

**Military Women's Health:
A Scoping Review and Gap Analysis, 2000 – 2015**

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Table of Contents

Copyright.....	ii
Acknowledgements.....	iii
Table of Contents	iv
List of Tables	viii
List of Figures.....	xi
Executive Summary.....	1
Introduction.....	1
Methods	1
Results & Discussion.....	3
Conclusion.....	4
Introduction.....	7
Background & Key Questions	8
Methods - Question 1: What Research Has Been Conducted on the Health of U.S. Military Women?.....	9
Benefits of a Scoping Review.....	9
Selection of Articles.....	11
Inclusion and exclusion criteria.....	11
Data Extraction.....	12
Level 3 Review.....	12
Level 4 Review.....	13
Analyses of Data	14
Categorization of articles.....	14
Quality Assurance	15
Methods - Question 2: What is the Quality of the Available Research?	16
Selection of Articles.....	16
Data Extraction.....	16
Hierarchy of evidence.....	16
Development of a quality indicator checklist.....	17
Analyses of Data	18

MILITARY WOMEN'S HEALTH: REVIEW & GAP ANALYSIS

Quality Assurance	20
Results and Discussion - Questions 1 & 2: What Research has been Conducted on the Health of U.S. Military Women? What is the Quality of the Available Research?.....	21
General Overview of the Analytic Sample.....	23
Overview of quality within the analytic sample.....	26
General quality recommendations.....	34
Overview of research topics within the analytic sample	36
Topic Overview of the Analytic Sample	37
Psychological Health.....	39
Readiness.....	42
Injury.....	45
Acute Care & Preventive Medicine.....	48
Deployment Health.....	51
Social Relationships.....	54
Obstetrics and Gynecology.....	56
Chronic Illness.....	60
Limitations	62
Methods - Question 3: Are there Differences in Healthcare Utilization by Gender?	63
DMED Diagnostic Data.....	63
Population selection.....	63
Data extraction.....	63
Analyses of data.....	64
Quality assurance.....	64
PDTS Pharmaceutical Data	64
Population selection.....	64
Data extraction.....	64
Analyses of data.....	65
Quality assurance.....	66
Results and Discussion - Question 3: Are there Differences in Healthcare Utilization by Gender? ..	67
DMED Overall Health Services Usage by Gender	67
Outpatient setting.....	67
ICD-9 chapter rate ratios of women to men in the outpatient setting.....	70

MILITARY WOMEN'S HEALTH: REVIEW & GAP ANALYSIS

Inpatient Setting.....	71
ICD-9 chapter rate ratios of women to men in the inpatient setting.....	73
Further Analysis of the Mental Disorders ICD-9 Chapter.....	74
Outpatient setting.....	74
ICD-9 category rate ratios of women to men in the outpatient setting.....	80
Inpatient setting.....	81
ICD-9 category rate ratios of women to men in the inpatient setting.....	85
Further Analysis of the Musculoskeletal Disorders ICD-9 Chapter.....	86
Outpatient setting.....	86
ICD-9 category rate ratios of women to men in the outpatient setting.....	91
Inpatient setting.....	92
ICD-9 chapter rate ratios of women to men in the inpatient setting.....	95
Further Analysis of the Injury and Poisoning ICD-9 Chapter.....	96
Outpatient setting.....	96
ICD-9 category rate ratios of women to men in the outpatient setting.....	101
Inpatient setting.....	102
ICD-9 category rate ratios of women to men in the inpatient setting.....	106
DMED Summary.....	107
Limitations.....	107
PDTS Healthcare Services Usage by Gender.....	108
Population descriptive statistics.....	108
Gender analysis by therapeutic class.....	109
Descriptive statistics by branch of service.....	112
Gender analysis by individual prescriptions.....	113
PDTS Summary.....	115
Limitations.....	115
Methods - Question 4: Are there Research Gaps that Need to be Addressed?.....	116
Population Selection.....	116
Data Extraction.....	116
Analyses of Data.....	117
Quality Assurance.....	118

MILITARY WOMEN'S HEALTH: REVIEW & GAP ANALYSIS

Results and Discussion – Question 4: Are there Research Gaps that Need to be Addressed?	120
Research Gap Overview	120
Psychological Health: Research Gap Analysis.....	122
Readiness: Research Gap Analysis	128
Injury: Research Gap Analysis	130
Acute Care & Preventive Medicine: Research Gap Analysis	131
Deployment Health: Research Gap Analysis.....	133
Additional analyses.....	134
Social Relationships: Research Gap Analysis.....	137
Obstetrics and Gynecology: Research Gap Analysis.....	141
Chronic Illness: Research Gap Analyses	158
Limitations of Research Gap Analyses.....	162
Conclusion	163
Limitations	163
Scoping Review: Content and Quality of Research.....	163
Healthcare Utilization Analyses by Gender	164
Analyses of Research Gaps	164
Future Directions.....	166
References.....	167
Appendix A: Gender-Specific and Gender-Inclusive Articles ($n = 979$).....	171
Appendix B: Subject Matter Experts (SMEs).....	222
Appendix C: Medical Subject Heading (MeSH) Terms	228
Appendix D: Literature Search Terms.....	229
Appendix E: Level 3 Article Review Form.....	231
Appendix F: Level 4 SME Survey	237
Appendix G: Phase I Topics and Subtopics.....	238
Appendix H: Detailed Description on Article Quality.....	239
Appendix I: Quality Scoring Example.....	241
Appendix J: Article Author Affiliations.....	242
Appendix K: Gap Analysis Matrices.....	244

List of Tables

Executive Summary Table 1 Inclusion and exclusion criteria for scoping review of literature2

Executive Summary Table 2 Identified gaps within each of the 8 major topic areas.....5

Table 1 Comparisons Between Systematic and Scoping Reviews10

Table 2 Levels of Article Review11

Table 3 Level One and Two Inclusion and Exclusion Criteria.....12

Table 4 Data Extracted in Level 3 Review.....13

Table 5 Categorized Topics and Number of Subtopics Within Each Main Area.....14

Table 6 Hierarchy of Evidence Levels for Intervention Studies16

Table 7 Article Review Summary Table21

Table 8 Top Ten Utilized Instruments32

Table 9 Therapeutic Class Categories65

Table 10 Top Five Most Commonly Diagnosed Outpatient ICD-9 Chapters for Enlisted Personnel
.....67

Table 11 Top Five Most Commonly Diagnosed Outpatient ICD-9 Chapters for Officer Personnel
.....68

Table 12 Top Five Most Commonly Diagnosed Inpatient ICD-9 Chapters for Enlisted Personnel
.....71

Table 13 Top Five Most Commonly Diagnosed Inpatient ICD-9 Chapters for Officer Personnel...72

Table 14 Top Five Most Commonly Diagnosed Outpatient ICD-9 Categories for Enlisted Personnel
within the Mental Disorders Chapter74

Table 15 Top Three Rate Ratios of Outpatient ICD-9 Categories within the Mental Disorders
Chapter for Enlisted Females by Service Branch.....76

Table 16 Top Three Rate Ratios of Outpatient ICD-9 Categories within the Mental Disorders
Chapter for Enlisted Males by Service Branch.....76

Table 17 Top Five Most Commonly Diagnosed Outpatient ICD-9 Categories for Officer Personnel
within the Mental Disorders Chapter77

Table 18 Top Three Rate Ratios of Outpatient ICD-9 Categories within the Mental Disorders
Chapter for Female Officers by Service Branch79

Table 19 Top Five Most Commonly Diagnosed Inpatient ICD-9 Categories for Enlisted Personnel
within the Mental Disorders Chapter81

MILITARY WOMEN’S HEALTH: REVIEW & GAP ANALYSIS

Table 20 Top Three Rate Ratios of Inpatient ICD-9 Categories within the Mental Disorders Chapter for Enlisted Females by Service Branch.....83

Table 21 Top Five Most Commonly Diagnosed Inpatient ICD-9 Categories for Officer Personnel within the Mental Disorders Chapter84

Table 22 Top Five Most Commonly Diagnosed Outpatient ICD-9 Categories for Enlisted Personnel within the Musculoskeletal Disorders Chapter.....86

Table 23 Top Three Rate Ratios of Outpatient ICD-9 Categories within the Musculoskeletal Disorders Chapter for Enlisted Females by Service Branch88

Table 24 Top Five Most Commonly Diagnosed Outpatient ICD-9 Categories for Officer Personnel within the Musculoskeletal Disorders Chapter.....89

Table 25 Top Three Rate Ratios of Outpatient ICD-9 Categories within the Musculoskeletal Disorders Chapter for Female Officers by Service Branch.....90

Table 26 Top Five Most Commonly Diagnosed Inpatient ICD-9 Categories for Enlisted Personnel within the Musculoskeletal Disorders Chapter.....92

Table 27 Top Five Most Commonly Diagnosed Inpatient ICD-9 Categories for Officer Personnel within the Musculoskeletal Disorders Chapter.....94

Table 28 Top Five Most Commonly Diagnosed Outpatient ICD-9 Categories for Enlisted Personnel within the Injury and Poisoning Chapter96

Table 29 Top Three Rate Ratios of Outpatient ICD-9 Categories within the Injury and Poisoning Chapter for Female Enlisted Personnel by Service Branch.....97

Table 30 Top Five Most Commonly Diagnosed Outpatient ICD-9 Categories for Officer Personnel within the Injury and Poisoning Chapter98

Table 31 Top Three Rate Ratios of Outpatient ICD-9 Categories within the Injury and Poisoning Chapter for Female Officer Personnel by Service Branch 100

Table 32 Top Five Most Commonly Diagnosed Inpatient ICD-9 Categories for Enlisted Personnel within the Injury and Poisoning Chapter 102

Table 33 Top Three Rate Ratios of Inpatient ICD-9 Categories within the Mental Disorders Chapter for Female Enlisted Personnel by Service Branch..... 104

Table 34 Top Five Most Commonly Diagnosed Inpatient ICD-9 Categories for Officer Personnel within the Injury and Poisoning Chapter 104

Table 35 Person Year Population Totals by Service Branch and Gender..... 108

Table 36 Therapeutic Class Category Prescription Data for Service Members, 2010..... 109

Table 37 Top Three Most Commonly Prescribed Medications Within the Three Most Highly Utilized TCCs for Women, Alongside Male Comparison Data 111

Table 38 Identified gaps within the Psychological Health topic..... 123

MILITARY WOMEN'S HEALTH: REVIEW & GAP ANALYSIS

Table 39 Identified gaps within the Readiness topic 128

Table 40 Identified gaps within the Injury topic 130

Table 41 Identified gaps within the Acute Care & Preventive Medicine topic 131

Table 42 Identified gaps within the Deployment Health topic..... 133

Table 43 Identified gaps within the Social Relationships topic..... 138

Table 44 Identified gaps within the Obstetrics and Gynecology topic..... 142

Table 45 Identified gaps within the Chronic Illness topic 158

Table 46 Identified gaps within each of the 8 major topic areas. 165

List of Figures

Figure 1 Principles of high quality within research articles.....18

Figure 2 Quality Indicators Checklist. Internal scores were used to provide a ‘low’, ‘good’, or ‘excellent’ quality rating for each article.....19

Figure 3 Schema for article review process, 2000-2015.22

Figure 4 Publication trends from 2000 to 2015 by female specific and gender inclusive samples.....23

Figure 5 Count of articles with a branch specific sample compared to service branch force strength percentages.....24

Figure 6 Number of years between end of data collection and article publication.....25

Figure 7 Percentage of articles by Hierarchy of Evidence level.....26

Figure 8 Percentage of articles by quality category.27

Figure 9 Percentage of articles in each quality category by Hierarchy of Evidence level.27

Figure 10 The six Quality Indicators Checklist dimensions with percentages for the analytic sample28

Figure 11 Conceptual Framing domain indicators with percentages for the analytic sample.29

Figure 12 Utilization of a theoretical or conceptual framework by study design type.29

Figure 13 Appropriateness domain indicators with percentages for the analytic sample.30

Figure 14 Transparency domain indicators with percentages for the analytic sample.30

Figure 15 Validity domain indicators with percentages for the analytic sample.....31

Figure 16 Percentage of articles that used instruments (left) and percentage of articles that used validated instruments.....32

Figure 17 Reliability domain indicators with percentages for the analytic sample.....33

Figure 18 Cogency domain indicators and percentages for the analytic sample.34

Figure 19 Topic categorizations by year of publication.36

Figure 20 Number of articles categorized in each topic.37

Figure 21 Article quality by topic.....38

Figure 22 Number of articles categorized in each subtopic of the Psychological Health topic.....39

Figure 23 Psychological Health article quality by subtopic.....41

Figure 24 Number of articles categorized in each subtopic of the Readiness topic.42

Figure 25 Readiness article quality by subtopic.....44

Figure 26 Number of articles categorized in each subtopic of the Injury topic.....45

Figure 27 Injury article quality by subtopic.....46

MILITARY WOMEN’S HEALTH: REVIEW & GAP ANALYSIS

Figure 28 Number of articles categorized in each subtopic of the Acute Care & Preventive Medicine topic.48

Figure 29 ACPM article quality by subtopic.50

Figure 30 Number of articles categorized in each subtopic of the Deployment Health topic.51

Figure 31 Deployment Health article quality by subtopic52

Figure 32 Number of articles categorized in each subtopic of the Social Relationships topic.54

Figure 33 Social Relationships article quality by subtopic.55

Figure 34 Number of articles categorized in each subtopic of the Ob/Gyn topic.....56

Figure 35 OB/Gyn article quality by subtopic58

Figure 36 Number of articles categorized in each subtopic of the Chronic Illness topic.....60

Figure 37 Chronic Illness article quality by subtopic.....61

Figure 38 Top five diagnosed ICD-9 chapters for outpatient enlisted females, alongside male comparison data.68

Figure 39 Top five diagnosed ICD-9 chapters for outpatient female officers, alongside male comparison data.69

Figure 40 Rate ratios greater than 2 (female:male) for outpatient ICD-9 chapters.70

Figure 41 Top five diagnosed ICD-9 chapters for inpatient enlisted females, alongside male comparison data.71

Figure 42 Top five diagnosed ICD-9 Chapters for inpatient female officers, alongside male comparison data.72

Figure 43 Rate ratios greater than 2 (female:male) for inpatient diagnosis chapters.73

Figure 44 Top five diagnosed ICD-9 categories for outpatient enlisted females within the Mental Disorders chapter, alongside male comparison data.75

Figure 45 Top five diagnosed ICD-9 categories for outpatient female officers within the Mental Disorders chapter, alongside male comparison data.78

Figure 46 Rate ratios greater than 2.0 (female:male) within the outpatient Mental Disorders ICD-9 chapter for enlisted and officer service women.80

Figure 47 Top five diagnosed ICD-9 categories for inpatient female enlisted personnel within the Mental Disorders chapter, alongside male comparison data.82

Figure 48 Top five diagnosed ICD-9 categories for inpatient female officers within the Mental Disorders chapter, alongside male comparison data.84

Figure 49 Rate ratios greater than 2.0 (female:male) within the inpatient Mental Disorders ICD-9 chapter for enlisted and officer service women.85

MILITARY WOMEN'S HEALTH: REVIEW & GAP ANALYSIS

Figure 50 Top five diagnosed ICD-9 categories for outpatient female enlisted personnel within the Musculoskeletal Disorders chapter, alongside male comparison data.	87
Figure 51 Top five diagnosed ICD-9 categories for outpatient female officers within the Musculoskeletal Disorders chapter, alongside male comparison data.	89
Figure 52 Rate ratios greater than 2.0 (female: male) within the outpatient Musculoskeletal ICD-9 chapter for enlisted and officer service women.	91
Figure 53 Top five diagnosed ICD-9 categories for inpatient female enlisted personnel within the Musculoskeletal Disorders chapter, alongside male comparison data.	93
Figure 54 Top five diagnosed ICD-9 categories for inpatient female officer personnel within the Musculoskeletal Disorders chapter, alongside male comparison data.	95
Figure 55 Top five diagnosed ICD-9 categories for outpatient female enlisted personnel within the Injury and Poisoning chapter, alongside male comparison data.	96
Figure 56 Top five diagnosed ICD-9 categories for outpatient female officers within the Injury and Poisoning chapter, alongside male comparison data.	99
Figure 57 Rate ratios greater than 2.0 (female: male) within the outpatient Injury and Poisoning ICD-9 chapter for enlisted and officer service women.	101
Figure 58 Top five diagnosed ICD-9 categories for inpatient female enlisted personnel within the Injury and Poisoning chapter, alongside male comparison data.	103
Figure 59 Top five diagnosed ICD-9 categories for inpatient female officers within the Injury and Poisoning chapter, alongside male comparison data.	105
Figure 60 Rate ratios greater than 2.0 (female: male) within the inpatient Injury and Poisoning ICD-9 chapter for enlisted service women.	106
Figure 61 Service members receiving at least one Central Nervous System Agent Prescription.	112
Figure 62 The top five most commonly prescribed OTC medications for military women, alongside male comparison data.	113
Figure 63 The top six most commonly prescribed non-OTC medications for military women, alongside male comparison data.	114
Figure 64 Number of articles by topic, stratified by service branch.	120
Figure 65 Psychological Health subtopics by service branch.	122
Figure 66 Gap Analysis Matrix for the Stigma subtopic.	124
Figure 67 Gap Analysis Matrix for the Adjustment Disorders subtopic.	125
Figure 68 Gap Analysis Matrix for the Personality Disorders subtopic.	126
Figure 69 Gap Analysis Matrix for the Eating Disorders subtopic.	127
Figure 70 Readiness subtopics by service branch.	128
Figure 71 Gap Analysis Matrix for the Sleep subtopic.	129

MILITARY WOMEN'S HEALTH: REVIEW & GAP ANALYSIS

Figure 72 Injury subtopics by service branch.....	130
Figure 73 Acute Care & Preventive Medicine subtopics by service branch.	131
Figure 74 Gap Analysis Matrix for the Sexually Transmitted Infections (STI) subtopic.....	132
Figure 75 Deployment Health subtopics by service branch.....	133
Figure 76 Percent of articles about each deployment setting by publication year.	134
Figure 77 Gap Analysis Matrix for the Gynecological Care subtopic.....	136
Figure 78 Social Relationships subtopics by service branch.....	137
Figure 79 Gap Analysis Matrix for the Sexual Assault subtopic.....	139
Figure 80 Gap Analysis Matrix for the Physical Assault subtopic.....	140
Figure 81 Obstetrics and Gynecology (Ob/Gyn) subtopics by service branch.....	141
Figure 82 Gap Analysis Matrix for the Uterine Wellness subtopic.....	143
Figure 83 Gap Analysis Matrix for the Menstruation subtopic.	144
Figure 84 Gap Analysis Matrix for the Menstrual Suppression subtopic.....	145
Figure 85 Gap Analysis Matrix for the Contraception subtopic.....	146
Figure 86 Gap Analysis Matrix for the Unplanned Pregnancy subtopic.....	147
Figure 87 Gap Analysis Matrix for the Fertility subtopic.....	148
Figure 88 Gap Analysis Matrix for the Antepartum subtopic.....	149
Figure 89 Gap Analysis Matrix for the Intrapartum subtopic.....	150
Figure 90 Gap Analysis Matrix for the Postpartum subtopic.....	151
Figure 91 Gap Analysis Matrix for the Birth Outcomes/Infant Health subtopic.....	152
Figure 92 Gap Analysis Matrix for the Breast Wellness subtopic.....	153
Figure 93 Gap Analysis Matrix for the Breastfeeding subtopic.....	154
Figure 94 Gap Analysis Matrix for the Vaginal Health subtopic.....	155
Figure 95 Gap Analysis Matrix for the General Obstetrics subtopic.....	156
Figure 96 Gap Analysis Matrix for the Urological Health subtopic.....	157
Figure 97 Chronic Illness subtopics by branch of service.....	158
Figure 98 Gap Analysis Matrix for the Cancer subtopic.....	160
Figure 99 Gap Analysis Matrix for the Multisystem Illness subtopic.....	161

Executive Summary

Introduction

Research on the U.S. military has until recently focused almost exclusively on the health of male service members. As the number of women in the U.S. military continues to grow, and as more women begin to serve in all military occupational specialties, more research will be needed to examine the health of this population. The objective of this project was to identify research gaps in the literature on military women's health. To that end, the project team at the Naval Health Research Center San Diego (NHRC) conducted a scoping review of the literature, systematically surveying all articles published in the peer-reviewed literature between January 2000 and September 2015. In addition, the team designed an article quality assessment instrument that was measureable and specific, and reviewed recent healthcare utilization data for women and men. The resulting data was aggregated into a weighted matrix, and a comprehensive gap analysis using all of the aforementioned data was performed.

Methods

Data sources and searches. MEDLINE/PubMed, Web of Science, CINAHL, and PsychINFO were searched for articles published between January 2000 and September 2015. The search included MeSH terms related to the health of women serving in the U.S. Armed Forces. Healthcare utilization data for calendar year 2014 was extracted from the Defense Medical Epidemiology Database (DMED). Prescription data for calendar year 2010 was extracted from the Pharmacy Data Transaction Service (PDTS).

Selection of articles. Inclusion and exclusion criteria are shown in Executive Summary Table 1. Each article (n=14,999) was subject to a four level review process. In order to maintain the focus on the health of service women, all articles were required to include a female sample AND include gender specific analysis and results in order to be included for full review. A total of 14,020 articles were excluded from the final Level 4 review. Each article that was marked for exclusion by a primary reviewer in Levels 1-3, was also examined by a secondary reviewer before a final determination was made. If there was disagreement between the reviewers, a senior investigator also examined the article, and a consensus was reached. The full-text of 979 articles (Appendix A) was included in Level 3 data abstraction, as well as in Level 4 review by subject matter experts (SMEs).

Executive Summary Table 1

Inclusion and exclusion criteria for scoping review of literature

Criteria	
Inclusion	Exclusion
U.S. military personnel Included female service members, compared male to female service members, or compared military females with civilian females Related to Military Health System (MHS) or MHS care delivered to service women Involved Active Duty, Reserve, or National Guard eligible for MHS healthcare Involved a health condition or functional status that required healthcare services Included a female sample AND included gender specific analysis and results	Literature reviews without novel data Editorials, expert opinion, commentaries, unpublished reports, historical articles, meeting summaries, case reports Focused solely on medical, nursing, or allied health education Involved only cadets or midshipmen Involved only veterans (prior Active Duty, Reserve or National Guard)

Data extraction. An article review form was specially designed by the NHRC research team to extract all relevant data from each article, including quality elements. Each article was categorized into at least 1 of 8 major topic areas, and into at least 1 of 73 subtopic areas. Article categorizations were not mutually exclusive. Characteristics of each study (such as demographic information, database sources, research settings, study designs, research instruments used, and sampling methods) were extracted by a primary reviewer. One of the senior investigators then randomly reviewed 10% of all data extractions for accuracy. Risk of bias within individual studies, and inter-rater reliability, were not assessed. Each article within the analytic sample received a quality score using the investigator-developed Quality Indicator Checklist. During Level 4 review, a total of 264 subject matter experts (see Appendix B) extracted the following specific information from each article: study question, overall study findings, gender-specific findings (including statistical significance), study limitations, and general comments.

Healthcare utilization data was extracted from DMED by International Classification of Disease, Ninth Revision, (ICD-9) medical diagnosis codes for all U.S. service members on Active Duty service during calendar year 2014. Pharmacy prescription data was extracted from PDTS by Therapeutic Class Category (TCC) and product name for all U.S. service members on Active Duty service during calendar year 2010.

Analyses of Data. Descriptive statistics, including frequencies and percentages, were calculated for all of the study data extracted. Results were initially summarized for the total analytic sample, and then by topic and subtopic. Article quality scores were binned into three categories based on percentage scores as follows: low (<70%), good (70-89.99%), and excellent ($\geq 90\%$).

