QUERI

An Evidence Map of the Women Veterans' Health Research Literature (2008 – 2015)

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PREFACE

The VA Evidence-based Synthesis Program (ESP) was established in 2007 to provide timely and accurate syntheses of targeted healthcare topics of particular importance to clinicians, managers, and policymakers as they work to improve the health and healthcare of Veterans. QUERI provides funding for four ESP Centers, and each Center has an active University affiliation. Center Directors are recognized leaders in the field of evidence synthesis with close ties to the AHRQ Evidence-based Practice Centers. The ESP is governed by a Steering Committee comprised of participants from VHA Policy, Program, and Operations Offices, VISN leadership, field-based investigators, and others as designated appropriate by QUERI/HSR&D.

The ESP Centers generate evidence syntheses on important clinical practice topics. These reports help:

- Develop clinical policies informed by evidence;
- Implement effective services to improve patient outcomes and to support VA clinical practice guidelines and performance measures; and
- Set the direction for future research to address gaps in clinical knowledge.

The ESP disseminates these reports throughout VA and in the published literature; some evidence syntheses have informed the clinical guidelines of large professional organizations.

The ESP Coordinating Center (ESP CC), located in Portland, Oregon, was created in 2009 to expand the capacity of QUERI/HSR&D and is charged with oversight of national ESP program operations, program development and evaluation, and dissemination efforts. The ESP CC establishes standard operating procedures for the production of evidence synthesis reports; facilitates a national topic nomination, prioritization, and selection process; manages the research portfolio of each Center; facilitates editorial review processes; ensures methodological consistency and quality of products; produces "rapid response evidence briefs" at the request of VHA senior leadership; collaborates with HSR&D Center for Information Dissemination and Education Resources (CIDER) to develop a national dissemination strategy for all ESP products; and interfaces with stakeholders to effectively engage the program.

Comments on this evidence report are welcome and can be sent to Nicole Floyd, ESP CC Program Manager, at Nicole.Floyd@va.gov.

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INTRODUCTION

Women currently comprise approximately 10% of all living US Veterans. This proportion is projected to rise to 15% by 2035 as the number and proportion of women serving in the US Military continues to increase. The demographics and life experiences of women Veterans are distinct from those of both non-Veteran women and male Veterans. Consequently, women Veterans face multiple unique health and healthcare concerns that were historically underserved by the Veterans Health Administration (VHA). In the past several decades, the provision of high-quality, evidence-based, accessible healthcare for women Veterans has become an increasingly vital strategic priority within VA. A growing body of literature addresses the health and healthcare concerns of women Veterans. The VA Women's Health Research Network, established in 2010, seeks to systematically improve women's healthcare and reduce sex/gender disparities by filling critical knowledge gaps in the evidence base related to women Veterans' health and healthcare needs.

An early review identified the literature related to women Veterans' health published between 1978 and 2004,[1] and a subsequent update evaluated the studies published between 2004 and 2008.[2] For the current evidence map, we identified and examined the published literature related to women Veterans' health from 2008 through 2015. Topic stakeholders were interested in a broad overview of the growth and depth of research on health and healthcare for women Veterans. We framed our evidence map around healthcare topics of interest according to key study characteristics in order to facilitate planning of future VA research, policy and clinical activities in women Veterans' health. The population of interest was US women Veterans. We included all interventions, comparators, outcomes, and settings. Due to the breadth of research included, we did not extract, evaluate, or present study findings. We identified gaps in knowledge and future research needs in the broad field of women Veterans' health, one of the primary aims of an evidence map approach.[3]

METHODS

TOPIC DEVELOPMENT

This topic was nominated by Ruth Klap, PhD, Program Manager of the VA Women's Health Research Consortium, VA HSR&D Center for the Study of Healthcare Innovation, Implementation on behalf of the VA Women's Health Services Office of Patient Care Services and the VA Women's Health Research Network. This review updates the Systematic Review of Women Veterans Health Research 2004-2008.[2]

SEARCH STRATEGY

We searched MEDLINE (Ovid), CINAHL, and the HSR&D database for articles published from 2008 to December 2015. Our search was limited to studies enrolling adults and published in the English language. The search included the MeSH terms Women; Women's Health; Women's Health Services; Veterans; Veterans' Health; and Hospitals, Veterans. The full search strategy is presented in Appendix A. We also obtained additional articles by reviewing references lists of relevant systematic reviews identified from our literature search.

STUDY SELECTION

Abstracts (2,276) were independently reviewed by a trained investigator or research associate. Given the number of abstracts and the minimal exclusion criteria, we chose to dual review a randomly selected 20% sample. Most abstracts were either excluded for very clear reasons (*eg*, our "VA" search criteria produced many studies related to "visual acuity" or "vertebral artery") or else forwarded on for full-text review. Our exclusion criteria were as follows:

- Studies that were not relevant to health/ healthcare
- Studies that did not include women US Veterans
- Studies that only included active duty members of the military
- Case reports, letters, meeting abstracts, dissertations, editorials, narrative or systematic reviews, conceptual frameworks, and protocols
- Studies that included a very small proportion or absolute number of women Veterans
    - If total n < 100, excluded if proportion women < 10%
    - If total n = 100-1000, excluded if proportion women < 5%
    - If total n > 1000, accepted studies with any proportion of women
- Studies in which the proportion of Veterans is less than 75% and the article does not explicitly address the results of the study for Veterans
- Studies in which the proportion of women is less than 75% and the article does not explicitly address the results of the study for women

We excluded 1,092 references at the abstract stage. Full-text reports of the remaining 1,184 references identified as potentially eligible were obtained for further review using the exclusion criteria described above. Each article was independently reviewed by an investigator or research associate. A second reviewer independently reviewed a random 10% sample of studies and any additional studies that the original reviewer had questions about. If the 2 reviewers disagreed, a "group arbitration" system was used. We noted reasons for excluding a study at full-text review.

DATA ABSTRACTION

We stratified our evidence map by 14 characteristics: 1) healthcare category, 2) study design, 3) number of participants, 4) proportion women, 5) population characteristics reported, 6) presence of special populations, 7) follow-up/duration, 8) research setting, 9) use of administrative database, 10) period of service, 11) Veteran engagement, 12) population, 13) outcomes reported, and 14) funding source. This information was extracted onto evidence tables by one investigator or research associate. For a randomly selected 10% sample of included studies, extraction was verified by a second researcher. Discrepancies were infrequent and when present with resolved by group discussion. To ensure consistency in selection of categories within a characteristic, an additional reviewer evaluated all included studies in categories that were inherently subjective (particularly "other" categories) and these were then double-reviewed by a second investigator. The principal investigator also performed additional checks while summarizing the findings by extracted categories.

A description of each of the study characteristics is presented at the start of the Results section.

RISK OF BIAS ASSESSMENT

We did not rate the risk of bias of individual studies.

DATA SYNTHESIS

We summarize studies by category of healthcare, study design, year of publication, sample size, proportion of women in the study sample, and funding source. We present our analysis as a broad literature map without commenting on the results or findings of individual studies.

RATING THE BODY OF EVIDENCE

We did not rate the strength of evidence.

PEER REVIEW

A draft version of this report was reviewed by content experts as well as clinical leadership. Reviewers' comments and our responses are presented in Appendix B and the report was modified as needed.

RESULTS

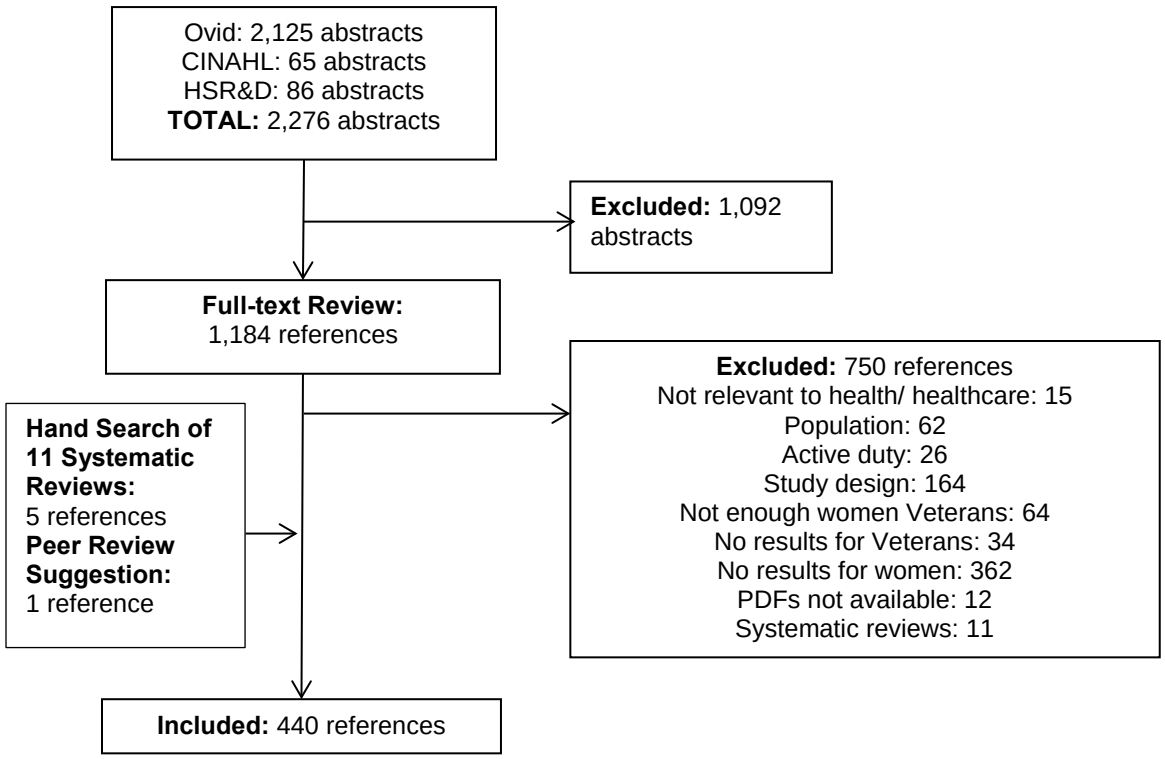
LITERATURE FLOW

We reviewed 2,276 abstracts: 2,125 from MEDLINE, 65 from CINAHL, and 86 from the HSR&D database (Figure 1). We excluded 1,092 abstracts and reviewed the full text of 1,184 references. During full-text review we excluded 750 articles leaving 434 eligible for inclusion. In addition, we reviewed the original studies cited in the 11 excluded systematic reviews and identified 5 references that were eligible but not identified by our literature search. During peer-review of the draft of this report, one more reference was identified. The total number of included references was 440.

Of the included references 208 were categorized as pertaining to Mental Health,[4-210,460] 78 Medical,[211-288] 13 Long-term Care/Aging,[289-301] 24 Reproductive Health,[302-325] 18 Prevention/Screening,[326-342,461] 31 Healthcare Organization and Delivery,[343-372] 3 Rural Health,[373-375] 24 Access and Utilization,[376-399] 18 Post-deployment Health,[400-417] 12 Homelessness,[418-429] and 11 Other.[430-439,462]

Nearly half (362/750 or 48%) of studies excluded during full-text review were excluded because study results were not explicitly provided for women. Only a small proportion (64/750 or 8.5%) was excluded because the study included too few women or because the authors did not provide results for Veterans (34/750 or 4.5%).

Figure 1: Literature Flow Chart



OVERVIEW OF EXTRACTED DATA

Healthcare Categories

With input from the topic stakeholders, we established 36 healthcare categories of interest (Table 1). Recognizing the potentially infinite methods for sub-dividing this broad literature, we defined and then refined our healthcare categories to maximally correspond to the topics identified as research priorities by the topic stakeholders, the topics of particular interest within VA generally, and to the actual topics found in the literature. Operationally, our 36 healthcare categories map closely to the Women's Health Research Network Strategic Priority Areas (Table 2). Notable differences include an inventory of specific medical and mental health conditions. We also separated articles addressing a clinical condition from those related to access, organization, or delivery of care for that condition. Finally, we created an "Other" category for studies that didn't fit into any of the 35 remaining categories (*eg,* studies on unemployment or overall mortality assessments).

Each included study was designated by one primary category. Category descriptions are included below, under "Summary of Findings: Healthcare Categories."

