



Original article

Systematic Review of Women Veterans' Health: Update on Successes and Gaps

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A B S T R A C T

Objective: We assessed the state of women veterans' health research by conducting a systematic review of scientific literature published from 2004 to 2008, updating a prior review spanning the history of this literature to 2004.

Methods: We identified articles by searching scientific databases and contacting experts. Relevant articles were independently evaluated by two physician reviewers. We categorized 195 articles by study design, funding source, period of military service, research topic, and health condition.

Results: More research was published during this 5-year review ($n = 195$) than in the 25 years beforehand ($n = 182$). The 195 studies included five trials, but only one randomized trial, a study that examined treatment outcomes for women with posttraumatic stress disorder (PTSD). The large number of articles focused on Operation Enduring Freedom and Operation Iraqi Freedom (OEF/OIF) soldiers' health issues ($n = 23$) reflects the growing participation of women in these conflicts. High rates of positive PTSD symptoms (range, 10%–19%) and other mental health disorders were found among OEF/OIF returning military women. The recent post-deployment literature underscores the need for repeated PTSD/mental health screening in returning veterans, and points to continuity of care needs for psychiatric and gynecological problems which occur in the field. The psychiatric and access/utilization literature confirmed the positive relationship between military sexual trauma and PTSD and the associated negative health effects.

Conclusion: Although most VA women's health research remains observational, methods are evolving toward an analytical focus. Even though successes are evident in the breadth and depth of publications, remaining gaps in the literature include post-deployment readjustment for veterans/families, and quality-of-care interventions/outcomes for physical and mental conditions.

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Background

Women are playing an ever increasing role in the U.S. military, representing about 15% of active military personnel, 17% of reserve and National Guard forces, and 20% of new military recruits (Meehan, 2006). Concurrently, women are one of the fastest growing groups of new users in the Department of Veterans Affairs (VA) Healthcare System, with particularly high rates of utilization among veterans of Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF). Of the more than 100,000 OEF/OIF women veterans, over 44% have enrolled for health care (Hayes & Krauthamer, 2009). Thus, women veterans represent an integral part of the veteran community.

Women's military experiences and responses to their military experiences are often distinct from those of men, and these differences can affect both their health status and their health care needs as active duty personnel and as veterans. This issue, together with the rise in the number of women veterans in the VA system, calls for increased understanding of women veteran health issues and knowledge gaps to guide VA care and VA research efforts. The body of research literature dedicated to women veterans and women's military health and health care has significantly grown and expanded in scope since the publication of the first systematic review of women veterans research (Goldzweig, Balekian, Rolon, Yano, & Shekelle, 2006). We update that review by examining the literature on women veterans' health and health care from 2004 to 2008. In this paper, we summarize major findings since 2004, and the advancements and gaps in comparison with the literature from the original syntheses from 1978 to 2004.

Methods

Search Strategy

We searched MEDLINE/PubMed, PsycINFO, WorldCat, and Web of Science for potentially relevant articles related to women veteran and military health published between January 2004 and September 2008. For each database search, we used the medical subject heading terms *women* and *veterans* to search for relevant literature. We supplemented this search by contacting other sources with expertise in women veteran and military health. The Department of Defense Health Affairs Division provided access to bibliographical reports on general deployment and mental health issues in OEF/OIF military personnel from 2002 through 2007 (Brix, 2008). We received additional articles from experts in the field and reviewed bibliographies from articles identified through our search. This study was approved as non-human subjects research by the VA Greater Los Angeles Institutional Review Board.

Study Selection

All titles identified through our search were screened for relevance by members of our team. Each article deemed potentially relevant was reviewed by two physicians with backgrounds in women's health, working independently (B.B., F.B., C.H.) using a standardized screening form. Disagreements in ratings were reconciled through team consensus. To be included, articles had to relate to U.S. veterans or military personnel, and meet at least one of the following criteria: a) Include women veterans, compare men and women, or analyze women separately; b) involve active duty military and involve a health condition or functional status that requires medical intervention; and/or c) the topic is relevant to VA health care delivery to women. In articles containing both men and women veterans but not focused on a gender comparison, the results had to contain gender-specific statistical testing to be included (e.g., Chi-square, odds ratio, or *p*-value related to gender/sex). An article was excluded if it was defined as a nonsystematic review, editorial, commentary, or an unclear publication type.

Data Abstraction

After the initial screening process, articles meeting inclusion criteria were further evaluated and abstracted using a structured

abstract form to collect year(s) of study or sampling timeframe; purpose of study; outcomes; study population; identification as women-focused or women as a subset population, or neither; summary of methods; and main findings. Sample sizes of women were included in the abstracted data and evidence tables because sampling in the VA system has been a major debate for studies involving or including women veterans and health care. For the few clinical trials identified, we used Jadad criteria for quality assessment (Jadad et al., 1996). For descriptive studies, which were by far the largest number of studies, no simple standardized assessment of quality exists; therefore, a quality assessment protocol was not included in this review.