The research team did not synthesize the results or findings from studies within the same topic or subtopic areas of research. The broad nature of this study precluded the use of any particular synthesis technique. The aim of the report was to present a map of the existing body of literature on military women's health by topic and subtopic, integrated with quality assessment data.

Results from the scoping review and healthcare utilization analyses were aggregated into a weighted Gap Analysis Matrix (GAM) for each subtopic. These matrices included the following pertinent information from the scoping review, highlighted information from the healthcare utilization data, external military women's health organizational priorities that were relevant to each specific subtopic, and a reviewer synthesis of this data for each subtopic. The GAM data was used to perform a comprehensive gap analysis of topics and subtopics identified within the scoping review of the literature.

Results & Discussion

Results of literature search. The full-text of 979 articles was reviewed (see Appendix A). An online searchable repository of the gender-specific and gender-inclusive articles pertinent to military women's health was created and can be found at <http://triservicenursing.org/database/womenshealth>. All articles were categorized into at least one of 8 major topic and 73 subtopic areas.

Overview of extracted data. There were 8 main healthcare topics of interest, with a range of 6 to 16 subtopics within each of those major categories. Many articles were not specific to a primary focus; because of this, articles were categorized into as many main topics as was pertinent, and the subtopics were used to provide a further layer of detail. Because of this methodology, topic and subtopic totals did not sum to 979. Article quality was determined by scoring specific data elements extracted from each article using the Quality Indicator Checklist. Healthcare utilization data from DMED included counts of all ICD-9 medical diagnoses for Active Duty service members during calendar year 2014. Data from PDTS included totals of all pharmacy prescriptions for Active Duty service members during calendar year 2010.

Summary of results. Of the studies identified in the search, the largest number of articles related to the Readiness (n=561) and Psychological Health (n=429) topics. The smallest number of articles related to Ob/Gyn (n=128) and Chronic Illness (n=97). A total of 958 articles used quantitative methods, 17 articles used qualitative methods, and 4 articles used a mixed methods study design. Overall, 10.2% of the articles were of low quality, 62.2% were of good quality, and 27.2% were of excellent quality. The topics with the highest percentage of excellent quality articles were Social Relationships (36%) and Injury (32%). The topic with the highest percentage of low quality articles was Ob/Gyn (21%).

Overall, the most commonly diagnosed outpatient ICD-9 diagnostic chapter for both officer and enlisted personnel was Musculoskeletal Disorders. Female enlisted and officer personnel were at least 2 times more likely to be diagnosed with a condition in the following outpatient ICD-9 chapters than their male colleagues: Diseases of the Blood & Blood Forming Organs (enlisted

RR=4.0, officer RR=3.0) and Diseases of the Genitourinary System (enlisted RR=7.0, officer RR=6.0). The most commonly diagnosed inpatient ICD-9 chapter for enlisted personnel was Mental Disorders, and the most commonly diagnosed outpatient ICD-9 chapter for officer personnel was again, Musculoskeletal Disorders. Female enlisted and officer personnel were at least 2 times more likely to be diagnosed with a condition in the following inpatient ICD-9 diagnostic chapters than their male peers: Diseases of the Genitourinary System (enlisted RR=6.3, officer RR=5.4), Neoplasms (enlisted RR=3.9, officer RR=4.8), Endocrine, Nutritional, Metabolic Disease, & Immunity Disorders (enlisted RR=2.2, officer RR=2.7), and Diseases of the Blood & Blood Forming Organs (enlisted RR=2.4, officer RR=less than 2.0). More detailed results are included in the report.

Central Nervous System Agents and Anti-Infective Agents were the most commonly prescribed therapeutic class categories (TCCs) for both men and women. The primary TCC in which women were more likely to be prescribed a medication than men was Contraceptives (83.6 times more likely). Women were also 10 times more likely to receive a prescription within the Blood Formation, Coagulation and Thrombosis TCC and in the Vitamin TCC than men. For both men and women, the most commonly prescribed over-the-counter (OTC) medications were Ibuprofen and Acetaminophen. And for both men and women, the most common prescription medications were Hydrocodone-Acetaminophen and Oxycodone-Acetaminophen.

Using the Gap Analysis Matrices, gaps in the literature were identified in 7 out of 8 major topic areas and 26 out of 73 subtopic areas. The Ob/Gyn topic contained the highest number of gaps: 15 of 16 subtopics were found to be areas of concern. The Psychological Health topic contained the second highest number of gaps: 4 of 16 subtopics were found to be areas of concern. The only topic in which no gaps were identified was Injury. More detailed results are included in the report.

Conclusion

The scope of this report was vast; multiple modalities and sources of information were used to generate the report presented here. From this report it is clear that the field of obstetrics and gynecology could benefit from high-quality research in a wide range of areas. Psychological health for military women has been highlighted as an area of concern by many organizations, and the data in this report shows that this research priority is still current, on target, and relevant.

As can be seen in Executive Summary Table 2, research gaps were identified in 7 out of 8 major topic areas; 26 out of 73 specific subtopics were determined to have insufficient evidence. This data shows that more high quality research is needed in the Ob/Gyn and Psychological Health major topic areas, but also in the smaller subtopic areas of sleep, sexually transmitted infections, deployment gynecological care, sexual and physical assault, multisystem illness, and cancer.

Executive Summary Table 2.

Identified gaps within each of the 8 major topic areas

PSYCHOLOGICAL HEALTH
Stigma
Adjustment Disorders
Personality Disorders
Eating Disorders
READINESS
Sleep
INJURY
No gaps identified
ACUTE CARE & PREVENTIVE MEDICINE (ACPM)
Sexually Transmitted Infections (STI)
DEPLOYMENT HEALTH
Gynecological Care
SOCIAL RELATIONSHIPS
Sexual Assault
Physical Assault
OBSTETRICS AND GYNECOLOGY (OB/Gyn)
Contraception
Uterine Wellness
Menstruation
Menstrual Suppression
Antepartum
Intrapartum
Postpartum
Birth Outcomes/Infant Health
Vaginal Health
General OB
Urological health
Unplanned Pregnancy
Breast Wellness
Breastfeeding
Fertility
CHRONIC ILLNESS
Cancer
Multisystem Illness

This report and the online repository of 979 gender-specific and gender-inclusive research articles can be useful to researchers, practitioners and policy makers in many ways. It is an invaluable resource that can be used by DoD health policy makers and funding organizations when developing long range strategies for research prioritization, as it highlights areas of research that are currently inadequately studied. Additionally, the online repository of articles reviewed for this report (<http://triservicenursing.org/database/womenshealth/>) provides clinicians with an easily accessible entry-point into the existing peer-reviewed literature within their clinical specialties to aid them in making evidence-based decisions to help improve the health outcomes of their patients. This report also helps health researchers by outlining the existing literature within specific fields of inquiry, and providing a reminder that more gender-focused and gender-inclusive research is needed in future endeavors.

This report and the online data repository are uniquely valuable as they provide a scientifically sound approach to assessing the status of military women's health; this is critical information for all organizations and personnel who lead, and serve within, the Military Health System.

Military Women's Health: A Scoping Review and Gap Analysis (2000 – 2015)

Introduction

Women in the U.S. military have successfully served alongside their male counterparts for over a century (Manning & Women's Research Education Institute, 2014); however, their representation within the total military force has historically been scant. The presence of women in the military has increased dramatically since the expiration of the Selective Service Act—from estimates between 1.6% and 2.5% of all personnel in 1973 (Leepson, 1981; Patten & Parker, 2011; U.S. General Accounting Office (U.S. GAO), 1990), to 16.5% in 2014 (U.S. Department of Defense (DoD), 2015). While the proportion of enlisted women within the total DoD has been relatively steady over a recent 15 year period (14.7% in 2000; 14.8% in 2014), female officer representation has increased from 14.4% in 2000 to 16.7% in 2014 (U.S. Department of Defense (DoD), 2015). In December of 2015, a historic decision was made to lift the ban on female participation in ground combat across all branches of the military (Rosenberg & Philipps, 2015). Following this decision, 100% of all military occupational specialties are now open to members of both sexes (Tilghman, 2015). These trends serve to indicate the growing importance of women's contributions to national defense.

While gender inclusive research in military populations has increased in recent decades due to National Institutes of Health (NIH) and DoD mandates requiring the inclusion of women in all clinical research ("National Defense Authorization Act for Fiscal Year 1994," 1993; "National Institutes of Health Revitalization Act of 1993," 1993), guidelines and priorities for military women's health research are still lacking. In 1994, Congress appropriated \$40 million for military women's health research, and the Defense Women's Health Program (DWHRP) was launched. Unfortunately, the program was dismantled before participating members could establish an infrastructure that both sustained and integrated research, policy and care strategies across the DoD in an efficient and cost-effective manner (McGraw, Koehlmoos, & Ritchie, 2016). To date, centralized recommendations on military women's health research priorities are still nonexistent.

Such priorities are critical because service members experience more physical and psychiatric morbidity than their civilian counterparts (Research Triangle Institute (RTI) International, 2009; U.S. Department of Defense (DoD), 2013) and some health conditions may differentially affect men and women U.S. Government Accountability Office (U.S. Government Accountability Office (GAO), 2013a). These differences are particularly important because the potential societal implications of disease and disability among women do not exempt military women (World Health Organization (WHO), 2008, 2009). Furthermore, the healthcare needs of military women differ from civilian women due to the unique social, environmental, and occupational exposures of military service. As military women continue to deploy and serve across more diverse occupational specialties, they are potentially exposed to increased health risks (GAO, 2013b).

The rapidly evolving nature of service women's roles necessitates the commitment of targeted research priorities and increased resources to this underdeveloped field. Research that aligns with and anticipates the changing trajectory of service women's experiences and will provide a more nuanced understanding of the factors that influence these experiences is critical to achieving positive health outcomes and maintaining operational readiness.

Background & Key Questions

In response to a 2015 National Defense Authorization Act (NDAA) request for more information about the health of U.S. service women, researchers at the Naval Health Research Center (NHRC) conducted a comprehensive review of the existing peer-reviewed literature on military women's health from 2000 to 2015. Using these results in combination with recent healthcare utilization data, a gap analysis was performed to identify potentially important research areas which were not well-represented in the literature. The project team had one other main goal beyond reviewing the existing literature, summarizing the healthcare utilization data, and conducting a gap analysis. The research team wanted to develop, and provide wide access to an online repository of all gender-specific and gender-inclusive articles within the project's analytic sample, alongside subject matter expert review of each article. This web-based repository is available to individuals and organizations interested in improving the health outcomes and operational readiness of service women, at <http://triservicenursing.org/database/womenshealth/>. This complete research report is built upon a previously published report by the TriService Nursing Research Program (TSNRP) Military Women's Health Research Interest Group (MWHRIG). The previous report assessed the peer-reviewed literature on military women's health from 2000-2010 (Trego, Rychnovsky, Wilson, Steele, & CHARS, 2015). This report is an expansion of the work done with that previous report.

The key questions of the current report were: 1) What peer-reviewed literature exists regarding the health outcomes and operational readiness of military women? 2) What is the quality of the available peer-reviewed literature and resulting evidence? 3) Are there differences in healthcare utilization by gender? and 4) Looking at the peer-reviewed literature and healthcare utilization data, are there research gaps that need to be addressed? Providing answers to these questions will enable military healthcare providers, researchers, and policy makers to more effectively target future health interventions, research initiatives, and funding opportunities. The rest of this report will be organized in terms of the research team's efforts to address these four questions.

Methods - Question 1: What Research Has Been Conducted on the Health of U.S. Military Women?

Benefits of a Scoping Review

Traditionally, large scale literature reviews are conducted using the systematic literature review format. According to the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P), a systematic review “attempts to collate all relevant evidence that fits pre-specified eligibility criteria to answer a specific research question” and “uses explicit, systematic methods to minimize bias in the identification, selection, synthesis, and summary of studies” (Moher et al., 2015, p. 3). A systematic literature review can also examine and synthesize statistical findings across similar study designs to answer a specific research question.

This project, however, sought to examine a very broad topic: “What research on the health outcomes of U.S. service women has been published between 2000 and 2015?” There was no narrowing of the focus to a specific research topic, and all types of study designs could be included. Therefore, the research team determined that it was not appropriate to conduct a traditional systematic literature review. In order to compile the evidence from a large, extremely diverse body of literature, a scoping literature review was conducted.

The claim has been levelled that scoping reviews are simply systematic reviews with less rigor (Brien, Lorenzetti, Lewis, Kennedy, & Ghali, 2010). However, scoping reviews are designed with a different purpose and breadth of knowledge in mind (Gough, Thomas, & Oliver, 2012). The scoping literature review compiles evidence from a range of study designs “thereby providing a mechanism for summarizing and disseminating research findings to policy makers, practitioners, and consumers,” and can draw “conclusions from the existing literature regarding the overall state of research activity” (Arksey & O'Malley, 2005, p. 21). Since scoping reviews are specifically designed to survey broad bodies of literature, they are particularly useful for identifying gaps in scientific knowledge (Kastner et al., 2012). According to Mays, Roberts, & Popay, scoping reviews map out “the key concepts underpinning a research area and the main sources and types of evidence available, and can be undertaken as standalone projects in their own right, especially when an area is complex” (2001, p. 194). Scoping reviews provide “a lay of the land” (Colquhoun et al., 2014, p. 1292), and this map of the research field can later be used to ask more precise research questions which are best answered with a systematic review.

Both systematic reviews and scoping reviews seek to approach the literature using a standardized stepwise approach. However, there are important conceptual and methodological differences between the two types of reviews. Some of the major differences have been summarized in Table 1.

Table 1
Comparisons Between Systematic and Scoping Reviews

Systematic Review	Scoping Review
Answers a focused research question with narrow parameters	Answers a broad research question
Examines articles with similar study designs	Examines articles across various study designs (e.g. randomized controlled trials, focus groups)
Describes specific research findings	Maps key themes, trends, and patterns within fields of study
Aggregates data using quantitative methods	Aggregates data using a combination of quantitative and qualitative methods
Assesses the depth of a topic	Assesses the breadth of a topic
Assesses risk of bias within and across similar studies using statistical methods	Does not statistically assess for bias due to the wide variability in study designs and questions
Summarizes previous analyses on a focused research question	Serves as an exploratory analysis of a broad topic or field of study
Generates conclusions relating to the focused research question	Identifies gaps in a body of literature and provides a platform for future research

Ultimately, the scoping review methodology was chosen for this study because it allowed for the presentation of a large body of varied research in an accessible and summarized format. A scoping review cannot assess the risk of bias within individual studies or aggregate principal summary measures (e.g. odds ratios) due to the breadth of literature surveyed; that is the province of the systematic literature review or meta-analysis. Due to the volume of literature surveyed in a scoping review, it is not practical or possible to present outcome effect estimates and confidence intervals for each study. The aim of this project was not to describe the effectiveness of, or collate specific research findings on, any particular intervention or field of study; the aim was to survey the recent literature for topical content using a wide-lens perspective. By describing trends and patterns in the articles, this scoping review highlighted research gaps in the existing peer-reviewed literature on the health of service women.

The research map generated by this project will be an invaluable resource for DoD health policy makers and funding organizations when developing long range strategies for research prioritization, as it will highlight areas of research that are currently inadequately studied.

Selection of Articles

In consultation with the MWHRIG a list of terms was developed that would be used in the literature search for this project. To capture all articles examining health issues of women serving in the U.S. Armed Forces, specific search criteria and medical subject heading (MeSH) terms were used (see Appendix C). A comprehensive search terms list can be found in Appendix D. From May 4, 2015 to November 1, 2015, NHRC researchers looked for potentially relevant peer-reviewed research articles on service women and military health using the following search engines:

MEDLINE/PubMed, Web of Science, CINAHL, and PsychINFO. The literature search included articles published between January 1, 2000, and September 30, 2015. All 14,999 articles retrieved from the initial search included bibliographic information and abstracts, and were compiled into an EndNote file (Clarivate Analytics, 2017) and given a unique identification number.

Systematic literature review or qualitative metasynthesis articles were excluded from consideration, because articles included in these reviews would also be captured individually by the extensive search strategy. However, to ensure that all relevant articles were identified, the reference sections of literature reviews and meta-syntheses were searched to find articles that may have been missed by the primary search strategy. Meta-analyses ($N = 3$) were included, as these studies can generate new knowledge by coalescing similar studies into one statistical analysis (Greenland & O'Rourke, 2008; Walker, Hernandez, & Kattan, 2008).

Inclusion and exclusion criteria. After removal of duplicates, 14,999 unique articles from the literature search were subject to review based on pre-determined criteria. Table 2 shows the four level review process that was used to select appropriate articles.

Table 2
Levels of Article Review

Level	Reviewed	Reviewers
1	Title and Keywords	NHRC Team
2	Abstract	NHRC Team
3	Full Text	NHRC Team
4	Full Text	Subject Matter Experts

The purpose of levels 1-3 of the review was to ensure that the correct articles were selected for review. These 3 reviews involved increasingly comprehensive reviews of each article to determine whether it met inclusion or exclusion criteria. Specifically, during Level 1 review, the title and keywords of each article were examined; during Level 2 review, the abstract was reviewed; during Level 3 review, the full text was reviewed. Articles that did not meet inclusion/exclusion criteria at any level of the review process were removed from further analysis. A complete list of inclusion and exclusion criteria used in Levels 1 through 3 can be seen in Table 3. In order to maintain a focus on the health of service women, all articles were required to include a female sample AND include gender specific results and analysis in order to be included for full review. All articles that passed the screening process were placed in a database for Level 4 review.

Table 3
Level One and Two Inclusion and Exclusion Criteria

Criteria	
Inclusion	Exclusion
U.S. military personnel Included female service members, compared male to female service members, or compared military females with civilian females Related to Military Health System (MHS) or MHS care delivered to service women Involved Active Duty, Reserve, or National Guard eligible for MHS healthcare ¹ Involved a health condition or functional status that required healthcare services Included a female sample AND included gender specific results and analysis	Literature reviews without novel data Editorials, expert opinion, commentaries, unpublished reports, historical articles, meeting summaries, case reports Focused solely on medical, nursing, or allied health education Involved only cadets or midshipmen ² Involved only veterans (prior Active Duty, Reserve or National Guard)

Note. ¹ Reserve and National Guard members were considered eligible for MHS healthcare if they were activated at the time of study data collection.

² Because some branches of the United States military consider cadets or midshipmen to be active duty while others do not, cadets and midshipmen were uniformly excluded for consistency.

Data Extraction

Relevant data were extracted from each article that passed the Level 3 review process. Level 3 data extraction was performed by NHRC staff. Level 4 data extraction was performed by external subject matter experts (SMEs, see Appendix B). Data extraction methods for Levels 3 & 4 are described in more detail below.

Level 3 Review. Relevant study information was collected using a specially developed form (Appendix E). To ensure that all reviewers collected data in a consistent manner, a data codebook including definitions for each data element was developed and disseminated to the entire team. The data elements coded for each article (shown in Table 4) were entered into an SPSS database for later statistical analysis. Some of this extracted data was also used to populate the searchable online repository of articles, as well as Level 4 SME reviews.

Table 4
Data Extracted in Level 3 Review

Variables for analysis	
Research question/hypothesis	Theoretical/conceptual framework
Total sample	Response rate
Male sample size	Female sample size
Branch of service	Inclusion and exclusion criteria
Participant demographics	Source of database records
Timeframe of data collection	Specific research instruments used
Deployment data collection setting	Physiological/clinical measures collected
Study design	Research setting
Method of data collection	Sampling method
Author disciplines	Topics covered

Level 4 Review. All articles that met inclusion criteria based on Level 3 review were assigned to SMEs for Level 4 review. Level 4 reviewers were SMEs from a broad range of backgrounds and specialties representing clinicians and researchers from the DoD, academia, and every branch of the U.S. military. Identification of SMEs was conducted using a snowball recruitment technique. The first SMEs were identified as experts or leaders in their areas of clinical practice or research by the MWHRIG core leaders. These SMEs were then asked to identify other experts they believed would be qualified to volunteer. Every effort was made to provide SMEs with articles appropriate to their areas of expertise. In order to be considered for participation, each recommended expert was required to meet the following criteria: (1) had earned a Master's degree or higher in a professional discipline; (2) had an interest in military women's health; (3) had a basic understanding of the U.S. military population and structure.

In order to avoid any conflict of interest, none of the NHRC study personnel were allowed to perform Level 4 reviews. A total of 264 SMEs participated in Level 4 reviews, which were completed using an online survey platform (SurveyGizmo, 2005-2017). Each SME was asked to review at least three articles, but the actual number of articles reviewed varied. SMEs extracted and evaluated the following data from each article: study question, overall study findings, gender-specific findings (including statistical significance), study limitations, and general comments. A copy of the Level 4 SME survey can be seen in Appendix F.

Analyses of Data

Descriptive statistics, including frequencies and percentages, were performed on all data extracted from each reviewed article. For some analyses, descriptive statistics were stratified by variable of interest (e.g. by branch of service, quality score, data collection method, etc.).

Categorization of articles. Article topics and subtopics were initially extracted during Level 3 review using 8 topics and 52 subtopics that were identified as relevant to military women's health by the MWHRIG in the Phase I MWHRIG Report (Trego et al., 2015). For a complete list of the Phase I topics and subtopics, see Appendix G. During Level 3, reviewers were instructed to select as many of the topic and subtopic categories as were appropriate for the article. If the article did not seem to fit into any of the existing categories, reviewers were instructed to manually type the article topics and subtopics into a free-text field for later analysis.

Upon completion of Level 3 classification of articles by topic and subtopic, it became clear that the topics and subtopics previously identified by the MWHRIG did not capture the full range of content on military women's health within the published literature. This was due to the fact that the Phase II literature review included over 600 more articles than the MWHRIG Phase I review. To ensure that as many articles were properly categorized as possible, the research team began an iterative process of creating new topics and subtopics. To this end, frequencies for each topic, subtopic, and free text field were obtained from the SPSS database. Members of the research team compared the existing and free text fields for each topic and subtopic and generated re-categorization tables that would better capture the topical content of each article. At the end of this process, 8 topics and 73 subtopics had been categorized. These topics and the number of subtopics within each main topic can be seen in Table 5.

Table 5
Categorized Topics and Number of Subtopics Within Each Main Area

Topic	Subtopics (<i>n</i>)
Psychological Health	16
Ob/Gyn Health	16
Readiness	9
Injury	7
Social Relationships	7
Deployment Health	6
Chronic Illness	6
Acute Care & Preventive Medicine	6

Upon finalization of the new topics and subtopics, all articles were re-reviewed to ensure that they were tagged with appropriate topics and subtopics. To ensure that all reviewers re-categorized the articles in a consistent manner, a topic and subtopic definition guide was created and team members had frequent meetings to discuss any questions that arose. In this stage of the process, there were no

free-text fields; each article was categorized under at least one of the existing topic and subtopic areas. For example, if an article was about the risk of adverse birth outcomes due to vaccination, the article would have been categorized as both “vaccinations” (under Acute Care and Preventive Medicine) and “birth outcomes/infant health” (under Ob/Gyn).

Quality Assurance

In order to ensure that each article was properly reviewed, several quality assurance measures were undertaken in each level of the review process. If an article was marked for exclusion during Level 1 through Level 3 reviews, a second reviewer examined the article using the selection criteria shown in Table 3. If both reviewers agreed that the article did not fit the inclusion criteria, the article was excluded. If the two reviewers did not agree, a third reviewer examined the article and made a determination so that two of the three reviewers reached a consensus. All three reviewers then discussed reasons for inclusion or exclusion, and disseminated these conclusions at weekly meetings to ensure that all team members were using the same criteria for article review.

