.6%) (95.8%–97.4%)	<.01
Non-Hispanic white	731(4.2%) (3.7%–4.6%)	15,052(95.7%) (95.3%–96.2%)	
Non-Hispanic black	139(4.0%) (3.1%–4.9%)	2563(95.9%) (95.0%–96.8%)	
All other races and ethnicities	23(1.8%) (.79%–2.8%)	1267(98.1%) (97.1%–99.2%)	
Education Level			
No high school diploma	200(6.9%) (5.5%–8.3%)	1898(93.0%) (91.6%–94.4%)	<.0001
High school graduate	268(5.5%) (4.5%–6.4%)	4353(94.4%) (93.4%–95.4%)	
Some college	344(4.6%) (3.9%–5.3%)	5996(95.3%) (94.4%–96.0%)	
College degree and more	122(1.3%) (1.0%–1.7%)	6808(98.6%) (98.2%–98.9%)	
Living Arrangements			
Living alone	413(5.5%) (4.8%–6.2%)	6149(94.4%) (93.7%–95.1%)	<.0001
Living with a spouse/-partner	172(3.1%) (2.5%–3.6%)	4836(96.8%) (96.3%–97.4%)	
Living with a roommate	46(5.1%) (3.1%–7.1%)	741(94.8%) (92.8%–96.8%)	
Adult only families	124(4.2%) (3.2%–5.2%)	2485(95.7%) (94.7%–96.7%)	
Living with children	300(3.4%) (2.8%–3.9%)	8049(96.5%) (96.0%–97.1%)	
Number of Chronic Health Conditions			
0	415(2.5%) (2.1%–2.8%)	15,161(97.45%) (97.1%–97.8%)	<.0001
1	288(4.5%) (3.9%–5.3%)	4707(95.3%) (94.6%–96.0%)	
2 or more	346(11.4%) (9.8%–13.1%)	2339(88.5%) (86.8%–90.1%)	
United States Regions			
North East	179(3.6%) (2.7%–4.5%)	3653(96.3%) (95.4%–97.2%)	Not significant.
Midwest	233(3.8%) (3.0%–4.6%)	4969(96.1%) (95.3%–96.9%)	
South	378(4.0%) (3.4%–4.5%)	7670(95.9%) (95.4%–96.5%)	
West	265(3.8%) (3.0%–4.6%)	5970(96.1%) (95.3%–96.9%)	

white veterans (10.5%) followed by Hispanic (8.9%) and black veterans (5.3%) (Table 2). The prevalence of SPD was highest among veterans with less than a high school education (30.2%) compared to adults with a high school education (12.1%), adults with some college (10.4%)

Table 4 Veterans with VA coverage aged 18 to 64 years with and with no serious psychological distress by health utilization indicator, NHIS: 2016

Health Utilization Indicator	Veterans with Serious Psychological Distress (Total Number = 48)	Veterans with No Serious Psychological Distress (Total Number = 461)	Rao Chi-square P- value
Waited too long in the doctor's office	25.5% (9.5%–41.5%)	7.1%(4.0%–10.2%)	<.05
Trouble finding a general provider	12.2%(2.3%–22.1%)	1.9% (.69%–3.2%)	<.01
Delay in care because doctor's office was not open	10.4%(1.0%–19.8%)	1.7%(0.0%–4.4%)	<.05
Delay in care because of no transportation	9.5%(0.0%–19.0%)	2.9% (.46%–5.5%)	.07
Changed usual place of healthcare	10.5% (.91%–20.0%)	9.8%(6.3%–13.4%)	.90
Doctor would not accept any new patients	12.6% (.82%–24.5%)	1.2% (.09%–2.3%)	<.001
Could not get through to doctor on the telephone	16.6% (4.5%–28.7%)	5.2% (2.2%–8.1%)	<.01
Could not get an appointment soon enough	34.9% (17.4%–52.4%)	11.2% (7.5%–15.0%)	<.01

and adults with a college degree or more (4.1%) (Table 2). The overall trend was that the proportion of veterans with SPD decreased as education increased (Table 2). The greatest proportion of veterans resided in the Southern U.S. region (48.8%), and the smallest proportion resided in the Northeastern U.S. region at the time of interview (10.7%) (Table 2). The prevalence of SPD among adult veterans varied by region. The highest prevalence of SPD was observed among veterans residing in the Western region of the U.S. at the time of the interview (16.0%) followed by the Midwestern U.S. region (7.8%), Southern U.S. region (7.7%), and Northeastern U.S. region (2.2%) (Table 2).

