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Military Sexual Trauma in Older Women Veterans: Prevalence and Comorbidities

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BACKGROUND: Recent attention has highlighted the common occurrence and health consequences of military sexual trauma (MST) in younger women veterans. However, almost nothing is known about MST in older veterans.
OBJECTIVE: To describe MST among older women veterans, including prevalence and common comorbidities.
DESIGN: Cross-sectional observational study, using data from national Department of Veterans Affairs medical records.
PARTICIPANTS: Population-based sample of women Veterans aged 55+ with at least one documented MST screen response and at least one clinical encounter in fiscal years 2005–2015.
MAIN MEASURES: MST screen: medical diagnoses (diabetes, hypertension, hyperlipidemia, myocardial infarction, cerebrovascular disease, congestive heart failure, obesity, chronic pain conditions, back pain, dementia, insomnia, sleep apnea, menopause symptoms) and mental health diagnoses (anxiety, depression, posttraumatic stress disorder, tobacco use, alcohol use disorder, substance use disorder, opioid use disorder, suicidal ideation) from International Classification of Diseases, Ninth Revision Clinical Modification codes in the medical record.
KEY RESULTS: In this cohort of older women veterans (n = 70,864, mean age 65.8 ± 10.4 years), 13% had a positive MST screen. In multivariable regression analyses adjusted for age, race/ethnicity, and marital status, MST was strongly associated with most mental health diagnoses, particularly posttraumatic stress disorder (OR 7.25, 95% CI 6.84–7.68), depression (OR 2.39, 95% CI 2.28–2.50), and suicidal ideation (OR 2.42, 95% CI 2.08–2.82). MST was also associated with multiple medical conditions, particularly sleep disorders (insomnia OR 1.61, 95% CI 1.43–1.82; sleep apnea OR 1.48, 95% CI 1.37–1.61) and pain (chronic pain OR 1.58, 95% CI 1.50–1.67; back pain OR 1.40, 95% CI 1.34–1.47).
CONCLUSIONS: A history of MST is common among older women veterans and associated with a range of medical and mental health diagnoses. These findings call attention to the need for additional research in this understudied population, and the importance of trauma-informed care approaches for women across the lifespan.

KEY WORDS: women's health; veterans; sexual assault; mental health; chronic disease.

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Prior Presentations *Preliminary results from this study were presented at the 2018 International Society for Traumatic Stress Studies Annual Meeting (Washington, D.C., November 8–10, 2018), and the 2019 North American and related results will be presented at the 2019 North American Menopause Society Annual Meeting (Chicago, IL, September 25–28, 2019).*

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INTRODUCTION

Recognition of the pervasive problem of military sexual trauma (MST), or sexual assault and/or repeated, threatening sexual harassment during military service, has increased over the past two decades. These experiences disproportionately affect women, with estimates from national VA data suggesting that while one in 100 men reports MST, one in four women reports MST in routine screening.[1] Rates as high as 70% have been reported by women veterans in anonymous surveys.[2] As with other forms of sexual trauma, these experiences have been linked to a range of medical and mental health concerns, including cardiometabolic disease,[3] obesity,[1,4] pain,[3, 5] sleep disorders,[6] posttraumatic stress disorder (PTSD) and other mental health conditions,[1] substance use disorders,[5] and suicide risk.[1,7]

Research on MST among women veterans has largely focused on younger women from recent service eras,[8–21] with little attention to older women.[2,22] A growing literature supports long-reaching effects of often remote sexual trauma on health among older women,[23] yet little is known about the potential impact of MST on aging-related health in women veterans.[2] Older women have unique and increased risks for a broad range of health concerns related to biological, physiological, and social factors, and the influence of trauma such as MST may differ in this population relative to their younger peers.[24] The military experience and exposure to MST for

older women veterans may also differ, given changes in military roles for women and multiple service eras represented by this cohort. Further, age-related prevalence of positive MST screens was last reported from 2003,[1] the year after the VA initiated universal annual MST screening for all veterans receiving VA healthcare. Reporting rates in this age cohort may have increased since that time, given changes in the cultural milieu around recognizing and reporting sexual harassment and sexual assault in the military and general population, and increased adoption and adherence to screening protocols since implementation.[25]

In this study, we determined MST prevalence among older women veterans and investigated associations between MST and medical and mental health diagnoses using national VA medical record data. We hypothesized that MST would be common and associated with increased odds of a range of medical and mental health diagnoses, independent of demographic risk factors.