Data Synthesis

We identified five key focus areas by using high priority areas identified in the 2004 literature synthesis (Goldzweig et al., 2006) and the VA Health Services Research and Development Service funding priorities: 1) Deployment and post-deployment health, 2) organizational research, 3) quality of care, 4) access to care and utilization, and 5) psychiatric conditions. We then summarized the findings in each area and highlighted their significance.

Results

Yield

Our search identified 675 titles of potential relevance. Of these titles, 118 were duplicate references to a study, 151 were rejected as not being relevant to the topic, and 26 could not be retrieved (Figure 1). Of the remaining 380 articles that were evaluated as full-text articles by at least two physician reviewers independently, 154 were rejected because they did not meet our

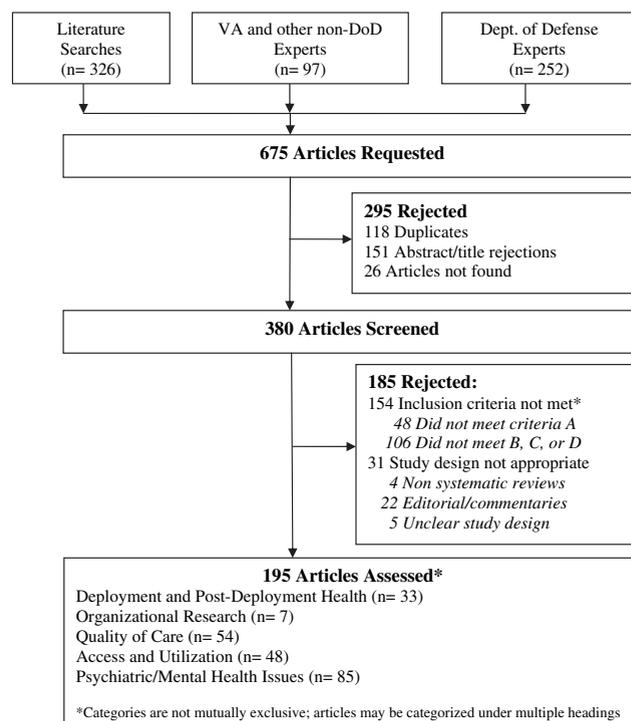


Figure 1. Literature flow.

inclusion criteria; 48 did not relate to U.S. veterans or military personnel and 106 failed to meet at least one of the following other criteria. Thirty-one articles were excluded because the study design was not appropriate (i.e., nonsystematic reviews, editorials or commentaries, or unclear design). Further, data abstraction was performed on the remaining 195 articles, and all were categorized into the following 5 areas, which were not mutually exclusive: Deployment and post-deployment health issues ($n = 33$), organizational research ($n = 7$), quality of care ($n = 54$), access and utilization ($n = 48$), and psychiatric conditions ($n = 85$).

Comparison of Baseline and Updated Reviews

The inclusion criteria for the updated review incorporated the main criterion from the baseline review (criterion a) that focused on studies which include women veterans, compare men and women, or analyze women separately and added two additional criteria (b and c) described previously within Study Selection. Figure 2 shows the cross walk between the categories for the baseline and updated review and provides an explanatory rationale.

Description of Evidence

As in the baseline systematic review (Goldzweig et al., 2006), the majority of articles discussed were observational ($n = 169$) or descriptive studies ($n = 13$). Nearly half of the research articles focused on psychiatric issues. Although eight studies were qualitative, only five studies were identified as experimental studies or clinical trials. Of these five, three focused on women veterans or military personnel with a PTSD diagnosis or symptoms

(Butterfield et al., 2001; David, Simpson, & Cotton, 2006; Schnurr et al., 2007), one on VA employees' perceptions about women veterans (Vogt, Barry, & King, 2008), and one on improving mammography screening among women veterans (Vernon et al., 2008). These trials highlight key advances in methods by including the first VA multisite, randomized, controlled trial of women veterans, and a moderately large mental health patient sample ($n = 284$; Schnurr et al., 2007). When comparing these experimental studies, the Schnurr trial received a high score for methodological quality for a clinical trial (Jadad et al., 1996); two others showed nearly similar quality (Butterfield et al., 2001; Vernon et al., 2008, Bean-Mayberry et al., 2010). A complete summary of the VA systematic review is available online (<http://www.hsrd.research.va.gov/publications/esp/womens-health.pdf>), and the searchable women's health literature database is available at: http://www.hsrd.research.va.gov/for_researchers/womens_health/search.cfm.

Deployment and Post-Deployment Health

Overall, 33 articles covered deployment and post-deployment health issues, with the majority of studies ($n = 23$) addressing health issues specific to OEF/OIF veterans (Table 1, Row 1). The OEF/OIF topics focused on mental health screenings, PTSD, general deployment health issues. The remaining articles consisted of deployment studies in non-OEF/OIF cohorts (Table 1, Row 2).