For studies that crossed multiple healthcare categories, we attempted to identify the primary focus of the study and categorize it under a single condition. If a study clearly did not belong to a single category, it was placed in one of 3 "multiples" categories: Multiple Mental Health Diagnoses, Mental Health Comorbid with Non-mental Health, or Comorbid Medical Conditions. All studies grouped in these categories were re-reviewed by at least 3 researchers to ensure that a single primary focus could not be identified. Though we ultimately counted these studies within "multiples" categories for the purposes of quantitative reporting in tables and figures, we also included descriptions of these studies in the Summary of Findings (below) under each healthcare category to which they pertained.

The 3 "multiples" categories are distinct from the 3 "Other" categories (Other Mental Health Topics, Other Medical Conditions, and Other), which were reserved for single-topic studies that did not fit into any of our identified categories.

Studies of prevention or screening were categorized as Prevention/Screening rather than by medical condition (*ie,* a study of screening for breast cancer was categorized as Prevention/Screening, not Cancer). Similarly, studies that related to medical or mental health topics but primarily addressed issues of healthcare organization and delivery (including care coordination and delivery of primary care, mental health, and emergency care), access and utilization, homelessness, or post-deployment health were placed in the latter groupings. As above, we also included text descriptions of these studies under each medical or mental health topic to which they pertained.

Table 1. Healthcare Categories

Healthcare Category		Number of Studies[a]
Mental Health **Total: 208 articles**	PTSD and trauma	71
	Military sexual trauma	37
	Substance abuse	20
	Depression and anxiety	4
	Suicide	13
	Intimate partner violence	9
	Disordered eating	5
	Reproductive mental health	4
	Serious mental illness	3
	Personality disorders	0
	Other mental health topics	3
	Multiple mental health diagnoses	16
	Mental health comorbid with non-mental health	23
Medical Conditions **Total: 78 articles**	Cardiovascular disease	11
	Obesity	9
	Chronic pain	7
	Cancer	6
	Traumatic brain injury	5
	HIV/AIDS	5
	Tobacco	6
	Multiple sclerosis	4
	Diabetes	3
	Spinal cord injury	1
	Traumatic amputations	1
	Hypertension	0
	Comorbid medical conditions	7
	Other medical conditions	13
Reproductive Health		24
Long-term Care/Aging		13
Prevention/Screening		18
Access and Utilization **Total: 24 articles**	Barriers and facilitators of care	13
	Healthcare utilization	11
Rural Health		3
Healthcare Organization and Delivery **Total: 31 articles**	Comprehensive and primary care delivery	16
	Mental healthcare delivery	9
	Emergency care delivery	3
	Virtual or telehealth care delivery	3
Homelessness		12
Post-deployment Health		18
Other		11
TOTAL NUMBER OF INCLUDED STUDIES		440

[a] Each study included once

Table 2. Mapping of Strategic Priority Areas with Evidence Map Health Care Categories

Women's Health Research Network Strategic Priority Areas	Evidence Map Healthcare Categories
Access to Care and Rural Health	Access and Utilization *Barriers and Facilitators of Care* *Healthcare Utilization* Rural Health
Primary Care and Prevention	Prevention/Screening Obesity Hypertension Tobacco Comorbid Medical Conditions Cancer Other Medical Conditions Healthcare Organization and Delivery *Comprehensive and Primary Care Delivery* *Virtual or Telehealth Care Delivery*
Mental Health	PTSD and Trauma Military Sexual Trauma Substance Abuse Depression and Anxiety Suicide Intimate Partner Violence Disordered Eating Reproductive Mental Health Serious Mental Illness Personality Disorders Other Mental Health Topics Multiple Mental Health Diagnoses Mental Health Comorbid with Non-mental Health Healthcare Organization and Delivery *Mental Healthcare Delivery*
Post-deployment Health	Post-deployment Health (includes readjustment, resilience, and well-being)
Complex Chronic Conditions/Aging and Long-term Care	Long-term Care/Aging (includes osteoporosis and dementia) Homelessness Diabetes Cardiovascular Disease Chronic Pain Spinal Cord Injury (SCI) Traumatic Brain Injury (TBI) Traumatic Amputation Multiple Sclerosis HIV Healthcare Organization and Delivery *Emergency Care Delivery*
Reproductive Health	Reproductive Health
	Other

Study Design

We classified studies as one of 5 study designs (Table 3). Observational (other) included retrospective cohort studies, cross-sectional studies, case-control studies, and surveys.

Table 3. Study Designs

Study Design	Number of Studies (%)
RCT/CCT	8 (2%)
Secondary or sub-group analysis of RCT/CCT	12 (3%)
Observational (Prospective cohort)	23 (5%)
Observational (Other)	375 (85%)
Qualitative	22 (5%)
TOTAL	440

RCT = randomized controlled trial; CCT = controlled clinical trial

Number of Participants

Studies were categorized by the number of participants (Table 4). In the majority of studies, the participants were women Veterans. However, where providers or clinic administrators were the focus, the number of providers or administrators was documented. The study with number of participants "not applicable" was a study of facilities.[141]

Table 4. Number of Participants

Number of Participants	Number of Studies (%)	
	Studies Enrolling Patient	Studies of Clinics/Providers[a]
n < 100	52 (12%)	7 (54%)
n = 100 to 1,000	126 (30%)	5 (38%)
n > 1,000	249 (58%)	0 (0%)
Not applicable	0 (0%)	1 (8%)
TOTAL	427	13

[a] Studies of Clinics/Providers that did not also include patients

Proportion of Women, Race, Age

For the 427 studies that enrolled women Veterans as participants, we documented the proportion of women and whether race and age was reported (Table 5).

Table 5. Proportion of Women, Race, and Age for Women Veteran Participants

Proportion of Women	Number of Studies (%)
Less than or equal to 10%	86 (20%)
11% to 50%	119 (28%)
51% to 99%	32 (7%)
100%	187 (44%)
Not reported	3
TOTAL	427
Race Reported in Women	**Number of Studies (%)**
Yes	278 (65%)
No	149 (35%)
TOTAL	427
Age Reported in Women	**Number of Studies (%)**
Yes	303 (71%)
No	124 (29%)
TOTAL	427

Research Setting

Studies were categorized according to where the research was conducted (Table 6). Studies that recruited and/or collected data from participants in the community (*ie*, outside of a healthcare setting) were categorized as "Non-healthcare based." The category "Multiple" was assigned to studies that utilized both VA and non-VA databases (*eg*, state mortality data, Area Resource File), enrolled both VA and non-VA patients, or combined data collected from patients directly (*eg*, in clinic, via telephone) with data obtained from administrative databases.

Table 6. Research Setting

Research Setting	Number of Studies (%)
Single-site VA (hospital or clinic)	70 (16%)
Multi-site VA (hospital or clinic)	95 (22%)
Administrative database – VA	179 (41%)
Non-VA healthcare setting	5 (1%)
Non-healthcare based	72 (16%)
Multiple	19 (4%)
TOTAL	440

VA = Veterans Affairs

Special Populations

We identified 64 studies enrolling and explicitly addressing populations of particular interest to VA stakeholders and researchers and described them as "special populations" (Table 7).

Table 7. Special Populations

Population	Number of Studies
Incarcerated	1
Lesbian, gay, bisexual, transgender (LGBT)	14
Racial or ethnic minorities	12
Homeless	19
Non-VA users	13
Physically disabled	5

Follow-up/Study Duration

Prospective studies (8 RCTs/CCTs and 23 prospective cohort studies) were categorized by the length of follow-up (Table 8). We do not report follow-up length for other study designs.

Table 8. Length of Follow-up

Length of Follow-up	Number of Studies
Less than 1 month	1
1 to less than 6 months	5
6 to 12 months	15
Greater than 12 months	8
Not reported	1

Administrative Database Study

We documented whether the study was conducted using VA administrative database and electronic health record data (Table 9). This may have been the sole source of data or a supplemental source (*eg*, in addition to a survey).

Table 9. Administrative Database

Administrative Database Study?	Number of Studies (%)
Yes	211 (48%)
No	229 (52%)
TOTAL	440

Period of Service

The period of service for included Veterans was noted (Table 10). "Not specified/multiple" included studies that enrolled Veterans from any service period.

Table 10. Period of Service

Period of Service	Number of Studies (%)
OEF/OIF/OND/Persian Gulf	95 (22%)
Vietnam	12 (3%)
World War II	0 (0%)
Not specified/multiple	333 (76%)
TOTAL	440

OEF = Operation Enduring Freedom; OIF = Operation Iraqi Freedom; OND = Operation New Dawn

Population

We identified whether the enrolled population was patients, clinics, providers, or policy makers (Table 11). "Other" was selected for a study that involved an expert panel (clinicians, researchers, educators, and policymakers) to develop a smoking cessation program and then piloted the program on a group of patients.[251] For "Population," a study could be included under more than one category.

Table 11. Population

Population	Number of Studies
Patients	427
Clinics	19
Providers	17
Policy makers	0
Other	1

Outcomes Reported

Outcomes were identified as clinical, resource utilization (*eg*, hospital or clinic visits, or treatment use and access to care), costs, or other (Table 12). Clinical outcomes were broadly defined as those related to disease burden, experiences, treatment, diagnosis, access to care, or disability status. We also included knowledge, awareness and beliefs about clinical and health-related social conditions and experiences (including interpersonal relationships, homelessness, unemployment, prostitution, sexual harassment and assault, deployment/trauma exposures, post-military transitions) under "clinical" outcomes. "Other" outcomes included measures related to healthcare delivery or organization, outcomes intended to refine or evaluate research methods or measures (including construct and test validity and implementation outcomes), and chemical and genetic biomarkers not typically used in clinical practice. A study could be included in more than one category.

Table 12. Outcomes Reported

Outcomes Reported	Number of Studies
Clinical	386
Resource utilization	159
Costs	11
Other	34

Funding Source

The source or sources of funding for the study were documented (Table 13). A study could be included in more than one category.

Table 13. Funding Source

Funding Source	Number of Studies
VA	302
DoD	29
Other Government (*eg,* National Institutes of Health)	65
Foundation	24
Industry	4
University	18
Not Reported	90
Unfunded	7

VA = Veterans Affairs; DoD = Department of Defense

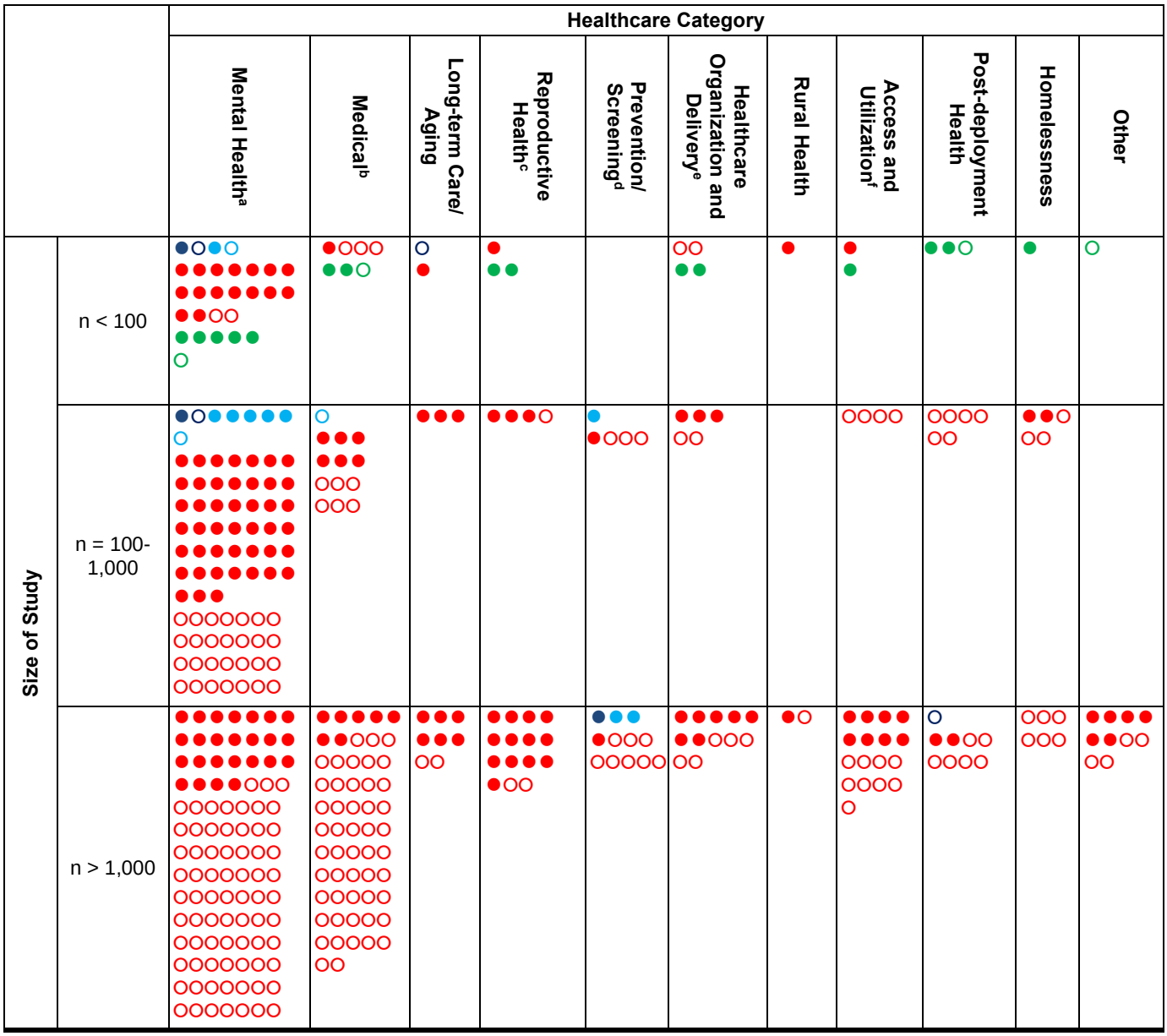
SUMMARY OF FINDINGS

We developed an evidence map of the literature related to women Veterans' health that was published from 2008 to 2015. Characteristics of studies in each of the Healthcare Categories and for expanded Mental Health and Medical categories are presented in Appendix C, Tables 1 to 3.