MATERIALS AND METHODS

Data Source

Data for this cross-sectional study were drawn from the VA National Patient Care Database. We obtained data on all women veterans aged ≥55 enrolled in the VA since 2005. This age cohort was chosen to encompass post-reproductive age and the emergence of aging-related cognitive and health issues. We used *International Classification of Diseases, Ninth Revision Clinical Modification* (ICD-9-CM) diagnostic codes derived from electronic medical records generated during clinical visits for women with at least one VA clinical encounter and documented response to MST screening in fiscal years 2005–2015. Data over the 10-year period were treated as cross-sectional in order to maximize capture of positive MST screens on repeated assessment, as MST and other forms of sexual assault are often not disclosed at initial screening.[26,27] The study was approved by the institutional review boards of the University of California, San Francisco and the Research and Development Committee of the San Francisco VA Health Care System.

Variables

All variables were categorized from medical records from fiscal years 2005–2015.

Military Sexual Trauma. Military sexual trauma (MST) was categorized from responses to VA MST screening. As mandated by a universal screening protocol instituted nationally in 2002, all veterans receiving care in VA outpatient primary care or mental health settings are screened for MST at least once, with responses documented in the medical record. MST screening implementation was shown to be widespread within a few years of the mandate, with rates estimated near 97% by 2010.[25] The VA defines MST as "experiences of sexual assault or repeated, threatening sexual harassment experienced while on federal active duty, active duty for training, or inactive duty training," assessed by two standard screening questions: (1) "While you were in the military, did you receive uninvited and unwanted sexual attention, such as touching, cornering, pressure for sexual favors, or verbal remarks?" and (2) "Did someone ever use force or the threat of force to have sexual contact with you against your will?" An affirmative response to either question is documented as a positive MST screen. In this study, MST was identified by a positive screen at any point during the observed period.

Medical and Mental Health Diagnoses. Diagnoses were categorized based on the presence of selected ICD-9-CM codes (Supplementary materials) on at least one encounter during the observed period, regardless of whether those preceded, followed, or were concurrent with encounters with MST screening responses. Medical diagnoses include cardiometabolic disease[3] (diabetes, hypertension, hyperlipidemia, history of myocardial infarction, cerebrovascular disease, and congestive heart failure); obesity;[1,4] pain conditions[3,5] (fibromyalgia, headaches/migraine, chronic pain syndrome, and back pain); menopause symptoms;[3] sleep disorders[6] (insomnia, sleep apnea); and dementia disorders.[3,28] Mental health diagnoses include PTSD,[1,29] depressive disorders,[1] and anxiety disorders,[1] the most common mental health diagnoses among women veteran VA users,[30] as well as tobacco use[31], alcohol use disorder,[1] substance use disorder,[5] opioid use disorder,[5] and suicidal ideation.[1,7] Selected diagnoses were chosen due to established associations of these or related conditions to MST or sexual trauma,[1,3–7, 28,30,31] though not previously examined specifically among older women. Medical diagnoses were also limited to conditions common among older adults.

