

Quality of life among women veterans

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ABSTRACT

Background: Of 23 million US veterans, 2 million are women. Female veterans often have physical and mental health disorders, but only 6.5% use the Veterans Health Administration (VA) system. Health care for women veterans is challenging in a health care system unfamiliar with this population.

Purpose: The purpose of this study was to investigate how receipt of treatment by female veterans at a VA women's health specialty clinic affected levels of distress, quality of life (QOL), and depression.

Methods: A retrospective record review was completed on 51 female veterans between the ages of 40 and 60 years attending a VA clinic. The clinic provides comprehensive women's health services to female veterans. Multiple linear regression models were fit to explore QOL and depression levels with socioeconomic status, parity, years of service, and military sexual trauma (MST).

Results: Female veterans had significantly lower baseline scores for QOL than did a comparison group. The only significant predictor associated with higher health-related symptom scores at baseline was a history of MST ($\beta = 0.363$; $t = 2.44$; $p = .02$). Means and standard deviations for total scores were significantly higher than those of the comparison group. Higher symptom scores indicated lower QOL among female veterans.

Implications for practice: Study findings suggested that timely, comprehensive, gender-specific health care can significantly improve overall QOL and depression levels. Nurse practitioners play a leading role in providing primary care to this population with significant potential to impact QOL, depression levels, and overall health of female veterans.

Keywords: Depression; disparities; education; females; gender gap; quality of life; underrepresented; VA; veterans; women; women's health; women's health center.

Journal of the American Association of Nurse Practitioners 32 (2020) 745–755, © 2020 American Association of Nurse Practitioners

DOI# 10.1097/JXX.0000000000000445

Following the terrorist attack on the United States on September 11, 2001, there were approximately 21.9–23 million veterans served in the United States armed forces (deKleijn et al., 2015). Of those, 2 million were women. Female veterans often have physical and mental health

disorders and impaired quality of life (QOL), rendering their health care needs complex (National Center for Veterans Analysis and Statistics, 2016). In the Veterans Health Administration (VA) system, health care gender disparities persist for female veterans who remain a minority of the patient (Katon et al., 2016; Washington et al., 2015; Yano, 2015). Despite efforts by the VA and increasing number of women veterans signing up for care at the VA, providing gender-specific comprehensive health care to veteran women continues to be a challenge. Due to women veterans' special needs as well as depression, decreased QOL, trauma, pain, and inexperience with the VA system, accessing and providing care may be overwhelming for women and health care systems unfamiliar with the specific needs of this population (Bergman et al., 2015).

The percentage of women veterans is expected to increase from 9.4% in 2015 to 16.3% in 2043 (National Center for Veterans Analysis and Statistics, 2017). The expected increase in women veterans and recent controversies regarding the adequacy of VA health care has added to the

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Supplemental digital content is available for this article. Direct URL citations appear in the printed text and are provided in the HTML and PDF versions of this article on the journal's Web site (www.jaanp.com).

Received: 27 November 2019; **revised:** 6 April 2020; **accepted:** 10 April 2020

urgency to improve health care for women veterans. When comparing genders, the percentage of male veterans using VA health care in 2015 was 33.5% versus 30.3% of veteran females (National Center for Veterans Analysis and Statistics, 2016). Additional studies and innovative methods of providing comprehensive and gender-specific care may decrease the gap between genders seeking and receiving health care in this system (Atkins & Lipson, 2015; Gray et al., 2015; Yano, 2015).

Problem

Despite the increasing number of female veterans in the VA health care system, inequities in the provision of comprehensive health care continue (Yano, 2015). In 2005, a total of 237,952 women veterans used the VA health care system. Ten years later, the number had nearly doubled to 455,875 women in 2015 (National Center for Veterans Analysis and Statistics, 2017). However, the number of female veterans seeking medical care through the VA system remains disproportionately low when compared with male veterans. The assumption is that female veterans are receiving health care outside the VA system (Bastian, 2016; Mattocks et al., 2018).

Female veterans' health varies markedly from that of women who are not veterans, due to military experiences and exposure to combat. Some female veterans have military sexual trauma (MST) alongside other types of traumas or injuries. These experiences often align with mental, physical, and emotional health disorders associated with QOL (Bastian et al., 2016; Yano & Frayne, 2011). To work toward improving the overall QOL of women who have served, those caring for female veterans have to be aware of their distinctiveness (Bastian et al., 2016).