To improve data quality during Level 3 data extraction, one of the senior investigators randomly reviewed 10% of all Level 3 data extraction forms and cross checked results with the primary reviewer. Differences in answers were discussed and a consensus was reached between the initial reviewer and the senior investigator. Conclusions from these discussions were then disseminated to the review team during weekly meetings to ensure that all team members were using the same criteria for review. Inter-rater reliability was not assessed. Upon completion of Level 4 SME review, each online entry was checked for quality by a research team member. If the review was incomplete, or of obvious low quality, the article was re-reviewed by a different SME; this happened only twice.

To ensure that articles were categorized and re-categorized consistently, 10% of the article categories were reviewed by one of the senior investigators and a third reviewer. Discrepancies were discussed, and the senior investigator made a final determination in the event of disagreement. Clarifications were disseminated to the team on a regular basis.

Methods - Question 2: What is the Quality of the Available Research?

Selection of Articles

The articles were selected as noted in Methods – Question 1.

Data Extraction

Hierarchy of evidence. The Level 3 reviews assessed the level of evidence ranking indicated by the study design. As the research came from a diverse pool of disciplines and covered a wide variety of topics, it was important to rank the evidence consistently across all articles included in the final review. To do this, the team adapted the Rating System for the Hierarchy of Evidence developed by Melnyk and Fineout-Overholt (2011); this adapted framework is shown in Table 6.

Table 6
Hierarchy of Evidence Levels for Intervention Studies

Level	Study Design	Strength
I	META-ANALYSIS: A quantitative synthesis of evidence from all relevant randomized controlled trials	Strongest
II	EXPERIMENTAL: An experiment in which subjects are randomized to a treatment group or control group	
III	QUASI-EXPERIMENTAL: An experiment in which subjects are non-randomly assigned to a treatment group or control group	
IV	CASE-CONTROL study: a comparison of subjects with a condition (case) with those who do not have the condition (control) to determine characteristics that might predict the condition COHORT study: an observation of a selected group (cohort) to determine the development of an outcome, such as disease CORRELATIONAL study: an examination of whether a relationship or association exists between 2 or more variables; cannot determine causality	
V	QUALITATIVE study: a detailed observation of human behavior to understand why and how decisions are made DESCRIPTIVE study: a collection of information on the what, where, and when of a topic of interest	Weakest

Note. Adapted from “Rating System for the Hierarchy of Evidence for Intervention/Treatment Questions” by B. M. Melnyk and E. Fineout-Overholt, 2011, *Evidence-Based Practice in Nursing and Healthcare: A Guide to Best Practice*, p.12. Philadelphia: Lippincott Williams & Wilkins.

According to this rating system, meta-analyses of randomized controlled trials provide the strongest evidence, whereas purely qualitative or descriptive studies offer weaker evidence. The team modified the rating system and the language used within it for clarity and study purpose, as can be seen in

Table 6. For example, systematic literature reviews of descriptive or qualitative studies were excluded for reasons described previously (Selection of Articles); expert opinions were part of exclusion criteria described in Table 3. Each rank of the modified hierarchy (I – V) was accompanied by descriptions of each type of study that could be encountered by reviewers. This gave guidance for the team in classifying articles written by authors across a variety of disciplines; each discipline does not use the exact same study design terminology.

Development of a quality indicator checklist. While the research team was able to adapt a pre-existing instrument to rank levels of evidence across all research articles, this was not possible for rating article quality. The Johns Hopkins Nursing Quality of Evidence Appraisal instrument (Newhouse, Dearholt, Poe, Pugh, & White, 2007) used by Trego and colleagues (Trego et al., 2015), was considered for this project. However, this instrument did not meet the criteria of the current project, which required an instrument that would (1) assess multiple dimensions of quality, (2) incorporate objective criteria, and (3) be applicable across a wide spectrum of research articles. A report by Nutley, Powell, and Davies (2013) outlined the Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI-Centre) format for assessing evidence quality (Nutley et al., 2013). The framework assesses individual studies according to three dimensions: (a) internal validity; (b) appropriateness of study method; and (c) appropriateness of samples, context, and measures. After each dimension is rated, the three separate ratings are combined for an overall assessment ranging from high to low. This method aligned well with the three criteria of the current project (listed above), and served as a good starting point for developing a quality assessment instrument.

The next challenge was to find an instrument that could be used to hone the particular dimensions of quality to be assessed. In a 2014 report by the Department for International Development (DFID), the authors focused on assessing the strength of scientific evidence. The following principles of high quality research articles were outlined: (1) conceptual framing; (2) transparency; (3) appropriateness; (4) cultural sensitivity; (5) validity; (6) reliability; and (7) cogency (Department for International Development (DFID), 2014).

The research team used 6 out of 7 high quality principles outlined in the report, omitting cultural sensitivity, which is objectively measured by assessing whether or not “the study explicitly considers any context-specific cultural factors that may bias the analysis/findings” (DFID, 2014, p. 14). As all studies to be included for review would be framed by the military cultural context, the research team agreed that this assessment would be redundant. The DFID also defined each principle, providing guidance as to how each could be assessed and measured. Using the EPPI-Centre and DFID frameworks, the research team crafted a quality assessment instrument which met the three criteria for this project: (1) it could assess multiple dimensions of quality, (2) it could incorporate objective criteria, and (3) it could be used across a wide spectrum of articles. The quality indicators, and operational definitions for each, are listed in Figure 1.

Conceptual Framing
<p>Authors describe a theoretical basis for their research.</p> <p>Authors describe a conceptual model of how the current analysis sits within the context of existing literature.</p> <p>Authors pose specific research questions and investigate specific hypotheses.</p>
Appropriateness
<p>The design and methods are clearly stated.</p> <p>Descriptive information on study structure is given.</p> <p>The descriptive information given is appropriate for the research project.</p>
Transparency
<p>There is clear disclosure of all data collected.</p> <p>Enough information is given so that the study can be replicated.</p>
Validity
<p>The measures used are well suited to measuring the indicators.</p> <p>Findings of a study are likely to be replicable across multiple contexts.</p>
Reliability
<p>Steps are taken to ensure that data gathered is measured consistently across the different members of the research team.</p> <p>The instruments/measures are applied consistently across the study population.</p>
Cogeneity
<p>A clear, logical thread runs through the entire paper.</p> <p>Limitations are identified, and alternative interpretations are explored.</p>

Figure 1. Principles of high quality within research articles. Adapted from “Assessing the Strength of Evidence,” by the U.K. Department for International Development, 2014. Retrieved from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/291982/HTN-strength-evidence-march2014.pdf

Analyses of Data

A base quality score was calculated for each article using the investigator-developed Quality Indicator Checklist (QIC). Articles were categorized by study design (i.e. quantitative, qualitative, or mixed methods). Data were exported to SPSS, and thereafter summative scores from the QIC questions for all articles were calculated. Quality was scored across the six domains seen in Figure 2.

For a detailed description of how articles were scored on quality, see Appendix H. Quality ratings were assigned based on the following percentages: low (<70%), good (70-89.99%), and excellent (≥90%). See Appendix I for a scoring example. Additionally, frequencies were run on quality overall, and across topic and subtopic areas.

Conceptual Framing	Yes	No
Max Total = 2 pts		
Is a theoretical or conceptual framework mentioned?	<input type="checkbox"/> (1 pt)	<input type="checkbox"/> (0 pts)
Is there a research question or hypothesis stated?	<input type="checkbox"/> (1 pt)	<input type="checkbox"/> (0 pts)
Appropriateness	Yes	No
Were the following included?		
Max Total = 2 pts		
Sampling method	<input type="checkbox"/> (.4 pts)	<input type="checkbox"/> (0 pts)
Research setting	<input type="checkbox"/> (.4 pts)	<input type="checkbox"/> (0 pts)
Study design	<input type="checkbox"/> (.4 pts)	<input type="checkbox"/> (0 pts)
Time frame of data collection	<input type="checkbox"/> (.4 pts)	<input type="checkbox"/> (0 pts)
Number of female participants	<input type="checkbox"/> (.4 pts)	<input type="checkbox"/> (0 pts)
Transparency	Yes	No
Were the following included?		
Max Total = 2 pts		
Age	<input type="checkbox"/> (.4 pts)	<input type="checkbox"/> (0 pts)
Sex	<input type="checkbox"/> (.4 pts)	<input type="checkbox"/> (0 pts)
Rank	<input type="checkbox"/> (.4 pts)	<input type="checkbox"/> (0 pts)
Sample size	<input type="checkbox"/> (.4 pts)	<input type="checkbox"/> (0 pts)
Service branch	<input type="checkbox"/> (.4 pts)	<input type="checkbox"/> (0 pts)
Validity	Yes	No
Quantitative or Qualitative: Max Total = 2 pts		
Mixed Methods: Max Total = 4 pts		
Were at least one-third of the instruments and measures used within the study validated?	<input type="checkbox"/> (1 pt)	<input type="checkbox"/> (0 pts)
Were 66% or more of the instruments and measures used within the study validated?	<input type="checkbox"/> (1 pt)	<input type="checkbox"/> (0 pts)
<i>Qualitative: Do the results of the research apply to other contexts or settings for military service women?</i>	<input type="checkbox"/> (2 pts)	<input type="checkbox"/> (0 pts)
Reliability	Yes	No
Quantitative or Qualitative: Max Total = 2 pts		
Mixed Methods: Max Total = 4 pts		
Was there some discussion about steps to ensure that researchers were consistent in the way they asked questions or gathered data? Or was data gathered via online/eformat?	<input type="checkbox"/> (2 pts)	<input type="checkbox"/> (0 pts)
<i>Qualitative: Was there documentation of checking data, analyses, or potential biases with other team members?</i>	<input type="checkbox"/> (2 pts)	<input type="checkbox"/> (0 pts)
Cogency	Yes	No
Max Total = 2 pts		
Are study limitations addressed?	<input type="checkbox"/> (1 pt)	<input type="checkbox"/> (0 pts)
Does the study make sense throughout?	<input type="checkbox"/> (1 pt)	<input type="checkbox"/> (0 pts)

Figure 2. Quality Indicators Checklist. Internal scores were used to provide a 'low', 'good', or 'excellent' quality rating for each article.

Quality Assurance

A senior investigator randomly reviewed 10% of data extractions, and cross-checked results with the primary data analyst to ensure that all relevant data had been extracted correctly. During statistical analysis of quality scores, the research team performed multiple calculation iterations to ensure that the quality scores were accurate across all types of studies. To ensure that quality scores were accurately calculated in SPSS, two members of the research team calculated the quality scores for a small random subset of each study type by hand and compared results to the calculations performed in SPSS. If any differences were found, the quality scoring syntax was corrected, re-run, and scores were re-calculated until there was 100% agreement between SPSS and hand calculations.

**Results and Discussion - Questions 1 & 2:
What Research has been Conducted on the Health of U.S. Military Women?
What is the Quality of the Available Research?**

A total of 14,999 articles were identified from the literature search. The literature search flow and reasons for exclusion from the analytic sample can be seen in Figure 3. During the Level 1 and Level 2 reviews, 13,637 articles were excluded. The Level 3 review served as a quality assurance checkpoint. During Level 3 review, the full texts of all 1,362 remaining articles were reviewed, using the same inclusion/exclusion criteria as in Level 1 and 2 reviews. Another 383 articles were flagged as inappropriate, and subsequently removed from further review. The remaining 979 articles were sent to one of 264 SMEs for Level 4 review.

Table 7 shows the results of the iterative four-step review process. A total of 6.5% of articles from the initial search result of 14,999 articles were retained for full analysis. The final sample consisted of 979 articles which related to the health of female service members on active duty.

Table 7
Article Review Summary Table

Level	N	% of Articles	Reviewed	Reviewers
1	14,999	100%	Title and Keywords	NHRC team
2	4,497	30%	Abstract	NHRC team
3	1,362	9.1%	Full Text	NHRC team
4	979	6.5%	Full Text	SMEs

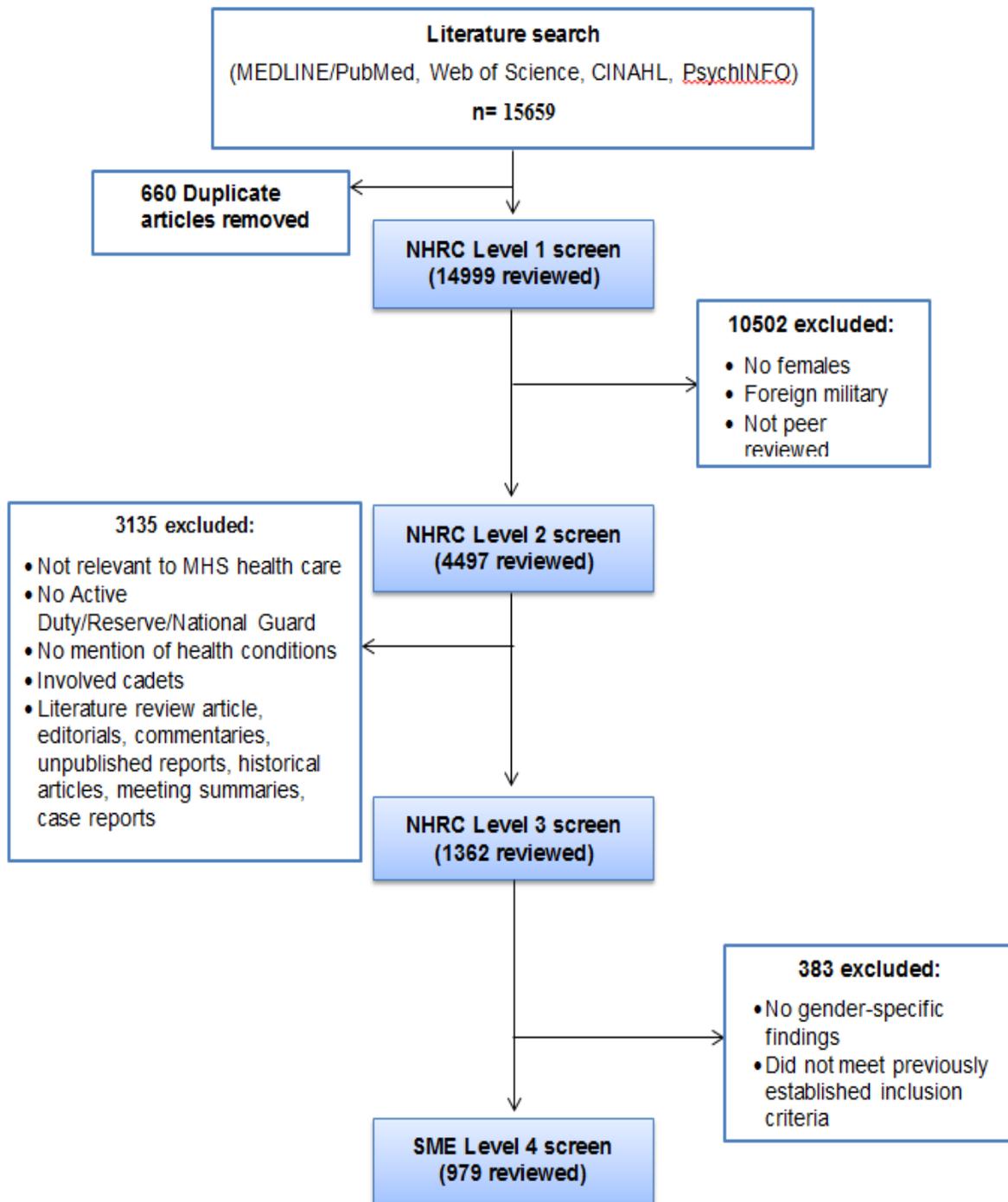


Figure 3. Schema for article review process, 2000-2015.

General Overview of the Analytic Sample

The peer-reviewed articles included in this report were published during the 15 year period between January 1, 2000 and September 30, 2015. Overall findings are presented initially, with quality recommendations to follow. Thereafter, each topic and subtopic of the review is presented, with more detailed quality analyses.

A comprehensive list of primary authors was created to demonstrate the breadth of academic disciplines represented in the scoping review. Military affiliations of primary authors were also included; more than 15% of authors were listed as current or former active duty/reserve at the time of publication. The comprehensive list resulted in 55 specific clinical and academic disciplines. The top five primary author disciplines represented were psychology/psychiatry, epidemiology, orthopedics, public health, and nursing. For a complete list of author affiliations, see Appendix J. Additional publication trends were analyzed using a variety of demographic data.

Figure 4 shows publication trends for military health research stratified by gender characteristics of the samples. In general, there was a gradual decline in gender-inclusive publications from 2000 to 2004, a gradual incline from 2004 to 2012, and a precipitous decline from 2013 to 2015. Publication results from 2015 should be interpreted with caution because of the abbreviated search dates for that year (January 01 to September 30, 2015).

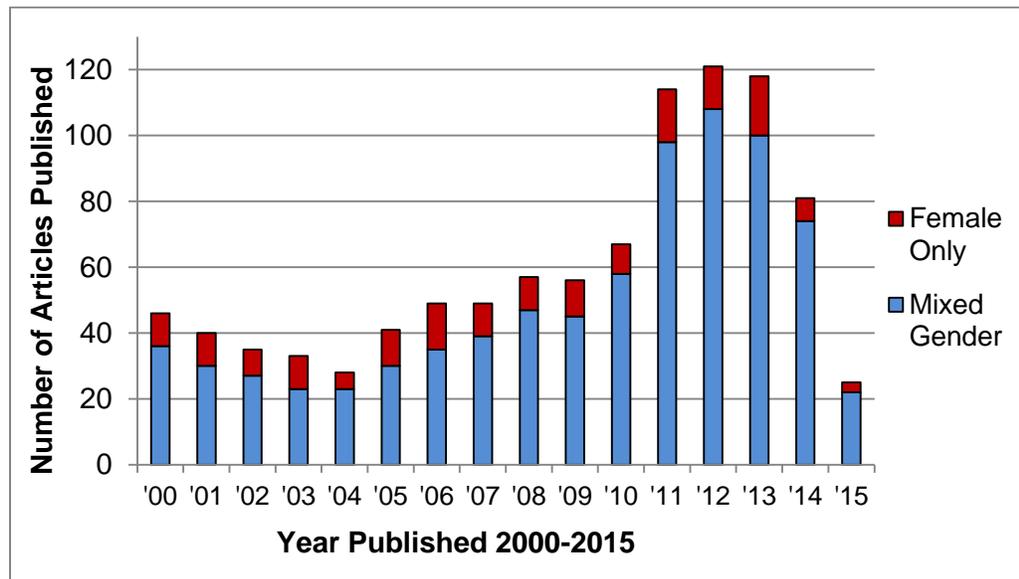


Figure 4. Publication trends from 2000 to 2015 by female specific and gender inclusive samples.
Note. 2015 data only includes articles published before September 30, 2015.

During the time frame from 2011 to 2013, there were more articles with female-only samples published than in any of the other years; the number of articles with gender-inclusive samples nearly doubled and tripled in this time when compared with numbers from previous years. The surge of research activity at this time could be attributed to the decreased operational tempo of Operations Enduring Freedom (OEF) and Iraqi Freedom (OIF). Results generated from the publication trend

data may imply increases in military health research during the tapering years of formal military conflicts, as opposed to the beginning or midpoint periods. This may hint at potential difficulties in gathering data and obtaining approvals to begin research with military populations during wartime. The data may also the scaling down of research as a DoD priority during periods of high operational tempo. However, prioritizing research during these critical wartime periods allows for timely dissemination of healthcare research findings, improving care for warfighters and their families.

To obtain an overview of the research collected, samples from different military service branches were analyzed. The data for Figure 5 were abstracted from reviewed articles and from published military population demographics from 2014 (DoD, 2015). The percentage of the entire Active Duty and Ready Reserve military force represented by each service branch during 2014 can be seen in Figure 5. This data is juxtaposed with the number of articles that reflect research samples within each service branch. Many studies included in the analysis contained samples from multiple Active Duty service branches (e.g. one study could contain Army and Marine Corps samples); the article count reflected for each service branch is not mutually exclusive. All articles were counted once for each branch of service that was represented.

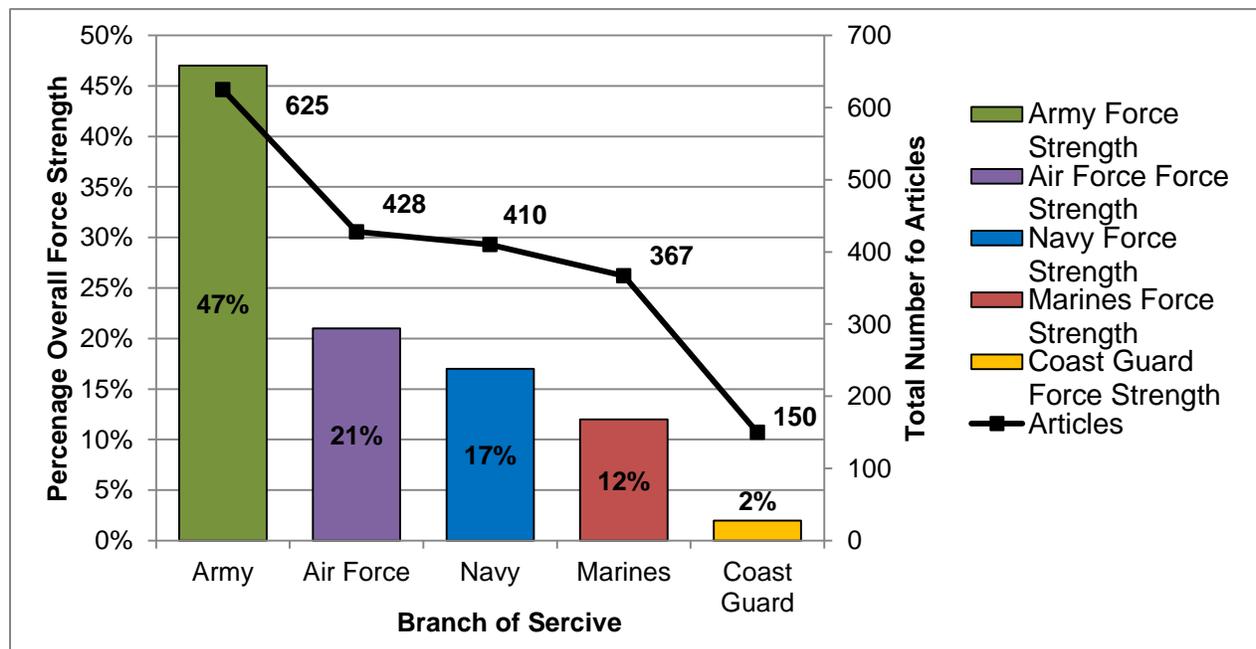


Figure 5. Count of articles with a branch specific sample compared to service branch force strength percentages. Branch of Service and total number of articles are not mutually exclusive.

Out of 979 articles within the analytic sample, the Air Force and Navy samples were reflected in 44% and 42% of the articles, respectively. Almost two thirds of the articles included in our analytic sample (64%) represented U.S. Army samples; this may reflect the relatively greater size of the Army in comparison to the other service branches. The Marine Corps and Coast Guard samples were very well represented based on their force distribution (37% and 15% of articles, respectively). For the

Marine Corps, this may reflect increased research with ground forces during the recent wars in Iraq and Afghanistan.

Figure 6 shows the elapsed number of years between the end of data collection and the publication of study results in a peer-reviewed journal. Data for this graph was only available for articles that listed a data collection timeframe ($n=782$). Overall the mean time between the reported end of data collection and publication was 3.97 years (SD 2.55 years).