Covariates. Sociodemographic covariates were obtained from medical record documentation. Age (continuous) was defined as age on the first encounter date during the observed period, based on date of birth. Race was categorized as non-Hispanic white, non-Hispanic black, Hispanic, Asian, or other/unknown. Educational and income strata were classified by linking veteran data to 2016 U.S. Census data. Education was categorized according to college education completion in the veteran's zip code tabulation area (ZCTA) (≤25% vs. >25% of the adult population); income was categorized by median ZCTA income tertiles, consistent with previously published methodology.[32] Sociodemographic variables considered as covariates were chosen due to established associations with both MST[1] and health-related outcomes.[33]

Statistical Analyses

Descriptive statistics were used to summarize key variables and covariates in the sample, including frequencies and percentages for categorical data and means and standard

Table 1 Demographic Characteristics of Study Participants ($n = 70,864$)

Characteristic	Positive MST screen ($n = 9514$, 13.4%)	Negative MST screen ($n = 61,350$, 86.6%)	p value
Age (mean, SD)	60.7 (6.1)	66.6 (10.7)	< .001
Race			< .001
Non-Hispanic white	5206 (54.7)	39,817 (64.9)	
Non-Hispanic black	967 (10.2)	5985 (9.8)	
Hispanic	49 (0.5)	243 (0.4)	
Asian	24 (0.3)	274 (0.5)	
Other/unknown	3268 (34.4)	15,031 (24.5)	
> 25% college educated in zip code	4309 (46.7)	28,306 (47.2)	.34
Median income tertile in zip code			.15
Low tertile (<$44,626)	3011 (32.8)	19,964 (33.4)	
Middle tertile	3149 (34.3)	19,873 (33.2)	
High tertile (>$58,937)	3033 (33.0)	19,948 (33.4)	
Marital status			< .001
Never married/single	1632 (18.0)	8664 (14.7)	
Married	2922 (32.3)	22,209 (37.8)	
Divorced/separated	3693 (40.8)	17,242 (29.3)	
Widowed	811 (9.0)	10,671 (18.2)	

Missing values: education (1698, 2.4%), income (1886, 2.7%), marital status (3020, 4.3%)

deviations for continuous data, stratified by MST. Sociodemographic differences by MST were examined using chi-square for categorical variables and t tests for continuous variables. Separate multivariable logistic regression models were used to examine associations between MST and all selected diagnoses, with covariates included in the final models selected due to significant associations with MST in bivariate analyses. Sensitivity analyses were also conducted for multivariable models with significant associations between MST and diagnoses. In separate analyses, models were further (1) adjusted for PTSD, to test for independent effects of MST given known associations between PTSD and both MST and medical outcomes, and the influence of MST disclosure on PTSD diagnosis and treatment in the VA setting; (2) adjusted for any mental health diagnosis, to test for independent effects of MST, given known associations between other mental health conditions and both MST and medical outcomes; and (3) limited to women whose frequency of VA encounters during the observed period was in the top 10% of the overall sample, as more visits would indicate greater opportunity to undergo MST screening, respond positively to repeat MST screens after negative screening(s), and/or receive diagnoses. Additionally, a post hoc sensitivity analysis was conducted in models with sleep apnea to adjust for obesity and tobacco use, common comorbidities thought to represent a mediational pathway. All analyses were conducted using SAS 9.4 (SAS Institute Inc., 2013; Cary, NC). Reported p values are 2-sided. Consistent with previous studies with large sample sizes drawn from VA data,[34] $p < .001$ was considered statistically significant.

RESULTS

Characteristics of the Sample

The analytic sample included 70,864 women veterans aged 55 and older (mean age 65.8, SD 10.4 years) with ≥ 1

