
An Evidence Map of the Women Veterans' Health Literature (2016–2023)

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PREFACE

The VA Evidence Synthesis Program (ESP) was established in 2007 to conduct timely, rigorous, and independent systematic reviews to support VA clinicians, program leadership, and policymakers to improve the health of Veterans. ESP reviews have been used to develop evidence-informed clinical policies, practice guidelines, and performance measures; to guide implementation of programs and services that improve Veterans' health and wellbeing; and to set the direction of research to close important evidence gaps. Four ESP Centers are located across the US. Centers are led by recognized experts in evidence synthesis, often with roles as practicing VA clinicians. The Coordinating Center, located in Portland, Oregon, manages program operations, ensures methodological consistency and quality of products, engages with stakeholders, and addresses urgent evidence synthesis needs.

Nominations of review topics are solicited several times each year and submitted via the [ESP website](#). Topics are selected based on the availability of relevant evidence and the likelihood that a review on the topic would be feasible and have broad utility across the VA system. If selected, topics are refined with input from Operational Partners (below), ESP staff, and additional subject matter experts. Draft ESP reviews undergo external peer review to ensure they are methodologically sound, unbiased, and include all important evidence on the topic. Peer reviewers must disclose any relevant financial or non-financial conflicts of interest. In seeking broad expertise and perspectives during review development, conflicting viewpoints are common and often result in productive scientific discourse that improves the relevance and rigor of the review. The ESP works to balance divergent views and to manage or mitigate potential conflicts of interest.

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Operational Partners

Operational partners are system-level stakeholders who help ensure relevance of the review topic to the VA, contribute to the development of and approve final project scope and timeframe for completion, provide feedback on the draft report, and provide consultation on strategies for dissemination of the report to the field and relevant groups.

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Technical Expert Panel

To ensure robust, scientifically relevant work, the technical expert panel (TEP) guides topic refinement; provides input on key questions and eligibility criteria, advising on substantive issues or possibly overlooked areas of research; assures VA relevance; and provides feedback on work in progress. TEP members included:

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Disclosures

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The findings and conclusions in this document are those of the author(s) who are responsible for its contents and do not necessarily represent the views of the Department of Veterans Affairs or the United States government. Therefore, no statement in this article should be construed as an official position of the Department of Veterans Affairs. The final research questions, methodology, and/or conclusions may not necessarily represent the views of contributing operational and content experts. No investigators have affiliations or financial involvement (eg, employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties) that conflict with material presented in the report.

Executive Summary

KEY FINDINGS

- ▶ We identified 932 articles relevant to women Veteran (WVs) health published between 2016-2023, which represents a 1.12-fold increase since the previous 7-year period.
 - ▶ Most articles (82%) used an observational design. While there was a 3-fold increase in the number of clinical trials since the 2008-2015 map, the total number remains very low ($k = 27$).
 - ▶ Approximately half (45%) included a prioritized Veteran population, most commonly Operation Enduring Freedom/Operation Iraqi Freedom/Operation New Dawn (OEF/OIF/OND) Veterans ($k = 156$) and Veterans with a history of trauma ($k = 141$).
 - ▶ There was a substantial increase in articles with targeted inclusion of transgender and/or nonbinary Veterans (4 to 32).
 - ▶ Approximately half (47%) reported results disaggregated for WVs. A slightly smaller number of articles (44%) included WVs only. The remainder were comprised of studies addressing WVs, non-Veteran civilian women, and Veteran men, or focused on provider data.
 - ▶ The 3 largest primary focus areas were general mental health (eg, PTSD, disordered eating, mental health care) ($k = 203$), chronic medical conditions ($k = 137$), and interpersonal violence ($k = 121$).
 - ▶ Areas of notable growth included reproductive health (3.7-fold increase), reproductive mental health (5.3-fold increase), interpersonal violence (2.6-fold increase), and areas of research priority for VA including chronic pain/opioids (4.3-fold increase) and suicide/non-suicidal self-injury (NSSI) (4.2-fold increase).
 - ▶ Emerging areas included harassment and discrimination experienced within the context of VA care, sleep disorders, and disordered eating, as well as toxic exposures (eg, pesticides, burn pits, and oil well fires).
 - ▶ Long-term care/aging had modest growth since the 2008-2015 map (1.6-fold increase) as a primary focus area and was rarely a secondary focus area.
 - ▶ Gaps were noted in the areas of cancer, menopause, reproductive mental health outside the peripartum period, common pulmonary- and gastrointestinal-related conditions, the intersectional effects of chronic disease and other conditions (eg, chronic pain, substance use), and the impacts of intersectional identities for women from racially and ethnically minoritized populations.
 - ▶ Areas for methodologic development included the conduct of interventional and implementation studies, reporting sex and gender as distinct constructs, and reporting Veteran engagement during study conduct.
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Historically, women have comprised a small proportion of the US armed forces, meaning the scope of VA services has largely focused on the health needs of Veteran men. The number of women using the VA for health care has increased 2.8-fold since 2000, with WVs using outpatient care at a higher frequency than their male counterparts. In addition to rising numbers, the sociodemographic