An overview of the included studies is presented in Figure 2. Each dot represents one study. Studies are categories by healthcare category (columns) and sample size (rows). The color of the dot indicates the study design (see Figure footnotes). A filled dot indicates that the study enrolled only women; an open dot indicates that the study enrolled fewer than 100% women. An expanded view of the Mental Health and Medical categories is presented in Appendix C, Figures 1 and 2.

Using the extracted data listed above, we provide summary descriptions below by healthcare category, design, publication year, sample size, percentage of women in the study sample, and funding source.

Figure 2. Overview of Included Studies by Healthcare Category, Study Sizes, Study Design, and Proportion of Women



●○ Dark Blue = RCT/CCT; ●○ Light Blue = Secondary Analysis of RCT/CCT; ●○ Red = Observational Study; ●○ Green = Qualitative Study; ● 100% women; ○ < 100% women

[a] One additional observational study of facilities; size of study and % women not applicable

[b] One additional observational study with n > 1,000; % women not reported

[c] Two additional observational studies with n = 100-1,000; % women not applicable

[d] One additional observational study with n < 100; % women not applicable

[e] 10 additional studies: % women not applicable for1 RCT/CCT (n = 100-1,000), 5 observational studies (2 with n = 100-1,000, 3 with n < 100) and 3 qualitative studies (all n < 100); % women not reported for 1 observational study (n > 1000)

[f] One additional observational study with n > 1,000; % women not reported

Healthcare Categories

Mental Health

Nearly half of the studies identified by our search and review addressed mental health (208/440 or 47%). This proportion was relatively consistent with the previous review,[2] in which 44% (85/195) of the articles identified pertained to psychiatric or mental health issues. Eighty-one percent (169/208) of the mental health articles we reviewed were categorized into 11 *a priori* designated primary mental topics, as well as an "Other" category for those that did not fit into the above. The other 19% (39/208) of the mental health studies were grouped into one of 2 combined categories that included studies of multiple mental health topics (16/208) or studies of mental health topics comorbid with non-mental health topics (23/208). An additional 16 articles address the organization and delivery of mental healthcare,[349,352,353,356,359,360,369-371] access and utilization of mental healthcare,[378,383,385,387,393,395] and issues regarding mental healthcare for rural populations,[375] specifically, and are described under each of those categories, respectively.

Post-Traumatic Stress Disorder (PTSD) and Trauma

Of the mental health studies identified, the most common topic was post-traumatic stress disorder (PTSD) and trauma (71/208 or 34%). While the overwhelming majority of these were observational studies (including 4 prospective cohort studies), there was one small (n < 100), VA-funded qualitative study on perspectives of family programs to support reintegration of Veterans returning from OEF/OIF deployment with PTSD.[80] In that paper, 34% (16/47) of included Veterans were women.

Nine papers presented the primary findings (3) or secondary analyses (6) of clinical trials related to PTSD and trauma. Three small to moderate-sized (n < 1000) trials of short to moderate duration (≤ 1 year) primarily tested evidence-based PTSD therapies or cognitive-behavioral interventions and reported clinical and healthcare delivery outcomes.[51,88,95] All 3 were published in 2014 or 2015, 2 of 3 studies were performed entirely with female Veterans, and one involved multiple VA sites. None of the primary trials was VA-funded, but all 6 secondary analyses received VA and DoD funding. Notably, all 6 secondary analyses[103,125-129] were based on the same RCT of cognitive behavioral therapy (CBT) for PTSD in women,[440] which was published in 2007 (and described in the previous review), and all were authored or co-authored by the original study's primary author. The 2007 RCT was a multi-site trial of women Veterans funded by the VA.

Of the 71 PTSD and trauma papers, 4 specifically addressed issues related to subpopulations of particular interest. Two of those highlighted racial and ethnic minorities,[77,108] one addressed homeless Veterans,[99] and the last paper addressed factors associated with VA utilization.[93] Several additional studies addressed PTSD comorbid with other mental health diagnoses (*ie,* personality disorder,[195] depression,[202] or substance abuse[207]). A secondary analysis of a small (n < 100), short (< 6 mo) yoga intervention for PTSD, which evaluated alcohol and drug abuse risk is included in the "Multiple Mental Health" category.[208]

Seven additional studies concerning PTSD in relation to non-mental health issues (*ie,* contraceptive use,[173,174] cervical cancer screening,[190] physical health symptoms,[188] urinary incontinence,[169] pain,[182] or receipt of psychotherapy visits[172]) were categorized under the heading "Mental Health Comorbid with Non-Mental Health." These studies were all observational.

Two additional studies assessed screening for PTSD in a cohort of Iraq and Afghanistan veterans[333] or among sleep apnea patients with PTSD.[330] These articles are described under the heading "Prevention and Screening."

Military Sexual Trauma (MST)

The next most common mental health topic was military sexual trauma (MST) (37/208 or 18% of MH studies). Most studies were observational. Seven of these were prospective cohorts, though only one involved a large cohort (n > 1000) and that study was majority men (≤ 10% female).[57] Some cohort follow-up extended to one year but most was less than 6 months. There were also 3 large (n > 1000) observational studies that were 100% women, which used either administrative data[16,54] or multiple VA sites.[30] Notably, 3 studies specifically addressed MST in homeless populations,[22,48,68] and one study addressed MST in LGBT populations.[6] One qualitative study of 19 OEF/OIF women Veterans explored how women Veterans cope with combat and MST.[29] Another qualitative study used individual interviews with 7 women Veterans to review the implications of pregnancy resulting from rape during military service.[460]

We identified one small (n < 100), VA-funded multi-site RCT of Cognitive Processing Therapy or CPT (as compared to Present-Centered Therapy or PCT) for Veterans with PTSD from MST.[39] The follow-up for participants was 6-12 months and the study included 85% women. A secondary analysis of that study, which was also VA-funded, evaluated quality of life and psychosocial functioning measures for the study participants.[53]

Substance Abuse

There were 20 studies primarily related to substance abuse. All were observational, and one study each addressed the following subpopulations: LGBT Veterans,[152] racial/ethnic minorities,[165] or non-VA users.[143] There were 8 additional studies in combination categories that addressed substance abuse along with other health problems, such as diabetes,[194] non-cardiac surgery,[171] or contraceptive use.[173,174] One of these was a secondary analysis of a clinical trial of yoga that evaluated substance abuse risk among Veterans with PTSD described under "Multiple Mental Health."[208]

Depression and Anxiety

Very few studies primarily addressed depression (k = 3) or anxiety (k = 1) disorders. All 4 were large (n > 1000) observational, administrative database studies that included < 15% women. One looked at depression in older Veterans (5.4% women),[7] 2 addressed medication use and side effects (Li 2011 – 8.7% women; Mohamed 2009 – 13% women),[26,33] and the last looked at racial and ethnic associations with utilization of care (14.4% women).[8] An additional 8 observational studies addressed depression comorbid or in combination with other mental health[202] or non-mental health conditions.[169,175,182,183,186,190,192] No additional studies related to anxiety were identified.

Suicide

Thirteen studies addressed suicide. One was a qualitative study of 19 OEF/OIF women Veterans' deployment experiences and suicide risk factors.[177] The remaining 12 were observational studies with ≤ 50% women.[134,142,144-146,153-156,179,189,193] Many related to firearm access and use and none specifically addressed vulnerable populations such as LGBT, minority, or homeless women.

Intimate Partner Violence (IPV)

There were 9 studies of intimate partner violence, all of which included only women Veterans. Two qualitative studies included either semistructured interviews with women and providers[11] or focus groups with women Veterans[17] about experiences and preferences for IPV screening, detection, and care. The remaining 7 observational studies were largely survey-based, VA-funded research studies that evaluated screening tools, risk factors, and associated mental health and physical health outcomes and needs.[9,10,12,18-21]

Disordered Eating

There were 5 moderate to large (n > 100) observational studies on disordered eating,[13,15,27,31,32] 2 of which included 100% women Veterans.[13,31]

Reproductive Mental Health

One small survey study (n = 68) assessed the perceived association between mental health concerns and the reproductive lifecycle among women Veterans receiving psychiatric care within a VA women's health clinic.[206] There also were 3 large (n > 1000), 100% female, administrative database observational studies related to reproductive mental health issues. One evaluated gynecologic and sexual health diagnoses associated with mental health diagnoses,[109] another looked at the association between PTSD and pre-term birth.[130] The last study assessed the association between pregnancy and MH diagnoses.[118]

Serious Mental Illness (SMI)

There were 3 large (n > 1000), ≤ 50% female observational studies related to serious mental illness. All 3 focused on describing gender differences: 2 compared medication prescribing using the VA administrative database[135,161] and one used a survey to compare health-related quality of life for male and female Veterans with SMI.[132]

Personality Disorders

We identified no studies focused primarily on personality disorders in women Veterans, though one observational study looked at ethnic differences in personality disorders among women with PTSD[195] and a second observational study evaluated the role of borderline personality disorder and depression in mediating the relationship between sexual assault and BMI.[175]

Other Mental Health Topics

Three studies related to mental health fell outside of the *a priori* identified mental health categories reviewed above. These included observational studies related to gender identity disorder,[64] pathologic gambling,[74] and aggression.[71]

Multiple Mental Health

There were 16 articles that addressed multiple mental health topics. All but one, a secondary analysis of an RCT (Reddy 2014) were observational studies. Nine studies included only women.[168,195,198,199,202,205,207-209] Seven studies addressed issues related to subpopulations of particular interest including LGBT,[168,197,202,205] racial-ethnic minority,[195] homeless,[199] and

incarcerated[200] Veterans. The secondary analysis evaluated the effect of a yoga intervention on substance abuse risk among women (Veteran and non-Veteran) with PTSD.[208]

Mental Health Comorbid with Non-Mental Health

Twenty-three articles addressed both mental health and non-mental health conditions. The studies were observational with 2 prospective cohort studies.[172,192] Fourteen of 23 included only women.[169,170,173-176,178,180,183,184,186,190,191,194] One study addressed racial-ethnic minority Veterans;[183] none of the others addressed specific subpopulations of interest.

PTSD was the most common mental health condition. Among the 23 studies, 7 addressed PTSD,[169,172-174,182,188,190] and 5 addressed depression and anxiety.[175,186,190,192,371] Other mental health conditions included schizophrenia,[167] mood disturbance,[176] personality disorder,[175] and trauma.[178,180,191]

Many of the studies are also listed below under the non-mental health condition categories "Cancer,"[167] "Chronic Pain,"[178,182] "Diabetes,"[183,186,194] "Cardiovascular Disease,"[183,186,192] and "HIV/AIDS."[192] Other non-mental health conditions included urinary symptoms,[169,170,180] non-cardiac surgery,[171] cervical cancer screening,[190] contraceptive use,[173,174] toxoplasma gondii,[176] gastrointestinal disorders,[181,184,191] hyperglycemia,[187] physical health symptoms,[188] and headache.[185]

Medical Conditions

We identified 78 articles (78/440 or 18%) that primarily addressed each of 12 *a priori* defined medical conditions, described multiple or comorbid medical conditions, or fell into the "Other Medical Conditions" category. Seventy-five of 78 articles (96%) were observational studies, while 3 qualitative studies addressed chronic pain[265,269] or tobacco use.[250] We found no clinical trials or secondary analyses of clinical trials of any medical conditions related to women Veterans that were published between 2008 and 2015. An additional 19 articles addressed the delivery of comprehensive and primary care[343-345,348,351,354,357,358,362-368,372] or virtual or telehealth care[347,350,355] delivery methods and are described under "Healthcare Organization and Delivery."