Table 2 Medical Diagnoses by MST Screening Status

Characteristic	Positive MST screen ($n = 9514$, 13.4%)	Negative MST screen ($n = 61,350$, 86.6%)	Adjusted odds ratio (95% CI)
Cardiometabolic disease			
Diabetes	2493 (26.2)	15,297 (24.9)	1.03 (0.98, 1.09)
Hypertension	5719 (60.1)	41,083 (67.0)	0.88 (0.84, 0.92)
Hyperlipidemia	5793 (60.9)	36,930 (60.2)	0.98 (0.94, 1.03)
Myocardial Infarction	245 (2.6)	1763 (2.9)	1.03 (0.90, 1.19)
Cerebrovascular disease (IA/stroke)	988 (10.4)	6984 (11.4)	1.12 (1.04, 1.21)*
Congestive heart failure	537 (5.6)	4337 (7.1)	1.14 (1.03, 1.25)†
Obesity	3623 (38.1)	17,462 (28.5)	1.15 (1.10, 1.21) ‡
Pain			
Chronic pain conditions	2231 (23.5)	8043 (13.1)	1.58 (1.50, 1.67)‡
Back pain	4446 (46.7)	21,310 (34.7)	1.40 (1.34, 1.47)‡
Dementia	310 (3.3)	4854 (7.9)	0.99 (0.88, 1.13)
Sleep disorders			
Insomnia	394 (4.1)	1335 (2.2)	1.61 (1.43, 1.82)‡
Sleep apnea	891 (9.4)	3156 (5.1)	1.48 (1.37, 1.61)‡
Menopause symptoms	2250 (23.7)	11,286 (18.4)	1.03 (0.97, 1.08)

All models adjusted for age, race/ethnicity, and marital status
$p < .01$, †$p = .01$, ‡$p < .001$

documented response to MST screening and ≥ 1 VA encounter during fiscal years 2005–2015. Overall, the sample was largely non-Hispanic white (64%) and married (37%) or divorced/separated (31%). A positive MST screen was documented for 13% of women, with variation by age; 18% of women aged 55–64, 10% of women aged 65–74, 3% of women aged 75–84, and 2% of women aged 85 and older had a positive screen. Women with positive MST screens were younger (mean age 60.7 vs. 66.6, $p < .001$), and more likely to be divorced/separated (41% vs. 29%, overall $p < .001$), and of racial/ethnic minority (45% vs. 35%, overall $p < .001$) (Table 1). Education and income were not associated with MST screen response, and therefore not included in multivariable models.

The most common medical diagnoses included hypertension (66%), hyperlipidemia (60%), and diabetes (25%). Depression was the most common mental health diagnosis, documented for 34% of women; 21% had an anxiety disorder, and 10% had PTSD (data not shown).

Military Sexual Trauma and Medical and Mental Health Comorbidities

In multivariable analyses adjusted for age, race/ethnicity, and marital status, a positive MST screen was associated with greater odds of obesity, chronic pain, back pain, insomnia, and sleep apnea (Table 2) and most mental health diagnoses. Most notably, MST was associated with 7.25 times the odds (95% CI 6.84–7.68) of PTSD and over twofold odds of depression and suicidal ideation, as well as increased odds of anxiety, alcohol use disorder, substance use disorder, and opioid use disorder (Table 3).

In sensitivity analyses adjusted for (1) PTSD and (2) any mental health diagnosis, associations between MST and chronic pain conditions, back pain, and sleep apnea were attenuated but maintained. In the restricted sample of high utilizers, including 7043 women with an average of 298 encounters (SD = 149) during the observed period, associations between MST and pain conditions, back pain, insomnia, sleep apnea, and most mental health diagnoses were attenuated but maintained (Supplementary materials). In post hoc analyses adjusting for tobacco use and obesity, MST remained equivalently associated with sleep apnea (OR 1.43, 95% CI 1.32–1.56, $p < .001$; data not shown).

DISCUSSION

We examined the prevalence and common medical and mental health comorbidities of MST among older women veterans in the VA healthcare system. In this national sample of women veterans aged 55 and older, positive MST screens were observed in nearly 1 in 5 women aged 55–64, and 1 in 10 aged 65–74. Accounting for demographic risk factors, MST was associated with increased odds of a range of diagnoses, particularly sleep disorders, pain conditions, PTSD, depression, and suicidal ideation.

This study extends the literature on associations between interpersonal trauma and health, demonstrating that older women veterans remain at risk for the effects of potentially remote MST. In a novel finding, sleep apnea, a prevalent but under-recognized condition among older women,[35,36] was strongly associated with MST. While links between sexual assault and sleep-disordered breathing have been reported in civilian samples and anticipated to present challenges to treatment adherence,[37] sleep apnea has not previously been examined in this context. Other significant associations between MST and health conditions were consistent with patterns previously observed in studies of veterans across the lifespan,[1,3–5, 38] but never examined specifically among older women veterans. These include increased odds of obesity, pain conditions, and insomnia, and common chronic conditions among older women with widespread effects on aging-related health and functioning.