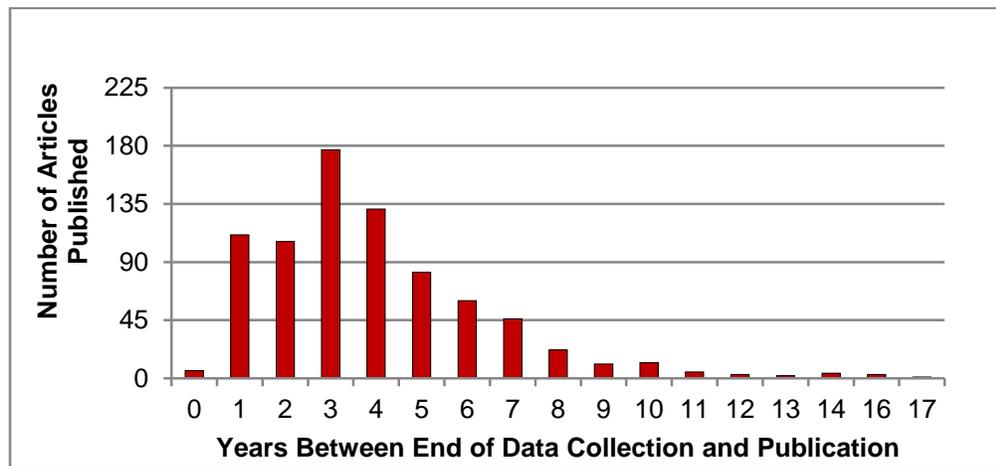


Figure 6. Number of years between end of data collection and article publication.

While publishing military research does require additional approvals for review of sensitive content, timely publication of findings is essential for translating research into clinical practice (Beller, Chen, Wang, & Glasziou, 2013; Carey, Yon, Beadles, & Wines, 2012; Ross, Mocanu, Lampropulos, Tse, & Krumholz, 2013). Over 32% of articles that included a data collection timeframe were published more than 5 years after data collection ended; almost 4% were published more than 10 years after data collection ended. It is beyond the scope of this review to determine why this time lag exists between data collection and publication or to compare publication timelines to the civilian literature. However, this is an area that warrants further investigation. For military research to have the greatest impact on the health and readiness of service members, timely translation of findings into deliverable products is necessary.

Overview of quality within the analytic sample. All 979 articles in this analysis were classified by study design using a modified version of Melnyk and Fineout-Overholt's 2011 Hierarchy of Evidence rating system (see Table 6). Figure 7 shows the hierarchies of evidence represented in the analytic sample.

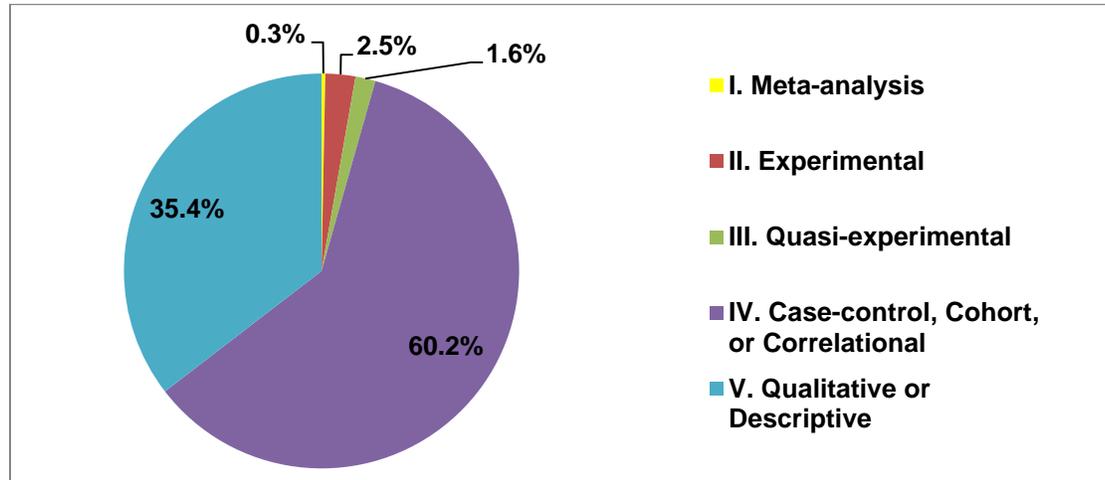


Figure 7. Percentage of articles by Hierarchy of Evidence level.

Both meta-analyses of randomized controlled trials, and experimental study designs, reflect the strongest level of evidence in the Hierarchy of Evidence rating system; out of 979 articles, only 0.3% ($n = 3$) and 2.4% ($n=24$), respectively, met that criteria. This calls attention to the increased need for study designs with stronger levels of evidence, as well as possible difficulties with designing randomized controlled trials in the field of military women's health. Over 60% of the articles ($n=589$) fell under case-control/cohort/correlational study designs, and over 35% ($n = 347$) were qualitative or descriptive studies. This may reflect a research ethos to conduct exploratory work on military women's health using descriptive and observational study designs, prior to randomized controlled trials. It may also reflect the research reality that not every healthcare topic can ethically be studied using a randomized controlled trial methodology. Developing a standardized quality measurement for descriptive and observational studies would thus be very helpful, since most of these studies are ranked as being a weaker level of evidence based on study design alone.

Article quality was determined using criteria previously mentioned (see Figure 2). Using the quality score percentages, excellent articles scored 90% and above, good articles scored between 70-89%, and low articles scored less than 70%. Article quality scores ranged from 32% to 100%. Figure 8 shows that only 10.2% ($n=100$) of the articles scored in the low range. The finding that 89.8% ($n=879$) of all 979 articles scored within the good to excellent range provides greater confidence in the findings represented within the reviewed articles.

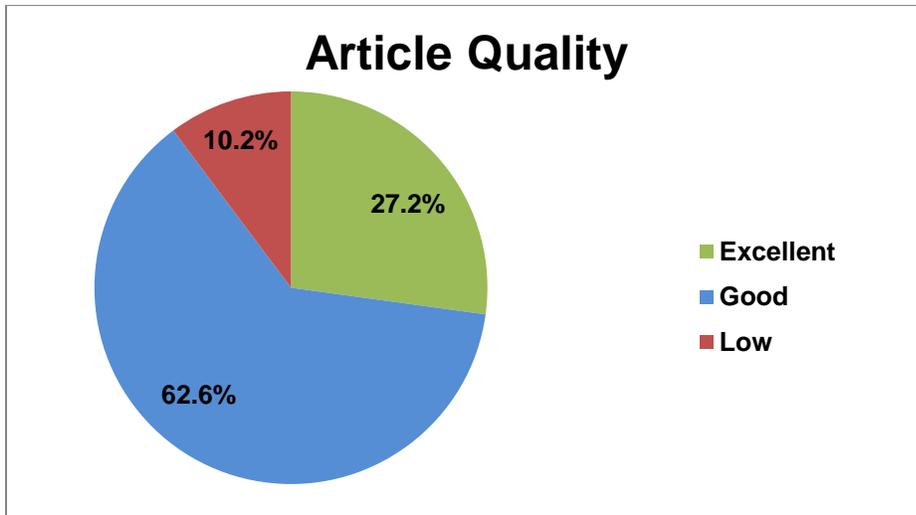


Figure 8. Percentage of articles by quality category

Hierarchy of Evidence level was compared to the three gradations of quality, and can be seen in Figure 9. Levels I, II & III represent the strongest evidence based on the Hierarchy of Evidence rating system. However, within the 43 articles which met the criteria for these three levels, there were 5 articles that were classified as low quality based on the Quality Indicator Checklist (QIC) scoring. The Level IV and Level V articles (589 and 347, respectively) are of weaker evidence based on the Hierarchy of Evidence rating system, but using the QIC scoring, over 89% of them were of good or excellent quality. This shows that Melnyk and Fineout-Overholt’s Hierarchy of Evidence Rating System (2011) may not be a reliable indicator of evidence quality on its own for this body of literature. Using an additional quality measure allows for a more fine-grained analysis of individual articles than can be obtained by using a measure based on study design alone.

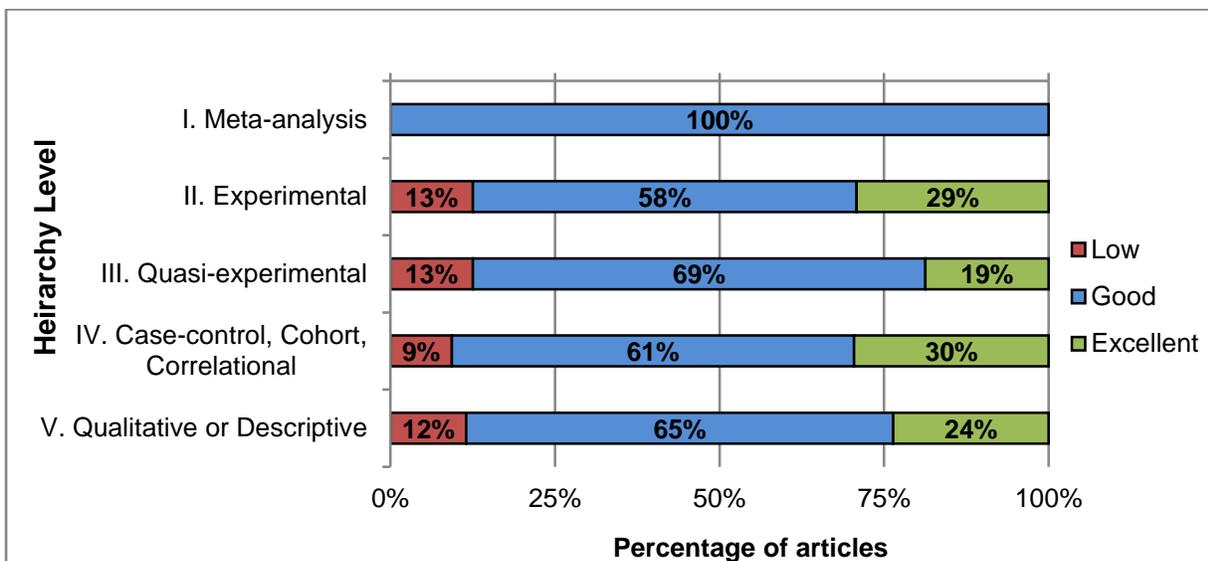


Figure 9. Percentage of articles in each quality category by Hierarchy of Evidence level.

The average quality score across all articles was 82.1 (good quality) regardless of study methodology (quantitative, qualitative, or mixed method). Figure 10 shows the percentage of articles that received full points within each of the 6 quality domains. Most articles lost quality points in the conceptual framing domain; only 24% of articles received full points in this dimension. Conversely, most articles received full points in the reliability domain; only 3% of articles received less than full points. Variations in article quality differed by article topic and study design. These variations are discussed in more detail in the Topic Overview section.

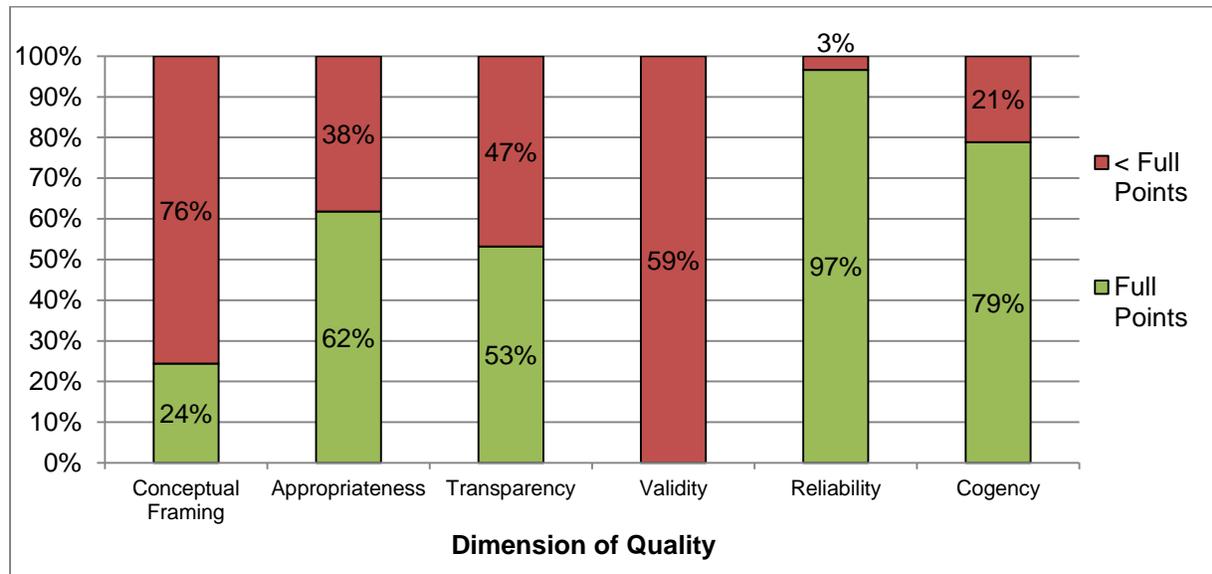


Figure 10. The six Quality Indicators Checklist dimensions with percentages for the analytic sample

Conceptual framing domain. This domain assessed authors' use of a theoretical or conceptual framework as a basis for their research, and whether they posed specific research questions or hypotheses. This domain was the quality indicator category where articles were most likely to lose quality points. As can be seen in Figure 11, almost all of the reviewed articles contained a research question or hypothesis, but only about 25% of articles contained a theoretical or conceptual framework.

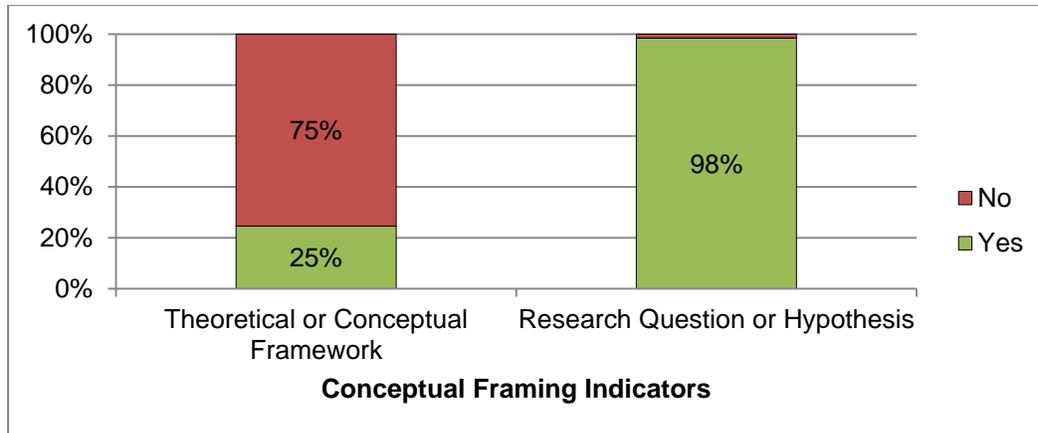


Figure 11. Conceptual Framing domain indicators with percentages for the analytic sample.

The use of a theoretical or conceptual framework varied widely by study methodology, as can be seen in Figure 12. Overall, theoretical or conceptual frameworks were only discussed in 25% (n=241) of articles. Mixed methods studies were the most likely to use a framework (75%, n=3). Only 35.3% (n=6) of the qualitative studies included in this review included a theoretical or conceptual framework. Quantitative studies were the least likely to use frameworks with only 24.2% (n=232) of articles using one. Since approximately 26% (n=253) of the quantitative articles included in this review were population based surveillance type studies, it is not surprising that theoretical or conceptual frameworks were less common within these studies. However, this would still mean that more than 50% of the remaining quantitative articles did not discuss use of a theoretical or conceptual framework.

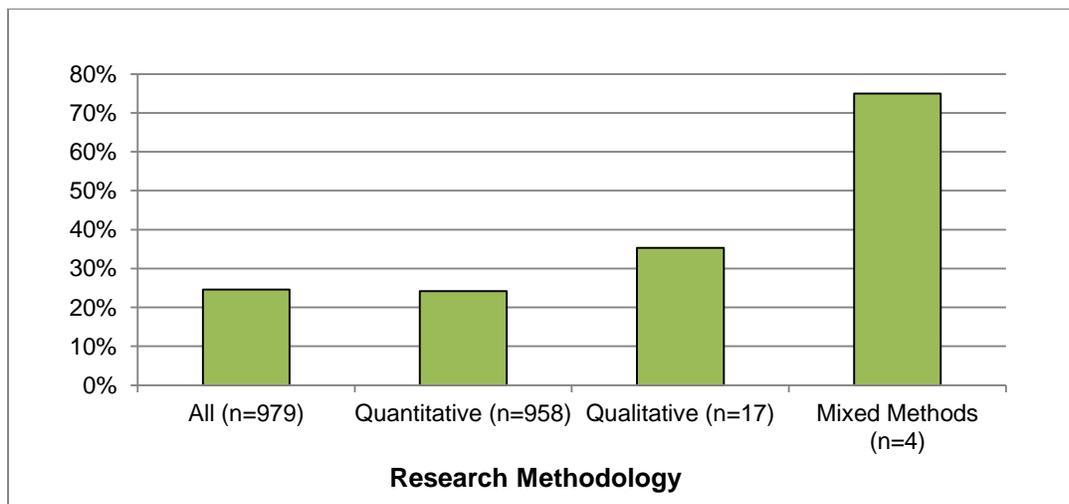


Figure 12. Utilization of a theoretical or conceptual framework by study design type.

Appropriateness domain. This domain assessed authors' clear statement of study design with appropriate descriptive information on study structure. Figure 13 shows the five components of the appropriateness domain, and what percentage of the 979 articles received full points on each component.

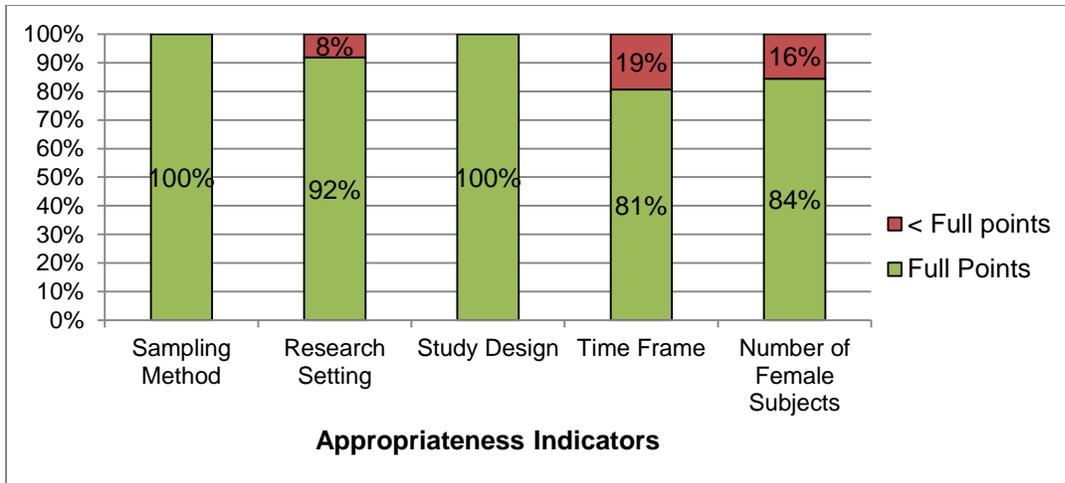


Figure 13. Appropriateness domain indicators with percentages for the analytic sample.

Overall, 62% (n=605) of articles received full points within the Appropriateness domain (Figure 10). On average, articles provided information on four out of the five measures (1.8 out of 2 points, *SD*: 0.24), with the lowest scoring articles providing information on just two out of the five measures (0.8 points). Every article that was reviewed mentioned sampling method and study design; 92% (n=899) of articles included the research setting, 81% (n=790) of articles included the study time frame, and 84% (n=827) of articles included the total number of female participants.

Transparency domain. This domain assessed authors’ inclusion of participant demographics and other information which would allow for study replication. Figure 14 shows the five components of the transparency domain, and what percentage of the 979 articles received full points on each component.

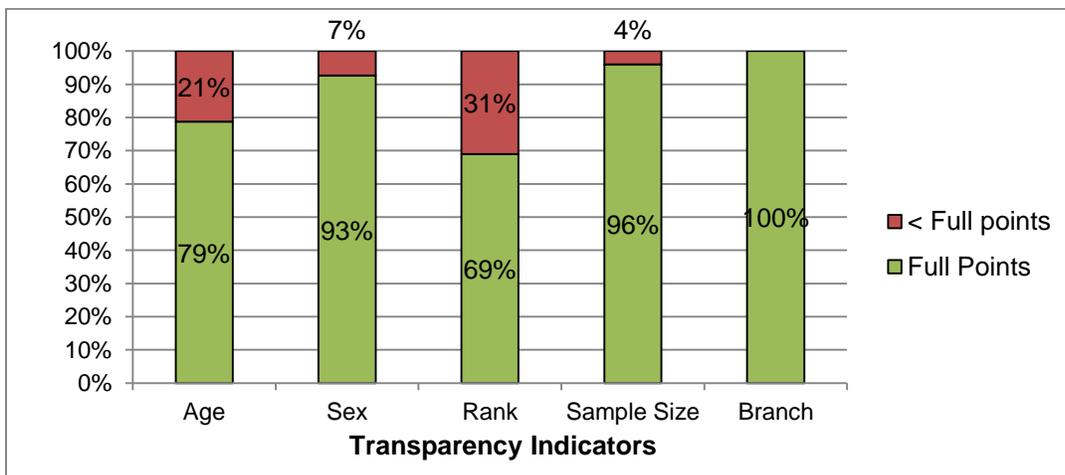


Figure 14. Transparency domain indicators with percentages for the analytic sample.

Overall, 53% (n=521) articles received full points within the Transparency domain (Figure 10). On average, articles provided information on four out of the five measures (1.7 out of 2 points, *SD*: 0.32), with the lowest scoring articles providing information on just one out of the five measures

(0.4 points). All articles gave information on service branch. The component that was least often included was subject rank (69%, n=675); subject age was only included in 79% (n=771) of articles.

Validity domain. The Validity domain assessed whether the data collection instruments used were well suited to accurately measuring the indicators and/or whether study findings could be applicable across multiple contexts. Figure 15 shows the quantitative component and the qualitative component for the validity domain, and what percentage of the 979 articles received full points for this domain.

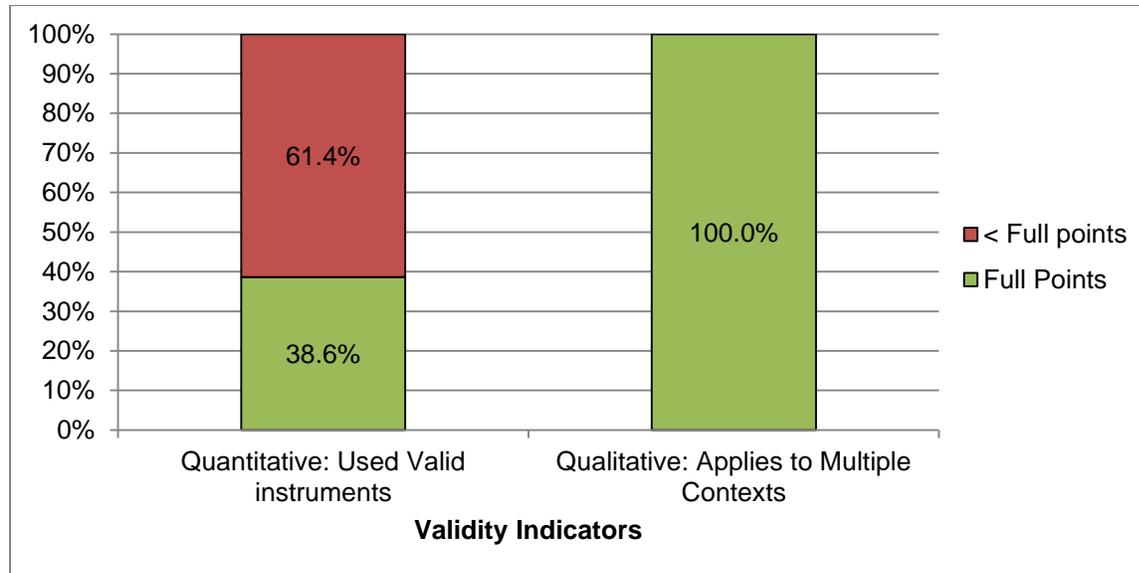


Figure 15 . Validity domain indicators with percentages for the analytic sample.