Comprehensive health care can facilitate the health outcomes of female veterans, especially those experiencing depression and impaired QOL (Department of Veterans Affairs, 2015a). Depression is a devastating chronic illness that severely influences female veterans' QOL, causing functional decline and behavioral problems (Bastian et al., 2016). Because of the complexity of depression and the complex needs of female veterans, this population requires prompt accessibility to multiple services in each visit in a location where they feel safe, build trust, and work with same-gender or highly specialized providers (Department of Veterans Affairs, 2015a). Often, when specific care is unavailable or denied, female veterans do not seek needed medical attention, compromising their overall well-being (deKleijn et al., 2015).

Beginning in the 1990s, the VA began working to improve services for female veterans. In 2010, the VA mandated that primary care providers be specifically trained as Comprehensive Women's Health Care Providers (WHCPs) and available to address women's specific health care concerns at one location, without inconveniencing the patient (Bergman et al., 2015; Maisel et al., 2015). Patients receiving care from WHCPs

tend to be happier with the care received than with those not trained as WHCPs (Bastian et al., 2014; Bergman et al., 2015). The VA also designated a Women Veterans Program Manager at each VA health care system ($N = 140$) to facilitate the care and proficiency of the new initiative and future endeavors (Maisel et al., 2015). The VA addressed the need for centers for female veterans in the system to increase access to care and decrease health disparities (Bastian et al., 2015; Di Leone et al., 2016; Mattocks, 2015; O'Hanlon et al., 2016; Whitehead et al., 2014; Yano, 2015). Further evaluation is required to assess the effect of care provided to female veterans visiting women's centers at the VA health care system.

The primary purpose of this study was to investigate how receipt of treatment by female veterans at a VA women's health specialty clinic (WHSC) affects levels of distress, QOL, and depression. The following goals were set and investigated.

Goals

Goal 1

To compare baseline levels of QOL among female veterans aged 40–60 years who used a WHSC to normal reference values of women in North America, provided by the original developers of the Menopause Rating Scale (MRS; Berlin Center for Epidemiology and Health Research, 2008; Heinemann et al., 2004).

Goal 2

To compare scores on outcome measures (depression and QOL) before and after receipt of treatment services of female veterans aged 40–60 years who attend the WHSC.

Goal 3

To investigate the association of socioeconomic status (SES), length of service, MST, and parity (number of deliveries) to baseline levels and treatment-related changes in QOL and depression among female veterans attending WHSCs.

Definition of terms

Depression. Major depressive disorder or clinical depression is a common, serious mood disorder. They cause severe symptoms affecting how one feels, thinks, and handles daily activities. To be diagnosed with depression, symptoms must be present for at least 2 weeks. Some forms of depression differ slightly or develop under unique circumstances (National Institute of Mental Health, 2016, p. 1).

Quality of life. "A multidimensional phenomenon composed of core domains that constitute personal well-being. These domains are influenced by personal characteristics and environmental factors" (Schallock et al., 2016, p. 4).

Women's health. "The general practice management of women's health involves a holistic patient centered

approach to the physical, mental and emotional health of women, their families, and their relationships” (The Royal Australian College of General Practitioners, 2011, p. 199).

Review of literature

The conceptual model for health-related QOL (Wilson & Cleary, 1995) was adapted for this study. The model hypothesizes that QOL depends on interactions and levels of interaction among five major functions—biological, symptoms, functional status, general health perceptions, and overall QOL—and individual and environmental features experienced by female veterans (Ferrans et al., 2005; Katon et al., 2016). Prior studies showed that this model facilitates understanding of the assessment, diagnosis, and treatment processes of depression while improving overall health and QOL (Chedraui et al., 2008).

Veterans Health Administration

The VA developed *VHA Handbook 1330.02* (Department of Veterans Affairs, 2015b) in 2010 to guide clinical practice necessary to provide comprehensive women’s health care. Although the VA can handle high volumes of male veterans, it lacks some knowledge, resources, an ability to provide the same for women, and discrepancies persist (deKleijn et al., 2015; Katon et al., 2016; Whitehead et al., 2014). Despite advances in medicine and the dedication of the VA to facilitate female veterans’ comprehensive care, the VA has been unable to meet all goals and address the needs of female veterans (Mattocks et al., 2018).

Comprehensive care is the backbone of female veterans’ health. The VA placed women’s health at the forefront of an agenda to increase knowledge among stakeholders and improve accessibility (Bergman et al., 2015; Department of Veterans Affairs, 2015b; Wagner et al., 2015). Health care providers must consider the perceptions of individual women’s needs as an integral part of their health care. Women consider that communication, coordination, continuity of care, and personalized care to be important factors in comprehensive care (i.e., not getting an appointment) during a perceived moment of crisis—physical or psychological—might lead to devastating outcomes for female veterans and for all stakeholders (Wagner et al., 2015). Women prefer to have all care at one facility and perhaps with one provider who was trained in caring for women’s specific issues (Department of Veterans Affairs, 2015a).