Cardiovascular Disease

Studies related to cardiovascular disease made up the largest group of medical studies (11/78 or 14%). All 11 studies were observational. Four articles included only women, 2 of which reported on the same cross-sectional study of 162 women at a single VA medical center.[219,220] That study, which was primarily National Institutes of Health (NIH)-funded, screened women for peripheral vascular disease and cardiovascular disease risk factors, and assessed knowledge and awareness of cardiovascular disease. Of the other two 100% female studies, both of which were large (n > 1000), one compared risk-adjusted post-operative mortality and morbidity for peripheral vascular surgery among women at VA versus university medical centers.[224] The fourth study, which was a VA-funded national telephone survey, was the only study to specifically address racial and ethnic differences in cardiovascular risk factors among women Veterans.[229]

Seven additional large studies (n > 1000) included a small proportion of women (5 included ≤ 10% women while 2 included 11-50% women). All reported on gender differences or disparities related to cardiovascular risk factors,[223,230,231] acute myocardial infarction,[235] medication use,[233,234] or cardiac catheterization outcomes.[222]

Two additional observational studies, categorized under "Comorbid Medical Conditions" and "Mental Health Comorbid with Non-Mental Health," respectively, used data from the Veterans Aging Cohort Study to evaluate HIV as a cardiovascular risk factor. One focused on women Veterans to determine whether HIV infection is an independent risk factor for cardiovascular disease among women[217] The second assessed whether depression and HIV are risk factors for incident heart failure among Veterans.[192] Two final articles, listed under "Mental Health Comorbid with Non-Mental Health," reported on a large (n > 13,000) database cohort of 100% women. The first assessed comorbidity rates of depression with coronary artery disease, hypertension, or diabetes[186] while the second described patterns of depression treatment among women Veterans with comorbid heart disease or cardiovascular risk conditions.[183]

Obesity

Nine observational studies related to obesity, all of which included less than 50% women, were published between 2010 and 2015. Four of these reported on bariatric surgery outcomes,[237,238,277,278] while 2 more described alternative weight management interventions, such as the MOVE program[253] or prescription anti-obesity medication.[246] Two studies described weight changes over time following military service,[254,259] and the final study addressed the relationship between BMI and mental health among OEF/OIF Veterans.[255] A tenth study, categorized with the Multiple Sclerosis (MS) studies, reported the prevalence of overweight and obesity among Veterans with MS.[252]

Chronic Pain

Seven studies addressed chronic pain among women Veterans. Most were observational, but 2 were small (n < 100), VA-funded qualitative studies on chronic pain. One used focus groups to describe barriers and facilitators to chronic pain self-management[265] while the second analyzed 15 ethnographic interviews with women Veterans and described beliefs, attitudes, and behaviors related to chronic pain and medical care.[269] Four moderate to large (n > 100) studies compared gender differences related to general chronic pain and pain management among Veterans.[271,275,280,286] The final article also looked at gender differences, though this small (n < 100) pre-post single group study tested a specific intervention (yoga) for chronic low back pain.[274] None of the chronic pain studies focused on subpopulations such as racial/ethnic minorities.

One additional article, grouped with the "Rural Health" articles, studied delivery of care for rural women Veterans with chronic pain and depression or PTSD associated with trauma.[375] Two final observational studies assessed chronic pain comorbid with mental health conditions or trauma, including PTSD and depression[182] or sexual trauma.[178]

Cancer

There were 6 observational studies related to cancer and women Veterans (not including studies focused solely on cancer screening, which are reported separately). All 6 studies were about breast cancer.[218,221,225-228] One study specifically described breast cancer incidence among transgender Veterans,[218] but none addressed other subpopulations such as racial/ethnic minorities or homeless Veterans. We identified no studies of other female-specific cancers, such as cervical or uterine cancer, or other non-gender-specific cancers, such as lung, colon, or hematologic cancers, that provided outcomes for women Veterans. One additional study, grouped with the HIV/AIDS articles, reviewed non-AIDS defining malignancies among HIV and non-HIV

infected Veterans.[240] Another study, listed under "Mental Health Comorbid with Non-Mental Health," described the use of adjuvant radiation therapy to treat breast cancer in patients with schizophrenia.[167] A final study described gender differences in skin cancer screening practices and attitudes and is listed under "Prevention and Screening."[341]

Traumatic Brain Injury (TBI)

Five VA-funded, moderate to large (n > 100) observational studies addressed TBI in women Veterans. One survey of 100% women Veterans specifically identified those with TBI as a consequence of intimate partner violence,[248] while 2 studies evaluated gender differences in clinical outcomes and associations of deployment-related TBI.[247,249] Two studies did not differentiate the source of TBI: one looked at gender differences in healthcare utilization following TBI[258] while the second studied multisensory impairment in Veterans with mild TBI.[257]

HIV/AIDS

We identified 5 large (n > 1000) observational studies related to HIV/AIDS, all with ≤ 50% women. Two of these reported on changes in HIV testing after a VA policy shift[245,256] while 2 described gender differences with respect to clinical outcomes of HIV infection.[239,241] The last study compared the incidence of non-AIDS defining malignancies among Veterans with and without HIV infection.[240] None of these 5 articles specifically addressed subpopulations of interest such as homeless, incarcerated, or LGBT Veterans.

Three additional studies addressed HIV/AIDS but were grouped under alternative categories for the purposes of this review. The first 2 studies, grouped with the "Comorbid Medical Conditions" and "Mental Health Comorbid with Non-Mental Health," respectively, discussed whether HIV infection serves as an independent risk factor for cardiovascular disease among women[217] and whether HIV and depression are risk factors for incident heart failure among Veterans.[192] Another study, grouped under "Rural Health," evaluated the use of a novel HIV therapy among rural Veterans.[374]

Tobacco

Five studies addressed tobacco use. Two of these articles described a multi-step project that involved focus groups[250] and pilot testing[251] of a tailored smoking cessation intervention for women. The other 3 large (n > 1000) observational studies with a relatively small proportion (≤ 10%) of women described smoking prevalence[242] and healthcare expenditures[266] related to smoking, and analyzed gender differences in smoking and cessation treatment.[272] No studies specifically addressed female subpopulations such as racial/ethnic minorities or homeless or incarcerated Veterans.

Multiple Sclerosis (MS)

There were 4 large (n > 1000) VA-funded observational administrative database studies with ≤ 50% women that addressed multiple sclerosis (MS). Two described a cohort of Gulf War-era Veterans with MS[261,285] while 2 looked at clinical comorbidities (overweight and obesity)[252] or outcomes (falls) associated with MS.[243]

Diabetes

Three large (n > 1000) VA-funded observational administrative database studies about diabetes were identified. Two addressed gender disparities in lipid management among Veterans with diabetes,[232,260] while the third reported mortality among those who initiated specific diabetes medications.[236]

Five additional studies addressed diabetes but were listed under alternative primary categories or combination categories for the purposes of this review. The first study, categorized under "Long-term Care and Aging," surveyed 327 women to describe the relationship between postmenopausal symptoms and glucose control among women with type 2 diabetes.[299] An additional qualitative study, categorized with the "Healthcare Organization and Delivery" articles, conducted semi-structured interviews with 17 pre-diabetic women Veterans to describe their experiences with a web-based diabetes prevention program.[355] Three large observational studies, categorized under "Mental Health Comorbid with Non-Mental Health" addressed the relationship between diabetes, depression, and substance use disorders.[183,186,194]

Spinal Cord Injury (SCI)

One study addressed spinal cord injury (SCI) among women Veterans.[244] It was a large VA-funded observational administrative database study that included very few (less than 3%) women and described demographic and clinical characteristics of SCI Veterans over time.

Traumatic Amputations

Only one large (n > 1000) observational administrative database study with < 2% women addressed combat amputations among women Veterans.[281] The study compared disability due to PTSD among male and female combat amputees.

Hypertension

We found no studies specifically related to hypertension management or outcomes for women Veterans. Several studies grouped with the "Cardiovascular Disease" articles above did include hypertension as a cardiovascular disease risk factor.

Comorbid Medical Conditions

A disparate group of 7 observational administrative database studies were categorized as addressing multiple medical conditions. Several evaluated the comorbid occurrence of specific medical conditions (HIV and cardiovascular disease,[217] Hepatitis B and C,[215] smoking and pain,[216] insomnia and epilepsy[211]). The remaining 3 studies looked more generally at multimorbidity in the elderly,[214] multisymptom illnesses among OEF/OIF Veterans,[212] or the association of PTSD and substance use with multimorbid medical conditions.[213]

Other Medical Conditions

Thirteen observational studies described medical conditions that did not fit into any of the above categories. Two included only women, and addressed irritable bowel syndrome (IBS)[273] and Vitamin D status.[263] The remaining 11 studies included ≤ 50% women. One small study (n < 100) compared sex-specific immune signatures in Gulf War illness and chronic fatigue syndrome.[284] Two moderate-sized (n = 100-1000) studies that took place at a single VA center

addressed post-dural puncture headaches[270] and *Staphylococcus aureus* bacteriuria.[262] Eight large (n > 1000) studies addressed the following topics: urologic disease,[264] restless leg syndrome,[267] headache,[268] ulcerative colitis,[276] arthritis,[279] epilepsy,[282] podiatric problems,[283] and amyotrophic lateral sclerosis (ALS).[287]

Reproductive Health

Twenty-four articles addressed reproductive health issues. There were 2 small VA-funded qualitative studies. One examined women Veterans' perspectives on reproductive life planning using 18 individual interviews[305] and the other described women Veterans' reproductive health preferences and experiences using 5 focus groups.[319] Of the remaining 22 observational studies, 7 included only women and addressed contraceptive use[302,303,306,313-315,325] and 2 addressed infertility.[308,317] Three papers described birth defects or risks of birth defects related to medication use[323,324] or military deployment[304] and 3 papers addressed associations between sexual assault and reproductive health issues.[320-322] We found only one study of sexually transmitted infections[316] and only one study that looked at specific prenatal complications among women Veterans.[309] The remaining 5 VA-funded studies described structural and healthcare delivery issues related to reproductive and prenatal care for women Veterans within VHA.[307,310-312,318] Three studies related to reproductive mental health were described above.