characteristics and health care needs of WVs differ from Veteran men: WVs tend to be younger, more racially and ethnically diverse, and are more likely service-connected than Veteran men. Thus, it is critical that the VA utilize available research to understand best practices for providing evidence-based care to women Veterans. The last WVs health evidence map was published in 2017, covering literature from 2008 to 2015. There have since been considerable advances in the field of WVs health research. Evaluating how the breadth and depth of this body of literature has changed is crucial for understanding how the field has progressed and identifying current gaps. We aimed to create an updated evidence map that describes the literature on WVs health since the 2008-2015 evidence map, spanning studies published from 2016-present. We focused on the future directions identified in the previous evidence map, identified areas of dramatic growth, and reassessed areas with a continued need for further research.

The following key question was the focus for this review: *What is the scope and breadth of the literature on WVs health published since 2015?*

CURRENT REVIEW

This review was requested by the VA Office of Women's Health, with technical support from VA Women's Health Research Network, to inform practice and policy updates and to identify evidence gaps to serve the research community. In the development of our approach, we sought input from our technical expert panel comprised of experts in women's health and WVs health care delivery.

METHODS

We adapted standard systematic review methodology to conduct our evidence mapping review. We conducted a primary search from January 1, 2016, to October 2023 of MEDLINE (via Ovid), Embase (via Elsevier), and CINAHL (via EBSCO). We included all studies which met at least 1 of the following criteria: (1) had more than 75% WVs; (2) reported results separately for WVs as a subgroup; and (3) included analyses with stratified results for women. Where possible, study designs and stages were classified as declared by study authors. We defined "women Veterans" as individuals who served in the armed forces (national guard and reserves) and who identify as women or are transgender and/or non-binary and were assigned female at birth. We also included publications including women's health clinical team members. Two reviewers screened citations at the title and abstract level. Additionally, a reviewer [KMG] verified 20% of abstracts excluded for having a mixed population, due to challenges identifying articles with stratified results for women. One reviewer evaluated citations at the full-text level. A second reviewer [AAT] examined 20% of excluded full texts to ensure integrity. An individual reviewer completed data extraction and a second reviewer performed a quality check for at least 20% for accuracy. Extraction was completed by an individual reviewer. Data from 20% of extracted articles were quality checked for accuracy. Additionally, we verified focus area and target population categories for all included studies. We assigned 1 primary and up to 2 secondary focus areas for each article. When an article had multiple potential primary focus areas, we classified it based on relevant medical condition (eg, hypertension) rather than care delivery characteristic (eg, utilization).