Female veterans’ are physically and psychologically more complex when compared with nonveteran women and male veterans (Bastian et al., 2016; Bergman et al., 2015). Diagnosing, treating, and following up may be challenging due to provider’s lack familiarity specific to female veterans’ needs: trust, mental health issues, physical disabilities, distinctive military experiences, gender-specific care, and lack of collaboration between

the VA system and non-VA system and providers among other variables (Bergman et al., 2015; Wagner et al., 2015).

Gray et al. (2015) reviewed data from 120 emergency rooms in the VA. Having a gynecologist available in the emergency department facilitated access to gender- and veteran-specific care at the time of a crisis and for future medical needs. The priority for this population is access to timely, quality, individualized medical care, better outcomes from depression, and the highest possible QOL (Di Leone et al., 2016). When female veterans can access their own unique comprehensive care, depression decreases, QOL improves, and overall health outcomes are better (Bastian et al., 2015; deKleijn et al., 2015; Di Leone et al., 2016).

Depression

Depression is a prevalent diagnosis, often occurring with other mental health disorders and chronic diseases in veterans, with women having a higher rate of depression compared with male veterans (Bastian et al., 2016; Brown et al., 2019). Brown et al., (2019) found that of those reporting depression in their study, 45.3% were women compared with 26.1% men. Female veterans often present with have multiple diagnoses such as depression, anxiety, post-traumatic stress disorder as well as hypertension, osteoporosis, and reproductive issues, among others (Bastian et al., 2016; Brown et al., 2019). Female veterans continue to be a minority among those receiving care at the VA, represented in research, but a majority with a diagnosis of depression among their own population (Brown et al., 2019; MacGregor et al., 2011; Oishi et al., 2011; Whitehead et al., 2014).

In 2011 and 2012, more than 200,000 women served on active duty, and 113,000 served in the reserves and national guards (Bean-Mayberry et al., 2011). By 2043, female veterans will comprise 16.3% of the US veteran population (National Center for Veterans Analysis and Statistic, 2017). Gender differences add to the difficulties and complexities of assessing and treating female veterans because the system is mostly male driven (Bean-Mayberry et al., 2011; Gerber et al., 2014). As the number of female veterans with depression is likely to increase, individualized care must rest on the causes of depression.

Having been physically or sexually abused before and during military service puts women at greater risk for further abuse, increasing risks for depression and other preventable diseases (Brown et al., 2019; Gerber et al., 2014; Lee et al., 2007). When identifying the potential for mental illness (e.g., depression and posttraumatic stress disorder), monitoring must continue. Depression among female veterans is higher, based on history of violence, higher incidence of military trauma, and combat exposure, among other causes (Bastian et al., 2016; Harrington et al., 2019). Increasing training among VA women’s health providers, location of care, and methods of assessment are essential

to decrease distress among women and increase participation in VA care (Gerber et al., 2014; Kelly et al., 2014; Lehavot et al., 2015). In the VA's "gender-specific care" policy, veterans may choose their provider's gender, facilitating ease in treatment and trust for female veterans who have experienced military trauma, especially sexual in nature (Bastian et al., 2016; MacGregor et al., 2011).

The Patient Health Questionnaire (PHQ-9) provided a simple method to screen, diagnose, and monitor depression among female veterans. The VA must identify providers who will screen, diagnose, and provide the necessary mental health services as needed by female veterans. Although the VA recommends improving women's health, a lack of agreement continues regarding who, when and where to provide such services, including mental health services (Bastian et al., 2016; MacGregor et al., 2011). As military service, combat exposure, and depression symptoms increase among women, comprehensive women's health care that includes mental health services must remain a priority (Creech et al., 2016). Female veterans have a higher rate of depression, which hinders multiple systems at different functional levels and ultimately impairs QOL (Bastian et al., 2015; Katon et al., 2016).

Quality of Life

Researchers continue to assess QOL across disciplines and populations. Research literature and conceptual models postulate that QOL includes all aspects of life: individual, environmental, biological, symptomatic, functional, and general health perceptions (Ferrans et al., 2005; Schalock et al., 2016). Quality of life is subjective; thus, levels may change quickly and QOL needs reassessment to consider improvement or decline (Schalock et al., 2016).

On average, QOL for female veterans is typically lower than QOL of women who are not veterans (Katon et al., 2016). A comprehensive model needs to incorporate efficient methods to assess QOL. Heinemann et al. (2004) from the Berlin Center for Epidemiology and Health Research (2008) developed the MRS instrument, validated as a health-related QOL instrument (Heinemann et al., 2003). The MRS has been demonstrated to be effective in evaluating QOL in women to make necessary treatment adjustments in a timely manner (Heinemann et al., 2003; Schneider et al., 2000). A significant factor that may hinder improvement of QOL is the VA health care system's lack of information and education regarding resources for female veterans (Bastian et al., 2016).