OEF/OIF Veteran Cohorts

Of the 23 studies addressing issues specific to OEF/OIF veterans, the majority (Table 1, Row 1, Group a) focused on mental

Categories in baseline review (1978 - 2004)	Categories in updated review (2004 – 2008)	Rationale
Stress of military life	Deployment and post-deployment health	A substantial body of work now focuses on OEF/OIF veterans as well as on women's health issues in the military theatre
Health services research	Organizational research	More focused literature has emerged examining how organizational factors affect women's health care delivery and the overall practice environment
Health services research	Quality of care	The literature on quality of care is now substantially expanded, including patient perceptions of quality and satisfaction and general quality of care processes and outcomes
Health services research; Health and performance of military or VA women	Access/utilization	The new category reflects the volume of work on determinants of access/utilization especially for special cohorts of veterans
Psychiatric conditions; Health and performance of military or VA women	Psychiatric conditions	New work describes prevalence of mental health conditions in different settings and for different subgroups and addresses non-trauma related health problems

Figure 2. Category cross walk.

Table 1
Research on Deployment and Post-Deployment Factors Related to Women Veterans Health Care (n = 33)

Row	Topic (no. of Articles)	Sample Size Ranges*	Study Characteristics	Selected Findings
1	OEF and OIF veteran cohorts (n = 23) Mental health screenings (a) MST and PTSD (b) Access, general deployment and other (c)	56–865,674 persons	Surveys of military or veteran persons before, during and/or after deployment	High rates of screen positive PTSD symptoms ^{39, 44, 76, 139, 160, 161} and other mental health disorders ^{39, 44, 74, 75, 101, 115, 139, 150, 151} occur among returning military women. Greater number of deployments are associated with screening positive for mental health problems. ^{74, 75, 101} MST combined with combat exposure was associated with doubled rates of new onset PTSD in women and men, and was associated with more readjustment difficulties in civilian life. ⁸⁶ Psychiatric evaluation occur frequently in the field. ^{141, 167} Gynecological services in the field may impact military readiness. ^{43, 172} Deployment impacts pregnancy stress in military families. ⁶³ Group (a). ^{39, 44, 74–76, 101, 112, 115, 139, 150, 151, 160, 161, 164} Group (b). ^{86, 161} Group (c). ^{43, 63, 72, 96, 141, 150, 164, 167, 172, 180}
2	Other deployment cohorts (n = 10)	5–73,777 persons	Surveys of deployed and returning military	Longer and first time deployments were associated with increased distress scores for military persons. ¹ Deployment related reproductive issues included problems during pregnancy and urinary tract infections. ^{3, 133} Military populations showed better health status scores than the general U.S. or VA population and deployment was not associated with decreased overall health. ^{132, 162} Group. ^{1, 3, 25, 106, 132, 133, 159, 162, 181, 192}

Abbreviations: MST, military sexual trauma; OEF, Operation Enduring Freedom; OIF, Operation Iraqi Freedom; PTSD, posttraumatic stress disorder.

* Group refers to the additional references in this systematic review that are related to the overall topic or specific subtopic listed in the second column of the table.

health screening before, during, or after deployment. Four themes were prominent: 1) High rates of positive screens for PTSD symptoms (range, 10%–19%) or other mental health disorders occur among OEF/OIF returning military women; 2) women in the military who recently returned from OEF/OIF deployments are disproportionately affected by PTSD symptoms, depression, and other mental health issues or are more likely referred for mental health care compared with recently deployed men; 3) younger age and separated or divorced marital status tend to place all military members at risk for more mental health symptoms; and 4) a greater number of OIF deployments seems to be associated with screening positive for mental health problems. Separately, military sexual trauma (MST) combined with combat exposure was associated with doubled rates of new-onset PTSD among women and men, and MST was associated with more readjustment difficulties to civilian life (Table 1, Row 1, Group b). Another key finding was that psychiatric diagnoses were common for both OEF and OIF evacuations for men and women, and recurrent gynecological needs in the field were not uncommon, suggesting the need for Department of Defense and VA to ensure that military personnel evacuated from the field for mental or physical health issues receive ongoing care (Table 1, Row 1, Group c).

Other Veteran Cohorts

The remaining 10 deployment and mental health articles are not specific to the OEF/OIF cohorts (Table 1, Row 2), a number of which discussed deployment stressors and/or social support among other cohorts of veterans (e.g., Vietnam). Key findings were that longer and first-time deployments were associated with increased distress in soldiers deployed to Bosnia, and gender-specific active duty problems involved problems with pregnancy or urinary tract infections.

The OEF/OIF studies reflect the growing participation of women in the recent conflicts. More than half of the OEF/OIF

articles underscore the need to screen for PTSD and other mental health symptoms among recently returning soldiers. Additionally, women and men with assault histories before combat had doubling rates of new-onset PTSD symptoms. Finally, military readiness for women includes field access to gynecological services and possibly family support during pregnancy. These issues will remain important for both Department of Defense and VA in post-deployment health care settings.

Organizational Research

These seven studies examined organizational characteristics of clinics delivering services to women in national or regional samples of VA sites for primary care (Table 2, Rows 1–2). Studies focused on VA establishment of women's health clinics, emergency department availability of women's health expertise, availability of gynecological services in VA settings, and determinants of availability of contraception (hormonal and intrauterine device). One other organizational study examined the influence of the practice environment (e.g., variable organizational support) on delivery of care for MST. Of note, the integration of gynecologists in VA settings or creation of separate gynecology or women's clinics in VA were associated with improved availability of intrauterine devices, advanced gynecologic services, and after-hours emergency gynecologic services. Furthermore, the local organizational culture and quality of leadership support for women's health were key factors in fostering gender-sensitive programs.