Long-term Care and Aging

We identified 13 articles on long-term care and aging. One of these was a small (n = 33, with 17 women), VA-funded, single-site 6-month RCT of aerobic exercise for mild cognitive impairment.[289] Of the remaining 12 observational studies, 3 addressed osteoporosis screening[290] and treatment [296,300] using VA administrative databases. Four moderate to large (n > 100) studies that included 100% women addressed postmenopausal symptoms and hormone therapy.[293-295,299] One article compared health and mortality between Veteran and non-Veteran participants in the Women's Health Initiative.[301] Another used the National Survey of Women Veterans to describe factors associated with Health Related Quality of Life for Women Veterans, including comparisons between VA users and non-VA users.[291] A single study described the characteristics and experiences of women Veterans who serve as informal caregivers for an elderly or chronically ill family member or friend.[297] The final 2 articles addressed specific medical conditions related to aging: one described associations of radiographic findings of CVD in postmenopausal women[292] while the second reported on herpes zoster incidence among Veterans.[298] One additional study, categorized with the "Comorbid Medical Conditions" articles, addressed multimorbidity in the elderly.[214]

Prevention and Screening

We identified 18 articles on prevention and screening. Four of the 18 report on a single RCT of mammography screening promotion among women Veterans. The first describes the primary outcomes of an NIH-funded study that randomized women Veterans to receive tailored and targeted versus targeted-only interventions to increase mammography screening.[338] The second paper describes a systematic assessment of that study's internal and external validity[329] and the third paper provides a cost-effectiveness analysis of those interventions.[334] The fourth paper used the control group arm of the study to test the predictive power of multiple health behavior theories with respect to screening behavior.[342]

Of the remaining 14 observational studies, 6 were VA-funded studies focused on cancer screening. One small (n < 100) study described an educational intervention to improve provider knowledge, attitudes, and comfort-level counseling women in their 40s about breast cancer screening.[327] Two studies addressed colorectal cancer screening self-reporting[332] and adherence.[331] One study looked at skin cancer screening practices and attitudes.[341] The last 2 cancer-screening studies included only women and described the association between organizational factors[328] or mental illness[340] and multiple types of cancer screening. One additional study, grouped with the "Healthcare Organization and Delivery" studies, compared "female-specific" cancer screening rates for "designated women's health providers" versus non-designated providers.[344] A second additional study, listed under "Mental Health Comorbid with Non-Mental Health," assessed cervical cancer screening in women Veterans with PTSD or depression.[190]

The other 8 studies report on non-cancer-related preventive health services. Three of these described the association between disability,[335] obesity,[339] or dual use[337] and receipt of preventive health services in general. Only one study during this time period addressed immunizations.[326] One study was about screening for sleep apnea among patients with PTSD.[330] One study reported on the rates of aspirin use for secondary prevention of atherosclerotic cardiovascular disease among Veterans dispensed aspirin as a prescription.[336] One study described gender differences in VA-specific universal screening of medical and mental health conditions among returning OEF/OIF Veterans.[333] The last study addressed racial, ethnic, and gender differences in hepatitis C screening and prevalence.[461]

Access and Utilization

There were 24 articles related to access and utilization of healthcare, over a third of which (9/24 or 38%) addressed OEF/OIF populations specifically. Whereas many of the articles (k = 159) included in this evidence map reported resource utilization as one study outcome, those described below had a primary focus of access to care or utilization alone.

Barriers and Facilitators of Care

Thirteen articles described barriers and facilitators of access to care. One qualitative study used focus groups of homeless women Veterans to understand barriers to psychosocial care among homeless women.[383] Of the remaining observational studies, 5 specifically addressed the barriers to care among women Veterans with mental health concerns, including a moderate-sized survey of OEF/OIF veterans with likely PTSD, depression, or alcohol abuse that described attitudes that facilitate or limit use of mental healthcare,[378] a small internet survey of women Veterans to determine needs and barriers to seeking mental healthcare within VA,[387] and a large survey of women Veterans with PTSD, depression, neither, or both that assessed barriers to care within VA such as affordability or knowledge of eligibility.[385] The final 2 studies evaluated the determinants of mental healthcare use among returning OEF/OIF Veterans[393] and among VA patients with a diagnosis or depression, anxiety, or PTSD.[395]

Three studies highlighted financial barriers to care, including an analysis of a national survey between 2003 and 2010,[376] a large survey study that compared the relationship between financial barriers to care and health-related quality of life for Veteran and non-Veteran women[388] and a large observational study that examined the relationship between private insurance and the use of VA care.[389] One article assessed delays in care using a large population-based national telephone

survey of women Veterans to assess barriers to timely care and causes of delayed care.[392] Two studies sought to better understand attrition from VA care, including one large national survey of women Veterans who had used VA before[382] and another large observational study that analyzed the association between travel time and attrition.[379] A final study used results from a large national telephone survey of young people to more generally compare access to care among men and women Veterans and non-Veterans.[381]

Healthcare Utilization

Eleven moderate to large (n > 100) observational studies quantified and described VA and non-VA healthcare utilization. Several studies described healthcare utilization among new women users of VHA[380] or Iraq and Afghanistan Veterans generally.[377,394] Others assessed the utilization of specific types of care, such as complementary and alternative medicine,[398] or Assertive Community Treatment (ACT).[386] Finally, several articles described the utilization of care by specific subgroups, including American Indian and Alaska Native women Veterans,[397] racial and ethnic minority veterans,[396] transgender[384,390] and sexual minority[391] Veterans, or women Veterans with a recent history of childbirth.[399]

Rural Health

Three observational studies, all published in 2013 and 2014, specifically addressed rural health. One study described the general demographics and access to care of rural women VA users.[373] The other 2 looked at access to specific therapies for rural patients: the first addressed access to care specifically for rural women Veterans with chronic pain and depression or PTSD associated with trauma,[375] while the second evaluated the use of a novel HIV therapy among rural Veterans.[374]

A fourth study, grouped with the "Access and Utilization" articles, described travel time barriers for Veterans.[379]

Healthcare Organization and Delivery

There were 31 studies on healthcare organization and delivery, 45% (14/31) of which were published in 2015. We included studies under this heading if they addressed the organization and delivery of comprehensive and primary care, mental healthcare, emergency care, or virtual or telehealth methods for care delivery. Some articles grouped in this category relate to specific subpopulations or treatments, but most identify overarching challenges, methods, and outcomes related to the delivery of care for women Veterans.

Comprehensive and Primary Care Delivery

Over half (52% or 16/31) of the articles on healthcare delivery addressed the delivery of high-quality comprehensive and primary care for women Veterans. A single VA-funded RCT of VA providers tested the effects of a 30-minute computerized educational program ("Caring for Women Veterans") on gender awareness.[362] One small (n < 100) VA-funded qualitative study used interviews with providers and administrators to explore more general issues related to delivering primary care to women Veterans within the VA.[345] Another VA-funded study used mixed methods (survey and qualitative interviews) to assess perspectives on healthcare delivery within the VA among a racially and ethnically diverse group of women Veterans.[363] A

retrospective cohort study assessed whether an initial integrated care visit improved subsequent psychosocial service utilization as compared with a standard primary care visit.[372]

The remaining observational studies reported the comprehensive and primary care needs, preferences, experiences, and outcomes of women Veterans in general[354,365-368] or of particular subgroups of women Veterans, including sexual and gender minorities,[358] homeless Veterans,[357] those with serious mental illness,[351] or those from varied military service eras.[364,366] Two articles analyzed the effects of the Women's Health Provider designation on either patient experiences[343] or cancer screening adherence.[344] Finally, the last article reported the results of an expert panel's priority recommendations for delivery of gender-sensitive comprehensive care to women Veterans within VA.[348]

Mental Healthcare Delivery

We identified 9 studies related to the delivery of mental healthcare for women Veterans. Two small (n < 100) VA-funded qualitative studies utilized semistructured interviews with mental health providers and administrators to better describe the organization of mental health services at multiple VA sites[353] or semistructured interviews with Veterans to assess the barriers to enrollment and participation in mindfulness-based interventions for women Veterans.[370] The remaining 7 were observational studies. One study compared women Veterans who use or do not use VA as their main source of healthcare.[360] The other 6 focused on current or future components of mental healthcare delivery within VA. One compared the patients served by specialty versus primary care-integrated mental health services[349] while another assessed whether integrated physical and mental healthcare services were associated with increased depression diagnoses.[371] One study described current national variations in women's mental healthcare delivery arrangements within VA.[356] Two studies identified women Veterans' needs and preferences for mental healthcare delivery: one utilized a cross-sectional, multisite survey at 4 Women's Health – Practice Based Research Network sites[352] and the second used a population-based national telephone survey.[369] The last study surveyed users of VA mental healthcare about their preferences for on-site childcare availability.[359]

Emergency Care Delivery

One qualitative study utilized semistructured interviews with emergency department providers and VA personnel to understand the potential facilitators and barriers to providing quality emergency gynecologic care in VA emergency departments.[441] Two articles described the delivery of emergency care for women Veterans generally,[346] or more specifically for racial and ethnic minority patients.[361]

Virtual or Telehealth Care Delivery

One qualitative study used semistructured interviews with 17 pre-diabetic women Veterans to describe their experiences with a web-based diabetes prevention program.[355] Two observational studies evaluated virtual or telehealth methods for delivering care for women Veterans generally[347] or for transgender Veterans.[350]

Homelessness

There were 12 studies that focused on homelessness. One small qualitative study that included only women used focus groups to describe pathways to homelessness for women Veterans.[419] Of

the 11 remaining articles, 2 moderate-sized (n = 100-1000) studies included only women,[420,428] while 9 moderate to large (n > 100) studies included both men and women. Three of those were limited to OEF/OIF Veterans[418,421,424] while 6 specifically compared male and female homeless Veterans.[422,423,425-427,429]

Seven additional articles addressed homeless populations in the context of mental health[22,48,68,99,199] or healthcare delivery[357] and access[383] issues, and were categorized with those studies for the purposes of this review.

Post-deployment Health

There were 18 studies related to post-deployment health, nearly half of which (8/18 or 44%) were published in 2015. One large (n > 1000; 39% female), VA-funded RCT studied the impact of online expressive writing on readjustment difficulties among OEF/OIF Veterans.[413] Three small qualitative studies, all published in 2014 and 2015, addressed individual,[401] social support,[411] and healthcare provider[409] issues related to post-deployment readjustment.

Two large (n > 1000) studies included only women, and described mortality[407] and health identities[415] following deployment. One study described the general mental and physical health and substance abuse status of returning Veterans.[402] Another study reported the impact of infidelity on combat-exposed Veterans.[406] A third study described psychometric properties of the Post-Deployment Readjustment Inventory.[408]

All of the remaining 9 moderate to large (n > 100) observational studies, composed of < 100% women, sought primarily to compare men and women with respect to specific factors, including deployment stressors[414] and the impact of combat,[400] post-deployment health conditions,[403] utilization,[204] and costs,[410] self-rated health,[416] disability,[412] the prevalence of painful musculoskeletal conditions,[404] and mental health.[405]

Other

Eleven studies did not fit into any of the above categories. One small VA-funded qualitative study used interviews and focus groups with VA patients to describe patient perspectives on proactive medication discontinuation.[436] Two articles addressed issues associated with using VA administrative databases to complete research on women Veterans' health.[439,430]

Four of the remaining 8 large (n > 1000) observational studies addressed overall mortality assessment[437] and patterns,[432] assessed trends in rates and costs of conditions among women Veterans over time,[438] or compared heath indicators among military, Veteran, and civilian women.[435] The final 4 studies addressed disparate topics including health disparities among sexual minority Veterans,[431] unemployment,[433] personal medication preparedness,[434] and sex differences in the relationship between military service and functional limitations.[462]

Study Design

Randomized or Controlled Clinical Trials (RCT/CCT)

Of 440 articles identified, less than 2% (8/440) described the primary findings of RCTs, most of which were published since 2013 (5/8 or 63%). The 2 trials published in 2008 were also identified in the previous review.[338,362] Our study therefore identified 6 new trials related to

women Veterans' health. Half of the 8 trials focused on mental health issues, and tested interventions to increase service utilization for PTSD,[51] treat survivors of sexual trauma with or without PTSD,[39,88] or to deliver Cognitive Processing Therapy (CPT) for PTSD using telemedicine.[95] Two of these were multi-site VA trials.[39,95] The other 4 trials included a small (n < 100) study of exercise for mild cognitive impairment,[289] and 2 large (n > 1000) trials of promotional interventions to increase mammography screening[338] or expressive writing to address post-deployment readjustment challenges.[413] The last trial, the only one that targeted providers, tested an intervention to improve care for women Veteran patients within VA.[362]

Four of the randomized trials were at least partially VA-funded, while the other 4 either did not specify a funding source,[88] or were funded by the National Institute of Mental Health,[51] NIH,[338] or DoD.[95] Three of the trials were conducted entirely with women (2 PTSD and trauma studies and one related to mammography screening).[88,95,338]

Secondary Analysis of an RCT/CCT

Twelve articles (12/440 or 3%) describe secondary analyses of 5 different RCTs. Eight of 12 (67%) relate to mental health topics. Six of these describe analyses related to the Schnurr 2007[440] article about CPT for PTSD,[103,125-129] while the other 2 articles describe psychosocial and QOL outcomes for a study of CPT versus PCT for PTSD[53] or evaluate alcohol and drug abuse risk among women undergoing a yoga intervention for PTSD.[208] One study explored the impact of smoking cessation on pain intensity in smokers with chronic illness.[288] The last 3 articles are related to the Vernon 2008 study[338] of varied interventions to increase mammography screening.[329,334,342]

Qualitative Studies

Five percent (22/440) of the articles we identified were small (n < 100) qualitative studies, 68% (15/22) of which included only women. Nearly half (10/22 or 45%) of the qualitative studies were published in 2015. The proportion of qualitative studies that report VA funding, 68% (15/22), was comparable to the overall rate of VA funding (69% or 302/440). Three VA-funded studies used interviews with providers and administrators to understand challenges in delivery of and access to primary,[345] emergency,[441] and mental healthcare[353] to women Veterans. The remaining 19 studies involved interviews or focus groups with Veterans and/or their family members. Six qualitative studies (27% or 6/22) addressed mental health topics, including IPV,[11,17] suicide,[177] MST,[29,460] and PTSD.[80] Three qualitative studies (14% or 3/22) addressed post-deployment health with OEF/OIF Veterans, though none of these reported VA funding. There were also 3 qualitative studies on the general medical topics chronic pain[265,269] and tobacco use.[250] Four of the last 7 articles described patient preferences for the delivery of specific clinical care, including reproductive healthcare,[305,319] medication discontinuation,[436] or web-based diabetes prevention.[355] The other 3 addressed pathways to homelessness[419] and barriers to accessing services for the homeless,[383] or challenges in the delivery of mindfulness based stress reduction.[370]

Observational Studies

Most (398/440 or 90%) of the articles identified by this review were observational studies.