Sample and setting

A statistical power analysis was performed to determine an adequate sample size. The target sample size was 50 female veterans attending an VA WHSC. The actual size obtained was 51 women. The study sample was compared with an external norm-based sample of 1,400 nonveteran women (Machin et al., 1997; Zar, 1984). With the original

target goal of 50 women, which was achieved, goal 1 provided 81.6% power assuming 2-sided type I error rate of 0.01 to detect a medium effect size of 0.50. For goal 2 and use of paired *t*-test comparing mean values of the MRS and PHQ-9 before and after treatment at the clinic, the *a priori* target sample size of 50 women provided 80% power with two-sided type I error rate of 0.01 and assuming within-subject correlation coefficient of 0.5 to detect a medium within-subject effect size of 0.01. For goal 3, the target sample size of 50 participants provided 80% power assuming two-sided type I error rate of 0.01 to detect a change in R^2 value of 0.196 attributed to four independent variables (forced in to the model) while adjusting for baseline value of the outcome of interest (MRS or PHQ-9) with assumed R^2 value of 0.3.

This study included a retrospective review of medical record information of (a) female veterans who were 40–60 years of age, (b) attended a WHSC between January 1, 2015, and October 1, 2016, and (c) completed the MRS and the PHQ-9 before and after treatment. Records reviewed for this study were strictly from one women-only center.

Instrumentation

The results of the MRS instrument were reviewed (Appendix A, Supplemental Digital Content 1, <http://links.lww.com/JAANP/A54>) along with the PHQ-9 (Appendix B, Supplemental Digital Content 1, <http://links.lww.com/JAANP/A54>) included in the medical records of patients who met the inclusion criteria. Demographic and clinical information from medical records were extracted.

Menopause rating scale instrument. The MRS instrument was designed and standardized as a self-administered scale to assess symptoms/complaints of aging women under different conditions, evaluate the severity of symptoms over time, and make appropriate changes in treatment in a timely fashion. Heinemann et al. (2004) from the Berlin Center for Epidemiology and Health Research (2008) developed the MRS, validated as a health-related QOL instrument (Heinemann et al., 2003). Compared were the levels of QOL of female veterans between 40 and 60 years with North American population reference values (Appendix C, Supplemental Digital Content 1, <http://links.lww.com/JAANP/A54>) provided by the Berlin Center for Epidemiology and Health Research and appraised levels of QOL of female veterans as they changed over time.

The MRS contains 11 symptoms with the severity of each symptom rated as no symptom (0), mild (1), moderate (2), severe (3), and very severe (4). Three subscales were recognized as autonomous: psychological, somatovegetative, and urogenital, accounting for a 58.8% total variance. The total score on the MRS may vary from 0 (no symptoms) to 44 (severe symptoms). Berlin Center for Epidemiology and Health Research (2008) and Heinemann et al. (2004) completed validity studies, comparing the means of 9,300

women from different clinic types and nine countries who self-administered the MRS; despite a small difference among religious groups and cultures, the symptoms appeared quite similar.

Researchers also evaluated criterion validity. The Kupperman index correlated closely with the Short Form 36 health survey questionnaire (SF36), as did Kendall's tau-b (0.75, 95% confidence interval [CI], 0.71–0.80) and Pearson correlation, 0.91 (95% CI 0.89–0.93) and 0.48 (95% CI 0.58–0.37; Berlin Center for Epidemiology and Health Research, 2008; Heinemann et al., 2004). The SF36 also had a significantly related Kendall's tau-b (0.43, 95% CI 0.52–0.35) for somatic domains, Kendall's tau-b (0.49, 95% CI 0.56–0.41) for the psychological domain, and Pearson correlation (0.73, 95% CI 0.81–0.65; Berlin Center for Epidemiology and Health Research, 2008; Heinemann et al., 2004). Cronbach's alphas were 0.83 and 0.86. Test–retest correlation across four continents was strong (0.8–0.9; Berlin Center for Epidemiology and Health Research, 2008; Heinemann et al., 2004).

The Patient Health Questionnaire. Researchers designed the PHQ-9 to monitor, identify, observe, and evaluate the severity of depression (Kroenke et al., 2001). This self-administered questionnaire asks nine questions that meet the *Diagnostic and Statistical Manual of Mental Disorders* (fourth ed.) depression standards. Researchers can use the PHQ-9 repeatedly to assess if a client is improving or deteriorating. The total PHQ-9 score fluctuates between 0 and 27 with questions answered as 0 (not at all) to 3 (nearly every day), with higher scores indicating worse depression. The total score for gravity of depression ranges from 5 (mild) to 10 (moderate), 15 (moderately severe), and 20 (severe depression).