Validity was a domain where articles often failed to gain quality points; only 41% (n=196) of articles received full Validity points (2 or 4 depending on study design). However there was a large difference in Validity scores between the study types. Qualitative studies scored high in the Validity domain with 100% of articles receiving full points (2 possible). Of the quantitative articles that used at least one research instrument, only 56% (n=261) used instruments that were validated, resulting in lower Validity scores. Among quantitative and mixed methods articles that used research instruments, only 38.6% (n=180) received full points for Validity (2 points for quantitative studies and 4 points for mixed methods studies).

Figure 16 shows a percentage breakdown of articles by how many used questionnaire instruments, and then from that, shows a further snapshot of the articles which used at least one validated instrument. Of the 979 reviewed articles, 466 articles (48%) used at least one research instrument to collect data. Of the 466 articles that used instruments, 261 articles (56%) used at least one validated instrument (with a maximum of 7 reported).

Used Any Instruments

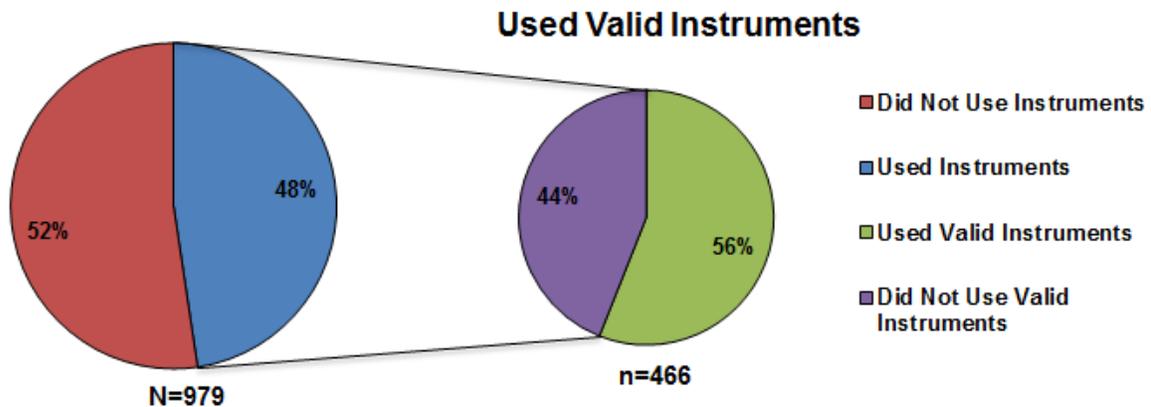


Figure 16. Percentage of articles that used instruments (left) and percentage of articles that used validated instruments (right).

Table 8 shows the top ten most commonly used instruments across the 466 articles that collected data with questionnaire instruments. Out of the top ten instruments, 4 are either military specific or have military oriented components. The DRRI, HRB, Millennium Cohort Study Questionnaire, and a military version of the PCL (PCL-M) are only applicable for military populations. The other 6 items are widely used in civilian literature, and thus may have greater research utility as these tools are comparable across military and civilian populations.

Table 8
Top Ten Utilized Instruments

Instrument Name	Frequency (n)	Percentage (%)	Validated
Post-Traumatic Stress Disorder Checklist (PCL)	82	17.6	Yes
Patient Health Questionnaire (PHQ)	57	12.2	Yes
Deployment Risk and Resilience Inventory (DRRI)	26	5.6	Yes
Medical Outcomes Study Health Survey (MOS)	20	4.3	Yes
Alcohol Use Disorders Identification Test (AUDIT)	16	3.4	Yes
Conflict Tactics Scale (CTS)	16	3.4	Yes
Beck Depression Inventory (BDI)	14	3.0	Yes
Millennium Cohort Study Questionnaire	14	3.0	No
Center for Epidemiologic Studies Depression Scale (CESD)	25	5.4	Yes
DoD Survey of Health Related Behaviors among Active Duty Military Personnel (HRB)	18	3.9	No

Note. Frequency indicates the number of articles that referenced that particular instrument; Percentage was calculated by dividing the number of articles that used the given instrument by 466.

Reliability domain. This domain assessed authors' use of steps to ensure that gathered data was measured consistently across different members of the research team. Figure 17 shows the quantitative component and the qualitative component for the reliability domain, and what percentage of the 979 articles received full points for this domain.

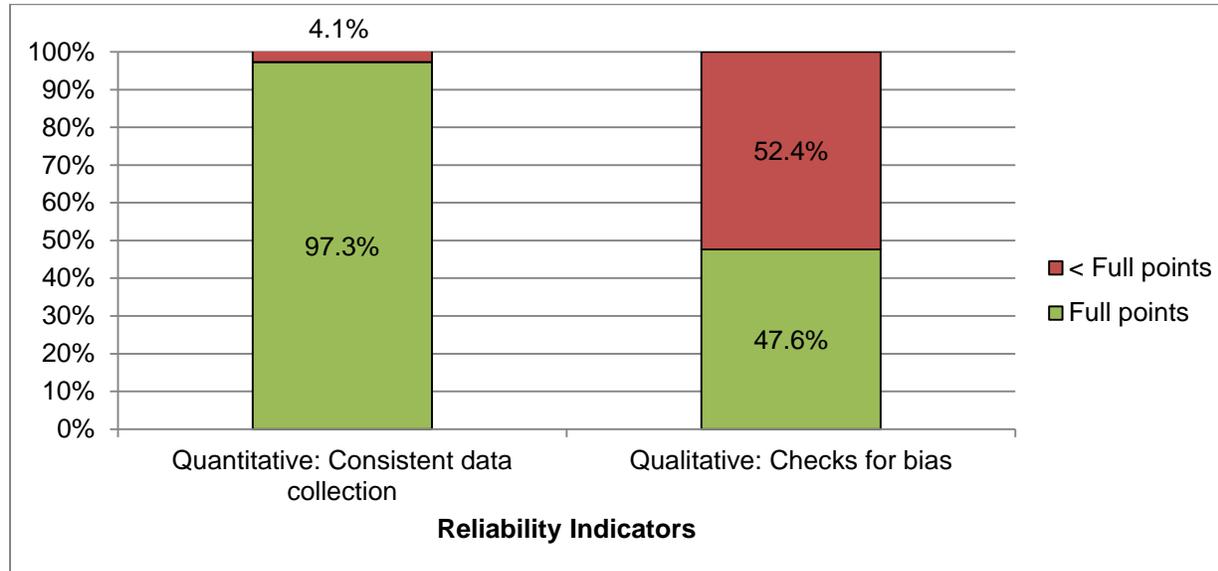


Figure 17. Reliability domain indicators with percentages for the analytic sample.

Quantitative articles scored higher than qualitative articles in the Reliability domain. Quantitative and mixed methods articles received full points for Reliability in 97.3% (936) of articles. Only 47.6% (n=10) of qualitative articles included methods to check data, analysis, or potential bias with other team members to improve reliability.

Cogency domain. This domain assessed authors' use of clear and logical reasoning within their paper, and whether or not they identified limitations to their study. Figure 18 shows the components for the cogency domain, and what percentage of the 979 articles received full points for each component. Almost all of the articles (99.1%, n=970) sustained a coherent line of reasoning throughout, but only 79.6% (n=779) of articles addressed study limitations.

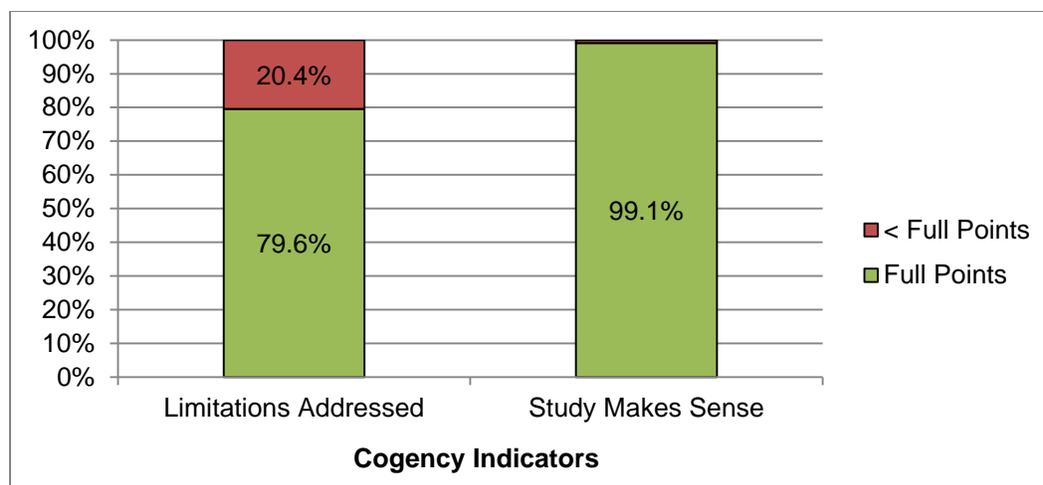


Figure 18. Cogency domain indicators and percentages for the analytic sample.

General quality recommendations. The overall quality of the reviewed articles was good to excellent. Only 10.2% ($n=100$) of articles received a quality score below 70%.

Conceptual framing recommendations. While almost all (98.5%) of the reviewed articles included a research question or hypothesis, only 24.6% included a theoretical or conceptual framework. Frameworks are an important component of all types of research design; they are useful for explaining why the research should be performed, what should be monitored, measured, or compared, and how to shape study designs. Theories are also essential for making connections between complex theories and real world applications (Glanz, Rimer, & Viswanath, 2008). Without a unifying framework, many studies will fail to adequately explain the connections or patterns within and between concepts. While theoretical or conceptual frameworks may not be appropriate for all study designs, publications should attempt to include frameworks when appropriate.

Appropriateness recommendations. In general, the articles scored high in the Appropriateness domain. Two areas for improvement are inclusion of the time frame of data collection, and inclusion of research setting. It is important to include the specific details of study structure, as this allows other scientists to gain knowledge as to how long a protocol might take, and where it has been executed in the past. Another area where quality was lost involved inclusion of the number of female subjects within the study. It is unclear why some researchers specifically stated that females were included in a study protocol, but then did not include a specific female sample size within the article. Research being done in the military should include all pertinent study information; this is important for advancement of scientific inquiry.

Transparency recommendations. Although the quality scores within the transparency domain were generally high, there are some components that could be improved upon to improve reproducibility. Age and rank have been found to be significant contributors to various health outcomes in both military and civilian populations. The lack of descriptive statistics on readily available demographic data is a surprising oversight shared by many studies within the sample. Research in and out of the military should include the reporting of these basic demographic variables.

Validity recommendations. The validity domain is one dimension of quality where many of the reviewed articles lost points. Many of the articles that used instruments to collect data, failed to use instruments that had been validated. Content validity is the extent to which an instrument measures what it is supposed to measure (Creswell, 2009). Validity is an essential element of data quality because it “refers to the extent to which outcomes can be attributed to an experimental factor, rather than to extraneous or confounding factors” (Glanz et al., 2008). Instruments with high validity are also more useful for generalizing results from study samples to entire populations. It is important to note that there are several fields of study where validated instruments either do not exist, or are too expensive, or are too time intensive to utilize in certain study designs. When appropriate, researchers should include validated instruments in their study designs, and/or describe efforts to validate their findings.

Reliability recommendations. Almost all articles with a quantitative study design included measures to ensure consistent data collection across the full sample. However, in less than 50% of the qualitative studies did the authors report checking for potential biases in data collection methods. This is surprising, considering the potential for various forms of researcher bias that are inherent to qualitative study designs, where the researchers are often the “instruments” of data collection. In the future, publications should report the steps that were taken to reduce bias within the study, for both quantitative and qualitative designs.

Cogency recommendations. The reviewed articles generally scored well within the cogency domain, but just over 20% of articles did not address potential and actual limitations of their study. Not all peer-reviewed journals require a study limitations section within the text of published articles, but the discussion of study limitations is an important element of scientific dialogue. Since no research effort is conducted without limitations, it is essential for authors to acknowledge and address how these limitations may have had an impact on the research, and on its future applicability. This allows for future study design improvement, and alerts readers to pitfalls to avoid in their own research. In order to produce higher quality literature, publications should include study limitations as a mandatory part of journal article submission requirements.

Overview of research topics within the analytic sample. Eight major topic areas were represented within the analytic sample. Research coverage of a wide array of topics has changed over the years, as shown in Figure 19. For almost every topic represented within the analytic sample, there was a gradual increase in publications starting in 2004, with a rapid uptick in 2010. There was also a corresponding decrease in publications from 2013 onwards. For the 15 year timespan of this review, Psychological Health and Readiness were the two mostly highly published topics within this review.

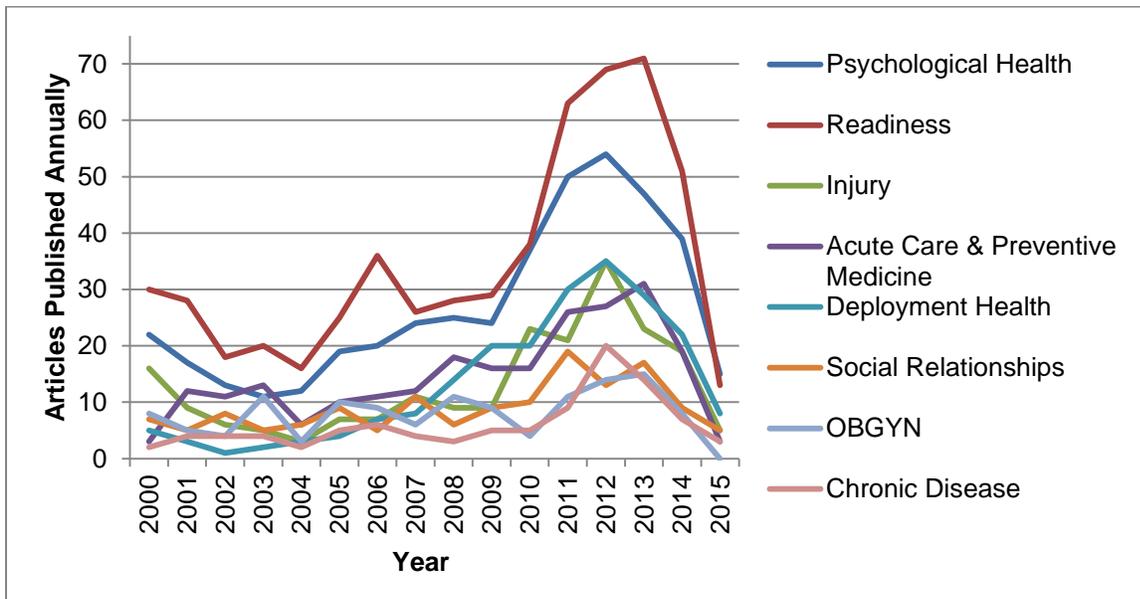


Figure 19. Topic categorizations by year of publication.

Topic Overview of the Analytic Sample

As can be seen in Figure 20, Readiness and Psychological Health were the two largest topic areas within the published scientific literature. Chronic Illness and Ob/Gyn were the two topics with the smallest number of articles.

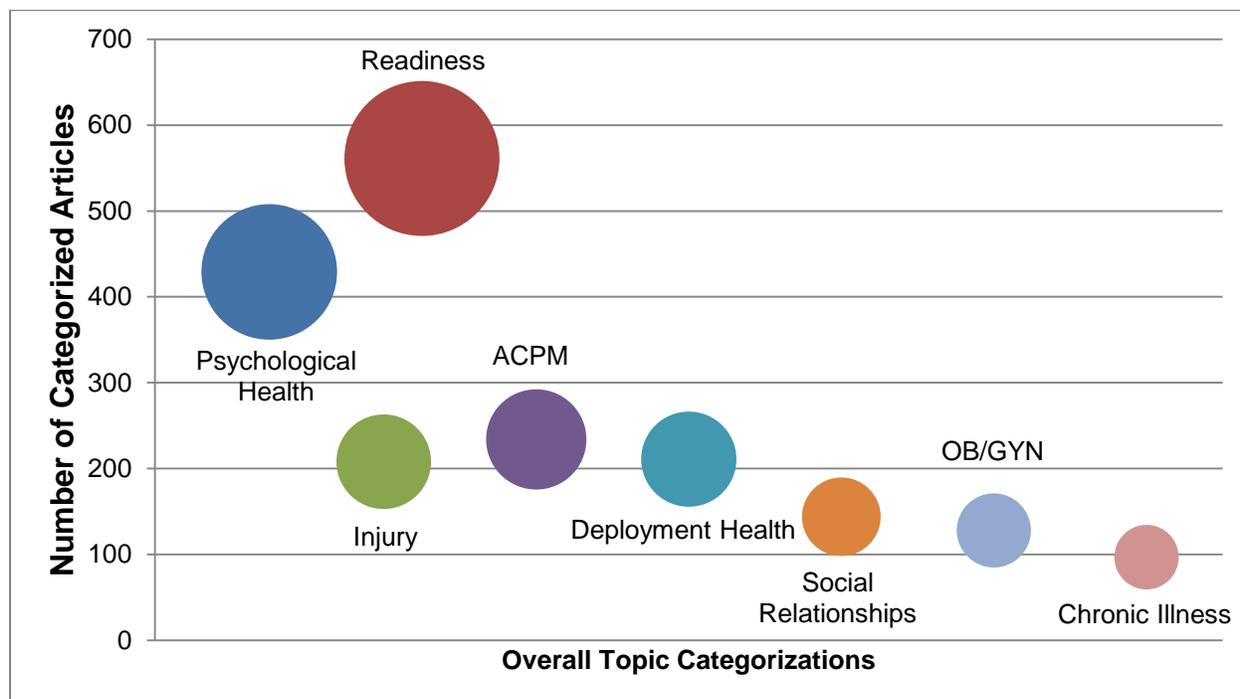


Figure 20. Number of articles categorized in each topic.

It is important to note that the topics and subtopics identified in this review are not mutually exclusive. Each article could have been (and most often was) categorized as more than one topic and/or subtopic. During categorization of articles, if an article was about chronic pain in service members with PTSD, multiple topics and subtopics would have been marked. The topic of Psychological Health, and its PTSD subtopic would have been marked, and the topic of Chronic Illness, and its subtopic of pain would also have been marked. As another example, if an article was about an aeromedical evacuation from theater due to a traumatic brain injury, the article would have been marked as 1) Deployment Health-aeromedical evacuation and 2) Injury-traumatic injury and 3) traumatic brain injury. This one article would have spanned 2 topics (Deployment Health and Injury) and three subtopics (aeromedical evacuation, traumatic injury, and traumatic brain injury). This non-mutual exclusivity is why there are 2012 topic categorizations for an analytic sample of 979 articles, as seen in Figure 21.

Within Figure 21, each topic area was mapped to QIC scores. The topic with the highest percentage of excellent quality articles was Social Relationships (36%), while the Ob/Gyn topic had the lowest percentage of excellent quality articles (17%). The topic with the smallest percentage of low quality articles was Injury (7%), while Ob/Gyn was the topic with the largest number of low quality articles (21%).

Topic	# of articles	% of Total Articles	# high quality articles	Article Quality (%)		
				Red=Low	Blue=Good	Green=Excellent
Psychological Health	429	21.3	120	10%	62%	28%
Readiness	561	27.9	141	11%	64%	25%
Injury	208	10.3	66	7%	61%	32%
ACPM	234	11.6	66	9%	63%	28%
Deployment Health	211	10.5	65	8%	62%	31%
Social Relationships	144	7.2	52	8%	56%	36%
OB/Gyn	128	6.4	21	21%	63%	17%
Chronic Illness	97	4.8	29	11%	59%	30%
Total	2012	100	560	10%	62%	28%

Figure 21. Article quality by topic.

Article topic categorizations are not mutually exclusive; each article may have been categorized in more than one topic. Although the total number of articles reviewed was 979, the total number of topic categorizations was 2012.

Due to differences in how frequency counts were calculated (by article versus by topic/subtopic categorizations) topic frequencies in Figure 21 may not match across all topic and subtopic specific tables and figures. For example, Figure 21 reports a low quality average of 10% within the Psychological Health topic, but Figure 23 reports a low quality average of 8% across all Psychological Health subtopics. Please note that this is by design, not by accident.

The remainder of this section (Results – Question 1 & 2) will examine each major topic, including definitions of subtopics and more detailed discussion of article quality by subtopic.

Psychological Health. The Psychological Health topic covered all articles related to the psychological health of service members and their families. Figure 22 represents a bubble plot of the articles within this main topic area. There were 16 subtopics, and brief descriptions of each can be found below.

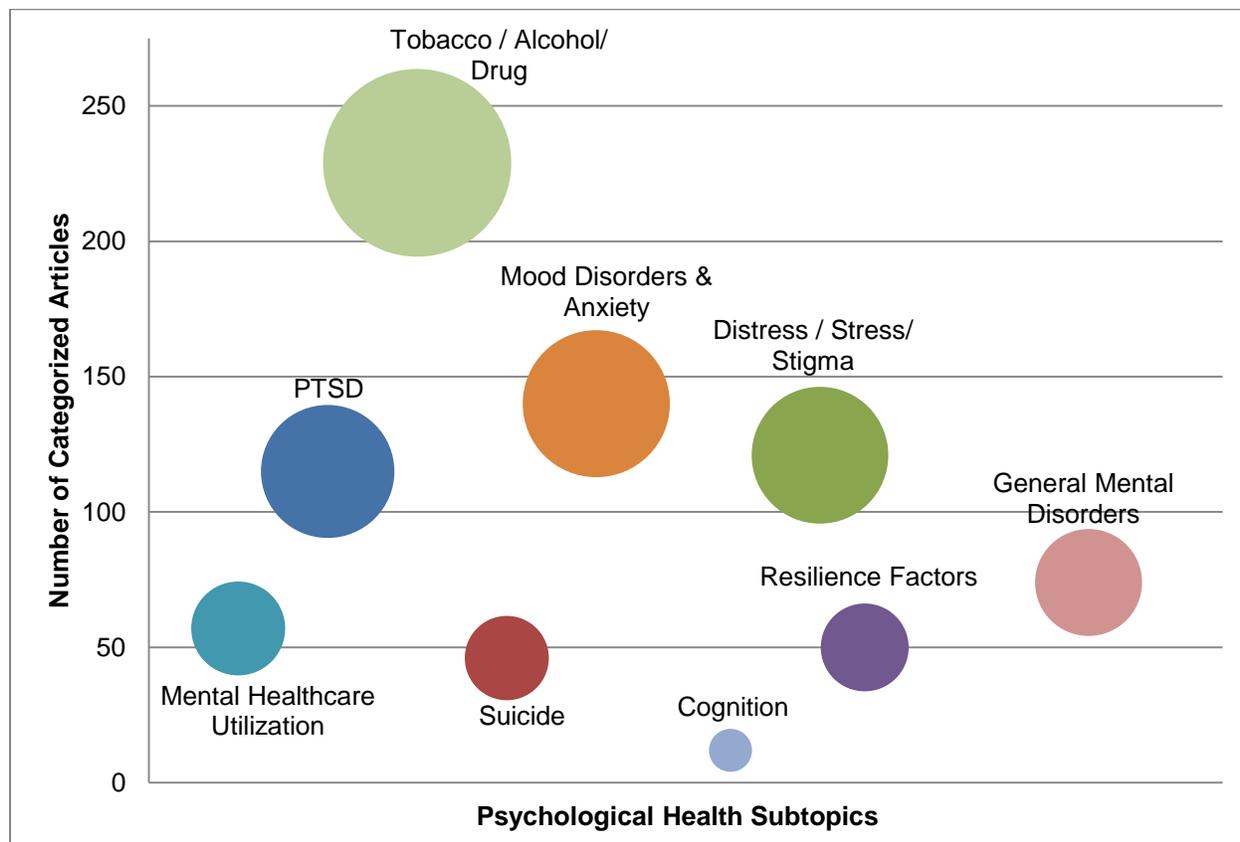


Figure 22. Number of articles categorized in each subtopic of the Psychological Health topic. Tobacco/Alcohol/Drug includes all Tobacco, Alcohol, or Drug subtopic articles. Distress/Stress/Stigma includes all Distress, Stress, and Stigma subtopic articles. General Mental Disorders includes all Adjustment Disorders, Personality Disorders, Eating Disorders, and Other Mental Disorders subtopic articles.