Comparison of the Total Sample with and with no SPD

Table 3 compares the prevalence of SPD across sociodemographic characteristics for the total U.S. sample. In the total sample adults with SPD were significantly more likely to be female, older, white and have less than a high school diploma compared to other respondents with SPD. Among respondents with SPD, a greater proportion of the total sample respondents with SPD lived alone, had 2 or more chronic health conditions and lived in the Southern region of the U.S.

Comparisons of Veterans with VA Coverage Solely with SPD to Respondents in the Total Sample with SPD

Bivariate differences in SPD rates observed between veterans and the total sample including non-veterans motivated the use of contrast statements to examine further sociodemographic differences. We found that black veterans (10.5%) were more likely to have SPD compared to black adults in the total sample (4.2%), and compared to Hispanic (8.9%) and white (5.3%) veterans as well as Hispanic (3.3%) and white (4%) adults in the total sample ($P < .05$ for all

Table 5 Logistic regression with sociodemographic characteristics and number of chronic health conditions as independent variables predicting serious psychological distress as the dependent variable in veterans with VA coverage between 18 years and 64 years: NHIS 2016

Serious Psychological Distress vs. No Serious Psychological Distress

Adjusted Odds Ratios Independent Variables included in model*	
Sex	
Men	1.00
Women	3.8(1.5–9.1)**
Age group (years)	
18–44	1.00
45–64	.59(.20–1.7)
Race/ethnicity	
Hispanic	.56(.10–3.2)
Non-Hispanic White	1.00
Non-Hispanic Black	.38(.12–1.1)
Other race/ethnicities	.23(.02–2.1)
Education	
Less than a High School degree	.20(.03–1.2)
High School degree	1.00
Some college	.15(.02–.79)*
College degree and more	.04(.008–.29)**
Living Arrangements	
Living alone	1.9(.61–6.0)
Living with spouse/partner	1.00
Living with other children and adults	2.4(.75–7.8)
Number of chronic health conditions	
0	1.00
1	.80(.26–2.4)
2 or more	3.4(1.2–9.5)*
Region of the United States	
Northeast	1.00
Midwest	3.0(.76–11.8)
South	6.4(1.6–24.7)*
West	11.2(3.0–41.5)**

*Reference groups include men, 18–44 year age group, white race/ethnicity, having some college, living with a spouse/partner, no chronic health conditions, and the Northeastern U.S. region.,

**$P < .05$

***$P < .01$

****$P < .001$

comparisons). A significantly greater proportion of veterans with SPD have no high school degree compared to the total sample (30.2% vs. 6.8%). A greater proportion of veterans with SPD live in the Western region of the U.S. compared to the total sample (16% vs. 3.6%).

Barriers to Health Care Utilization among Veterans with and with no SPD

In Table 4 we compared barriers to health care utilization between veterans with and with no SPD. Several barriers to health care utilization were more prevalent among veterans with SPD compared to veterans with no SPD including: waited too long in the doctor's office ($P < .05$), had trouble finding a general provider ($P < .01$), a delay in care because the doctor's office was not open ($P < .05$), doctor would not accept any new patients ($P < .001$), could not get through

to the doctor by telephone ($P < .01$), and could not get an appointment soon enough ($P < .01$) (Table 3).