Kroenke et al. (2001) assessed validity by comparing the results of 3,000 primary care patients from eight offices with those of 3,000 obstetrics–gynecology patients from seven offices. The correlation between the severity of depression and functional status were the same between the groups, the level of functioning highly correlated with the level of depression (mental health issues) rather than pain or other variables, and “most pairwise comparisons within each SF-20 scale between successive PHQ-9 levels were highly significant” (Kroenke et al., 2001, p. 609). Researchers evaluated criterion validity through interviews conducted with mental health professionals. They concluded, “the area under the curve for PHQ-9 ... discriminates well between persons with and without major depression” (Kroenke et al., 2001, p. 609). Alphas varied only slightly between primary care clinics (0.89) and obstetrics–gynecology clinics (0.86).

Demographic data

Demographic data included age, ethnicity, marital status, medical insurance, employment status, years of service, parity, history of sexually transmitted infection, sexual activity, location of deployment or era served, trauma

experiences while in the military, and military branch served. Low SES was derived from medical insurance and employment status variables. Data were accrued on all qualified participants using a chart audit form (Appendix D, Supplemental Digital Content 1, <http://links.lww.com/JAANP/A54>). Variables were identified in previous studies with a similar population and assisted in addressing the aims and hypotheses of this study.

Procedures

To extract data from electronic medical records, approval from the Institutional Review Board of both the university and the Veterans Hospital Research and Development Committee were obtained. Because this was a retrospective medical record investigation, a waiver of informed consent and a waiver of the Health Insurance Portability and Accountability Act authorization were granted.

Records of patients who attended the WHSC at the VA between January 1, 2014, and October 1, 2016, were reviewed. Review of records and data collection continued until sample size was achieved. Data were accrued from entry to clinic (baseline) until end of treatment (3–12 months depending on patients' needs).

Data analysis

SPSS version 23 was used for data entry, management, and analysis. Data were analyzed to describe the sample using frequencies and percentages. A two-sided type I error rate of 0.01 was used for all analyses to account for multiple comparisons. To compare mean levels of the MRS at baseline among the study sample to North American population reference values, a one-sample *t*-test was performed against an external population sample. To compare within-subject changes on the primary outcomes of interest (MRS and PHQ-9) for female veterans treated at the clinic, paired *t*-tests were conducted. Multiple linear regression analysis was used to assess the predictive value of four covariates selected a priori (SES, parity, years of services, MST, and outcomes of QOL and depression) on the outcomes of MRS or PHQ-9 post treatment, adjusted for baseline (pre-treatment) value. For these models, all variables were forced in regardless of statistical significance.

Results

All participants completed the MRS and PHQ-9 at every visit. Aligned with study-inclusion criteria, participants were between 40 and 60 years. Frequency and percentage of demographic factors were assessed for age, ethnicity, and marital status. Nearly half of participants were between 51 and 55 years (41.2%), more than half identified as White (52.9%), and nearly three-quarters were married (74.3%). Frequencies and percentages of medical insurance and work status appear in **Table 1**. The highest frequencies of work status were disabled (33.3%) and unemployed (27.1%).

Table 1. Demographic characteristics and frequency and percentage of principal type(s) of traumatic experiences encountered while in the military

Source	n	%	Source	n	%
Age, year			Military branch		
40–45	6	11.8	Army	19	47.5
46–50	9	17.6	Air force	12	30.0
51–55	21	41.2	Navy	8	20.0
56–60	15	29.4	Marine corps	1	2.5
Ethnicity			Coast guard	0	0
White	27	52.9	Years of service		
African American	15	29.4	0–4 years	11	29.7
Hispanic-Latino	8	15.7	5–9 years	12	32.5
Asian/Pacific Islander	1	2.0	10–14 years	2	5.4
Eskimo/Native American Indian	0	0.0	15–19 years	1	2.7
Mixed (specify)	0	0.0	20–24 years	8	21.6
Other (specify)	0	0.0	25–29 years	3	8.1
Marital status			30+ years	0	0.0
Married	26	74.3	Witnessed death or execution		
Divorced/separated	5	14.3	Yes	2	3.9
Never married	0	0	No	32	62.7
Living with partner	2	5.7	IED blast or combat explosion		
Widowed	2	5.7	Yes	2	5.9
Medical insurance			No	32	94.1
Tricare	13	43.3	Witnessed major injuries (nonlethal)		
Blue cross/blue shield	2	6.7	Yes	5	14.7
Humana	1	3.3	No	29	85.3
Medicaid	4	13.3	Physical assault	33	
Medicare	5	16.7	Yes	0	0
Other (cigna, optimum health)	5	16.7	No	33	64.7
Work status			Sexual assault		
Full time	11	22.9	Yes	7	13.7
Part time	2	4.2	No	30	58.8
Unemployed	13	27.1	Other (trauma/verbal/harassment)		
Disabled	16	33.3	Yes	7	18.4
Retired	6	12.5	No	31	81.6

Note: IED = improvised explosive device.