RESULTS

Of 1,762 articles identified for full-text review, we excluded 533 that reported samples including both Veteran men and WVs, or WVs and non-Veteran civilian women, but did not report outcomes separately for WVs. We identified 932 articles relevant to WVs health published since 2016. Overall,

we found that more than double the number of articles were published on average per year since 2016 compared to prior evidence maps: 2016-2023 = 932 articles (117 per year), 2008-2015 = 440 articles (55 per year), 2004-2008 = 195 articles (39 per year). (Note: the comparison across maps is not exact due to some overlap.) The literature described in this map represents the work of 598 unique first authors. Though many studies reported multiple sources of funding, the VA supported 73%, with National Institute of Health (NIH) or other government grants funding 20%. Other sources included Department of Defense (DOD) (5%), university support (4%), foundations (3%), and industry (eg, pharmaceutical companies) (3%). Unfunded or studies that did not report funding sources comprised 15%.

The majority of articles had an observational design ($k = 759$), while there were 107 qualitative, 24 mixed-methods, 26 randomized controlled trials (RCTs), and 16 Cochrane Effective Practice and Organization of Care (EPOC) study designs or other experimental designs. Half of RCTs examined interventions for mental health conditions in the general mental health category, which included conditions such as PTSD and depression, and were largely aimed at patient-level treatment approaches for screening or treatment of mental health conditions. The remaining RCTs appeared within substance use ($k = 4$), interpersonal violence ($k = 4$), preventive health ($k = 2$), chronic medical conditions ($k = 2$), and health care organization/delivery of care for WVs ($k = 2$). Among the EPOC or other experimental design studies, general mental health was the most common primary focus area ($k = 6$) followed by substance use ($k = 3$). We found 17 systematic and scoping reviews or evidence maps.

Over half of the articles included a VA prioritized patient population, most frequently OEF/OIF/OND Veterans and Veterans with a history of trauma. The greatest growth in research focusing on populations prioritized by the VA occurred among transgender and/or nonbinary individuals, increasing from the 2008-2015 map ($k = 4$) to the current map ($k = 32$). Only 11 studies specifically sought inclusion of rural-dwelling Veterans. Of the 932 articles we identified, 436 included WVs and Veteran men, 405 included a WVs only sample, and 61 included WVs and non-Veteran women. There were 50 articles that either included a health care provider sample or were systematic reviews for which the unit included was measured by the number of articles.

Areas with the greatest growth were reproductive mental health (5.3-fold increase), interpersonal violence (4.5-fold increase), chronic pain/opioids (4.3-fold increase), suicide/NSSI (4.2-fold increase), and reproductive health (3.7-fold increase). Long-term care/aging experienced limited expansion since the 2008-2015 map (1.6-fold increase), was rarely identified as a secondary focus area, and remained an overall smaller focus area ($k = 21$). As primary focus areas, access/utilization of care and health care organization/delivery of care for WVs experienced modest growth (1.25- and 1.6-fold increase, respectively); however, this likely reflects a shift in our approach to categorizing articles as they were the most common secondary focus areas identified. Emerging areas of this literature included harassment and discrimination experienced within the context of VA care, sleep disorders, disordered eating, and toxic exposures. Brief descriptions of primary focus areas are listed below.

Mental Health

Given the growth in WVs mental health research and as this general topic area accounted for the largest proportion of identified studies, we created several new focus areas of mental health research to aid interpretation and utility of this evidence map for future planning. These new areas are interpersonal violence, substance use, suicide/non-suicidal self-injury (NSSI), reproductive mental health, and other violence.