Multivariable Logistic Regression Predicting SPD among Veterans with VA Coverage

Table 5 presents a multivariable logistic regression model predicting SPD among veterans. Predictor variables included sociodemographic characteristics, number of chronic health conditions and region of residence at the time of the interview. The model demonstrated a strong association between sex and SPD among veterans, with females having greater risk compared to males (aOR = 3.8 CI = 1.5–9.1). Veterans with higher education levels including some college education and a college degree or more had reduced risk for SPD compared those with less than a high school education (aOR = .04 CI = .008–.29). We also observed a strong association between region of residence and SPD, with veterans in the Southern and Western regions of the U.S. having greater risk compared to veterans residing in the Northeastern region at the time of the interview (Southern region: aOR = 6.4 CI = 1.6–24.7; Western region: aOR = 11.2(CI = 3.0–41.5) (Table 4).

Discussion

Our study makes the novel contribution of describing risk factors for SPD among U.S. veterans with VA coverage and distinguishing important factors between these veterans and non-veterans. Our findings could help to identify veterans at risk for developing mental health problems and/or who need mental health interventions. Characteristics of veterans with VA coverage that are associated with risk for SPD, including gender, education level and living arrangement, can guide VA clinicians as they screen, identify and treat veterans. Veterans with SPD were predominately female, middle aged (45–64 years), white, have less than a high school education and live alone or with other adults. The greatest proportion of veterans with SPD lived in the Western U.S. region at the time of the interview, and the smallest proportion lived in the Northeastern U.S. region. Our study corroborates previous findings in the non-veteran population that women are at greater risk for poor mental health and SPD compared to men [16].

Previous research suggests a relationship between suicide and SPD [4]. This prior research suggests that the risk of SPD in women may require more monitoring. Suicide rates among women have recently increased and are closing the gap between men and women (https://www.va.gov/healthbenefits/apply/active_duty.asp). Our study also shows an association between region at the time of interview and SPD. This may offer a connection between the known regional patterns of suicide risk in the U.S. [17]. Using VA data, researchers have found that rural veterans had a greater risk of suicide compared to urban veterans, particularly by firearms [17]. Although no region in the U.S. is likely to be completely rural, the Southern and Western U.S. regions may have less dense urbanization compared to the Northeastern region in the U.S. and could suggest the need for increased surveillance and intervention for SPD in VAs located in high risk regions.

Importantly, veterans with SPD have characteristics that differentiate them from the non-veteran population with SPD. This is critical information to guide screening and intervention because standard population-based risk factor profiles may not fit the veteran at risk. Greater proportions of veterans of all race/ethnicities had SPD compared

to non-veterans. In the non-veteran population, research has documented the increasing risk of SPD in whites but not in other race/ethnic groups [4]. We also found that veterans in the Midwestern region were more likely to have SPD compared to their civilian counterparts. Future research should examine the influence of distance traveled from residence to the VA, difficulty in obtaining mental health care and difficulty finding employment among veterans who reside in that region.

We observed differences between veterans with SPD and without SPD in reported barriers to care for almost every indicator, suggesting that veterans with SPD experience greater challenges utilizing VA care. Of note was the greater proportions of veterans with SPD who self-reported not having transportation arrangements to visit healthcare providers. Although the difference with veterans without SPD was marginally statistically significant ($p = 0.07$), it may still indicate the need to increase access to veterans with SPD who are unable to travel. Efforts to increase telehealth, particularly for mental health care, to reach veterans who are unable to travel to their local medical center, as well as free transportation that covers large distances, may be needed to ensure access to healthcare in this population. Regional differences in ability to utilize VA care warrants further examination and has been previously reported [18]. It is possible that access and availability of physicians, such as mental health providers, may vary by region.

Veterans with less than a high school level education were more likely to have SPD compared to their counterparts with higher levels of education. This finding is consistent with previous studies finding an inverse association between income, education level and SPD [19]. These findings suggest that veterans with less education are at greater risk for poor mental health. Further research should examine socioeconomic barriers to healthcare access in this population. Injuries and disability, possibly from combat experience, could complicate veterans' efforts to return to school or gain employment (20).