Participants' military branch and years of service appear in **Table 1**. Most common were the Army (47.5%) and Air Force (30%). The most frequent length of service was 5–9 years (32.5%). The majority of participants served during the

Vietnam era (43.1%) or the Persian Gulf era (47.1%). Principal traumatic experiences encountered by participants in the military appear in **Table 1** and included witnessing non-lethal major injuries (14.7%) and sexual assault (13.7%).

Table 2. Means, SDs, and Z score of QOL (MRS score) for female veterans and North American women and paired sample t test of QOL and depression at baseline and after treatment

	Female Veterans			North American Women			z/t	p	Cohens d
	n	M	SD	n	M	SD			
Total score	51	21.2	9.2	1,376	9.1	7.6	9.41	.000	1.31
Psych score	51	8.0	4.7	1,426	3.4	3.5	6.93	.000	0.970
Somatovegetative score	51	7.9	3.2	1,440	3.8	3.1	10.8	.000	1.51
Urogenital score	51	5.2	3.3	1,437	2.0	2.3	5.89	.000	0.826
Depression									
Baseline	51	9.52	6.56						
After treatment	51	7.15	6.33						
Difference	51	2.37	4.52				3.74	.000	
Quality of life									
Baseline	51	21.2	9.17						
After treatment	51	12.8	9.11						
Difference	51	8.35	7.64				7.80	.000	

Note: QOL = quality of life.

Descriptive statistics were calculated to identify baseline means on the MRS scale. Female veterans had higher mean scores on all components of the MRS at baseline than

those of the North American population reference values (**Table 2**). Paired sample t-tests were conducted that indicated significant improvement in QOL and depression

Table 3. Multiple linear regression model of baseline and change in MRS score and four predictors of interest forced in the model

Predictors	Baseline						Changed					
	df	B	Standard Error	B	t	p	df	B	Standard Error	β	t	p
Intercept	1	18.707	3.200	0	5.85	<.0001	1	1.393	3.140	0	0.44	.6595
Low SES	1	2.461	2.908	0.123	0.85	.4020	1	— 4.964	2.158	— 0.299	— 2.30	.0264
Years of service	1	— 0.614	3.141	— 0.033	— 0.20	.8458	1	— 3.425	2.313	— 0.221	— 1.48	.1460
Years of service missing	1	0.324	3.514	0.016	0.09	.9271	1	1.842	2.587	0.109	0.71	.4804
MST	1	9.581	3.927	0.363	2.44	.0188	1	— 2.754	3.080	— 0.125	— 0.89	.3762
MST missing	1	1.175	3.177	0.058	0.37	.7132	1	— 1.959	2.342	— 0.115	— 0.84	.4076
Parity	1	0.133	0.880	0.021	0.15	.8805	1	0.593	0.648	0.114	0.91	.3653
Baseline MRS								0.421	0.111	0.505	3.80	.0005

Note: N = 51; baseline $R^2 = .139$; baseline adjusted $R^2 = .0217$; changed $R^2 = .343$; changed adjusted $R^2 = .236$.

MRS = Menopause Rating Scale; MST = military sexual trauma; SES = socioeconomic status.

Table 4. Multiple linear regression model baseline depression score and four predictors of interest forced in the model

Predictors	Baseline						Changed					
	df	B	Standard Error	β	T	p	df	B	Standard Error	β	t	p
Intercept	1	6.022	2.269	0	2.65	.0110	1	0.381	1.542	0	0.25	.8059
Low SES	1	2.731	2.062	0.191	1.32	.1921	1	— 1.498	1.327	— 0.152	— 1.13	.2653
Years of service	1	1.824	2.227	0.137	0.82	.4171	1	— 0.989	1.416	— 0.108	— 0.70	.4886
Years of service missing	1	4.109	2.491	0.282	1.65	.1062	1	3.437	1.620	0.342	2.12	.0397
MST	1	5.396	2.784	0.286	1.94	.0590	1	1.407	1.831	0.108	0.77	.4464
MST missing	1	— 0.273	2.252	— 0.019	— 0.12	.9042	1	— 2.388	1.421	— 0.238	— 1.68	.1002
Parity	1	0.093	0.624	0.021	0.15	.8823	1	0.027	0.394	0.009	0.07	.9463
Baseline depression							1	0.240	0.095	0.347	2.52	.0156

Note: $N = 51$; baseline $R^2 = .155$; baseline adjusted $R^2 = .040$; dependent variable = baseline depression.

