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Gender differences in mental and physical health conditions in U.S. veterans: Results from the National Health and Resilience in Veterans Study

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Abstract

Objectives—To characterize gender differences in the prevalence of mental and physical health conditions and evaluate the moderating effect of assaultive trauma on risk for these conditions in a nationally representative sample of male and female U.S. veterans.

Methods—Cross-sectional data were analyzed from 3,157 U.S. veterans from the National Health and Resilience in Veterans Study. Multivariable logistic regression analyses assessed gender differences in health outcomes and evaluated physical and sexual trauma as possible moderators of these outcomes.

Results—Compared to male veterans, female veterans had higher prevalence estimates of lifetime posttraumatic stress (OR=3.33) and lifetime and current major depressive (ORs=2.10 and 2.76, respectively) disorders, and lifetime histories of arthritis, migraine headaches, and osteoporosis (ORs ranging 2.14–9.74), but lower prevalence estimates of lifetime nicotine dependence (OR=0.46), lifetime and current alcohol use (ORs=0.19 and 0.36, respectively) and lifetime drug use (OR=0.39) disorders, and lifetime histories of diabetes, heart attack, and high blood pressure (ORs ranging 0.05–0.49). The elevation in risk associated with physical and sexual assault was greater for males than females for numerous health conditions (but greater for females for posttraumatic stress disorder).

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Conclusions—Results provide a comprehensive assessment and characterization of gender differences in mental and physical health conditions and risk conferred by assaultive trauma for certain conditions in U.S. veterans.

Keywords

mental health; physical health; gender differences; trauma; veterans; women

1. Introduction

Only a small number of female veterans have traditionally been included in large-scale epidemiologic studies of veterans' health. In the few existing national studies, female veterans reported having poorer general health and greater prevalence of mental and chronic health conditions, including depressive and anxiety disorders and cancer, compared with their civilian counterparts [1]. Additionally, female veterans who used VA services had worse physical and mental health compared with those who did not use VA services [2].

Gender differences have been reported among veterans for specific health conditions. Among veterans who served in Operation Enduring Freedom/Operation Iraqi Freedom, females were more likely to screen positive or be diagnosed with depression and military sexual trauma, and less likely to do so for posttraumatic stress disorder (PTSD) and alcohol use disorder (AUD) than males [3,4]. Most previous studies on veterans' health have used samples that were predominantly male, only included veterans who used VA services, or focused on veterans from more recent wars. Thus, direct comparisons of the health of male and female veterans from contemporary, nationally representative samples of U.S. veterans are needed.

Veterans have elevated exposure to assaultive trauma, which increases risk for certain health problems, including PTSD [5] and AUD [6]. Risk for exposure to various types of traumatic events differs across gender [7,8] and the association of trauma with adverse health outcomes varies by traumatic event type [9]. Thus, it is important to consider the possibility that assaultive trauma is differentially associated with health outcomes in male and female veterans.

The aims of this study were to: 1) document the prevalence of mental and physical health conditions in male and female U.S. military veterans using data from a contemporary, nationally representative sample; and 2) evaluate gender differences in the magnitude of associations between assaultive trauma and a range of health conditions.

2. Methods

2.1 Sample and assessments

Data were analyzed from Wave 1 of the National Health and Resilience in Veterans Study (NHRVS), a cross-sectional nationally representative survey of 3,157 U.S. veterans conducted between October and December 2011 [8,9]. The sample was drawn from a probability-based survey panel (over 50,000 households) of a nationally representative U.S. adult sample, maintained by GfK Knowledge Networks, Inc. When the NHRVS was fielded,

4,750 veterans were in the survey panel; 3,408 (71.7%) responded to an invitation to participate. Of these, 3,188 (93.5%) confirmed eligibility (current or past active military status) with a screening question, and 3,157 (92.6%) completed the 60-minute, confidential online survey. Sociodemographic characteristics and prevalence estimates of assaultive trauma for male (n=2,836) and female (n=321) veterans are shown in Supplementary Table I.