Prospective Cohort Studies

Of the observational studies, 6% (23/398) were prospective cohort studies, 5 of which tracked participants for less than 6 months and 7 of which followed participants for more than one year. Nine of the prospective cohorts utilized VA administrative databases (9/23 or 39%). One small (n < 100) cohort prospectively tracked providers through the implementation of a transgender care delivery system[350] while the other 22 prospective cohorts followed patients. Nine (9/22 or 41%) of the patient prospective cohort studies included only women. The only large (n > 1000) prospective cohort to include only women was an analysis of Veterans (as compared to non-Veterans) within the Women's Health Initiative.[301] All 8 of the other women-only prospective cohort studies addressed mental health issues. Three small (n < 100) prospective cohorts tracked access to care[375] or outcomes[23,89] for women Veterans with a history of trauma. The other 5 moderate-sized (n = 100-1000) cohorts included women Veterans with mental illness or a history of trauma engaged in treatment or experiencing homelessness. Thirteen (13/22 or 59%) of the patient prospective cohort studies included both men and women subjects. Eight of these were large (n > 1000) cohorts of primarily male subjects (all included ≤ 50% women, most included ≤ 10% women), while the other 5 were moderate-sized (n = 100-1000) cohorts, most of which included 11-50% women.

Other Observational Studies

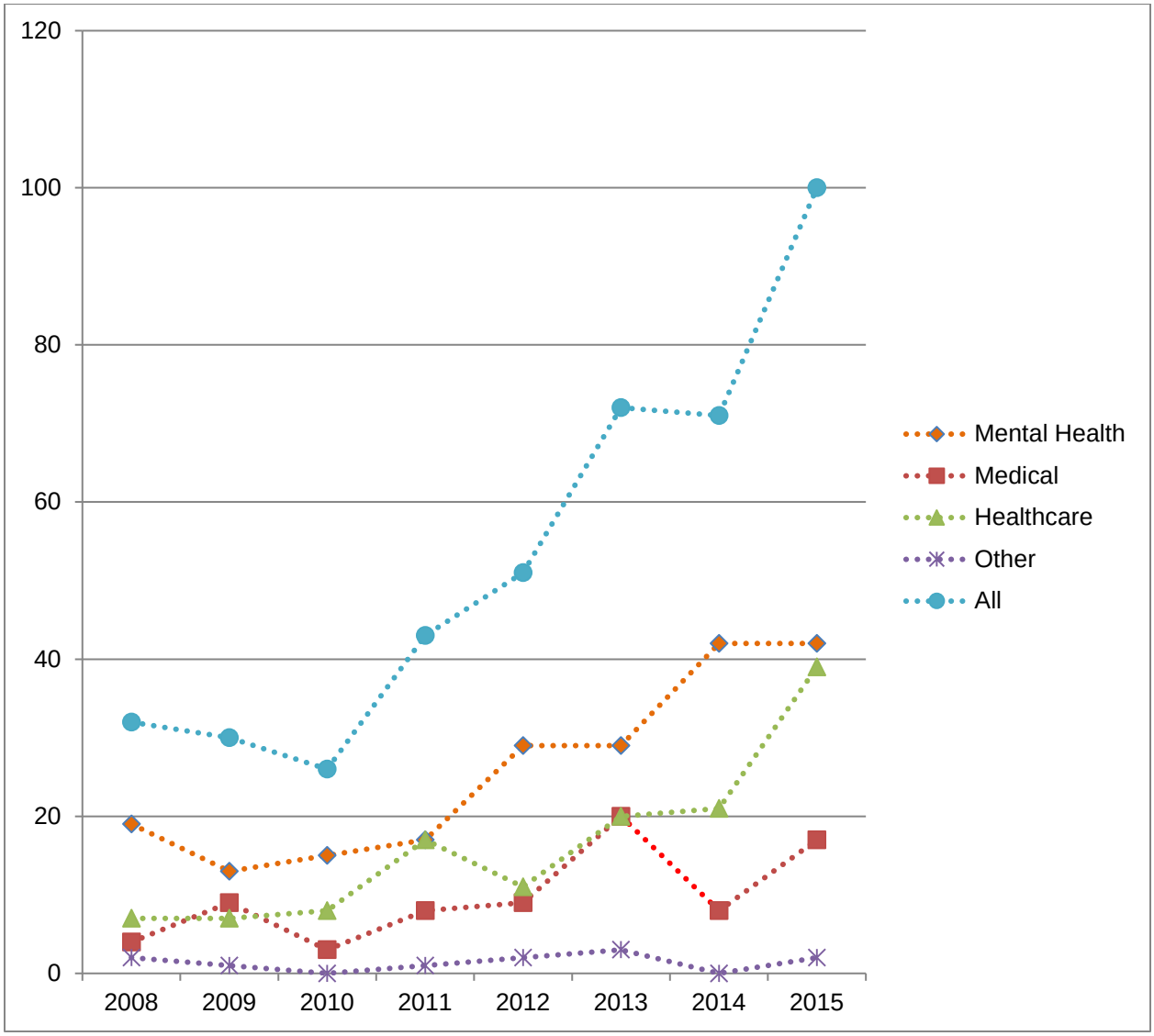
The remaining 94% (375/398) of the observational studies were retrospective cohorts, case-control studies, cross-sectional or survey studies, and other designs. Given the large number of observational studies and often ambiguous descriptions of study design found in the articles, these were all designated as "Other Observational Studies" for the purposes of this review. Nearly half of these observational studies (170/375 or 45%) used VA administrative databases for at least part of their data collection. Forty percent (151/375) included 100% women, which is comparable to the overall proportion of studies that included only women (187/440 or 43%).

Publication Year

The previous review identified a significant increase in publications during the 5-year period from 2004-2008 (k = 195) as compared to the prior 25-year period (k = 182). A direct comparison to our review period (2008-2015) is not possible, as we excluded studies that pertained only to active duty military members (these were included in the previous review) and our review period overlaps slightly with the previous one (we began our search January 1, 2008; theirs extended through September 2008). As a result, our finding of 440 articles in 8 years (an average of approximately 55 articles per year or 440/8) should not be directly measured against the 39 average articles per year (195/5) reported in the last review.

However, the change in number of articles published per year over the 8 years included in this review was notable (Figure 3). The first half of our review period, 2008-2011, saw 135 publications, whereas the second half, 2012-2015, produced more than double that number (k = 305). In fact, there were more articles published in 2015 alone (k = 101) than in 2008, 2009, and 2010, combined. The increase in publications in recent years can be at least partially attributed to VA HSR&D-funded journal supplements in 2011, 2013 and 2015.[442-444]

Figure 3. Number of Papers Published by Year and Healthcare Category



Mental Health includes the following healthcare categories: PTSD and trauma, military sexual trauma, substance abuse, depression, intimate partner violence, personality disorders, anxiety, suicide, disordered eating, reproductive mental health, serious mental illness, multiple mental health diagnosis, other mental health, mental health comorbid with non-mental health

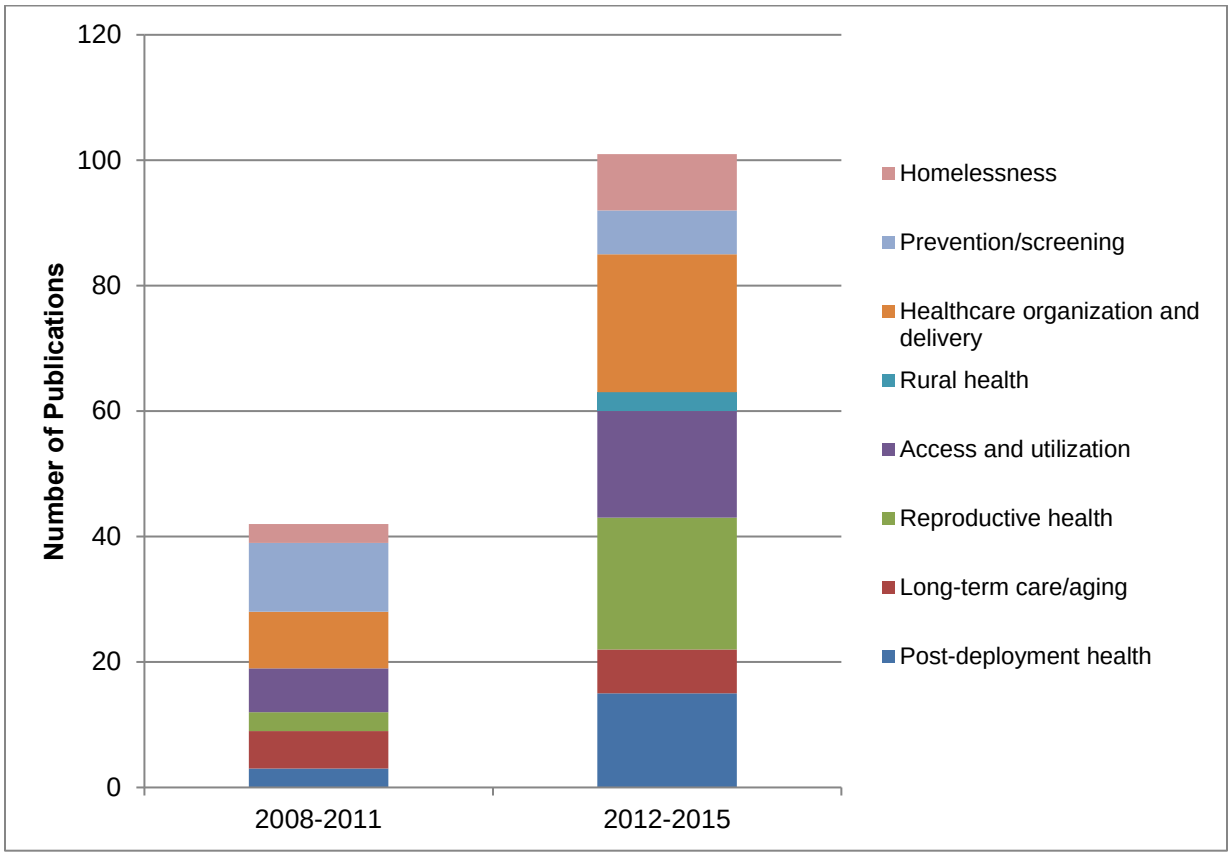
Medical includes the following healthcare categories: Chronic pain, cancer, spinal cord injury, traumatic brain injury, HIV/Aids, multiple sclerosis, tobacco, obesity, diabetes, hypertension, cardiovascular disease, traumatic amputations, comorbid medical conditions, other medical conditions, post-deployment health, long-term care and aging, reproductive health, prevention and screening

Healthcare includes the following healthcare categories: Access and utilization, rural health, and healthcare organization and delivery

Other includes the following healthcare categories: Other, homelessness

The rate of increase was roughly parallel among mental health (2.3-fold increase from 64 articles in 2008-2011 to 144 in 2012-2015) and medical studies (2.1-fold increase from 25 articles in 2008-2011 to 53 in 2012-2015), but was even more striking among several smaller categories identified as recent strategic research priorities (Figure 4). For example, only 3 articles related to post-deployment health were published between 2008-2011, while 5 times that number (k = 15) were published since 2012. Similarly, articles related to reproductive health increased dramatically from 3 during the first half of our review period to 21 during the second half. All 3 rural health studies were published in 2013 and 2014, and more than 75% (22/29) of the studies on healthcare organization and delivery were published since 2012. Two categories did not follow this pattern. Long-term care and aging did not show a significant change over time (k = 6 for the first half and k = 7 for the second half of the review period) and Prevention and Screening was the only category to demonstrate a drop in research over time (k = 11 for the first half and k = 7 for the second half).