Our study also makes the novel contribution of examining how living arrangements are related to risk for SPD among veterans. Veterans living with children have greater risk for SPD compared to non-veterans. In contrast, living alone represents the greater risk factor for SPD among non-veterans. We also found that there was a greater prevalence of SPD among women who lived with children compared to men. We speculate that the difference may be due to the high proportion of women who may be more likely to live with children compared to men. Distance from the VA combined with childcare demands may represent burdens that increase risk for SPD among women relative to men. Other challenges faced by female veterans include difficulty with making appointments and accessing medical care (20). Further research exploring mental health and living arrangements among female veterans could help to clarify these findings. We recommend that studies examine women veterans' transitions from active duty to veteran status. To date little or no research has focused on the combined roles of women as veterans and mothers—including whether the strains associated with these dual roles increase risk for poor mental health relative to male veterans.

The NHIS is a cross-sectional survey limiting the ability to make any causal inferences. NHIS is also a home or phone-based interview, excluding homeless veterans and veterans residing in correctional facilities. The exclusion of homeless veterans may lead us to underestimate the percentage of veterans with SPD and barriers to accessing care. Further, our measure of SPD may be influenced by unmeasured recall bias as it is possible that veterans with SPD may be more readily able to recall their life experiences. Additionally, VA coverage may include the sicker and more disabled veterans compared to those who do not have VA coverage.

The major strength of our study is the use of current data from the NHIS, the largest dataset dedicated to health in the U.S. These data allowed for comparisons between veterans and the civilian population on sociodemographic and healthcare measures, including those with and without SPD. Our study makes the novel contribution of identifying several prominent sociodemographic risk factors for SPD in veterans, which may help with targeting interventions towards veterans with poor mental health in this population.

Conclusion

Our study identified sociodemographic differences in the population of veterans with and with no SPD, and compared these factors between veterans and the civilian population. Findings also demonstrate that veterans with SPD report greater barriers to care compared to their counterparts with no SPD. Future research should examine how best to offer mental health and other physical health care services to veterans with SPD who may be unable to access mental health care in their region. In particular, efforts should be made to increase the availability, access and numbers of mental health providers in regions with the greatest proportions of veterans with SPD and should pay particular attention to female veterans due to their high rates of SPD.

Compliance and Ethical Standards

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Dr. Marianne Goodman is a Professor of Psychiatry at the Icahn School of Medicine at Mount Sinai and full time VA clinical research physician at the James J Peters VA (JJPVA) for 20 years. She is the director and developer of the JJPVA Suicide Research and Clinical Program since 2010, with expertise in the management of high risk suicidal and emotionally dysregulated Veterans, borderline personality disorder and delivery of dialectical behavioral therapy (DBT). She is considered one of the foremost suicide prevention experts in the VA system, actively involved in clinical care, research and education and recipient of several prestigious awards including in 2009, the New York Federal Executive Employee Outstanding Individual Achievement Award for my Clinical DBT Program for Suicidal Veterans, in 2012, the VISN 3 Network Director's Achievement Award for Training VISN 3 Clinicians in DBT, in 2018, the New York State Excellence in Suicide Prevention Award for Implementation of Zero Suicide in a Healthcare Setting and in 2018, The ISITDBT Researcher Award, given once every 3 years. Dr. Goodman's research efforts focus on novel treatment development for high risk suicidal individuals including psychotherapy, medication and tele-health approaches and in conjunction with biomarker studies. She has been funded by the American Foundation for Suicide Prevention, the Department of Defense, Veterans Administration and Suicide Prevention Initiatives. She is also involved with education efforts for non-VA primary care and mental health clinicians regarding Veteran suicide risk. She was the President of the North American Society for the Study of Personality Disorders from 2015 to 2018. Clinical Professor. Icahn School of Medicine at Mount Sinai. Director of the JJPVA Suicide Prevention Research and Care Center Mental Illness, Research, Clinical Care (MIRECC), VISN 2S President, North American Society for the Study of Personality Disorders (NASSPD). Current detailee for the Office of Mental Health and Suicide Prevention.

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