Lifetime AUD, drug use disorder (DUD), MDD, and nicotine dependence were assessed with an adapted self-report version of the Mini-International Neuropsychiatric Interview [10]. Lifetime and current PTSD were assessed using the PTSD Checklist for DSM-IV [11]. The Alcohol Use Disorders Identification Test-10 [12] and Patient Health Questionnaire-4 [13] assessed current AUD and MDD, respectively. A modified question from the Patient Health Questionnaire-9 [14] assessed current suicidal ideation. Participants were asked, “How often have you been bothered by thoughts of hurting yourself in some way?” and “In the past 2 weeks, how often have you been bothered by thoughts you might be better off dead?”. Those who responded several days (1) on either question were coded positive for current suicidal ideation. Attempting suicide and receiving mental health treatment were assessed with the questions, “Have you ever tried to kill yourself?” and, “Have you ever received mental health treatment (e.g., prescription medication or psychotherapy for a psychiatric or emotional problem)?”, respectively. Physical health conditions were assessed using a checklist of various conditions preceded by the question, “Has a doctor or health care professional ever told you that you have any of the following medical conditions?”.

The Trauma History screen [15] assessed lifetime exposure to assaultive traumatic events. Participants who reported ever being hit or kicked hard enough to injure as a child and/or adult, and/or being attacked with a weapon were coded positive for lifetime physical assault. Participants were coded positive for lifetime sexual assault if they reported ever experiencing forced sexual contact as a child and/or adult.

2.2 Data analysis

Chi-square tests of association were conducted to compare sociodemographic characteristics, trauma histories, and health conditions by gender. Fisher’s exact test statistics were largely the same as those from Chi-square tests, and reported results are all from Chi-square analyses. Multivariable logistic regression models were conducted to evaluate differential risk of health conditions in male vs. female veterans, with sociodemographic and trauma history variables entered as fixed factors or covariates. Models assessing suicidality, mental health treatment utilization, and physical health conditions were additionally adjusted for lifetime MDD and/or PTSD, AUD and/or drug use disorder, nicotine dependence, and total number of medical conditions. Gender by trauma type (physical and sexual assault) interaction terms were incorporated into models to test for differential associations by gender. All analyses were conducted in SPSS version 22. Post-stratification weights based on demographic distributions of U.S. veterans from U.S. Census data were applied in analyses to enable generalizability of results to the whole U.S. veteran population [9]. All raw frequencies reported are unweighted. P-values <.05 were considered statistically significant.

3. Results

In multivariable models of lifetime mental disorders, females exhibited significantly higher prevalence estimates of PTSD and MDD, and lower estimates of alcohol, drug, and nicotine use disorders compared with males (Table I). This same pattern was observed for current mental health conditions, although the gender difference in prevalence of current PTSD was not statistically significant. Females had higher estimates for current suicidal ideation, past suicide attempts, and receiving mental health treatment, although these differences were not statistically significant in multivariable models. Regarding physical health conditions, females had significantly higher prevalence estimates of osteoporosis or osteopenia, migraine headaches, and arthritis, but lower estimates of diabetes, heart attack, and high blood pressure in multivariable models.

Significant interaction terms for gender by assault were found in multivariable analyses for several conditions. The prevalence of each of these conditions stratified by gender and trauma history, and the ORs from the interaction terms, are displayed in Table II.

4. Discussion

Consistent with findings from general population-based studies [16,17], we found gender differences in the prevalence of numerous health conditions in U.S. veterans. Our results further indicate that the association of exposure to assaultive trauma with risk for some of these conditions differs by gender. Physical assault was associated with greater risk for lifetime PTSD for females, whereas for current suicidal ideation, heart attack, and high blood pressure, risk conferred by physical assault was greater for males. Sexual assault was associated with increased risk for lifetime AUD, current MDD, and heart attack and disease to a greater degree in males.

It is noteworthy that, among those with sexual assault histories, males were at increased risk for current MDD compared with females, whereas MDD is more prevalent overall in females in the general population (and in this sample) [16]. While sexual assault is a known risk factor for MDD in women [18,19], our results suggest that sexual assault may be even more strongly associated with MDD in males. This finding aligns with previous studies that have found sexual harassment and military sexual trauma to have greater negative health effects on men than women [20,21].