- General Mental Health ($k = 203$): This topic area mirrors the prior evidence map organization with the most common mental health conditions and those conditions that didn't meet criteria for new mental health focus areas listed above. We found this area primarily comprised observational studies ($k = 161$). Most were mixed-sex or mixed-gender ($k = 116$) and often included the prioritized populations of OEF/OIF/OND Veterans ($k = 56$) and Veterans with a history of trauma ($k = 51$). This focus area also had the largest number of RCTs ($k = 13$), which primarily focused on patient-level treatment and screening approaches for mental health symptoms. PTSD was the most common mental health condition addressed in this area ($k = 96$), while co-occurring mental health diagnoses was the second ($k = 28$). Emerging topics in this area were disordered eating ($k = 18$) and sleep-related conditions ($k = 17$). We found relatively few studies on other common mental health conditions, such as depression or anxiety. Although a more direct comparison showed the overall number of mental health articles in the current map ($k = 471$ [50%]) has more than doubled since the 2008-2015 map ($k = 208$ [47%]), we found that mental health-focused studies comprised a similar overall proportion of published research.
- Substance Use ($k = 71$): The most common substances studied were alcohol, tobacco, or substance use generally, with few articles addressing opioid use disorder. Articles in this area most often evaluated gender or sex differences in treatment access, utilization, and outcomes, or the prevalence of different substance use disorders. There were 4 RCTs evaluating different substance use treatment interventions. Other common subtopics included evaluating the relationship between substance use and stress or sexual trauma and substance use among marginalized groups, including 7 articles focused on transgender and/or nonbinary Veterans. We identified 1 systematic review related to alcohol use and 1 scoping review on smoking behavior among marginalized groups.
- Suicide and Non-Suicidal Self-Injury ($k = 55$): Most ($k = 44$) articles described the prevalence and risk factors for suicide or ways to better characterize suicidal ideation, suicidal behaviors, or NSSI. We found no experimental studies designs, systematic reviews, or implementation studies for this focus area. The most common priority populations targeted were OEF/OIF/OND Veterans, followed by Veterans with a history of trauma, and transgender and/or nonbinary Veterans.
- Reproductive Mental Health ($k = 21$): This area included primarily observational studies ($k = 15$) and focused on peripartum (*ie*, the time surrounding pregnancy including postpartum) mental health care or the prevalence and risk factors for peripartum mental health conditions ($k = 16$). We found limited literature on mental health issues outside of the peripartum period and little on sexual functioning. Note that this category is mutually exclusive from reproductive health.

Medical Conditions

We created 2 new primary focus areas under medical conditions for cancer and chronic pain-related articles.

- Chronic Medical Conditions ($k = 137$): Chronic medical conditions was the second largest focus area identified. We found nearly double the number of articles categorized in this focus area compared with the last evidence map, which included a broader range of medical conditions. Identified articles were mostly observational ($k = 129$), with the largest categories

related to cardiovascular ($k = 32$), endocrine ($k = 22$), and neurologic disorders ($k = 20$). There were 2 RCTs and 1 systematic review. Most articles ($k = 95$) included both men and women and reported results disaggregated for WVs. We found only 29 articles that sought to specifically include Veterans from prioritized populations, primarily OIF/OEF/OND and Gulf War Era Veterans. Few to no articles were related to conditions common among WVs, such as hypertension, lumbosacral disorders, eye disorders, and irritable bowel syndrome. Combined with the categories of cancer and chronic pain/opioids, we found that 179 studies were published between 2016-2023, over twice that within the medical conditions category of the 2008-2015 map ($k = 78$).