Quality of Care

The quality-of-care literature on women veterans included 54 studies that covered patient perceptions of quality and satisfaction (Table 3, Row 1), general quality of care processes and

Table 2
Research on Organizational Factors Related to Women Veterans Health Care ($n = 7$)

Row	Topic (No. of Articles)	Sample Size Ranges*	Study Characteristics	Selected Findings
1	VA organization of women's care ($n = 6$)	8–155 facilities	National surveys evaluating organizational influences on service availability, quality of care	VA comprehensive women's health centers comparable to DHHS women's health centers of excellence. ¹² Over 60% of VA facilities have women's clinics, ¹³ representing an 8-fold growth over the previous decade. ¹⁹⁷ VAMCs more likely to have women's clinics and services available than community clinics. ¹³ Onsite gynecologists increase service availability. ^{28, 152} After-hours emergency gynecologic care limited. ¹⁸⁸ Group. ^{12, 13, 28, 152, 188, 197}
2	Practice environment for MST care ($n = 1$)	34 providers	Survey of MST providers in one VA regional network	Individual, facility, and regional MST practice environment (e.g., workload, burnout) highly correlated with organizational support for MST care delivery. ⁶⁵

Abbreviations: DHHS, U.S. Department of Health and Human Services; MST, military sexual trauma; VA, U.S. Department of Veterans Affairs; VAMC, VA Medical Center.

* Group refers to the additional references in this systematic review that are related to the overall topic or specific subtopic listed in the second column of the table.

outcomes (Table 3, Row 2), surgical outcomes (Table 3, Row 3), prescribing outcomes (Table 3, Row 4), gender-specific and reproductive care (Table 3 Row 5), and other quality of care issues (Table 3, Row 6), including two clinical trials.

The literature on patient perceptions of quality and satisfaction reflects efforts to better understand women veterans' knowledge, attitudes, and experiences with VA services. Overall, the satisfaction data are mixed, especially among women VA users with mental health problems who have reported both higher and lower satisfaction in outpatient care. Women veterans who do not use the VA lack understanding of VA care and services. In the VA, women veteran satisfaction is positively affected by access to women's clinics, gynecological services, and overall continuity of care. Among VA users, women and men had similar outpatient satisfaction ratings; however, women had consistently lower ratings for inpatient care (e.g., physical comfort, courtesy).

The general quality of care studies indicate that women in VA may have some comparable outcomes with men; however, overall improvement is needed for lipid (low-density lipoprotein cholesterol) control, hypertension control, and preventive immunizations (Table 3, Row 2).

Surgical outcomes indicate that women in VA settings have equal or lower surgical morbidity and mortality outcomes compared with the private sector for general and vascular procedures (Table 3, Row 3). Prescribing outcomes indicate that VA (compared with settings outside the VA) has consistently lower or comparable rates of inappropriate prescription drugs in the elderly, but women in the VA (compared with men) are consistently more likely to be prescribed inappropriate drugs regardless of the criteria used (Table 3, Row 4). The articles on gender-specific and reproductive care covered a broad range of topics, including urological issues related to postponed voiding, contraception needs, hormone therapy discontinuation, and adverse pregnancy outcomes in a small veteran sample (Table 3, Row 5).

We identified two clinical trials in the quality of care literature. The first, an educational intervention, evaluated gender role stereotypes, knowledge of, and sensitivity to women veterans (Vogt, Barry, & King et al., 2008). Older age, direct patient contact, and years of VA employment predicted greater gender awareness and significant improvements in sensitivity and knowledge, but no significant improvement in gender role stereotypes. The other randomized trial compared rates of mammography among women assigned with two types of interventions, but neither was superior to the mammography rate among the control group (Vernon et al., 2008).

Access and Utilization

Forty-eight articles focused on access to care and utilization of services. Twelve articles focused on determinants of access (Table 4, Row 1), 14 on gender-related issues in access (Table 4, Row 2), 6 on sexual trauma patients and utilization (Table 4, Row 3), and 11 on PTSD or other mental health issues and utilization (Table 4, Row 4). Five additional studies focused on access and utilization among specific cohorts of veterans related to periods of military service. Overall, women with mental health diagnoses, positive screening tests, or trauma tended to use more health care services than women without positive screens or than male veterans. In a few areas, findings were mixed, cautioning us to remain aware of patients who may underutilize health care because of specific mental health issues.

Psychiatric Conditions

The 85 publications covering mental health and psychiatric issues fell into five broad categories: PTSD ($n = 42$), substance abuse and treatment ($n = 5$), trauma ($n = 18$), general mental health ($n = 13$), and other ($n = 7$).