Figure 4. Number of Publications in Research Priority Areas, 2008-2011 and 2012-2015



In addition to an increase in research related to priority healthcare categories, there was also an increase in studies related to strategic populations and targeted study designs over time. The number of studies related to OEF/OIF Veterans more than tripled from the first half of the review period (k = 23) to the second half (k = 72). The 2 RCTs from 2008 were captured in the previous review. Of the 6 novel RCTs described in our review, 5 were published between 2013 and 2015. The total number of studies that involved multiple VA sites also increased substantially over time, from k = 26 (2008-2011) to k = 68 (2012-2015).

There were 14 observational studies published in 2010 or later that specifically highlighted issues related to LGBT patients; 12 of these were published since 2012. Half of the LGBT studies related to mental health concerns, while most of the others described healthcare access and delivery issues. Four of these specifically addressed transgender patients.

Sample Size

Over half of the articles we identified were large studies that reported more than 1000 study subjects (249/440 or 57%), while 30% (131/440) were moderate-sized (n = 100-1000) and only 13% (59/440) were small (n < 100). One additional study was a study of facilities. Whereas larger studies are more likely to achieve statistical significance (which may contribute to publication bias in favor of these studies), a smaller sample size may be more appropriate for some study designs (such as qualitative studies) or topic areas (such as a randomized trial of psychotherapy). Additionally, large studies that utilize only data from administrative databases are subject to potential limitations in the accuracy of the medical record and very large studies can be "overpowered" to detect statistical significance in the absence of a clinically meaningful difference.

Large Studies (n > 1000)

Two of the 249 large studies were RCTs: one tested various interventions to improve mammography screening[338] while the second was a VA-funded trial of online expressive writing for post-deployment readjustment.[413] There was also a single secondary analysis of the mammography promotion study.[334] The remaining 246 large studies were observational, 9 of which (9/246 or 4%) were prospective cohort studies. Two-thirds of these (6/9) used VA administrative databases[57,192,236,239,253,254] and two-thirds (6/9) included ≤ 10% women. Four of the large prospective cohort studies addressed issues of mental health and homelessness, including one study of comorbid depression and HIV.[192] The other 5 cohorts related to HIV,[239] obesity,[253,254] diabetes,[236] or overall mortality within the Women's Health Initiative.[301]

Of the remaining 237 large observational studies, over two-thirds (169/237 or 71%) utilized VA administrative databases. There were 3 large studies (3/249) that included study populations of both patients and providers, all of which were VA-funded studies[16,343,344] that evaluated associations between the designation of Women's Health Providers and outcomes related to patient experience or screening for MST or female-specific cancers.

Moderate-sized Studies (n = 100-1000)

Most of the 131 moderate-sized studies were observational, except for 3 RCTs (2 related to PTSD[51,95] and one that targeted providers to improve gender-aware healthcare within VA[362]) and 8 secondary analyses of RCTs. Three of the moderate-sized (3/120 or 3%) observational studies also targeted providers to study the factors associated with variations in mental healthcare, osteoporosis screening, or reproductive healthcare for women in the VA.[290,310,356] Ten of the 120 moderate-sized observational studies were prospective cohorts, 4 of which took place at multiple VA sites.[72,99,111,420] Half of the moderate-sized prospective cohorts (5/10) included only women and addressed topics related to mental health or homelessness.[22,35,99,111,420] Of the remaining 110 moderate-sized observational studies, 24 (or 22%) utilized VA administrative databases as data sources.

Small Studies (n < 100)

All 22 of the qualitative studies were small, accounting for 37% of the small studies (22/59). Of the other 37 small studies, there were 4 prospective cohort studies, 3 RCTs, and 2 secondary analyses of RCTs. Three of the remaining small observational studies (6/28 or 21%) used VA administrative databases. Eighteen of the 25 (72%) small observational studies that reported proportion female included only women, which is a higher proportion than the 44% of studies overall that included only women (187/424).

Just under half the small studies (28/59 or 47%) were about mental health topics, whereas only 12% (7/59) addressed medical conditions. Notably, 10 of 59 (17%) small studies addressed healthcare organization and delivery issues (this represents over one-third (34% or 10/29) of the healthcare organization and delivery articles). Ten of the small studies (10/59 or 17%) included providers as study participants (4 of those were qualitative studies that included both patients and providers). This accounted for over half of the 18 total studies that included providers.

Proportion of Study Subjects Who are Women

Of the 424 included articles that reported the proportion of study subjects who are women, 44% (187/424) contained 100% women, 8% (32/424) contained 51-99% women, 28% (119/424) contained 11-50% women, and 20% (86/424) contained ≤10% women. As noted in the Methods section, studies with a total population of n < 100 and less than 10% women were excluded, as were studies with a total population between 100 and 1000 with less than 5% women. These exclusions were created to help focus our evidence map on the literature that included a significant number of women Veterans. Studies that include a higher proportion of women study subjects may be more likely to explicitly address issues relevant to women Veterans. However, women currently comprise 10% of all living US Veterans, so research representative of current US Veteran population demographics is not likely to include a high proportion of women without oversampling this group.

100% Women

Only 3 of the 187 studies that included only women were RCTs,[88,95,338] and 9 were secondary analyses of RCTs. Notably, 79% of the qualitative studies involving patients (15/19) included only female study participants. Small or moderate-sized studies involving patients were more likely to include only women than large studies. Nearly three-quarters (38/52 or 73%) of the small (n < 100) studies included 100% women, 56% (70/126) of the moderate-sized (n = 100-1000) studies and only 32% (79/246) of the large (n > 1000) studies.

Medical topic articles were least likely to include 100% women (16/77 or 21%), while studies related to long-term care and aging (10/13 or 77%) and reproductive health (19/22 or 86%) were most likely to include only women. Seventy percent (48/69) of the studies that took place at a single VA site included only women, in contrast to only 55% (47/85) of the studies that took place at multiple VA sites.

Studies that included only women nearly always reported age (180/187 or 96%) and/or race/ethnicity (164/187 or 88%) for female study subjects. This was in distinct contrast to the 237 studies that included some men: only about half of those studies reported age (123/237 or 52%) and/or race/ethnicity (114/237 or 48%) for female study subjects.

≤10% Women

Keeping in mind that small (n < 100) studies containing less than 10% women and moderate-sized (n = 100-1000) studies containing less than 5% women were excluded from this review, it is not surprising that most (75/86 or 87%) of the studies that included ≤ 10% women were large (n > 1000). All but one of the 86 were observational studies and most (69/86 or 80%) utilized VA administrative databases as a data source (in contrast to the 144/338 or 43% of studies reporting more than 10% women that used the VA databases).

Funding Source

Overall, 69% of the articles (302/440) included in this review described research performed using VA funding. Less than 7% had DoD funding (29/440). Fifteen percent (65/440) reported other governmental funding (such as NIH). A relatively small number of studies reported foundation (24/440 or 5%) or university (18/440 or 4%) funding. Less than 2% (7/440) of studies explicitly stated that they were unfunded (all were observational), and only 4 studies (4/440 or < 1%) reported industry (all pharmaceutical corporation) funding. These were all observational studies related to RLS, osteoporosis, or IBS.

Notably, one-fifth of the articles we identified (90/440 or 20%) did not identify funding sources in the text. Articles about post-deployment health (7/18 or 39%) or homelessness (5/12 or 42%) were most likely not to specify a funding source.

The proportion of studies funded by the VA varied somewhat by healthcare category. Mental health (70% or 145/208) and medical (65% or 51/78) articles were similar to the overall average. However, whereas over 80% of reproductive health (20/24) and healthcare organization and delivery (25/31) articles were VA-funded, only 50% of post-deployment health (9/18) and homelessness articles (6/12) were VA-funded.

Only 4 of the 8 RCTs (50%) received VA funding.[39,289,362,413] Two reported DoD funding, 2 reported other governmental funding, and 2 did not specify. The VA funded 8/12 (67%) of the secondary analysis of RCTs. The secondary analyses were also the most likely to list DoD funding, with 50% (6/12), though these were all related to funding of a single clinical trial[440] and the 6 secondary analysis articles published about that single trial. Qualitative studies were most likely to be VA funded (15/22 or 68%) and least likely to be funded by other governmental bodies, such as the NIH (2/22 or 9%)

SUMMARY AND DISCUSSION

This evidence map organizes and describes the broad field of research related to women Veterans' health published between 2008 and 2015. In the past 8 years, this literature base has grown and developed substantially. In 2010, Bean-Mayberry and colleagues published a systematic review of the women Veterans' health research completed between 2004 and 2008.[2] Their review, presented at the 2010 VA Women's Health Services Research Conference, helped outline the existing knowledge gaps and develop directions for future research. In July-August 2011, Women's Health Issues devoted a supplemental issue (Health and Health Care of Women Veterans and Women in the Military: Research Informing Evidence-Based Practice and Policy, Volume 21-4S) to women Veterans' health.[442] An article by Elizabeth Yano and colleagues summarized the outcomes of that conference and set forth an ambitious research agenda.[445] The VA Women's Health Research Network has worked to support and advance this agenda. Whereas many independent researchers from both in and outside of VA contribute to the overall research base in this broad field, our analysis confirms a significant shift in topics and increase in research since 2011.

Our evidence map of the literature published between 2008 and 2015 reveals significant strides in many priority areas, several persistent limitations, and areas to consider moving forward.

ADVANCES IN KEY RESEARCH PRIORITIES

The 2010 VA Women's Health Services Research Conference resulted in the development of a research agenda with 6 key topic areas, listed below:[445]

- Access to care and rural health
- Primary care and prevention
- Mental health
- Post-deployment health
- Complex chronic conditions/ long-term care and aging
- Reproductive health.

As described in the "Overview of Extracted Data," we utilized an expanded, though parallel array of healthcare categories in creating this evidence map. A complete cross-walk between those categories and the key topic areas that comprise the 2010 Women's Health Services Research Agenda and can be found in Table 2. An additional overarching goal of the research agenda was to begin transitioning from observational studies to interventional research.[446] Cross-agency partnerships and collaborations were sought to help expand financial and intellectual resources for women's health research.[445]

We observed advances in the following key research priorities (Table 14):

Table 14. Advances in Key Research Priorities

Research Priority Areas		Notable Advances
Topics	Access to Care/Rural Health Post-deployment Health Reproductive Health Primary Care Delivery Mental Health	Increased number of publications More interventional research
Populations	OEF/OIF Veterans LGBT Veterans Racial & Ethnic Minorities Homeless Veterans	New studies specific to Veterans of recent conflicts Increased articles New transgender focus Increased articles with a minority focus Identification of minority women in 100% female studies Increased number of articles with some focused on Veterans of recent conflicts
Research Funding	DoD Funding Other Governmental Funding	Increasingly common sources of funding, including for RCT/CCTs

Priority Topics

Of these 6 key topic areas, 4 (and a subsection of a fifth) have shown notable growth in the last 8 years. Three smaller topic areas – access to care and rural health, post-deployment health, and reproductive health – demonstrated a significant increase in the number of articles published, with total counts rising up to seven-fold from the first half of our review period to the second half. Studies in these areas were largely observational but included several qualitative studies and one large VA-funded RCT focused on post-deployment health.[413] A fourth key topic area, mental health research, particularly that related to PTSD and MST, has not only grown in numbers, but has also recently begun to shift from entirely observational to include a few interventional studies. To that end, 4 new small to moderate-sized RCTs on PTSD and MST were published between 2013 and 2015. Notably, only one of those trials received VA funding and only 2 were multi-site VA studies. Within the broad area of primary care and prevention, the subsection of research specifically related to the organization and delivery of primary and comprehensive care for women Veterans (categorized under "Healthcare Organization and Delivery" for the purposes of this evidence map), has also advanced considerably in both publication numbers and scope, including several qualitative studies and an RCT.

Priority Populations

Research addressing priority populations has also increased substantially over the past 8 years. Returning OEF/OIF Veterans have dramatically shifted the demographics of current US Veterans, particularly for women. Over one-fifth (22% or 95/440) of the articles included in this review specifically targeted Veterans from OEF/OIF/OND or the Persian Gulf conflicts. This encompassed nearly all (89% or 95/107) the articles that specified a period of service for included Veterans. Three-quarters of those studies (72/95 or 76%) were published since 2012,

including 2 RCTs and 6 qualitative studies. Nearly one-quarter (23/95 or 24%) of the studies that targeted Veterans of recent or ongoing conflicts included only women.