- Reproductive Health ($k = 88$): This focus area grew from only 24 articles in the last evidence map. Most articles within this area were observational ($k = 79$); we identified 1 systematic review and no RCTs. The largest categories in this area addressed maternal health ($k = 30$) and family planning ($k = 29$), while 11 studies were related to uterine diagnoses and surgeries. Unlike other focus areas, the most common prioritized population was racial and ethnic minoritized Veterans ($k = 15$), with a smaller number targeting women with a history of trauma and OEF/OIF/OND Veterans.
- Preventive Health ($k = 45$): We found approximately half of articles in this area described health screening ($k = 21$), mainly for cancer, mental health, and sexual health. Twenty-one articles addressed aspects of health behavior ($k = 21$), mostly focusing on obesity and body weight management. Few articles targeted inclusion of prioritized populations. We identified 2 RCTs and no systematic reviews. Several articles leveraged data from large VA cohort studies and programs (eg, the Million Veterans Program).
- Chronic Pain/Opioids ($k = 30$): Most articles in this focus area were exclusively observational ($k = 27$) with 3 qualitative studies. Primary topics included risk factors for chronic pain, opioid use among VA users, or pain assessment and management. Articles on opioid use mostly investigated prescribing patterns within certain Veteran subpopulations, such as pregnant, menopausal, or transgender and/or nonbinary Veterans. We identified no studies examining differences in opioid prescribing between men and WVs or any studies on harm reduction strategies. OIF/OEF/OND Veterans were the most common prioritized populations ($k = 6$) followed by rural-dwelling ($k = 2$) and transgender and/or nonbinary ($k = 1$) Veterans.
- Long-Term Care/Aging ($k = 21$): All articles in this focus area were observational. There were 2 systematic reviews. Common topics included morbidity and mortality associated with various demographic identities or health conditions and cognitive function. We identified a very small volume of literature on end-of-life care and general aging or functioning and no articles on caregiving for WVs. Four articles targeted prioritized populations, 1 each for Veterans with a history of trauma, racial and ethnic minoritized populations, sexual minoritized populations, and Vietnam-era Veterans.
- Cancer ($k = 12$): Most articles in this focus area were observational, with 1 qualitative study, and primarily addressed epidemiology, risk factors, or associations. We found no RCTs, program evaluations, or systematic reviews. Half of identified articles were related to breast cancers and half addressed cancers not specific to women. We found no articles on sex-specific cancers outside of breast (eg, cervical, ovarian) nor on non-sex specific cancers commonly affecting women such as lung cancer. Only 1 article addressed a prioritized population.

Trauma, Violence, and Stressful Experiences

- Interpersonal Violence ($k = 121$): Most articles we identified within this area were observational ($k = 89$). Twenty-four were qualitative studies focused mainly on Veterans' experiences with interpersonal violence and VA care. Military sexual trauma (MST) was the most addressed trauma type ($k = 69$), followed by intimate partner violence (IPV; $k = 41$). Articles primarily addressed prevalence, risk factors, or mental and physical health sequelae of these experiences. Though there were 6 RCTs or other experimental designs, these studies largely focused on testing the efficacy of interventions for MST and IPV survivors. OEF/OIF/OND Veterans and Veterans with a history of trauma were heavily represented, while little literature addressed interpersonal violence among other prioritized populations (eg, only 2 articles targeted racial and ethnically minoritized populations or those with homelessness experiences).
- Other Violence ($k = 6$): In this small primary focus area, we identified 4 studies on firearm ownership and 2 on other forms of violence. There were no experimental, implementation, or program evaluation articles.
- Harassment and Discrimination ($k = 9$): This focus area was new in this evidence map and primarily included articles related to harassment experienced in the VA from patient and provider perspectives. There was 1 program evaluation.

Structures and Determinants of Care for WVs

- Health Care Organization/Delivery of Care for WVs ($k = 51$): The majority ($k = 27$) of articles in this area fell under the topic of service delivery and addressed aspects of the structure and experience of care delivery for WVs. We identified this area as a secondary focus area for an additional 153 articles, most commonly in reproductive health and general mental health. Sixteen articles collected data from VA providers, staff, or facilities. Six articles related to methods development pertinent to WVs were identified in this section.
- Access/Utilization of Care ($k = 30$): While we found minimal growth in this primary focus area, there were 166 articles in other focus areas that identified access/utilization of care as a secondary focus. Of note, 12 articles addressed access/utilization of care specific to prioritized populations, most commonly Veterans who identified as LGBTQ+.

Other Focus Areas

- Social Determinants of Health (SDOH) ($k = 30$): Articles in this focus area addressed the influence of non-medical factors on health outcomes, with half addressing aspects of housing instability. We found no experimental study designs, 1 program evaluation, and 2 systematic reviews. The most common prioritized population targeted was Veterans with experiences of homelessness.
- Toxic Exposures ($k = 3$): In this new focus area, we found 3 observational studies on exposures among Gulf War Era Veterans. Exposures investigated by studies in this section included pesticides and oil well fires.