Three PTSD clinical trials (Table 5, Row 1, Group a) focused on treatment advances, including structured group psychotherapy and self-defense training (improved PTSD symptoms and self-efficacy at 3 and 6 months), prolonged exposure therapy (reduction of PTSD symptoms and PTSD diagnostic criteria), and olanzapine therapy for non-combat-related PTSD (no between-group differences but a large placebo effect). PTSD screening and symptoms (Table 5, Row 1 Group b) included seven articles spanning disability benefits, gender differences in perceived threat, and the importance of availability of specialized treatment programs for women who come to the VA for PTSD treatment.

Twelve articles focused on determinants of a diagnosis (Table 5, Row 1, Group c). High social supports and significant unit cohesion appeared to be protective for active duty soldiers, specifically women. A few studies focused on the determinants of PTSD found the following associations: 1) Poorer perceptions of health and well-being were correlated with increased depression or PTSD symptoms in a mixed gender group; 2) PTSD diagnosis and symptoms were associated with more medical conditions and poorer health-related quality of life among women, and gender did not moderate the relationship between PTSD and poorer health-related quality of life; 3) pain-related factors, childhood nonsexual/physical maltreatment, and childhood

Table 3
Research on Quality of Care Factors Related to Women Veterans Health Care ($n = 54$)

Row	Topic (No. of Articles)	Sample Size Ranges ^a	Study Characteristics	Selected Findings
1	Patient perceptions of quality and satisfaction ($n = 9$)	51–133,562 persons	Focus groups and national, regional and local surveys evaluating patient perceptions and satisfaction among women veterans, and women in military setting	Lack of knowledge and gaps about VA prevalent among women veteran non-users. ¹⁸⁷ High satisfaction reported with VA women's clinics, gynecological services, and lower satisfaction among women for inpatient care. ^{9–11, 194} Mixed ratings for satisfaction and mental health care, poor satisfaction related to problems with maternity care in 1 military hospital sample. ^{35, 66, 100} Group. ^{9–11, 35, 42, 66, 100, 187, 194}
2	General quality of care ($n = 13$)	23–235,147 persons	Administrative and clinical database analyses, surveys, or focus groups evaluating a quality measure	Quality measures for women compared with men were mixed; ^{81, 168} however, women were less likely to undergo colorectal cancer screening ⁴¹ and have LDL cholesterol controlled. ^{173, 174} Group. ^{30, 41, 48, 53, 81, 83, 87, 88, 94, 168, 174, 175}
3	Surgical outcomes ($n = 4$)	478–32,624 persons	Surgical outcomes in women patients or diseases predominant in women	Women in VA vs. private sector showed equal or better outcomes for gender-specific surgeries, general surgery procedures, breast surgery outcomes, and gastric bypass surgery. ¹⁰² Group. ^{45, 79, 84, 102}
4	Prescribing outcomes ($n = 5$)	281,150–1,265,434 persons	Prescribing outcomes for VA users, VA and private sector, VA, and Medicare using	Rates of inappropriate drug use lower for VA males or females vs. private sector. ⁶ Within VA populations, inappropriate prescribing more likely to occur among VA women using multiple prescribing guideline criteria. ^{17, 135, 136} Group. ^{6, 17, 21, 135, 136}
5	Gender-specific and reproductive care ($n = 14$)	6–117,110 persons	Surveys, administrative database analyses, qualitative description of program, and 2 trials on gender-specific issues	Multiple behaviors occur among military women in the field to control urination are associated with subsequent urological issues. ^{2, 163} Deployment stress and/or chronic medical and mental health conditions occur frequently among pregnant women veterans or military women. ^{27, 63} Needs for information on sexual health, contraception, and menopausal hormones are needed for women. ^{67, 68, 77, 184} Group. ^{2, 3, 5, 27, 33, 63, 67, 68, 82, 109, 133, 163, 184}
6	Other ($n = 9$) Other various (a) Clinical trials (b)	450–595,081 persons	Samples from administrative data, Veteran's Large Health Survey, single sites, and convenience samples used for a variety of topics	Angioedema in VA patients was associated with Black race, female gender, presence heart failure or coronary artery disease but lower in diabetics. ¹¹⁷ Group (a). ^{107, 111, 113, 117, 122, 191, 199} Group (b). ^{176, 178}

Abbreviations: LDL, low-density lipoprotein; VA, U.S. Department of Veterans Affairs.

^a Group refers to the additional references in this systematic review that are related to the overall topic or specific subtopic listed in the second column of the table.

sexual assault or adult sexual assault were significant predictors of PTSD symptom clusters among women veterans. Two studies were discussed in the deployment health section (Lapierre, Schwegler, & Labauve, 2007; Smith, Ryan, et al., 2008).

Fifteen articles focused on quality of life (Table 5, Row 1, Group d). Among male and female veterans treated for PTSD in the VA, overall quality of life was poor and did not differ between genders; numbing was uniquely associated with reduced quality of life (Schnurr & Lunney, 2008). In contrast, women screening positive for PTSD symptoms (compared with those screening negative) had more mental and physical problems, and poorer health-related quality of life (Dobie et al., 2004). PTSD-related stress also affects the family of veterans, demonstrating the negative impact of PTSD symptom severity on marital adjustment, family adaptability, cohesion, and parenting satisfaction. Some family experiences may contribute

to PTSD risk, in addition to contributions from experiencing combat, witnessing someone being assaulted or killed, and number of adverse childhood events. Disparities in estimated rates of service connection for PTSD by gender were partially explained by differences in combat exposure. Separately, satisfaction had mixed associations with PTSD symptoms among women. In sum, for comorbid disorders ($n = 5$) women with an MST history had greater odds of developing PTSD, and women with PTSD had worse health status than women with depression or neither diagnosis.