MST was also strongly associated with numerous mental health comorbidities. A new and concerning finding was a significant association between MST and opioid use disorder. Chronic pain is common among older women, mirrored by high rates of prescribed opioids, high-dose opioids, and opioid polypharmacy;[39] women who have experienced MST may be at heightened risk for abuse potential that can occur within routine medical care. MST was also associated with alcohol and substance use disorders in this study, though the magnitude of this association was smaller than that generally observed in younger women for whom these conditions are more common.[1,3,5,8,19,38,40–42] Older women veterans who had experienced MST had over sevenfold increased odds of PTSD, the most common mental health diagnosis associated with MST,[1,5,9,15,16,18,19,40,42,43] and twofold or more increased odds

Table 3 Mental Health Diagnoses by MST Screening Status

Characteristic	Positive MST screen ($n = 9514$, 13.4%)	Negative MST screen ($n = 61{,}350$, 86.6%)	Odds ratio (95% CI)
Anxiety	3371 (35.4)	11,222 (18.3)	1.99 (1.89, 2.09)*
Depression	5393 (56.7)	18,754 (30.6)	2.39 (2.28, 2.50)*
PTSD	3362 (35.3)	3420 (5.6)	7.25 (6.84, 7.68)*
Tobacco use	2421 (25.5)	12,240 (20.0)	1.00 (0.95, 1.05)
Alcohol use disorder	859 (9.0)	2430 (4.0)	1.71 (1.57, 1.86)*
Substance use disorder	510 (5.4)	1204 (2.0)	1.88 (1.69, 2.10)*
Opioid use disorder	136 (1.4)	346 (0.6)	1.77 (1.44, 2.17)*
Suicidal ideation	276 (2.9)	534 (0.9)	2.42 (2.08, 2.82)*

All models adjusted for age, race/ethnicity, and marital status
*$p < .001$

of anxiety, depression, and suicidal ideation. Although not previously examined specifically among older women, similar patterns with equivalent[1,22] or lesser[5,16] magnitudes have been reported among younger women and women across the lifespan.[1,5,9,15,16,18,19,42–49] The strong magnitude of the relationship between MST and PTSD in this study may suggest vulnerability for PTSD among older women with prior MST, possibly related to cumulative lifetime trauma exposure.[50] Although the duration of these diagnoses cannot be determined, the strong relationships between MST and current mental health concerns may suggest long-standing, chronic mental health needs with known effects on aging-related health.

Potentially reflecting these known effects, the observed relationships between MST, obesity, and insomnia were attenuated after accounting for mental health diagnoses or high VA healthcare utilization. However, sleep apnea and pain conditions were strongly and consistently associated with MST, independent of comorbid PTSD, other mental health diagnoses, and healthcare utilization; sleep apnea was also independent of tobacco use and obesity, possibly reflecting gender differences in the development of sleep apnea.[35,51] Although sleep apnea is often under-recognized and undiagnosed among women,[36] it affects an estimated 20% of women, with dramatically increasing risk beginning in midlife.[35] Similarly, women veterans are disproportionately affected by pain,[5] with common chronic pain diagnoses often emerging in or worsening in midlife.[52] These conditions present significant challenges to health management and barriers to effective care that may be further complicated by MST.