$N = 51$; $R^2 = .309$; changed adjusted $R^2 = .197$; $p = > .10$; dependent variable = change in depression score.

MST = military sexual trauma; SES = socioeconomic status.

levels among female veterans attending the WHSC (Table 2). Table 3 shows results of multiple linear regression models, fit to explore the association between SES, parity, years of services, MST, and outcomes of QOL and depression.

After fitting a multiple linear regression model of baseline MRS scores (dependent variable) and the four predictors of interest (low SES, number of deliveries, years of service, and MST), the only predictor that appeared significantly associated with higher MRS scores at baseline was a history of MST ($\beta = 0.363$; $t = 2.44$; $p = .02$), with higher MRS scores interpreted as lower QOL among female veterans. Full model results did not completely support the notion that all four predictive variables aligned with a higher MRS score at baseline (Table 3).

For the multiple linear regression model with change in MRS scores as the outcome of interest in relation to the four predictors (low SES, parity, years of service, and MST), the only predictor of change in MRS scores was low SES ($\beta = -0.298$; $t = -2.30$; $p = .03$). Because this association was negative, female veterans with low SES experienced less change (improvement) in MRS scores after adjusting for baseline MRS scores (Table 3). For the multiple linear regression model with change in depression scores as the outcome of interest in relation to the four predictors, no predictors of interest aligned with change in depression scores ($p > .10$; Table 4).

Two additional multiple linear regression models were fit to explore other variables that may link with change in MRS and depression. The first regression model included change in MRS scores as the outcome of interest, with low SES and a

history of sexually transmitted infections (STIs) as predictors of interest. Some negative relationships emerged between low SES and change in MRS, attenuated after adjustment for a history of STIs. A history of STIs negatively aligned with change in MRS ($\beta = -0.234$; $t = -1.75$; $p = .09$; Table 5).

The second regression model fit included change in depression score as the outcome of interest, with no predictors of interest forced into the model. Using a forward stepwise regression approach, the following variables were selected, ($p < .20$): White ($\beta = 0.317$; $t = 2.51$, $p = .02$), sexually active ($\beta = 0.246$; $p = .06$), and vaginal delivery ($\beta = -0.239$; $t = -1.88$; $p = .07$). Greater changes (reductions) emerged in depression scores among Whites and women who were sexually active, and conversely, less improvement arose among women with a history of vaginal delivery (Table 5).

Discussion

As the number of female veterans accessing health care from the VA system continues to grow, stakeholders must prepare for the complex needs of this vulnerable population. Difficulties in the VA system and specialty require multilevel and multisystem commitment to improve the overall health and QOL of female veterans.

This analysis validates the Katon et al. (2016) theory that QOL for female veterans tends to be lower than that of women who are not veterans. Although a significant difference in QOL was observed, many factors may have contributed to these differences. Female veterans often have a

Table 5. Multiple linear regression models of change in MRS score and depression score

Predictors	df	B	Standard error	β	t	p
Dependent variable change in MRS, one predictor of interest (low SES) included in the model						
Intercept	1	3.74883	2.75035	0	1.36	.1794
Low SES	1	−2.71248	2.15758	−0.16329	−1.26	.2149
Baseline MRS	1	0.31938	0.10985	0.38321	2.91	.0055
History of STI	1	−3.67143	2.09239	−0.23452	−1.75	.0858
R^2	.276					
Adj. R^2	.230					
Dependent variable: change in depression score, no predictors of interest forced in the model						
Intercept	1	−1.59767	1.67583	0	−0.95	.3455
Baseline depression	1	0.30398	0.08753	0.44632	3.47	.0011
White	1	2.83687	1.12995	0.31671	2.51	.0157
Sexually active	1	2.20661	1.13199	0.24635	1.95	.0575
Parity	1	−2.29106	1.22148	−0.23940	−1.88	.0672
R^2	.326					
Adj. R^2	.266					

Note: $N = 51$; $R^2 = .276$; adjusted $R^2 = .230$; dependent variable: change in MRS.
 $N = 51$; $R^2 = .326$; adjusted $R^2 = .266$; dependent variable: change in depression score.
MRS = Menopause Rating Scale; SES = socioeconomic status; STI = sexually transmitted infection.

multitude of multifactorial problems that may influence and cause fluctuation in QOL over time (Heinemann et al., 2003). These complexities often contribute to levels of QOL and to how female veterans seek and acquire health care. Female veterans must be addressed on an individual basis, comprehensively, and in a timely manner, with continual assessment of QOL (Bergman et al., 2015; Schalock et al., 2016).