Five studies explored substance abuse issues among military and veteran populations (Table 5, Row 2). Whereas men tend to binge, women soldiers often exceed quantity guidelines with alcohol use. Separately, among women, psychiatric conditions and alcohol use predict admission into substance abuse treatment programs.

Table 4
Research on Access and Utilization Factors Related to Women Veterans Health Care (n = 48)

Row	Topic (No. of Articles)	Sample Size Ranges*	Study Characteristics	Selected Findings
1	Determinants of access (n = 12)	51–1,468,417 persons	National, regional surveys and one focus group evaluating patient use, ratings and perceptions of care, and administrative datasets analyzed for inpatient or outpatient VA utilization	Barriers to care included knowledge gaps, incorrect assumptions about services to women, and difficulty using VA care. ^{179, 187, 189} Among dual eligible VA–Medicare patients, women veterans were more likely to rely solely on the VA. ^{78, 121} Lower dual VA + non-VA use was associated with lack on insurance and receiving gynecological care from the VA. ^{8, 129} Group. ^{8, 78, 121, 129, 138, 153, 154, 179, 185, 187, 189, 190, 200}
2	Gender-related issues in access and utilization (n = 14)	62–4,429,414 persons	Administrative and clinical database analyses, organizational surveys, local or regional clinical samples with a specific condition evaluated	Women VA users (compared with men) had more outpatient encounters and used more services if they had medical mental health, or pain conditions. ^{49, 52, 104} Emergency gynecologic and mental health services are high during day hours, but after hours VA care is linked to presence of a separate women's clinic and lower community managed care penetration. ¹⁸⁸ Group. ^{18, 26, 49, 52, 68, 69, 70, 89, 95, 103, 104, 156, 158, 188}
3	Sexual trauma patients and utilization (n = 6)	219–573,640 persons	National, multisite, or clinic samples of mixed-gender or female-only veteran samples	Veterans with sexual trauma history experienced more difficulties with their emotions, more use of VA services, and more psychological impairment compared with veterans with other trauma. ^{90, 134, 166, 201} A national study of veterans screened for MST showed both men and women with a positive screen were twice as likely to have a mental health visit. ⁹³ Group. ^{90, 93, 134, 143, 166, 201}
4	PTSD and other mental health issues and utilization (n = 11)	149–223,856 persons	National, multisite, and clinic samples of inpatient and outpatient military or veteran samples of patients with mental health disorders	Women with PTSD or other mental health conditions were more likely to use VA services compared with women without PTSD symptoms or men. ^{37, 119} Both women veterans with PTSD and women partners of Vietnam veterans with PTSD preferred treatment or support services that were female only. ^{46, 155} Group. ^{37, 39, 46, 54, 60, 61, 85, 99, 118, 119, 155}
5	Specific veteran cohorts (n = 5)	1,205–1,605 persons	Multisite study of active-duty Air Force personnel and Vietnam Veteran Readjustment Study cohort	Air Force men and women who self refer for mental health services vs. receiving a referral from a supervisor, have fewer negative outcomes. ¹³⁹ Group. ^{24, 74, 108, 112, 140}

Abbreviations: PTSD, posttraumatic stress disorder; VA, U.S. Department of Veterans Affairs.

* Group refers to the additional references in this systematic review that are related to the overall topic or specific subtopic listed in the second column of the table.

Trauma articles included general sexual trauma, MST, or multiple forms of trauma exposure (sexual, physical, both; Table 5, Row 3). A key finding from the nine articles on sexual trauma or MST indicated that positive MST screens among women and men were associated with greater odds of nearly all mental health comorbidities, including PTSD. In particular, per Kimerling, Gima, Smith, Street, and Frayne (2007) the association of PTSD to MST was nearly three times stronger among women than among men. Additionally, general mental health articles (Table 5, Row 4) on prevention and screening indicated that military women had a greater prevalence of mental health disorders such as panic, anxiety, and depression compared with military men. The majority of other psychiatric articles (Table 5, Row 5) focused on depression treatment (e.g., high screening rates but low follow-up), and serious mental illness.

The section on psychiatric conditions covers a broad spectrum of literature describing issues by gender and provides a strong foundation for future studies on women veterans.

- More clinical trials are required to direct VA providers toward mental health treatment options that are best suited for women veterans.
- The literature confirmed the positive relationship between MST and PTSD, and the associated negative health-related effects. In particular, women with a sexual trauma history

reported significant anxiety for any invasive examination and for male providers. Such data are critical for managing patients in VA where invasive examinations (breast, pelvic, rectal) are required to provide comprehensive primary care delivery.