Mood Disorders & Anxiety: Any article related to anxiety, as well as mood disorders, such as depression and bipolar disorder

PTSD: Any article related to PTSD, including diagnostic evaluations and treatments

Alcohol: Any article related to alcohol use (whether occasional or chronic use), abuse of alcohol, or alcohol treatment programs

Tobacco: Any article related to tobacco use (whether occasional or chronic use)

Drug: Any article related to illegal drug use (e.g. marijuana, cocaine) or drug rehabilitation and treatment programs

Stress: Any article related to psychological or physiological stress

Distress: Any article, which did not discuss a mental health disorder, but instead looked at topics such as anger, grief, or mental health stigma

Stigma: Any article related to mental health stigma

Mental Healthcare Utilization: Any article related to mental healthcare utilization, such as rates of hospitalizations and outpatient encounters

Resilience Factors: Any article related to resilience factors, such as benefit finding, social support, or spirituality

Suicide: Any article related to suicide, suicide prevention, or suicidal ideation

Cognition: Any article related to cognitive functioning or performance

Other Mental Disorders: Any article related to diagnosed mental disorders which were not captured by other categories (e.g. ADHD)

Adjustment Disorders: Any article related to the diagnosis and treatment of adjustment disorders

Personality Disorders: Any article related to the diagnosis and treatment of personality disorders (e.g. Antisocial Personality Disorder)

Eating Disorders: Any article related to specific risk factors for, and diagnosis and treatment of, eating disorders

Research topic array. Within the Psychological Health topic, the largest number of articles were related to Mood Disorders & Anxiety ($n=140$, 16.6%). The majority of these articles focused on depression and anxiety. The second largest subtopic was PTSD ($n=115$, 13.6%), which included PTSD-specific research on neurocognitive factors, injury, and physical violence. The largest collapsed subtopic (seen in Figure 22) was Tobacco, Alcohol, & Drugs ($n=229$, 27.1%), reflecting a very high research workload in these areas. In fact, Alcohol was the third largest single subtopic with 107 articles, representing 12.7% of research within the Psychological Health topic. Articles related to alcohol included alcohol-specific research on gender, motor vehicle injury, and intimate partner violence.

The subtopics with the smallest number of articles were adjustment disorders ($n=10$, 1.2%), personality disorders ($n=10$, 1.2%) and eating disorders ($n=6$, 0.7%). Articles related to adjustment disorders, personality disorders, and eating disorders included disorder-specific research on predictors, as well as specific inquiry within recruit samples. It is important to note that many of the articles about adjustment disorders and personality disorders examined broad categories, and not specific subtypes. In contrast, articles about eating disorders examined specific subtypes, such as anorexia nervosa, bulimia nervosa, and binge eating disorder.

Research quality. Within Figure 23, each Psychological Health subtopic area was mapped to QIC scores. The average quality score for articles within the Psychological Health topic was 82.7% (i.e. good quality). The subtopic with the largest proportion of low quality articles was tobacco (20%). Nearly 85% of tobacco articles lacked a theoretical/conceptual framework, and

more than 75% of those that used a tobacco questionnaire did not use a validated instrument. Within the tobacco subtopic, many of the articles focused on the epidemiology (e.g. incidence, prevalence, predictors, etc.) of tobacco use or examined tobacco use as a covariate of other health conditions. This may explain why a theoretical/conceptual framework was not typically used. The validity data are surprising, since validated instruments for measuring tobacco use do exist (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991). The use of validated instruments allows for more reliable comparisons across studies on the same topic, and this is lacking within the tobacco subtopic. Additional quality points were lost within the cogency domain, where almost a quarter of articles neglected to include information about study limitations.

Psychological Health	# of articles	% of Psychological Health Articles	# high quality articles	Article Quality (%)		
				Red=Low	Blue=Good	Green=Excellent
Mood Disorders & Anxiety	140	16.6	55	6%	55%	39%
PTSD	115	13.6	43	6%	57%	37%
Alcohol	107	12.7	34	8%	60%	32%
Tobacco	85	10.1	13	20%	65%	15%
Drug	37	4.4	12	11%	57%	32%
Stress	74	8.8	16	11%	68%	22%
Distress	34	4	10	3%	68%	29%
Stigma	13	1.5	5		62%	38%
Mental Healthcare Utilization	57	6.8	21	2%	61%	37%
Resilience Factors	50	5.9	16	8%	60%	32%
Suicide	46	5.5	17	7%	57%	37%
Cognition	12	1.4	1	17%	75%	8%
Other Mental Disorders	48	5.7	10	8%	71%	21%
Adjustment Disorders	10	1.2	3		70%	30%
Personality Disorders	10	1.2	3		70%	30%
Eating Disorders	6	0.7	3		50%	50%
Total	844	100	262	8%	61%	31%

Figure 23. Psychological Health article quality by subtopic. Categorized articles are not mutually exclusive and may include one or more subtopics.

Also of interest were subtopics that included only good quality or excellent quality articles. Subtopics meeting these parameters were Eating Disorders, Stigma, Adjustment Disorders, and Personality Disorders. While both the Eating Disorders and Stigma subtopics rank among the top three subtopics within the Mental Health topic in terms of quality, both subtopics were relatively small in size.

Readiness. The Readiness topic covered all articles that related to individual readiness among military members. Figure 24 represents a bubble plot of the articles within this main topic area. There were nine subtopics within the Readiness topic. A brief description of each of these subtopics can be found below.

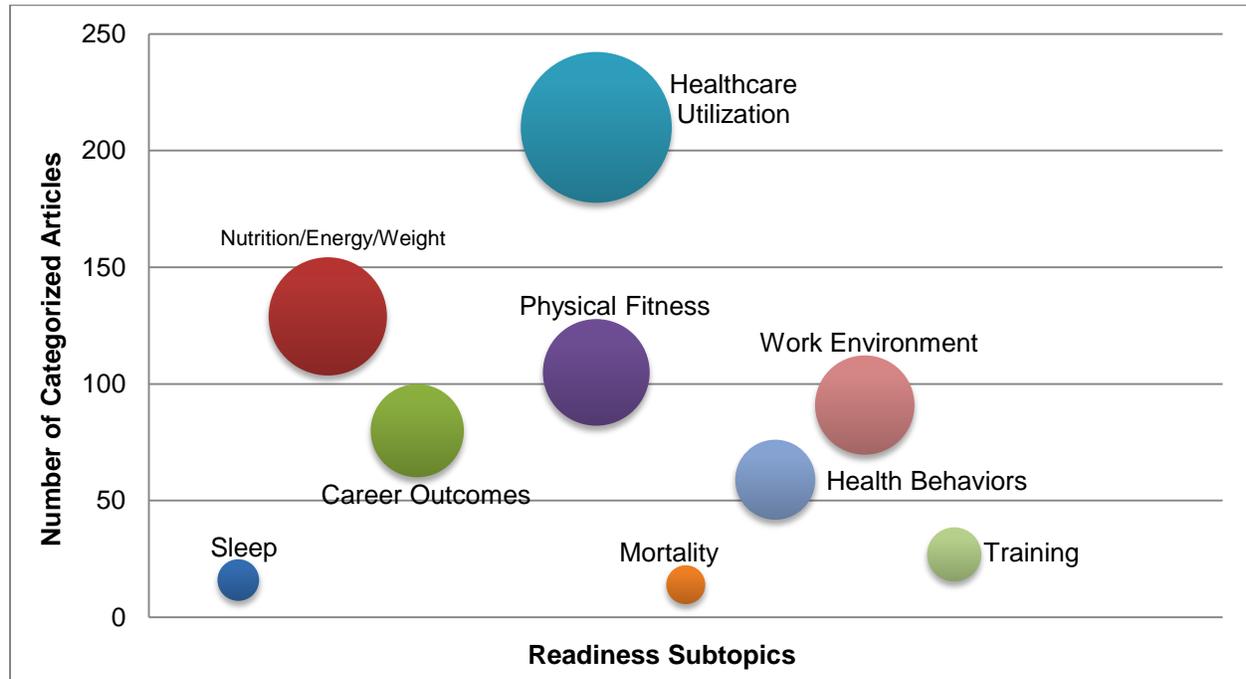


Figure 24. Number of articles categorized in each subtopic of the Readiness topic.

Healthcare Utilization: Any article related to healthcare service utilization by service members and their families, including trends in hospitalizations and/or ambulatory care visits

Nutrition/Energy/Weight: Any article related to service member nutrition, energy levels, or weight, including anthropometric assessments

Physical Fitness: Any article related to the physical activity or fitness of service members, including Physical Fitness Testing (PFT)

Work Environment: Any article related to how the work environment may impact health and/or readiness; included non-deployment related occupational and environmental factors

Career Outcomes: Any article related to career outcomes including service member retention and attrition

Health Behaviors: Any article related to non-sexual behaviors that may impact the health and/or readiness of service members; included both positive and negative behaviors and risk reduction interventions (such as tobacco cessation programs)

Training: Any article related to how training for military specific tasks may impact the health and/or readiness of service members

Sleep: Any article related to sleep or factors contributing to alterations in sleeping habits or circadian rhythm

Mortality: Any article related to non-combat related deaths (i.e. car accidents)

Research topic array. The largest number of articles centered on Healthcare Utilization, and represented the most-published subtopic by percentage within the Readiness topic area (n=210, 28.7%). This subtopic included articles that related to utilization of healthcare services by service members and their families. Many of these articles were surveillance studies to determine trends in hospitalizations and/or ambulatory visits. Since injury and illness significantly impact operational readiness, the proportionately large number of articles published on healthcare utilization patterns aligns with military goals of better understanding how service members use healthcare services (Defense Health Agency (DHA), 2016). The second and third largest subtopics within the Readiness topic were Nutrition/Energy/Weight (n=129, 17.6%) and Physical Fitness (n=105, 14.4%), respectively. Articles about Nutrition/Energy/Weight included research on how to improve the nutrition of incoming recruits, changes in energy levels during combat or physical training, and how weight may impact the readiness of service members. Physical Fitness articles included research on how physical fitness impacts risk of injury, how physical fitness impacts combat readiness, and on Physical Fitness Test (PFI) results. The amount of research on these subtopics, relating to anthropometrics and fitness, is in keeping with the goal of the military to maintain a strong, healthy force, able at all times to meet operational requirements stateside and overseas (Institute of Medicine (IOM) Subcommittee on Military Weight, 2004; U.S. Department of Defense (DoD), 2002).

The two subtopics with the smallest number of published articles were Sleep (n=16, 2.2%) and Mortality (n=14, 1.9%). Articles relating to Sleep included research on postpartum fatigue, changes in sleep patterns due to shift work, and the impact of psychological disorders on sleep patterns. Sleep is a topic of importance to the military, as many military members perform duties that require attention to detail and peak cognitive performance, many times in a sleep-deprived setting (Troxel, 2015). Articles on Mortality included topics such as non-combat related deaths due to suicide, underlying cardiovascular disease, or accidents. Considering many of the deaths researched by the articles within the Mortality subtopic were preventable (such as deaths due to unintentional injury and heat exposure), this would be a useful topic on which to have more data.

Research quality. Within Figure 25, each Readiness subtopic area was mapped to QIC scores. The average quality score for articles within the Readiness topic was 81.3% (good quality). The subtopic with the smallest percent of low (4%) and the largest percent of excellent (35%) quality articles was Career Outcomes. Every year the military invests billions of dollars to train recruits, but the services “have historically lost about one-third of their enlistees before they have completed their initial terms of service” (U.S. GAO, 2000). The relative number and high quality of research on Career Outcomes aligns with the importance of this subtopic for military readiness.

Readiness	# of articles	% of Readiness Articles	# high quality articles	Article Quality (%)		
				Red=Low	Blue=Good	Green=Excellent
Healthcare Utilization	210	28.7	65	6%	63%	31%
Nutrition/Energy/Weight	129	17.6	26	15%	65%	20%
Physical Fitness	105	14.4	16	18%	67%	15%
Work Environment	91	12.4	25	14%	58%	27%
Career Outcomes	80	10.9	28	4%	61%	35%
Health Behaviors	59	8.1	9	15%	69%	15%
Training	27	3.7	5	7%	74%	19%
Sleep	16	2.2	4	6%	69%	25%
Mortality	14	1.9	4	21%	50%	29%
Total	731	100	182	11%	64%	25%

Figure 25. Readiness article quality by subtopic.

Categorized articles are not mutually exclusive and may include one or more subtopics.

The subtopic with the largest percent of low quality articles was Mortality (21%). Several of the Mortality articles failed to gain points in the transparency domain, which included sample demographic information. Considering the sensitive nature of mortality in the military, it may not have been appropriate for these articles to include this information for privacy reasons. It should also be noted that although the Mortality category had a proportionately large percentage of articles that received low quality scores, it also had the third largest percentage of excellent quality articles (29%). Another area of concern when it comes to article quality is the Health Behaviors subtopic. Only 59 articles (8.1%) related to Readiness were about Health Behaviors; of these 59 articles, only 9 (15%) were of excellent quality. This is an important area of research for the military; many high risk health behaviors such as tobacco or supplement use and driving under the influence are prevalent among military populations (DoD, 2014b).

Although the Nutrition/Energy/Weight and Physical Fitness subtopics were the two categories with the second and third largest number of articles published, they both had a smaller proportion of excellent quality articles compared to other topics within the Readiness topic. Many of the articles in these subtopics articles lost points for not using valid instruments. Only 40% of Nutrition/Energy/Weight articles and 39% of Physical Fitness articles received points for validity, resulting in lower overall quality scores.

Injury. The Injury topic covered all articles that related to injuries among military members. Figure 26 represents a bubble plot of the articles within this main topic area. There were seven subtopics within the Injury topic. A brief description of each of these subtopics can be found below.

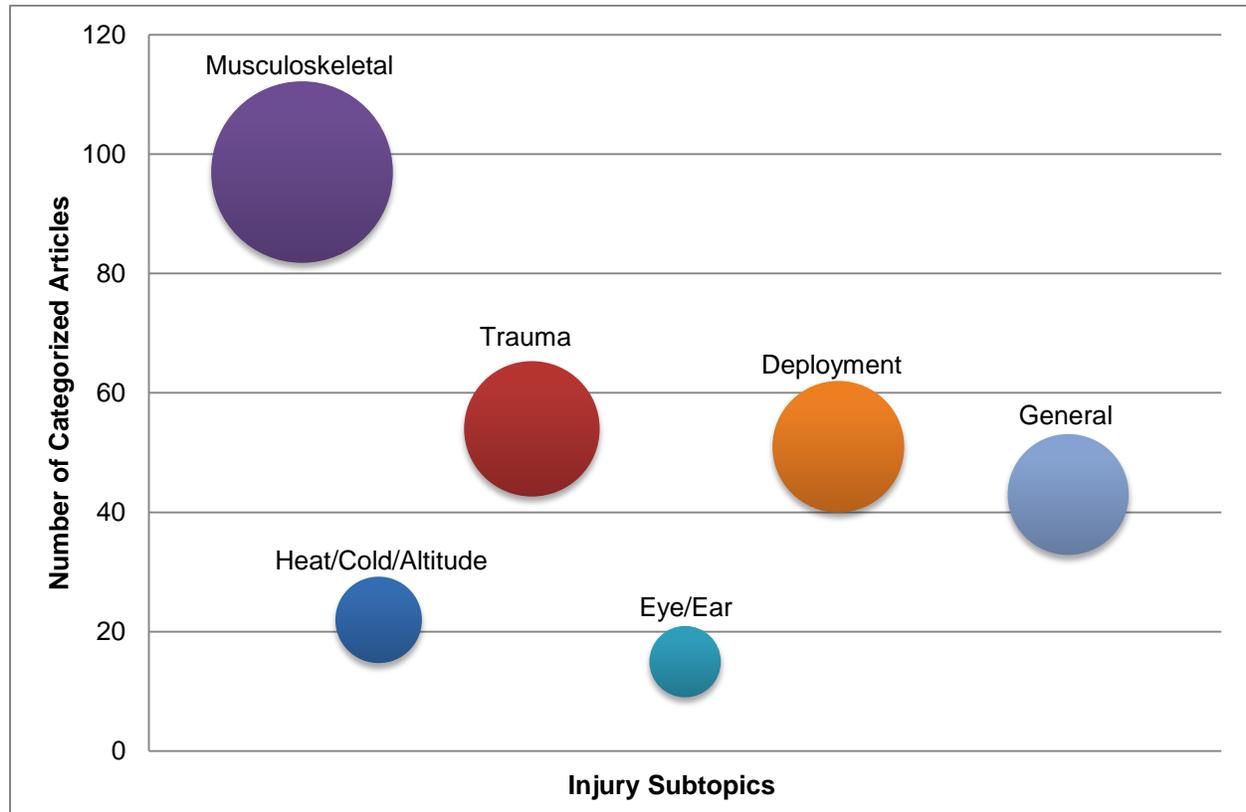


Figure 26. Number of articles categorized in each subtopic of the Injury topic.

Trauma includes all articles from the Traumatic Injury and Traumatic Brain Injury subtopics.

Musculoskeletal Injury: Any article related to musculoskeletal injuries, including overuse or acute injuries

Traumatic Injury: Any article related to an injury caused by trauma (intentional and accidental)

Traumatic Brain Injury (TBI): Any article related to traumatic brain injuries including concussions and mild TBI

Deployment Injury: Any article related to injuries sustained specifically during deployment (combat and non-combat related)

General Injury: Any article related to injuries that do not fit into any of the above subtopics, including articles about non-specific injury types or locations

Heat/Cold/Altitude: Any article related to heat, cold, or altitude related injuries or health issues

Eye/Ear Injury: Any article related to injuries of the eye and/or ear, including intracranial injury

Research topic array. Within the Injury topic, the largest number of articles (n=97, 31.7%) were related to Musculoskeletal Injuries. This subtopic included articles on sprains and strains, low back injuries, and overuse injuries. A majority of the articles in this subtopic were either surveillance studies or epidemiological investigations of potential risk and protective factors for this type of injury within military populations.

The next largest subtopic within Injury was Traumatic Injury (including Traumatic Brain Injury) (n=54, 17.6%). Almost half of the articles about Traumatic Injuries related to Traumatic Brain Injuries (TBI) (n=24). Other articles within this category related to traumatic injuries from motor vehicle accidents, training, and sports/athletics. It is also important to note that 21 articles were categorized as both Traumatic Injury and Deployment Injury because they were traumatic injuries that occurred during deployment.

The smallest number of Injury articles were published on Eye/Ear injuries (n=15, 4.9%). Every branch of service has well established eye and ear injury prevention policies, including prescribed use of personal protection devices for eye and ear protection (DoD, 2010). The relatively small number of articles relating to eye and ear injuries may indicate that existing injury prevention policies are sufficient to minimize the risk of eye/ear injuries in military populations.

Research quality. Within Figure 27, each Injury subtopic area was mapped to QIC scores. The overall quality of the peer reviewed articles in the Injury topic was high with an average quality score of 82.6 (out of 100). Only 6.5% (n=20) of articles were low quality; 35% (n=107) were excellent quality. Approximately 35% (n=34) of the articles in the Musculoskeletal Injury subtopic received excellent quality scores. Research has shown that musculoskeletal injuries impact more service members than any other health condition, are responsible for the largest number of medical encounters, and are the leading contributor to days of limited duty in military populations (Armed Forces Health Surveillance Branch, 2016). The high number and high quality of research on Musculoskeletal Injuries properly reflects the health impacts of this subtopic.

Injury	# of articles	% of Injury Articles	# high quality articles	Article Quality (%)		
				Red=Low	Blue=Good	Green=Excellent
Musculoskeletal	97	31.7	34	10%	55%	35%
Traumatic	54	17.6	20	4%	59%	37%
Traumatic Brain Injury	24	7.8	12		50%	50%
Deployment	51	16.7	51	6%	53%	41%
General	43	14.1	43	12%	65%	23%
Heat/Cold/Altitude	22	7.2	22		77%	23%
Eye/Ear	15	4.9	15		67%	33%
Total	306	100	107	7%	58%	35%

Figure 27. Injury article quality by subtopic. All TBI articles were also marked as Traumatic. Categorized articles are not mutually exclusive and may include one or more subtopics.

The subtopic with the largest percentage of excellent quality articles was Traumatic Brain Injury (TBI). Within this category, 50% (n=12) of articles were excellent quality and there were no low quality articles. TBI has been called one of the “signature wounds” of the Afghanistan and Iraq wars (Tanielian et al., 2008). In an effort to reduce the impact of TBI, the DoD increased resources for TBI screening, diagnosis, treatment, and research (U.S. Assistant Secretary of Defense, 2008). Based on the results of this scoping review, the quality of that research is generally excellent, which is very encouraging news for this field of research, and for the potential impact that these findings will have on military service members.

The subtopic with the second largest percentage of excellent quality articles was Deployment Injury. Unfortunately, injuries are common during deployment. Surveillance on the types and impact of deployment related injuries provides invaluable information to military leaders and policy makers so they can implement strategies to reduce injury risk. Also of note, there were no low quality articles about eye/ear or heat/cold/altitude injuries. Instead, these two subtopics had the largest percentage of good quality articles within the Injury topic. The comparatively higher quality of articles on these subtopics is encouraging, especially considering many of the injuries within these categories are preventable.

Acute Care & Preventive Medicine. The Acute Care & Preventive Medicine (ACPM) topic covered all articles that related to medical care for acute care diagnoses, as well as for disease prevention. Figure 28 represents a bubble plot of the articles within this main topic area. There were six subtopics within the ACPM topic. A brief description of each of these subtopics can be found below.

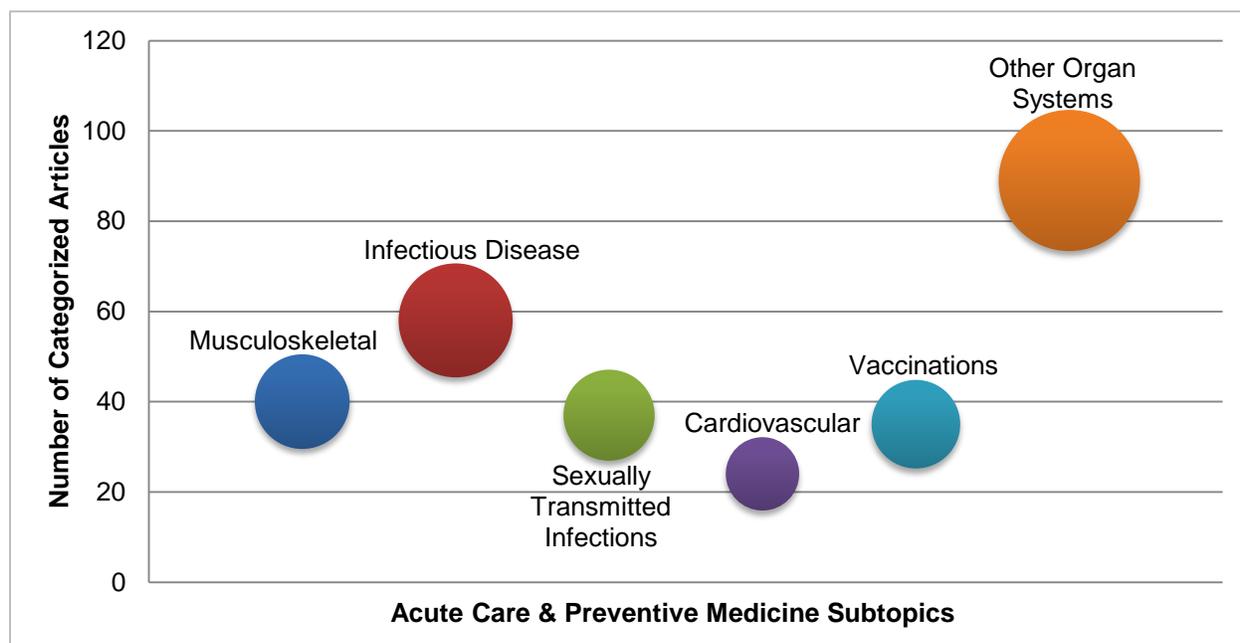


Figure 28. Number of articles categorized in each subtopic of the Acute Care & Preventive Medicine topic.