These findings should be interpreted considering several limitations. Sexual trauma may be underreported; the degree to which positive MST screens reflect the underlying prevalence of MST in this population is unknown. Although the observed rate of 13% positive MST screens is supported by equivalent estimates in this age cohort from 2003,[1] we had expected that rates among older women may have increased since that time. This equivalence may be due to the broad period of assessment in the current study, which draws from 2005 to 2015. The overall rate is also affected by the low prevalence of documented MST in the oldest women in the cohort, which may be related to differential exposure related to service era and job roles over time, and/or underreporting or underscreening among older women. Further, we cannot account for women who were only screened outside of the observed period. MST screens likely underestimate true prevalence of these experiences,[26] due to reporting biases such as not being screened or not being re-screened after an initial negative response.[53] As a result, observed associations may be underestimated. Further, an estimated 70% of eligible women veterans are not enrolled in VA healthcare and therefore do not contribute to these screening estimates; that choice may be influenced by MST and discomfort with receiving care in a military-related, male-dominated system.[15] A temporal relationship with MST preceding diagnoses was assumed, as MST necessarily occurs during military service while diagnoses were assessed among older women veterans, but directionality cannot be determined with these cross-sectional data. Opportunities for exposure to MST, as well as the environment in which it occurred, are likely influenced by length of service, service era, and occupational role in service; this information cannot be determined from these VHA data. This study was drawn from older women veterans who use VA healthcare, and results may not be generalizable to the larger population of women veterans who do not use VA care. Reliance on ICD-9-CM codes may underrepresent diagnoses, and collinearity in mental health diagnoses examined may impact sensitivity analyses. Finally, we cannot confirm the validity, duration, or chronicity of diagnoses on record, which may influence the health-related implications of these conditions.

Despite these limitations, this study has multiple strengths. These include use of a large, diverse, nationally representative sample of older women veterans, an understudied population at elevated risk for medical and mental health concerns.[30] We accounted for a range of demographic factors, mental health diagnoses, and healthcare utilization to assess for independent relationships and limit effects of confounding. We characterized varied aspects of health, defined by medical record data to enhance the reliability of diagnoses. A 10-year period was examined, maximizing opportunities to capture screening occurrence and positive screens that may have only been endorsed with repeated screening. These findings demonstrate connections between MST and chronic conditions important in aging populations to inform comprehensive gender-sensitive care both within and outside of VA settings.

These findings have important clinical implications for both VA and community healthcare systems. Women who have experienced MST tend to be higher utilizers of healthcare, with some studies suggesting that they report less satisfaction with healthcare services[54] and perceived barriers to accessing gender-sensitive care.[55] Other studies have identified dissatisfaction with care coordination and challenges with provider-patient communication among women with MST.[56] However, care coordination and communication with multiple providers in interdisciplinary and specialty care settings is often necessary in the care of older women, particularly for conditions such as chronic pain and sleep disorders that were linked to MST in this study. Routine MST screening, as well as acknowledgement of these exposures in routine medical care, provides an opportunity to talk with patients about the potential effects of trauma on physical and mental health, facilitate access to effective treatments, and provide a healing environment through thoughtful, supportive trauma-informed care.

CONCLUSION

Our findings from national VA medical record data indicate that positive MST screens are prevalent among older women veterans. Further, MST was associated with higher prevalence

of numerous medical and mental health conditions common among older women. Although past trauma is not often considered in the clinical care in this population, both VA and community care providers caring for older women veterans should recognize the prevalence and importance of MST in aging-related health and healthcare, even in the absence of PTSD or other mental health concerns. These findings call attention to the need for additional research in this understudied population, and the importance of trauma-informed care approaches for women across the lifespan.

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Author Contribution *CJG, SM, and KY were responsible for the study concept and design. KY obtained funding and supervised the study. FX conducted the statistical analysis. All authors were involved in the interpretation of data. CJG drafted the manuscript, and all authors critically revised it for important intellectual content and approved the final version. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.*

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Data Availability *No additional data are available owing to a data use agreement with the Department of Veterans Affairs.*

Compliance with Ethical Standards:

The study was approved by the institutional review boards of the University of California, San Francisco and the Research and Development Committee of the San Francisco VA Health Care System.

Conflict of Interest: *Dr. Yaffe serves on DSMBs for Takeda Inc. and a National Institute on Aging–sponsored study, and is also member of the Beeson Scientific Advisory Board. All other authors report no disclosures.*

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