One of the goals set forth in the 2010 VA Women's Health Services Research Agenda was to increase the knowledge base related to potentially vulnerable populations of women Veterans, including LGBT, racial and ethnic minority, and homeless Veterans. As noted above, most (86% or 12/14) of the observational studies concerning LGBT Veterans were published since 2012, including 4 studies of transgender Veterans and 6 multi-site VA studies. Over 70% (10/14 or 71%) were VA-funded.

Twelve observational articles particularly highlighted issues related to racial and ethnic minorities, 7 of which were VA-funded. Two-thirds of these (8/12) were published since 2012. Many studies (278/440 or 63%) reported race or ethnicity specifically for female study subjects, increasing the potential for secondary or subgroup analyses by race. Studies that included only women (which doubled in number during our review period from k = 61 the first 4 years to k = 126 the second 4 years) were far more likely to identify race and ethnicity for women study participants (164/187 or 88%). None of the qualitative studies, randomized trials, or secondary trial analyses we identified focused on issues related to race or ethnicity.

Research about homelessness has also increased substantially during this review period. We identified 12 studies focused on homelessness, including 3 specifically devoted to homeless OEF/OIF Veterans, as well as 7 studies in other topic areas that specifically addressed homeless participants. Most (14/19 or 74%) were published since 2012.

Research Funding

Only a small proportion of studies reported non-VA governmental funding sources such as DoD or NIH. However, the number of studies funded by these sources rose steadily throughout the study period, from k = 8 (DoD) and k = 25 (other governmental agencies) in the first half of the review period, to k = 21 (DoD) and k = 40 (other governmental agencies) in the second half. Notably, these funding sources accounted for 4 of the 8 randomized trials we identified.

SHORTFALLS AND LIMITATIONS OF THE LITERATURE

Gaps within Specific Healthcare Topics

Despite the advances in 4 of 6 priority topic areas noted above, 2 of the key areas identified within the 2010 Women's Health Services Research Agenda have failed to show significant growth. These include primary care and prevention and complex chronic conditions/long-term care and aging (Table 15). Given the nature of the literature, we subdivided these articles to group studies on prevention/screening, those related to long-term care and aging, and those that addressed specific medical conditions or healthcare organization and delivery. We found that the number of studies related to prevention/screening actually dropped over time from 11 the first half of the review period to 7 the second half, and the single RCT on this topic was captured in the previous review.[338] Most cancer-related screening articles described breast cancer only, and aside from a single study on "female-specific" cancer screening in general, there were no studies related to cervical cancer, which has a prescribed screening regimen that shifted throughout this review period, or ovarian and uterine cancers, which do not. As the female Veteran population begins to age, cancer-related screening research will become even more prescient. There was also only one study related to immunizations.

Table 15. Shortfalls and Limitations within the Literature

Research Priority areas		Limitations/Gaps
Topics	Prevention and Screening	Decrease in publications over time Limited focus (primarily breast cancer)
	Long-term Care and Aging	No increase in research Few studies pertinent to medical conditions of aging
	Primary Care Complex Chronic Conditions	Few studies related to common chronic diseases or mental health issues seen in primary care No RCT/CCTs on medical topics
Study Design and Presentation	Experimental Studies	Very few RCT/CCTs
	Comparison Groups	Many studies describe gender differences only
	Funding	A substantial proportion of studies fail to identify a funding source

The number of studies related to long-term care and aging, a historically limited area of research,[447] remained relatively flat throughout the 8 year review period, with 6 published in the first half and 7 the second half (though 4 of these were released in 2015, which may portend a coming increase). Only 3 studies addressed osteoporosis, 3 described postmenopausal hormone therapy, and none addressed arthritis or moderate to advanced dementia. Though there was one RCT related to mild cognitive impairment, it was a small, single-site study published in 2010 that has generated no additional secondary studies or larger trials to date. Nearly 70% of the studies we identified reported the age of female study participants (303/440 or 69%) and nearly all of the studies that included only women did so (180/187 or 96%). Nevertheless, collecting and describing this information does not seem to have translated into secondary or subgroup analyses by age thus far, which may be a first step in the development of knowledge specific to older women Veterans.

We elected not to separate medical topic studies using the categories of primary care and complex chronic conditions due to challenges mapping the literature within these headings. For example, we felt that diabetes research clearly applied to both categories, whereas other common medical conditions, such as cardiovascular disease, were not readily captured by either. Instead, we categorized articles by specific medical condition, and found that relatively little research has been devoted to physical conditions (as opposed to mental health), specifically chronic diseases, that affect women Veterans. For example, only a handful of studies addressed diabetes and none specifically targeted hypertension. Even research related to cardiovascular disease, the broadest group of medical condition studies (k = 11), was largely confined to comparisons between men and women. Chronic pain, an area of great need as well as intense scrutiny both within and outside VA at present, produced only 7 studies in 8 years, none of which were multi-site VA studies or evaluated subpopulations such as racial/ethnic minorities, homeless, or incarcerated Veterans. Complex conditions that impact women Veterans, such as spinal cord injury and amputees, were limited to a single large observational study each with a tiny proportion of women study subjects. There were no randomized trials and few qualitative studies related to medical conditions. In addition, we noted that the field of mental health research continues to grow, particularly with respect to specialty mental health treatments for PTSD and MST; there were nearly as many PTSD (k = 71) studies as all general medical studies (k = 78). However,

mental health conditions most often encountered by primary care providers, including depression, anxiety, and postpartum depression, were largely absent from the literature.

Shortfalls in Study Design and Presentation

The most obvious study design limitation of the literature base identified in this review is the very small number of experimental studies. We identified only 8 controlled interventional trials over the course of 8 years that related to women Veterans, and 2 of these had already been described in the previous review. Only half of the 8 RCTs were VA-funded and only 3 took place at multiple VA sites.

Another limitation noted in our review, was the proportion of studies that address women Veterans solely in comparison to male Veterans. Describing differences or disparities between female Veterans and the remainder of the largely male VA population has been a necessary initial step in establishing this field. Looking forward, however, we encourage further study of the broad range of patient demographic, health condition, and social determinant characteristics that exists within the population of women Veterans. For example, comparing racial or socioeconomic subgroups of women Veterans across or within health conditions may help identify or describe needs of particularly vulnerable populations. This approach parallels that endorsed by the NIH's Office of Research on Women's Health strategic plan for women's health research.[448] Expanding the outcomes of interest beyond gender differences and disparities will further advance women Veterans' health research.

Finally, a notable finding in our review was the large proportion of studies (1 in 5) that did not report a source of funding. This was a particular problem for the growing categories of post-deployment health and homelessness. Reporting the source of funding and role of the funder is considered a quality standard for both experimental[449] and observational[450] research studies. Though it is possible that much of women Veterans' health research remains unfunded, only a small number of studies specifically identified an absence of funding. Far more studies simply did not address funding source within the text. This is an easily remedied shortfall that will strengthen the integrity of the research base while providing information for stakeholders reviewing current and potential sources of funding to expand women Veterans' health research.

FUTURE DIRECTIONS

Capturing Ongoing Research

One of the initial limitations we encountered in developing this literature map was the large quantity of published articles that included women Veterans but did not provide explicit outcome results for women Veterans (instead providing results only for the complete study population). In this situation, study results cannot be directly interpreted and applied by women Veterans' providers and researchers. In fact, we identified over 350 articles that included women Veteran study subjects but were excluded from this review because sex-specific results were not reported. This number approaches the final quantity of included studies in the review. The need for sex-specific reporting of scientific research results has been recognized by both the NIH[448] and the Institute of Medicine.[451] Multiple challenges of sex-specific reporting with respect to study design, statistical analysis, and results reporting exist.[452] Research related to Veterans, which often utilizes the national VA administrative databases, may be more likely to have the statistical power to report subgroup analysis by sex or gender than non-VA health research. Additionally,

VA, as a source of research funding, may have the ability to require the inclusion of women and specific results-reporting for women in research studies. Women Veterans' health stakeholders should champion efforts to capitalize on the large body of research in which women Veterans are already participating.

Social and Cultural Transitions

Social and cultural shifts within both the US military and American society will also provide opportunities for expanded research related to women Veterans' health. Notable examples include experiences of LGBT Veterans following the end of the "Don't Ask Don't Tell" policy (2011) and the more recent move to allow openly transgender service members (2016). The expanding role of women in combat following the lifting of the Combat Exclusion Policy (2013) may have significant implications for research related to TBI, SCI, and amputees, all areas that are currently lacking for women Veterans. Increased combat exposure may also result in a higher burden of and shift in the etiology of PTSD among women Veterans. Finally, a transition in the national discussion of sexual assault, including the proliferation of "Affirmative Consent" policies on college campuses, may filter into future research and policy related to Military Sexual Trauma, which has unfortunately affected so many women Veterans.

Veteran Engagement

VA is increasingly seeking to engage Veterans in research by including Veteran stakeholder perspectives in research processes such as development of study questions, selection of outcome measures, and interpretation of findings. None of our included studies described Veteran engagement as a component of their methods. Although several studies incorporated Veterans' perspectives (*eg*, qualitative input to improve an intervention), they all adhered to a traditional model in which the women were study subjects, rather than research stakeholders or partners.

LIMITATIONS

There are several inherent limitations in a review of such a broad body of literature.

Study Review and Data Abstraction

Given the large number of abstracts reviewed (2,276), we did not perform a dual review of all abstracts. However, our exclusion criteria were minimal and most abstracts were either excluded for very clear reasons (*eg*, our "VA" search criteria produced many studies related to "visual acuity" or "vertebral artery") or else forwarded on for full-text review. Additionally, the 20% sample of abstracts that was dual-reviewed did not reveal systematic biases.

We were also limited in our ability to perform a systematic full-text dual review and data extraction by 2 investigators for each of 1,184 articles. However, we utilized a "second reviewer" system for a random sample of studies as well as any additional studies that the original reviewer had questions about, and a "group arbitration" system for studies about which 2 reviewers disagreed. To ensure consistency in definitions, a single additional reviewer was assigned to evaluate all included studies in categories that were inherently subjective (particularly "other" categories) and these were then double-reviewed by a second investigator. The principal investigator also performed additional checks while summarizing the findings by extracted categories. Though limitations remain due to the subjective and overlapping nature of many of the categories of data extracted, we are confident that our final database has been

thoroughly reviewed and represents a best attempt to organize and evaluate this large body of literature.

Applicability of Findings to the VA Population

We included studies of women Veterans both within and outside of the VA health system. Though generally relevant for VA women's health providers and researchers, some included studies may be more pertinent to the VA population than others.

OPPORTUNITIES FOR EXPANDED REVIEWS

This broad evidence map identifies and describes 440 articles across 36 healthcare categories and 13 additional elements of study design and presentation. Advancing specific fields of research and the provision of quality healthcare to women Veterans will require additional in-depth reviews of study quality and bias, as well as a synthesis of outcomes, all of which were outside the scope of this review. This evidence map can be used to prioritize additional reviews and meta-analyses of specific determinants of or treatments for specific health conditions or populations.

For example, we identified (and searched the included studies of) several recent systematic reviews of women Veterans with PTSD,[453-455] substance abuse,[456,457] and mental health concerns in general.[458] Within the field of women Veterans' mental health, however, additional reviews related to military sexual trauma, the delivery of mental healthcare, or integration/coordination with primary care could be considered.

In 2014, Bielawski and colleagues produced a special report updating the previous women Veterans' health systematic review specifically with respect to 5 chronic conditions.[459] Future systematic reviews or meta-analyses could address issues of multimorbidity or primary care for racial/ethnic or sexual/gender minority women Veterans. Post-deployment health and reproductive health are both emerging areas of research for women Veterans that could benefit from focused systematic reviews to help direct future research. Finally, synthesizing the substantial research we identified into the delivery of care for women Veterans, with respect to access, rural health concerns, and organization of care will help inform future policies and care delivery decisions.

CONCLUSIONS

We reviewed the recent published literature related to all topics in women Veterans' health. This large and varied body of research represents a growing evidence base that can be leveraged to improve the health of women Veterans. Though significant progress has been made toward achieving the ambitious research agenda set forth during the 2010 VA Women's Health Services Research Conference, we have identified several persistent knowledge gaps and research shortfalls. VA research and clinical stakeholders can use this evidence map to help direct the future of women Veterans health research.

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