Other Organ Systems: Any article related to acute or preventive care for other organ systems not covered in the other subtopics, such as wound care for burns (dermatology), non-specific loss of consciousness (neurology), and upper respiratory infections (pulmonary)

Infectious Disease: Any article related to infectious diseases, excluding most sexually transmitted infections. This subtopic includes Hepatitis A/B/C and influenza, but did not include HIV (HIV was categorized in the Chronic Illness topic).

Musculoskeletal System: Any article related to non-injury and non-chronic musculoskeletal diagnoses, including surgical repair, bone health, amputations, and other preventive measures

STI: Any article related to sexually transmitted infections, except HIV (covered in the Chronic Illness topic) and Hepatitis A/B/C (covered in the Infectious Disease subtopic). Examples included *Trichomonas vaginalis* and genital warts

Vaccinations: Any article related to vaccinations and immunity

Cardiovascular: Any article related to acute cardiovascular conditions or preventive measures, including syncope, and evaluation of lipid panels

Research topic array. Within the ACPM topic, the largest number of articles related to Other Organ Systems ($n=89$, 31.4%). This subtopic included research on hearing, vision readiness, dental caries risk, and gastrointestinal symptoms. Every service member is required to go through dental screening and hearing testing as part of individual readiness requirements. Each service branch generates quarterly reports to summarize the Individual Medical Readiness (IMR) status of all service members (DoD, 2014a). There seems to be a discrepancy between the amount of data available from these screenings, and the amount of research conducted with this data. Only 6 out of 89 articles in the Other Organ Systems subtopic utilized dental and hearing test data. This may indicate difficulty in conducting studies that utilize electronic medical data from service personnel, or perhaps these topics are not considered high priority research areas for the DoD.

The second and third largest subtopics within the ACPM topic were Infectious Disease ($n=58$, 20.5%) and the Musculoskeletal System ($n=40$, 14.1%). Articles regarding Infectious Disease research included risk factors for methicillin-resistant *Staphylococcus aureus* (MRSA) infections, predictors for immunologic alterations, and incidence rates for soft tissue infections. More than half of these articles utilized database information, such as from the Defense Medical Surveillance System (DMSS); this may indicate less funding for field research in this subtopic. Articles in the Musculoskeletal subtopic included research on shoe fit evaluations, and acute musculoskeletal pain. These two subtopics reflect the exposures and conditions that service personnel may often experience during the course of military service.

The two subtopics with the smallest number of published articles were Vaccinations ($n=35$, 12.4%) and the Cardiovascular System ($n=24$, 8.48%). Articles within the Cardiovascular subtopic included research on lipid and plasma markers associated with fatigue, transient cardiac dysfunction, and rates of syncope. Articles related to Vaccinations included research on hepatitis A immunity, vaccine responsiveness and clinical outcomes, and risks of anthrax vaccinations. It is not surprising that the number of articles within the vaccination subtopic is relatively small; the civilian literature in this area is most likely very pertinent to military populations.

Research quality. Within Figure 29, each ACPM subtopic was mapped to QIC scores. The average quality score for articles within the ACPM subtopic was 82.4% (good quality). The subtopic with the largest percentage of excellent quality articles was Infectious Disease (38%). This likely reflects the high research prioritization given to tracking infectious diseases and analyzing this data among active duty personnel (The Henry J. Kaiser Family Foundation, 2013). Given the nature of the military as a global presence, it is critical to establish standardized preventive measures for, and to contain, infectious disease outbreaks. This is particularly important as the broad spectrum of acute physical manifestations from an infectious disease may compromise the readiness of military personnel, potentially leading to chronic after-effects.

ACPM	# of articles	% of ACPM Articles	# high quality articles	Article Quality (%)		
				Red=Low	Blue=Good	Green=Excellent
Other Organ Systems	89	31.4	21	8%	69%	24%
Infectious Disease	58	20.5	22	7%	55%	38%
Musculoskeletal	40	14.1	14	8%	58%	35%
STI	37	13.1	7	14%	68%	19%
Vaccinations	35	12.4	10		71%	29%
Cardiovascular	24	8.5	6	8%	67%	25%
Total	283	100	80	7%	64%	28%

Figure 29. ACPM article quality by subtopic.

Categorized articles are not mutually exclusive and may include one or more subtopics.

The ACPM topic was one of three topics which had the lowest percentage of low quality articles (7%; the others were Injury and Deployment Health). The ACPM subtopic with the highest percentage of low quality articles was Sexually Transmitted Infections (14%), which had double the percentage of the overall ACPM topic. Within the STI subtopic, 62% of the articles did not gain full points in the transparency domain. Further high-quality research with clear descriptions of the sample population and use of validated instruments in this area are needed.

The Vaccinations subtopic ($n=35$) consisted of only good and excellent quality articles. The quality of these articles as a whole is impressive, especially considering that they make up more than 12% of the total number of articles for this topic. Many of the articles included in this subtopic (42%) included non-recruit samples (e.g. officer or enlisted). This may reflect the availability of robust vaccination data in Active Duty service personnel who have graduated from basic training.

Deployment Health. Deployment Health was defined as health topics experienced by active duty members when in a deployed setting. This included data that was collected post deployment, as long as questionnaires related to exposures or behaviors DURING deployment. Figure 30 represents a bubble plot of the articles within this main topic area. There were 6 subtopics within the Deployment Health topic. A brief description of each of these subtopics can be found below.

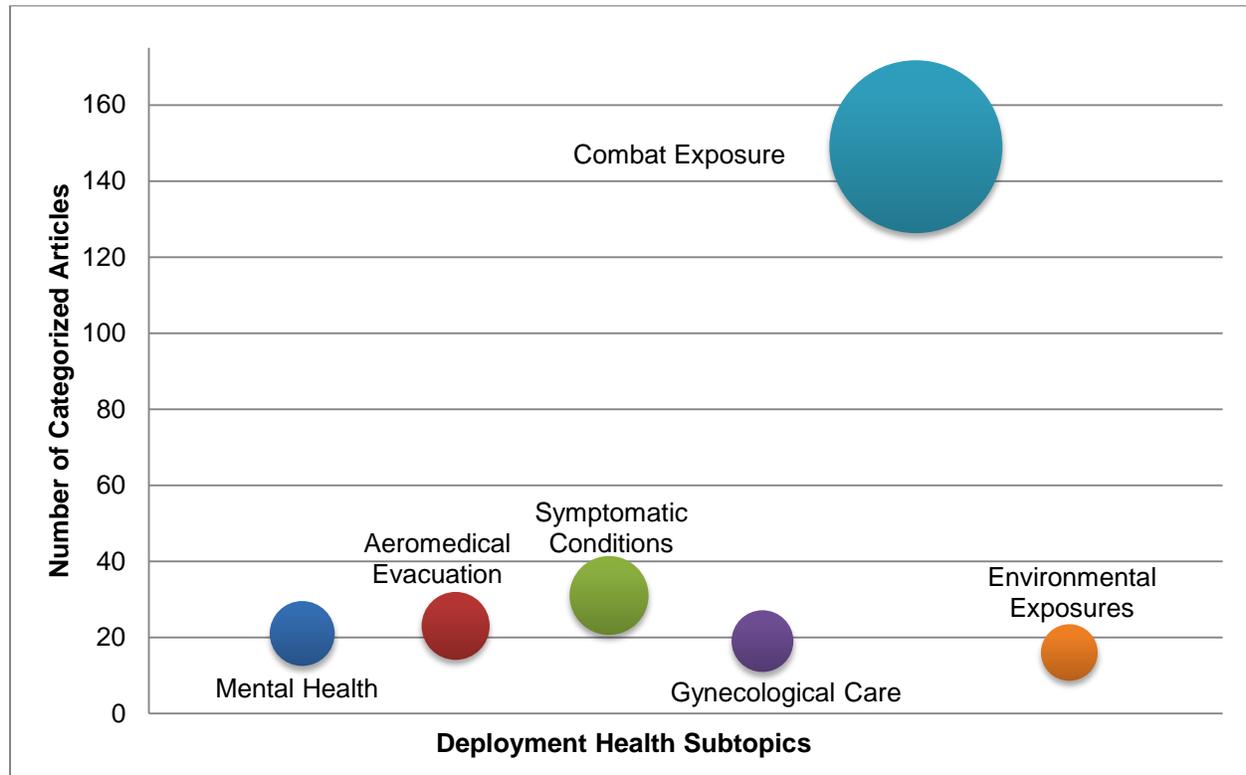


Figure 30. Number of articles categorized in each subtopic of the Deployment Health topic.

Combat Exposure: Any article related to exposure to combat during deployment

Symptomatic Conditions: Any article related to any illness that occurred during deployment, did not include injuries

Aeromedical Evacuation: Any article related to aeromedical evacuation from a deployment setting, included evacuation not both combat and non-combat related injuries or illnesses

Mental Health: Any article related to mental health during deployment, included access to care or factors that impacted the mental health of deployed service members

Gynecological Care: Any article related to gynecological care during deployment, included access to care or necessary supplies

Environmental Exposures: Any article related to environmental exposures during deployment

Research topic array. The subtopic with the highest number of articles by far in the Deployment Health category was Combat Exposures ($n = 149$). This subtopic included many

articles investigating linkages between combat exposures and mental health outcomes, such as post-traumatic stress disorder (PTSD), disordered eating, and suicidal ideation. This subtopic also had a number of articles relating to physical injuries, including TBI. The second largest subtopic was Symptomatic Conditions ($n = 31$); these articles included research on diagnosed conditions that deployed service members were treated for in a deployed setting. Diagnosed conditions included urinary tract infections, headaches, and upper respiratory infections.

All of the other four subtopics contained a smaller number of articles (range: 16-23). Articles on aeromedical evacuation related to transporting active duty members out of the deployed setting. Both the mental health and gynecological care subtopics particularly described these types of healthcare for service members in the deployed setting. Articles on environmental exposures reflected a wide range of exposures including open air burn pits, vehicle exhaust, and sand.

The overall number of articles for the Deployment Health subtopics was surprisingly low, with the exception of Combat Exposure. Service men and women face a multitude of exposures and situations that can affect their health, even when they are not facing direct combat on a deployment. Additional exposures and effects on health during deployment need to be examined, as well as ongoing research into the effects of combat exposures.

Research quality. Within Figure 31, each Deployment Health subtopic was mapped to QIC scores. The subtopic with the highest percentage of excellent quality of articles was Aeromedical Evacuation (39%). Within this subtopic, articles consistently received high scores in the Reliability and Appropriateness domains. Considering the nature of emergency healthcare, especially in combat zones, the quality of these articles reflects an interest in the efficient and safe evacuation of service members from the operational theater. Combat exposure had the second highest percentage of excellent quality articles (36%). The percentage of low quality articles (5%) was very small when considering the large total number of articles in this subtopic ($n = 149$). Many of the articles used validated instruments to measure combat exposure, and scored full points within the transparency and cogency quality domains.

Deployment Health	# of articles	% of Deployment Health Articles	# high quality articles	Article Quality (%)		
				Red=Low	Blue=Good	Green=Excellent
Combat Exposure	149	57.5	53	5%	59%	36%
Symptomatic Condition	31	12	4	13%	74%	13%
Aeromedical Evacuation	23	8.9	9	4%	57%	39%
Mental Health	21	8.1	6		71%	29%
Gynecological Care	19	7.3	2	21%	68%	11%
Environmental Exposures	16	6.2	5	13%	56%	31%
Total	259	100	79	7%	62%	31%

Figure 31 . Deployment Health article quality by subtopic. Categorized articles are not mutually exclusive and may include one or more subtopics.

The subtopic area with highest percentage of low quality articles (21%) was gynecological care; this topic also had the lowest percentage of excellent quality articles (11%). Many articles within this subtopic lost points by not using validated instruments, as well as by not stating study limitations, or providing specific demographic information. This is concerning; the number of women serving in the military is continues to increase. Within the area of gynecological health, proper preventive care and treatment are of utmost importance to the health of deployed female service members specifically, as well as the health of the overall force.

Social Relationships. The Social Relationships topic covered all articles that related to social relationships, both positive and negative, among military members and their families. Figure 32 represents a bubble plot of the articles within this main topic area. There were seven subtopics within the Social Relationships topic. A brief description of each of these subtopics can be found below.

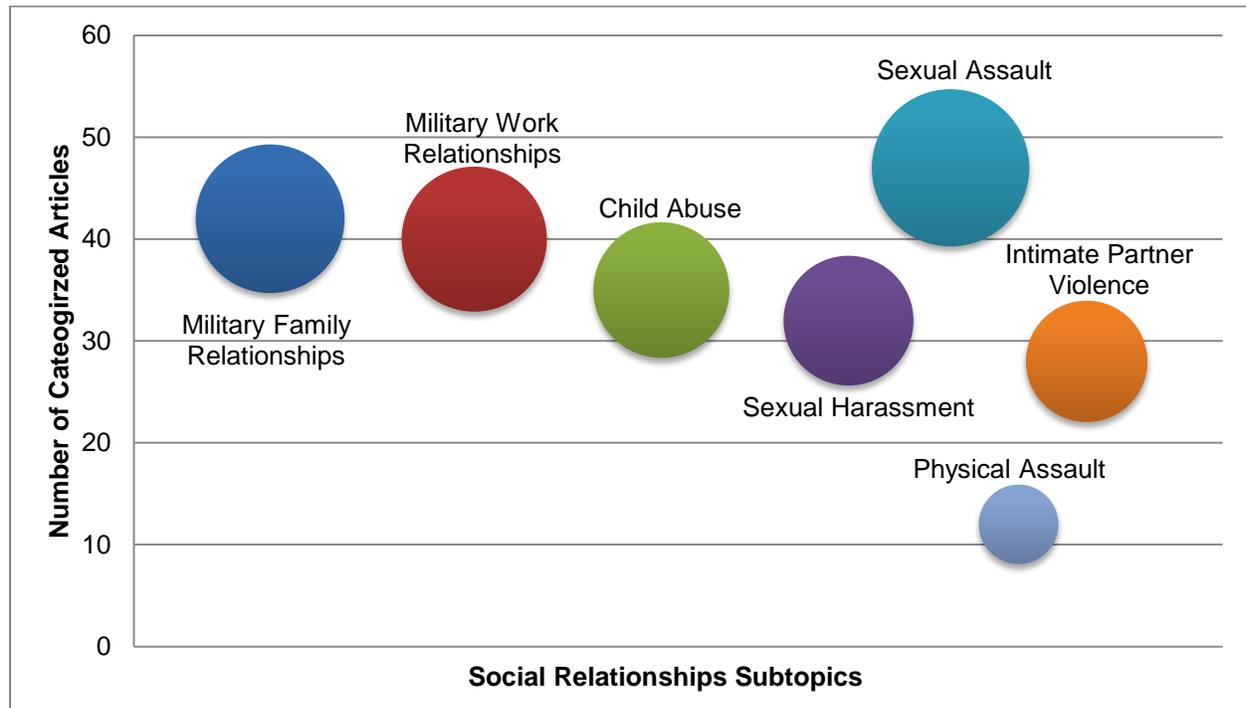


Figure 32. Number of articles categorized in each subtopic of the Social Relationships topic.

Sexual Assault: Any article related to sexual assault experienced or perpetrated by military populations, included military sexual trauma

Military Family Relationships: Any article related to social relationships between military members and their families, did not include child abuse or intimate partner violence

Military Work Relationships: Any article related to social relationships between military members and either other military service members or their civilian co-workers

Child Abuse: Any article related to the child abuse; included physical, emotional, and sexual maltreatment or abuse victimization and perpetration, and adult aftereffects of child abuse

Sexual Harassment: Any article related to sexual harassment experienced or perpetrated by military populations

Intimate Partner Violence: Any article related to physical violence experienced or perpetrated by military members and/or their spouse/romantic partner

Physical Assault: Any article related to violence experienced or perpetrated by military members, excludes violence from/against partners or children

Research topic array. With 144 (7.2%) peer-reviewed articles, Social Relationships was one of the smaller topics reviewed in this scoping review. The Sexual Assault subtopic had the largest number of peer-reviewed articles within this topic (n=47, 19.9%). These articles included research on the prevalence and impact of sexual assault experienced or perpetrated before and during military service. There were also 32 articles (13.6%) on Sexual Harassment.

Military families also play an important role in the health and readiness of service members. This is reflected in the percentage of articles that have been published on Military Family Relationships. This subtopic had the second largest number of articles published within the area of Social Relationships (n=42, 17.8%). The Military Family Relationships subtopic included research in areas such as marriage satisfaction, the impact of social support, and family stress. Work relationships can also impact the health and readiness of service members. Approximately 16.9% (n=40) of all Social Relationships articles were about Military Work Relationships. These articles included research about issues such as work stress, unit cohesion, and the impact of leadership.

Research quality. Within Figure 33, all Social Relationships subtopics were mapped to QIC scores. With an average overall quality score of 84.3%, the Social Relationships topic had the highest quality rating among the eight reviewed topic areas. Within every subtopic, at least 33% of articles received an excellent quality score; 50% of articles about both Intimate Partner Violence (n=14) and Physical Assault (n=6) received an excellent quality score. There were also two subtopics (Intimate Partner Violence and Child Abuse) that had no low quality articles. The largest percentage of low quality articles (15%) was in the Military Work Relationships subtopic. All but one of the low quality articles in the Military Work Relationships subtopic lost points in the Validity dimension of quality because they failed to use valid instruments during data collection. Researchers should attempt to use valid instrumentation in the future to allow for comparable findings across studies, thereby increasing the quality and generalizability of their findings.

Social Relationships	# of articles	% of Social Relationship Articles	# high quality articles	Article Quality (%)		
				Red=Low	Blue=Good	Green=Excellent
Sexual Assault	47	19.9	16	13%	53%	34%
Military Family Relationships	42	17.8	14	10%	57%	33%
Military Work Relationships	40	16.9	14	15%	50%	35%
Child Abuse	35	14.8	16		54%	46%
Sexual Harassment	32	13.6	13	9%	50%	41%
Intimate Partner Violence	28	11.9	14		50%	50%
Physical Assault	12	5.1	6	8%	42%	50%
Total	236	100	93	8%	52%	39%

Figure 33. Social Relationships article quality by subtopic. Categorized articles are not mutually exclusive and may include one or more subtopics.

Obstetrics and Gynecology. The Obstetrics and Gynecology (Ob/Gyn) topic included all articles related to reproductive, maternal, and infant health. Figure 34 represents a bubble plot of the articles within this main topic area. While a majority of the subtopics in this area were specific to female-only samples, the Fertility, Sexual Health, Contraception, and Urological Health subtopics were inclusive of adult male samples. There were sixteen subtopics within the Ob/Gyn topic. For ease of data visualization, several of these subtopics were collapsed under broader headings, as noted under Figure 34. A brief description of each of these subtopics can be found below.

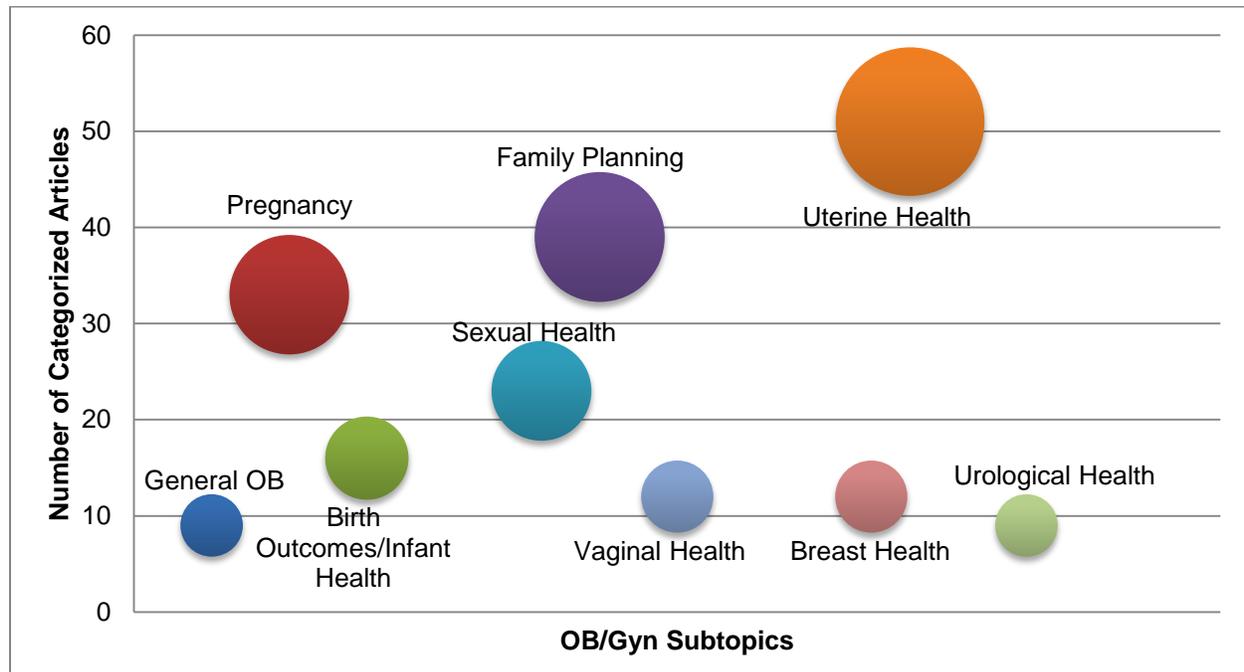


Figure 34. includes all Postpartum, Antepartum, and Intrapartum subtopic articles. Family Planning includes all Contraception, Unplanned Pregnancy, and Fertility subtopic articles. Uterine Health includes all Uterine Wellness, Menstruation, and Menstrual Suppression subtopic articles.

Contraception: Any article related to contraception used for any purpose (e.g. birth control, menstrual suppression), included the use of male condoms

Uterine Wellness: Any article related to health outcomes involving the uterus or cervix, included pap smears

Sexual Health: Any article related to sexual behaviors, sexual education, or sexual health interventions. This subtopic did not contain articles on sexually transmitted infections (covered in Acute Care & Preventive Medicine) or human immunodeficiency virus infections (covered in Chronic Illness).

Menstruation: Any article related to menstruation, but not menstrual suppression

Menstrual Suppression: Any article related to menstrual suppression and/or regulation

Postpartum: Any article related to medical care given following the delivery of the child

Antepartum: Any article related to medical care given during pregnancy but before delivery of the child

Intrapartum: Any article related to medical care given from the onset of labor to delivery

Birth Outcomes/Infant Health: Any article related to the delivery of the baby, and health outcomes for both the mother and baby. This subtopic also included articles about the association of birth defects with certain exposures (e.g. vaccines, deployment).