- A few studies showed that social support (in military or civilian life) may contribute to resiliency and quality of life among women (and possibly their children) while in the military and when they transition home from deployment.

Discussion

The growth in the number of women in the military is reshaping the veteran population, with women constituting one of the fastest growing segments of eligible VA health care users. This trend has been accelerated by the unexpectedly high VA enrollment of women veterans from the recent wars in Iraq and Afghanistan. Concurrently, the VA's health services research enterprise aligned its funding with high-priority topics such as women veterans' health and health care. These leadership efforts were formalized with the VA Women's Health Research Agenda Setting Conference in late 2004 (Yano, Bastian, et al., 2006), which a) brought together researchers from various scientific fields to focus on establishing an evidence base for a women's health agenda and b) incorporated results of the first VA systematic review of the literature on women veterans (Goldzweig et al.,

Table 5
Research on Psychiatric Conditions Related to Women Veterans Health Care (n = 85)

Row	Topic (No. of Articles)	Sample Size Ranges*	Study Characteristics	Selected Findings
1	PTSD (n = 42) Clinical trials (a) Screening and symptoms (b) Determinants of diagnosis (c) Quality of life (d) Comorbid disorders (e)	10-1,599 persons	Clinical treatment interventions, behavioral intervention, surveys, and interviews of active duty, veteran, and veteran registry participants	Prolonged exposure was associated with greater reduction of PTSD symptoms and a lower likelihood of meeting diagnosis criteria after therapy was completed. ¹⁴⁷ Structured group therapy and self-defense training was associated with improvements in avoidance behavior and hyperarousal symptoms. ³² Perceptions of poorer health correlated with increased depression or PTSD symptoms. ^{110, 120} Factors predicting/associated with PTSD symptoms clusters in women veterans included pain, childhood sexual/physical maltreatment, childhood sexual assault, or adult sexual assault. ^{4, 14, 98, 99} PTSD-related stress negatively impacts veteran marriages, families, and parenting adjustments. ^{16, 58} Group (a), ^{22, 32, 147} Group (b), ^{46, 60, 64, 96, 139, 183, 191} Group (c), ^{4, 14, 19, 40, 98, 99, 101, 110, 120, 130, 160, 182} Group (d), ^{16, 35-37, 39, 54, 56, 58, 76, 100, 123, 125, 128, 148, 155} Group (e), ^{23, 51, 73, 157, 195}
2	Substance abuse and treatment (n = 5)	86-8,329 persons	National VA database analyses, national military samples, military hospital, and VA domiciliary samples for inpatient treatment	Although male gender was associated with alcohol-related consequences and binge drinking, females who consumed alcohol had twice the rate of drinking above established guidelines for safety. ^{62, 97} Women's admission to substance abuse treatment programs was associated with comorbid psychiatric conditions and concurrent use of alcohol. ³⁸ Group. ^{15, 38, 62, 97, 165}
3	Trauma (n = 18)	31-4,325,768 persons	Administrative database analyses, multisite and clinic sampling, and a convenience sample of women veterans in both mental health and women's health in a hospital setting	Positive MST screens among men and women were associated with greater odds of nearly all mental health comorbidities including PTSD. ^{31, 92, 105, 125, 127, 134, 161, 166} Anxiety level is elevated in women with a sexual trauma history for any invasive examination (breast, pelvic, rectal) when the clinician is male and associated with more urgent care utilization. ^{105, 134} Multiple traumatic events (sexual, physical, or both) in military service severely impacted health status. ^{144, 145} Group. ^{31, 57, 92, 105, 116, 124, 125, 126, 127, 134, 142, 144, 145, 149, 161, 166, 169, 170, 193}
4	General mental health (n = 13)	263-679,859 persons	National VA database and clinical registry analyses, Large Survey of Veterans, Millennium Cohort Sample, specific cohorts of active-duty and veteran samples	General screening data showed that women in military compared with men had higher prevalence of panic attacks, anxiety, and depression compared with men, but not alcohol abuse. ^{55, 137} Air Force women showed increased levels of family stress and conflicts compared with community samples, and children of deployed Air Force mothers had risks for behavioral and emotional adjustment problems. ^{131, 177} Group. ^{47, 50, 55, 61, 85, 118, 119, 131, 137, 140, 171, 177, 186}
5	Other (n = 7)	184-80,668 persons	VA and non-VA veteran samples; national samples of VA patients screened for depression or with serious mental illnesses	Although VA depression screening rates were 85% in 2002, only half the patients screening positive received follow-up. ³⁴ Group. ^{21, 29, 34, 91, 146, 200, 202}

Abbreviations: MST, military sexual trauma; PTSD, posttraumatic stress disorder; VA, U.S. Department of Veterans Affairs.

* Group refers to the additional references in this systematic review that are related to the overall topic or specific subtopic listed in the second column of the table.

2006). That review identified 182 relevant articles published between 1978 and 2004. Most were descriptive in nature, using observational study designs; only two were randomized, controlled trials. About 45% of the studies were VA funded, with the majority of the literature focusing on women veterans' mental health (mostly risk, prevalence, and some treatment of PTSD) and general health services research (8 on quality of care, 5 on patient satisfaction, and 25 on utilization or organization of care).