Assaultive traumatic events can lead to dysregulation of the stress response system [22], which has been associated with numerous physical and mental health conditions, including depression and cardiovascular disease [23,24]. The gender by assault interactions observed may reflect differential stress responses due to physical and sexual assault in male vs. female veterans, resulting in different effects on health. Others have previously suggested that sexual assault may be more unexpected in men than women, and thus that the uncontrollable and unexpected nature of sexual assault in men may lead to more severe stress and differential health effects [20]. Other co-occurring psychological conditions that could modify the sex differences in mental and physical health conditions observed were adjusted for in the multivariable analyses.

Some limitations should be noted for this study. First, all measures were self-reported. Self-report of sexual assault among males may be underreported, in which case associations between sexual assault and health conditions in males may be even greater than those reported here. Second, our sample only included veterans with permanent addresses, excluding homeless veterans who may have higher health needs [25]. This limitation may affect prevalence estimates overall, but would not likely affect gender differences. Lastly, due to the cross-sectional nature of this survey, temporality could not be established and cause-and-effect relationships could not be assessed.

Nonetheless, our findings highlight substantial gender differences in the prevalence of many health conditions in veterans. With more women joining the military, consideration of their distinct health needs is critical for delivering effective care and developing effective health interventions. Our findings additionally illuminate gender differences in the association of assaultive trauma with risk for a range of conditions, and underscore the importance of assessing for assaultive trauma in this population.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Highlights

- We found substantial gender differences in the prevalence of many health conditions
- Gender differences found are consistent with findings from the general population
- Associations differed by gender and type of trauma on risk for many conditions
- Male veterans with sexual assault histories were at increased risk for current MDD

Table 1

Mental and Physical Health Conditions in Male and Female U.S. Veterans

	Male (n = 2,836), Raw Frequency (weighted %)		Female (n = 321), Raw Frequency (weighted %)		Bivariate Analysis		Multivariable Analysis Reference Category: Men	
					χ ²	P	OR	95% CI
Mental health measures								
Lifetime								
Alcohol use disorder	1,206 (44.0)		78 (24.0)		44.18	<.001	0.19 ^{abc}	0.12, 0.31
Drug use disorder	350 (13.6)		36 (11.5)		0.96	.369	0.39 ^{ab}	0.18, 0.83
Major depressive disorder	402 (15.1)		115 (34.6)		71.86	<.001	2.10 ^{ab}	1.36, 3.24
Nicotine dependence	542 (20.2)		40 (12.2)		11.05	.001	0.46 ^{ab}	0.26, 0.83
Post-traumatic stress disorder	155 (6.8)		57 (19.4)		58.13	<.001	3.33 ^{abd}	1.74, 6.40
Current								
Alcohol use disorder	400 (15.4)		24 (9.2)		8.23	.003	0.36	0.19, 0.68
Major depressive disorder	175 (7.3)		37 (12.5)		9.97	.003	2.76 ^{abc}	1.46, 5.20
Post-traumatic stress disorder	86 (4.7)		16 (6.0)		0.86	.381	0.47 ^{ab}	0.11, 1.97
Current suicidal ideation	199 (9.3)		32 (11.5)		1.55	.211	1.81 ^d	0.97, 3.36
Ever attempted suicide	123 (6.0)		42 (15.2)		35.21	<.001	0.81 ^{ab}	0.35, 1.90
Ever received mental health treatment	546 (20.0)		131 (39.3)		58.19	<.001	1.42 ^a	0.91, 2.25
Lifetime physical health conditions								
Arthritis	876 (29.5)		108 (30.4)		0.12	.738	2.14	1.38, 3.31
Asthma, chronic bronchitis, or COPD	291 (10.5)		51 (15.9)		8.00	.006	1.52 ^{ab}	0.82, 2.83
Cancer	467 (16.1)		28 (6.1)		20.96	<.001	0.74 ^b	0.38, 1.44
Chronic pain	539 (20.2)		57 (16.3)		2.60	.125	1.14 ^b	0.67, 1.94
Diabetes	560 (18.0)		37 (10.2)		11.55	<.001	0.49	0.24, 0.97
Heart attack	246 (9.2)		9 (1.4)		21.08	<.001	0.05 ^{bcd}	0.01, 0.45
Heart disease	434 (15.2)		10 (2.7)		34.57	<.001	0.41 ^{ac}	0.15, 1.10