Quality of life and depression among female veterans aged 40–60 years who attended the WHSC improved significantly from pretreatment to posttreatment, confirmed by paired sample *t*-tests. Changes in depression between baseline and after treatment were statistically significant ($p < .001$), with women experiencing decreased depression symptoms and overall improvement in QOL.

Notwithstanding the significance found in levels of distress over time, changes in depression and QOL may have been caused by multiple factors. It is quite likely that QOL and depression strongly relate; thus, if depression improves, QOL also is likely to improve. The change in QOL was relatively greater than the change in depression scores; thus, other factors must have also influenced QOL scores.

These results support the Gerber et al. (2014) and Brown et al. (2019) recommendations for future studies

and program development. Specialized comprehensive care for female veterans contributes to improved QOL, depression, and other outcomes. Female veterans need and prefer timely, comprehensive care in a gender-specific VA facility, facilitating improvement in overall health status and QOL (Gerber et al., 2014; Kelly et al., 2014; Lehavot et al., 2015; Wagner et al., 2015).

Results did not confirm associations among multiple variables, including low SES, length of service, MST, and parity, as significant predictors of QOL and depression, perhaps because of the small sample size ($n = 51$). Researchers need to identify other predictor variables. Multilinear regression found that a history of MST significantly aligned with baseline QOL and depression scores, supporting the Kelly et al. (2014) findings. Frequent monitoring of QOL and depression would better assess the need for immediate intervention and facilitation of resources, providing safety and improving the overall well-being of female veterans (Bergmann et al., 2015; Schalock et al., 2016).

Two additional multiple linear regression models that might align with changes in MRS and depression were explored. A regression model fit included change in MRS scores with low SES and a history of STIs as predictors of

interest. A history of STIs negatively aligned with changes in MRS score. However, having a history of STIs significantly aligned with changes in MRS score, confirming the need to investigate other predictor variables when examining QOL.

Conclusions and implications for nurse practitioners

Female veterans attending a WHSC reported low QOL scores compared with North American population reference values. Women significantly improved QOL and depression from baseline to after treatment. Before implementing system-wide recommendations, further investigation is needed despite these encouraging findings.

This study contributes to the current agenda of VA health services' research and development of the VA Women's Health Research Network and may increase collaboration between clinical providers and researchers, creating opportunities for translational research on female veterans (Yano, 2015). This study also adds to the database of female veteran health research and of nursing science.

A need persists to develop reliable, valid, gender, and veteran-specific instruments that assess constructs and behaviors on specific issues associated with female veterans' overall well-being. Study results may assist researchers, providers, the VA, and female veterans understand how to innovatively provide individualized, quality, comprehensive care; create effective methods to train veteran-specific women's health providers; assist female veterans with self-advocacy; and create dialogue and collaboration among stakeholders.

Nurse practitioners can provide primary care and gender-specific comprehensive health care to this population. Educating providers who care for female veterans is of utmost importance, given the anticipated number of women in the near future. The word *Veteran* and all it encompasses must be understood by *all* associated with this population. Nurse practitioners can dramatically assist in the overall well being of female veterans by providing comprehensive care by: being aware of available services; understanding the need for adequately trained staff; advocating for more resources, and more gender-specific centers. The importance of providing comprehensive health care to women veterans cannot be underestimated.

Future studies should include a larger sample size, wider age range, other VA facilities, and the use of experimental research designs. Finally, exploring outcomes that contribute to QOL and depression, such as sexual dysfunction, may help in investigating gender-specific differences.

Acknowledgments: *The authors thank committee member: Dr. Allyson Duffy, PhD, RN: Her expertise in women's health, recommendations, and encouragement assisted to guide the direction of this study. They especially thank Dr. Jacqueline Paykel, MD, who saw the authors' vision and was willing to*

collaborate and provide advise before and during the study. Without the amazing work she has completed and continues to do with female veterans and at the VA hospital, this study would not have taken place. D. T. Devine is especially thankful to Dr. Versie Johnson-Mallard, PhD, APRN, for her encouragement and mentorship.

Authors' contributions: *This study was completed as D. T. Devine's dissertation as partial fulfillment of the PhD program at the University of South Florida College of Nursing. All coauthors were also dissertation committee members. D. T. Devine, S. C. McMillan, K. Kip, and G. Powell-Cope: Made substantial contributions to the conception, design, analysis, and interpretation of data for the work; revised it critically for important intellectual content; provided final approval of the version to be published; and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work were appropriately investigated and resolved.*

Competing interests: *The authors report no conflicts of interest.*

Disclaimer: *This material is the result of work supported with resources and the use of facilities at the James. Haley Veterans' Hospital. The contents of this study do not represent the views of the Department of Veterans Affairs or the United States Government. IRB # 27934/28305. R&D # 006436.*

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