In the current updated systematic review, we identified 195 articles from 2004 through 2008—more articles in 5 years than identified in the previous 25 years combined. This sharp increase

in volume is likely due to the VA's increased focus on research funding in these priority areas. Consistent with the previous systematic review, most VA women's health research continues to be observational; however, more studies shifted from a descriptive to an analytical focus (i.e., determinants of care or health), and there were five clinical trials, a moderate increase from the first review.

Based on the state of published research in the five areas covered by the literature, we have several recommendations on types of designs needed as the field moves ahead. For post-deployment health, more descriptive and observational

research on non-mental health issues (e.g., chronic care needs) and a transition to mental health interventions are needed. Relevant organizational research is still modest but informative, suggesting needs for more descriptive and observational, but also attention to organizational interventions in key areas (e.g., mental health). More descriptive and observational research is also needed to better understand determinants of quality of care, but quality improvement interventions are needed, especially related to reductions of gender disparities, which is a national VA performance measure focus. Interventions to improve access to and use of services, as well as observational studies among non-users would also be beneficial. And, although the psychiatric literature predominates, more observational designs are called for in understudied conditions (e.g., depression, anxiety, substance use disorders), whereas interventions to improve care for PTSD, MST, and other better-studied conditions are needed. Fortunately, with the advent of the VA's new women veterans' practice-based research network, one of the principal barriers to the conduct of randomized multisite trials among women veterans will have been eliminated (Yano et al., 2010).

The primary limitation of this systematic review is the potential for having missed salient articles. Search terms for our topic area of women veterans' health and health care have not been standardized in such a way that authors routinely select consistent terms. We augmented traditional computerized search strategies by contacting leading researchers in the hopes of enhancing our yield. As with any systematic review, this one is limited by publication bias.

Building Knowledge: Notable Research Successes

Previous gaps identified in the literature included limited information on the prevalence of chronic diseases, women veterans' preferences and self-reported care needs, utilization patterns within and outside the VA, transitions from military to veteran status, and studies about the quality of care women veterans receive. These gaps served as the basis for more targeted solicitations for new research. Such efforts have been successful, with interim progress in addressing these gaps. We highlight three areas of noteworthy impact.

Treatment outcomes in PTSD

The Schnurr study is the first multicenter, VA-funded, cooperative trial focused on outcomes of women veterans with PTSD using a comparison of prolonged exposure therapy to a previous standard of care. Because of the quality of the research and significant clinical findings, prolonged exposure therapy is being considered by the VA administration as one of several options in the revised VA national guidelines for PTSD standards of care. Separately, the Schnurr trial tackles the historical dilemma of insufficient sampling strategies for performing primary or subgroup analyses of women in the VA and demonstrates that it is feasible to conduct robust clinical trials among women veterans (Yano et al., 2010).

Access to care

We now know more about barriers, perceptions, and utilization of VA care among women veterans, and this information should be used as a foundation to remove barriers and consider methods for restructuring care to meet health care needs. Also, the high use of care among women with chronic physical and mental health conditions should direct us toward potential interventions for treatment.

Organizational determinants of quality care

Advances in research describing how care is organized for women in the VA demonstrate variations in service availability and their determinants as well as the importance of practice environment for women veterans care. Better attention to gynecologic access (staff, clinic, services) is important for the types of services a woman has access to and a key area for future VA research. The impact of local leadership on women veteran services seems essential, and future quality improvement efforts must integrate leadership or other stakeholders in care delivery.

Collectively, this research provides a fertile evidence base for detecting and reducing barriers to VA care that women service members may encounter, defining optimal women's health care delivery arrangements, and adopting best practices for care delivery.

Ongoing Gaps: Future VA Research Targets

In contrast with the growth in the scientific literature on access, utilization, and quality, ongoing gaps in the research about the health of women veterans include the following.

1. Clinical and intervention outcomes for chronic physical or mental health conditions and complex combinations of diseases (e.g., cardiovascular/diabetes and mental health outcomes).
2. Health issues for women veterans across the life span (e.g., pregnancy and aging).
3. General care or gender-specific care for veterans with poly-trauma or traumatic brain injury.
4. Challenges and strategies for co-managing mental health and general preventive health care.
5. Service member transitions from military to civilian life.
6. Effect of military duty and transitions on families.

We anticipate that the increases in VA women's health services research funding over the past 5 to 6 years will continue to affect the topical coverage and methodological diversity and rigor of published manuscripts seen in the coming years. Ongoing efforts to update the literature will enhance the value and application of this growing evidence base and promote improvements in health care delivery for women veterans within and outside the VA.

Conclusion

The areas more fully developed in women veterans' research (access, utilization, and quality of care) will serve as a foundation for future intervention and implementation research in VA. Although the substantial scope of women veterans' mental health literature is broad, research on better studied conditions needs to be expanded with intervention studies, and quality of care areas will benefit from quality improvement and outcomes research. Future research in each of these areas should explore ways in which patients, providers, or practice settings may optimize the health status of our veteran patients.

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