	Male (n = 2,836), Raw Frequency (weighted %)		Female (n = 321), Raw Frequency (weighted %)		Bivariate Analysis		Multivariable Analysis Reference Category: Men	
	Raw Frequency (weighted %)		Raw Frequency (weighted %)		χ^2	P	OR	95% CI
High blood pressure	1,502 (50.6)		100 (26.1)		64.43	<.001	0.42 ^{bd}	0.27, 0.66
High cholesterol	1,452 (47.4)		113 (34.2)		18.73	<.001	0.87	0.57, 1.31
Kidney disease	80 (2.9)		4 (0.7)		5.07	.022	0.41	0.61, 2.72
Liver disease	49 (1.9)		5 (1.7)		0.05	>.999	0.49	0.07, 3.47
Migraine headaches	134 (5.0)		64 (16.9)		65.86	<.001	3.64 ^b	1.95, 6.79
Osteoporosis or osteopenia	65 (2.0)		35 (9.2)		52.95	<.001	9.74	4.54, 20.90
Rheumatoid arthritis	96 (3.7)		14 (3.7)		0.00	>.999	1.79	0.70, 4.56
Sleep disorders	540 (19.4)		60 (21.4)		0.68	.397	0.90	0.53, 1.52
Stroke	65 (2.0)		2 (0.3)		4.17	.04	0.08	0.00, 26.86
Traumatic brain injury	13 (0.6)		3 (0.3)		0.307	>.999	0.64	0.01, 77.34

Abbreviations: OR = odds ratio; 95% CI = 95% confidence interval; COPD = chronic obstructive pulmonary disease

Note: ORs for psychiatric disorders are adjusted for age, race, marital status, education, employment status, income, combat veteran status, lifetime exposure to physical assault, lifetime exposure to sexual assault, and interactions of each assault type by gender

ORs for suicidality, mental health treatment utilization, and physical health conditions are further adjusted for lifetime history of major depressive and/or post-traumatic stress disorder, lifetime alcohol and/or drug use disorder, lifetime nicotine dependence, and number of medical conditions.

Conditions that differed by gender are highlighted in bold font, $p < 0.05$

^a significant main effect of lifetime sexual assault

^b significant main effect of lifetime physical assault

^c significant interaction of lifetime sexual assault by gender

^d significant interaction of lifetime physical assault by gender

Table II

Prevalence of mental and physical health conditions stratified by assault history and gender for conditions with significant interaction terms in multivariable analyses

	With assault history, Raw Frequency (weighted %)		Without assault history, Raw Frequency (weighted %)		OR	95% CI
	Men	Women	Men	Women		
Physical assault						
Lifetime post-traumatic stress disorder	121 (15.1)	29 (29.5)	33 (2.3)	28 (15.2)	1.81	1.04, 3.17
Current suicidal ideation	120 (17.7)	11 (15.7)	74 (4.5)	21 (9.9)	2.94	1.47, 5.88
High blood pressure	504 (49.9)	27 (22.5)	983 (51.6)	70 (27.1)	2.22	1.27, 3.85
Heart attack	74 (7.8)	5 (5.7)	165 (9.7)	4 (0.5)	5.77	1.11, 29.98
Sexual assault						
Lifetime alcohol use disorder	103 (59.6)	43 (37.9)	1084 (43.3)	35 (14.1)	2.90	1.69, 4.99
Current depression	29 (25.0)	15 (13.7)	140 (5.9)	22 (11.8)	5.39	2.43, 11.92
Heart disease	35 (22.9)	0 (0.0)	390 (14.7)	9 (4.7)	44.23	2.39, 818.45
Heart attack	18 (10.9)	0 (0.0)	221 (8.8)	8 (2.4)	26.18	1.35, 508.18

Abbreviations: OR = odds ratio; 95% CI = 95% confidence interval

Note: ORs for psychiatric disorders are adjusted for age, race, marital status, education, employment status, income, combat veteran status, lifetime exposure to physical assault, lifetime exposure to sexual assault, and interactions of each assault type by gender.

ORs for suicidality, mental health treatment utilization, and physical health conditions are further adjusted for lifetime history of major depressive and/or post-traumatic stress disorder, lifetime alcohol and/or drug use disorder, lifetime nicotine dependence, and number of medical conditions.

ORs reported are those for the interaction terms of gender by assault type found in multivariable analyses (Table I)