DISCUSSION

In this evidence map, we identified 932 articles on WVs health published between 2016 and 2023, representing double the publication rate observed from 2008-2015. As in the last evidence map, mental

health accounted for half of this body of literature. Reproductive health, reproductive mental health, interpersonal violence, chronic pain/opioids, and suicide/NSSI experienced the greatest growth over this period. Among populations prioritized by the VA, literature on transgender and/or nonbinary individuals experienced the largest growth, while there was relatively little focus on rural-dwelling Veterans or those from older conflict eras such as the Vietnam War era. One focus area with limited growth was long-term care/aging. Emerging areas of the WVs health literature include harassment and discrimination experienced within the context of VA care, sleep disorders, disordered eating, and toxic exposures. As reported in the last evidence map, we found that WVs health literature remained primarily observational, though we found 26 RCTs and 43 program evaluations or multi-site quality improvement (QI) projects. Overall, there was a similar proportion of articles which exclusively focused on WVs only data (~44%) compared with those with mixed samples of WVs and Veteran men (~47%) or WVs and non-Veteran civilian women (~6.5%).

These findings should be considered within the context of the limitations of our approach. First, the categorization of identified articles could have been conducted in multiple ways, both overall and for each individual article. In particular, we provided context for our findings in relation to prior WVs health evidence maps and acknowledge that our eligibility criteria and approach to categorization and mapping of the literature was not identical to the prior map, which limits a direct comparison. We excluded articles that described single-site QI projects to focus on generalizable scientific literature. Given the volume of literature, we did not contact authors for clarification when aspects of reporting or analyses were unclear. Instead, we described the study characteristics to the best of our abilities based on information in the primary literature.

Future Research

The largest portion of WVs who are receiving care in the VA are reaching middle age. There is thus a need to understand conditions affecting this subpopulation at present and in coming years, including chronic conditions and issues related to aging and long-term care needs. Additionally, there is a need to explore the intersection of exposures and conditions better studied among WVs (*eg*, mental health and violence) as they co-occur with chronic conditions and the full spectrum of the reproductive lifespan (*eg*, post-menopausal). For chronic conditions, there is a great opportunity to continue to leverage mixed-sex and gender study populations to explore how and when care should be tailored for women.

Significant opportunities exist to leverage existing data sets to expand VA research and generate valuable data to inform patient-centered, personalized care for WVs. We excluded over 500 articles that did not report findings for WVs subsamples, for which it was likely feasible for many to disaggregate outcomes for WVs. Future research could thus better utilize VA data to explore differing outcomes among WVs and Veteran men. When data lack sufficient statistical power for subgroup analyses, making data available stratified for WVs could assist hypothesis generation or individual participant meta-analyses.

We also note important design and reporting considerations. Harmonization of eligibility criteria, outcomes, and data collection strategies can facilitate the ability to pool analyses across studies. Additionally, reporting sex and gender as separate variables will be crucial, as will reporting Veteran engagement activities conducted in the design and execution of research. Reporting engagement in research is needed for study transparency, to recognize the Veteran efforts, and to advance the literature of engagement science. Overall, though we identified some experimental and implementation studies, a preponderance of WVs research continues to be observational in nature. Future monitoring

of the field of WVs literature should seek rigorous effectiveness and studies of taking evidence-based practices to scale when appropriate, as well as track the progress and impact of program implementation during innovation dissemination.

We identified several program evaluations, highlighting the growth of VA clinical offerings or innovations for WVs health and the increased use of program evaluation resources in VA's Learning Health Care System model. Low-risk innovations may be appropriate for pragmatic research studies and program evaluations, which may allow more rapid advancement to clinical practice, particularly when safety evidence is established across other clinical settings and populations. Consistent monitoring of WVs health research should thus continue to include tracking the progress and outcomes of program evaluation efforts in addition to rigorous efficacy and implementation trials.

CONCLUSIONS

A robust evidence base is critical to promote the health of WVs and improve their quality of life and overall well-being. The pace of growth of WVs health research has doubled and expanded in important areas that align with VA research priorities, such as pain and suicide. Further advancement of this field should include research on health issues pertinent to an aging WVs population and greater utilization of rigorous but pragmatic research and program evaluation approaches.