Vaginal Health: Any article related to this specific part of the female genital tract, as well as related conditions and diseases

General Obstetrics: Any article related to the non-medical care aspects of pregnancy, such as pregnancy intention

Urological Health: Any article related to male and female urinary tracts and related medical conditions, such as urinary tract infections (UTIs) and urinary stones

Unplanned Pregnancy: Any article related to rates and prevention of unintended pregnancies

Breast Wellness: Any article related to breast cancer and breast examinations, such as mammograms

Breastfeeding: Any article related to breastfeeding practices, including rates of breastfeeding among military women or qualitative studies of breastfeeding experiences

Fertility: Any article related to the desire to get pregnant, as well as rates of infertility among active duty service women

Research topic array. Within the Ob/Gyn topic, the largest single subtopic with the greatest number of articles was the Contraception subtopic ($n=29$, 14.2%). These articles focused on different types of contraception given to women (and sometimes men), as well as participants' knowledge and attitudes towards contraceptive use. This is an important and operationally relevant topic for both male and female service members. The DoD has provided guidance on pre- and post-deployment contraceptive counselling which should be provided to service members, as well as instructing that contraceptive counselling be given during deployment healthcare visits also (DoD, 2016). Women have legitimate health reasons to use birth control over and above pregnancy prevention, such as for menstrual suppression during deployment.

The single subtopic with the second largest number of articles was Uterine Wellness ($n=24$, 11.8%). Articles included in this subtopic dealt with rates of uterine fibroids, hysterectomies, and myomectomies. The subtopic with the third largest number of articles was Sexual Health ($n=23$, 11.3%). Examples of articles included in this subtopic were articles on sexual concerns, sexual health information needs, and sexual health programs. These three single subtopics are closely aligned; knowledge about contraception, and availability of contraception, likely impact decision making processes related to sexual health and uterine health (World Health Organization (WHO), 2014).

The two subtopics with the smallest number of published articles were Breastfeeding ($n=5$, 2.45%) and Fertility ($n=3$, 1.47%). Articles relating to the Breastfeeding subtopic included research on

breastfeeding practices, breastfeeding experiences, and rates of breastfeeding. The scant number of articles on this topic signifies a lack of scientific knowledge on breastfeeding within the military population. Additionally, there may be barriers to breastfeeding within the military population, despite breastfeeding-specific directives (Department of the Army, 2015). A recent survey of women’s healthcare services demonstrated low rates of breastfeeding in U.S. military hospitals (GAO, 2016). The Fertility subtopic included research on female and male infertility, and the delivery of reproductive healthcare.

Research quality. Within Figure 35, all Ob/Gyn subtopics were mapped to QIC scores. The average quality score for articles in the Ob/Gyn topic was 78.8% (good quality). Overall, the average number of low quality articles was 29% across the Ob/Gyn topic.

OB/Gyn	# of articles	% Of OB/Gyn Articles	# high quality articles	Article Quality (%)		
				Red=Low	Blue=Good	Green=Excellent
Contraception	29	14.2	6	31%	48%	21%
Uterine Wellness	24	11.8	4	33%	50%	17%
Sexual Health	23	11.3	3	13%	74%	13%
Menstruation	17	8.3	3	47%	35%	18%
Menstrual Suppression	10	4.9	1	60%	30%	10%
Postpartum	16	7.8	1	19%	75%	6%
Antepartum	11	5.4	1	27%	64%	9%
Intrapartum	6	2.9	0	50%	50%	
Birth Outcomes/Infant	16	7.8	1	25%	69%	6%
Vaginal Health	12	5.9	1	42%	50%	8%
General OB	9	4.4	1	22%	67%	11%
Urological Health	9	4.4	2	22%	56%	22%
Unplanned Pregnancy	7	3.4	0	29%	71%	
Breast Wellness	7	3.4	3		57%	43%
Breastfeeding	5	2.5	0	40%	60%	
Fertility	3	1.5	1		67%	33%
Total	204	100	28	29%	57%	14%

Figure 35 . OB/Gyn article quality by subtopic. Categorized articles are not mutually exclusive and may include one or more subtopics.

The subtopic with the largest percentage of excellent quality articles (43%) was Breast Wellness ($n=7$); this subtopic also had no low quality articles. The overall quality of the articles in this subtopic is encouraging, although the number of articles is quite small. In comparison, the Breastfeeding subtopic ($n=5$) had no excellent quality articles, and a significant proportion of low quality articles (40%). When juxtaposing these two subtopics, which both contributed to the Breast Health heading, it is clear that there is a striking difference in quality. However, due to the small amount of articles included in the collapsed subtopic ($n=12$), it is difficult to make concrete inferences from the data; further research is warranted to provide greater statistical context.

Other subtopics with no excellent quality articles were Intrapartum ($n=6$) and Unplanned Pregnancy ($n=7$). These subtopics, as well as the Breastfeeding subtopic, had rates of low quality that ranged from almost 30% to 50%. More than half of the articles included in these three subtopics failed to gain points in the quality domains of transparency and validity. Compared to all other major topic areas, Ob/Gyn had the highest percentage of low quality articles, and the smallest percentage of excellent quality articles. The quality of this existing research on the reproductive health of service women is concerning.

Chronic Illness. The Chronic Illness topic covered all articles related to chronic illness among service members. Figure 36 represents a bubble plot of the articles within this main topic area. Brief descriptions of the six subtopics can be found below.

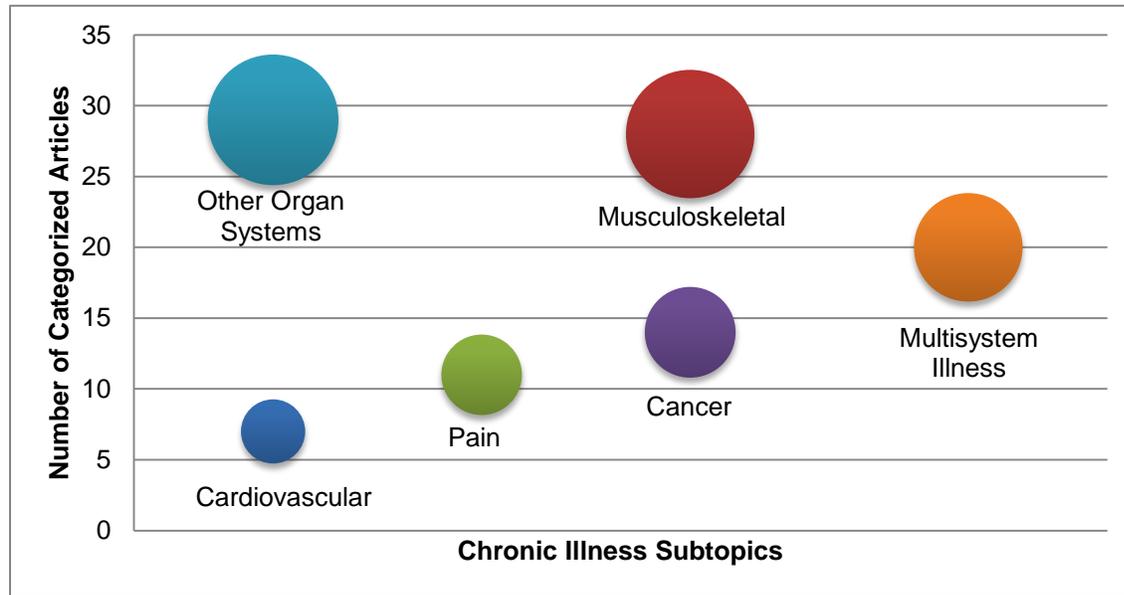


Figure 36. Number of articles categorized in each subtopic of the Chronic Illness topic.

Other Organ Systems: Any article related to chronic illness in other organ systems, such as kidney disease, lung disease, or prostatic disease

Musculoskeletal: Any article related to chronic musculoskeletal conditions (i.e. non-injury)

Multisystem Illness: Any article related to a non-specific chronic illness (e.g. Gulf War syndrome) or to a chronic illness that affects multiple body systems (e.g. HIV/AIDS, lupus)

Cancer: Any article related to diagnosis and treatment of any type of cancer

Pain: Any article related to diagnosis and treatment of chronic pain

Cardiovascular: Any article related to chronic cardiovascular disease, such as congestive heart failure, or coronary disease

Research topic array. Within the Chronic Illness topic, the largest number of articles were related to Other Organ Systems (n=29, 26.6%). This subtopic included articles about conditions such as hearing loss, headaches, and epilepsy. The second and third largest subtopics were the Musculoskeletal System (n=28, 25.7%) and Multisystem Illness (n=20, 18.3%). Articles related to the Musculoskeletal subtopic included research on osteoarthritis and degenerative disc disease. Of the twenty articles related to Multisystem Illness, twelve examined HIV and five examined chronic conditions potentially resulting from some type of environmental or occupational exposure (such as burn pits, jet fuel, or deployment during the Gulf War).

The subtopics with the smallest number of articles were Cancer (n=14, 12.8%), Chronic Pain (n=11, 10.1%) and the Cardiovascular System (n=7, 6.4%). The Cancer subtopic included articles related to any type of cancer. Examples of article topics within the Pain category included chronic low back pain, fibromyalgia, and greater trochanteric pain syndrome. Articles within the Cardiovascular subtopic included research on coronary heart disease, congestive heart failure, and cardiomyopathy.

Research quality. Within Figure 37, all Chronic Illness subtopics were mapped to QIC scores. The average quality score for articles within the Chronic Illness topic was 83% (i.e. good quality). The subtopic with the largest proportion of low quality articles was Multisystem Illness (35%). In this subtopic, 90% of articles did not use a theoretical or conceptual framework; many of them primarily focused on the epidemiology (e.g. incidence, prevalence, predictors, etc.) of conditions such as HIV and Gulf War Syndrome. This subtopic also lost points in the appropriateness and transparency domains. Within the transparency domain, 55% of articles did not include information about rank, and 45% neglected to include information about age. Within the appropriateness domain, 35% of articles lacked information about female sample size. Within the cogency domain, 40% of articles did not include information regarding study limitations. It is unclear why authors left out this information, but this is concerning from a quality standpoint.

Chronic Illness	# of articles	% of Chronic Illness Articles	# high quality articles	Article Quality (%)		
				Red=Low	Blue=Good	Green=Excellent
Other Organ Systems	29	26.6	7	3%	72%	24%
Musculoskeletal	28	25.7	14	4%	46%	50%
Multisystem Illness	20	18.3	2	35%	55%	10%
Cancer	14	12.8	4		71%	29%
Pain	11	10.1	3	9%	64%	27%
Cardiovascular	7	6.4	2	14%	57%	29%
Total	109	100	32	10%	61%	29%

Figure 37. Chronic Illness article quality by subtopic. Categorized articles are not mutually exclusive and may include one or more subtopics.

The Cancer subtopic consisted entirely of good quality or excellent quality articles. However, the Cancer subtopic was quite small (n = 14); this may be explained by the relative youth and health of the military population. The Musculoskeletal subtopic had the largest proportion of excellent quality articles (50%). Service members engage in both occupational and recreational activities that may increase their risk for developing chronic musculoskeletal conditions. The high quality of the available research on chronic illness in this population strengthens the generalizability and reliability of the results therein and can provide a platform for informed decision-making.

Limitations

Due to the broad scope of this study, and the large number of articles reviewed, several limitations are worth noting. A comprehensive literature search was performed using an extensive list of key terms; however, it is possible that some peer-reviewed articles were not captured. Moreover, the unique goals and applications of military research may preclude the publication of research findings in most peer-reviewed journals, resulting in a considerable repository of grey literature that is not publicly accessible.

Data for each article was extracted by research staff with varying degrees of experience and subject matter expertise; quality assurance measures were employed to ensure reliable extraction. For example, one of the senior investigators randomly reviewed 10% of all Level 3 data extraction forms, cross-checking results with the primary reviewer. Discrepancies were discussed, and a consensus was reached. Similarly, 10% of the article categories (i.e. topics and subtopics) were reviewed by the primary reviewer, one of the senior investigators, and a third team member. Discrepancies were discussed, and the senior investigator made the final determination in the event of disagreement. Articles were categorized according to their primary foci; however, topics and subtopics were not mutually exclusive. As a result, the weighting of topics and subtopics within the peer-reviewed literature might have been skewed. It is important to note here that science is often an interdisciplinary endeavor; the resulting articles encompass a wide array of subject areas and primary author disciplines.

Also of note, at the time of this study no existing quality instrument met the unique needs of the project. The instrument that was developed for this project (the QIC) was adapted from several existing quality instruments, and has not been assessed for validity or reliability. Because of this, it is possible that the QIC was biased towards particular topics and research designs. The team attempted to address this by developing scoring systems for different research designs, and scaling scoring when certain indicators were not appropriate. For a detailed explanation of scoring system adaptations, please refer to Appendix H. The QIC used in this study is just one 'snapshot' method of assessing the quality of articles; a diligent reader will have time and opportunity to make a more nuanced quality assessment. The QIC is the first instrument of its kind within the scoping review literature; achieving a balance between accuracy and reproducibility was essential when evaluating the 979 articles included within this project.

Methods - Question 3: Are there Differences in Healthcare Utilization by Gender?

To answer the third key question of this report, “What are the differences in healthcare utilization by gender?” the team extracted population level data on all medical diagnoses given to service members during 2014 (which was the most recent information available at the time of data collection). Data was obtained from the Defense Medical Epidemiology Database (DMED). Detailed prescription data for active duty personnel in 2010 (which was the most recent information available to the team at the time of data collection) was also collected from the Pharmacy Data Transaction Service (PDTS). Methods for extraction and evaluation of diagnostic and pharmaceutical data are described below.

DMED Diagnostic Data

Population selection. All service members that served on active duty in the U.S. military and were seen for a qualifying medical encounter between 1 January 2014 and 31 December 2014 were included in the population. Qualifying medical encounters were (1) inpatient or outpatient encounters reimbursed by the TRICARE Management Activity, and (2) the first occurrence of a primary diagnosis during the above specified time period. In select cases, the first occurrence option was not available, and “all occurrences” of a diagnosis were used instead. Data was obtained for U.S. Air Force, Army, Marine Corps, and Navy populations.

Data extraction. Data was obtained from the Defense Medical Epidemiology Database (DMED), derived from the Defense Medical Surveillance System (DMSS). DMSS is a comprehensive repository of all medical, personnel and deployment data for all service members. DMED is a de-identified database allowing for the querying of all active duty service members' medical data. DMED includes the International Classification of Disease, Ninth Revision, Clinical Modification (ICD-9) medical diagnoses that were reimbursed by the TRICARE Management Activity.

The ICD-9 is a systematic way to categorize and group disease entities. The largest ICD-9 grouping is a chapter, and examples of these include the Mental Disorders chapter, the Neoplasms chapter, and the Injury and Poisoning Chapter. Within each chapter there are smaller diagnostic clusters called categories. For example, a category within the Mental Disorders chapter is personality disorders. Within each category there are subcategories; within personality disorders, two subcategories are ‘schizoid personality disorder’ and ‘other personality disorders.’ When even more detail is needed, subclassifications are used; within ‘other personality disorders’ several subclassifications exist, including “narcissistic personality disorder” and “borderline personality disorder.” Throughout the report, the ICD-9 nomenclature of chapters, categories, subcategories, and subclassifications will be used. ICD-9 information was available for medical encounters within an MTF, as well as encounters paid for by TRICARE in an off-base setting.

DMED also includes demographic and military service information. DMED data are de-identified and presented in an aggregate format, displaying both counts and rates, with the total population

strength or service specific strength as the denominator. All of the information reported on DMED reflects data from calendar year 2014. Data was extracted by sex (male and female), rank (enlisted and officer), medical care setting (ambulatory and hospitalized), and branch of service (Army, Navy, Air Force, & Marine Corps). For each ICD-9 diagnostic category, data was pulled in all possible combinations (e.g. outpatient, female, enlisted, Army; outpatient, male, enlisted, Army).

Analyses of data. Preliminary exploratory work was carried out on 15 of the 17 ICD-9 diagnosis categories. Two diagnostic categories were excluded as they related to female-specific conditions, and could not be compared between the sexes. The following two classes of diagnoses were excluded: (1) complications of pregnancy, childbirth, and puerperium, and (2) conditions originating in the perinatal period.

Rates were calculated per 1,000 person-years and the risk ratio between females and males was calculated and tested for a significant difference. If a condition had a very small sample size (i.e. fewer than 30 cases for either females or males), statistical analyses were not conducted due to the potential instability of the calculations (Klein, Proctor, Boudreault, & Turczyn, 2002).

After completion of preliminary analyses, the team examined classes of diagnosis codes with high frequencies. Additional in-depth analyses were conducted for the following categories: (1) mental disorders, (2) diseases of the musculoskeletal system and connective tissue, and (3) injury and poisoning. In sub-analyses, specific diagnoses in each category were queried to further explore areas of interest identified in the scoping review. Additionally, sub-analyses were conducted if large numbers of cases were noted in an ill-defined category (such as “other, not elsewhere specified”) to gain further detail and clarity on these diagnoses.

Quality assurance. Data quality was assured through the use of DMED, a reliable and trustworthy data source. Information in the database was captured through the use of insurance medical reimbursement data. All data pulls were captured with a preserved copy of the information viewed and archived. To assure data quality and consistency, all data was entered and checked for accuracy by two individuals. The data analysis team had weekly meetings to ensure that all team members were aware of the overall analytic plan; any data questions were discussed and resolved.

PDTS Pharmaceutical Data

Population selection. The PDTS is a centralized database that includes a comprehensive profile of all medications received by DoD beneficiaries across all service branches (Health.mil). All prescriptions obtained by active duty personnel between January 1st, 2010 and December 31st, 2010 were included in the data analysis. All prescriptions across all service branches were included if they had been reimbursed by the TRICARE Management Activity.

Data extraction. The Pharmacy Data Transaction Service (PDTS) is part of the DoD Military Health System (MHS). PDTS includes pharmaceutical issuance data from military treatment facilities, retail, and mail pharmacies that are reimbursed through TRICARE. The following PDTS data fields were extracted: Sponsor ID (SSN), Beneficiary Category, Gender, Branch of Service, Product Name, Therapeutic Class Category (TCC), and Issue Date. PDTS prescription data is

categorized based the American Hospital Formulary Service (AHFS) Pharmacologic-Therapeutic Classification System (PTCS) (AHFS Clinical Drug Information, 2017). This system groups medications with similar pharmacologic, therapeutic, and/or chemical characteristics. The list of 30 PDTS therapeutic class categories can be seen in Table 9.

Table 9
Therapeutic Class Categories

Prescription Types	
Antihistamines	Gastrointestinal Drugs
Anti-Infectives	Gold Compounds*
Antineoplastic Agents	Heavy Metal Antagonists*
Autonomic Drugs	Hormones and Synthetic Substitutes
Blood Derivatives*	Local Anesthetics
Blood Formation/Coagulation/ Thrombosis Agents	Medical Devices
Cardiovascular Drugs	Miscellaneous Therapeutic Agents
Central Nervous System Drugs	Oxytocics*
Contraceptives	Pharmaceutical Aids
Diagnostic Agents	Radioactive Agents*
Dental Agents*	Respiratory Tract Agents
Disinfectants (non-dermatologic use)*	Serums, Toxoids, and Vaccines
Eye, Ear, Nose and Throat Preparations	Skin and Mucous Membrane Preparations
Enzymes*	Smooth Muscle Relaxants
Electrolytic, Caloric, and Water Balance	Vitamins

Note. *= Excluded from further analysis

The research team then excluded prescriptions in the gold compound, heavy metal antagonist, enzyme, dental agents, blood derivatives, disinfectants, and radioactive agent categories due to the scant amount of prescriptions issued in these categories, which precluded calculations of statistically significant rate ratios. Oxytocics were also excluded because only women received prescriptions in this category. Therefore, a total of 22 therapeutic class categories were analyzed. Some medications were recoded based on active ingredient. For example, Motrin and Advil (which are trade names) were recoded to Ibuprofen, which is the generic name reflecting the active medication ingredient.

Analyses of data. Data in calendar year 2010 were stratified by gender, and branch of service. Only the first issued prescription within each therapeutic class was used to obtain data on therapeutic classification frequencies. For example, if a service member received prescriptions for

acetaminophen and ibuprofen (both within the Central Nervous System Drug classification), this would only be counted once. However, when assessing frequencies for specific prescriptions, each unique prescription issued *for the first time* in the calendar year was included. If a service member was issued refills for a specific prescription within the calendar year, those refills were not counted.

To calculate prescription rates by total DoD force strength, as well as by individual service branch, calendar year 2010 data was retrieved from DMED, which included only active duty personnel. Frequencies for each class were divided by total number of active duty personnel and multiplied by 1,000 (i.e., [number of prescriptions from PDTS/population size from DMED] \times 1,000) to reflect prescription rates per 1,000 active duty personnel. Descriptive statistics and frequencies were calculated using IBM SPSS 23.0 for Windows (SPSS, Chicago, Illinois).

Quality assurance. To assure data quality and consistency, the research team had weekly meetings to ensure that all team members were aware of the overall analytic plan; any data questions were resolved by the senior investigator. All programming to recode prescription names was double-checked for accuracy by a second team member, and statistical analyses were performed by two individuals to ensure that all results matched.

Results and Discussion - Question 3: Are there Differences in Healthcare Utilization by Gender?

Results presented in this section reflect service member healthcare utilization data from calendar year 2014 and pharmacy prescription data from calendar year 2010. Results and discussion for healthcare utilization data from DMED is presented first. An overall summary of all utilization data is followed by more detailed descriptions from selected ICD-9 chapters described in the Question 3 methods section above. Results and discussion for each DMED data section are presented for outpatient encounters by rank, gender, and branch of service, followed by inpatient encounters by rank, gender, and branch of service. The sections are presented in the following order: 1) Overall health services usage, 2) Analysis of Mental Disorders, 3) Analysis of Musculoskeletal Disorders, 4) Analysis of Injury and Poisoning. Results and discussion for pharmacy prescription data from the PDTS database follow. Analyses of prescriptions within each of the 22 therapeutic drug classes described in the Question 3 methods section are presented by gender and branch of service.

DMED Overall Health Services Usage by Gender

Outpatient setting. Table 10 shows the top 5 ICD-9 diagnosed chapters for enlisted personnel overall, as well as split out for men and women. It is important to note that for this section on overall utilization, ICD-9 Diagnostic Chapter data was only available for all occurrences; this resulted in non-mutually exclusive data and some rates over 1,000 per 1,000 person-years. Among enlisted personnel, the ICD-9 chapter with the largest number of cases in an outpatient setting was Diseases of the Musculoskeletal System and Connective Tissue (hereinafter referred to in text, tables, and figures as the “Musculoskeletal Disorders” chapter).

Table 10

Top Five Most Commonly Diagnosed Outpatient ICD-9 Chapters for Enlisted Personnel

ICD-9 Diagnostic Chapter	Overall Population Cases	Rate Ratio (F : M)	Female Enlisted (n = 162,556)		Male Enlisted (n = 939,574)	
			Number of cases	Rate per 1,000	Number of cases	Rate per 1,000
Musculoskeletal Disorders	2,495,473	1.5	516,228	3,175.7	1,979,245	2,106.5
Mental Disorders	1,742,614	1.6	383,142	2,357.0	1,359,472	1,446.9
Symptoms, Signs, and Ill-Defined Conditions	1,383,381	1.9	336,981	2,073.0	1,046,400	1,113.7
Diseases of the Nervous System and Sense Organs	841,822	1.2	142,579	877.1	699,243	744.2
Injury and Poisoning	700,483	1.1	114,279	703.0	586,204	623.9

Note. ICD-9 Diagnostic Chapter data was only available for all occurrences; this resulted in non-mutually exclusive data and some rates over 1,000 per 1,000 person-years.

Figure 38 shows the top five diagnosed chapters for female enlisted service members, along with side-by-side male comparison data. The top four chapters for women were the same as those for men; the fifth highest chapter for men was Injury and Poisoning.

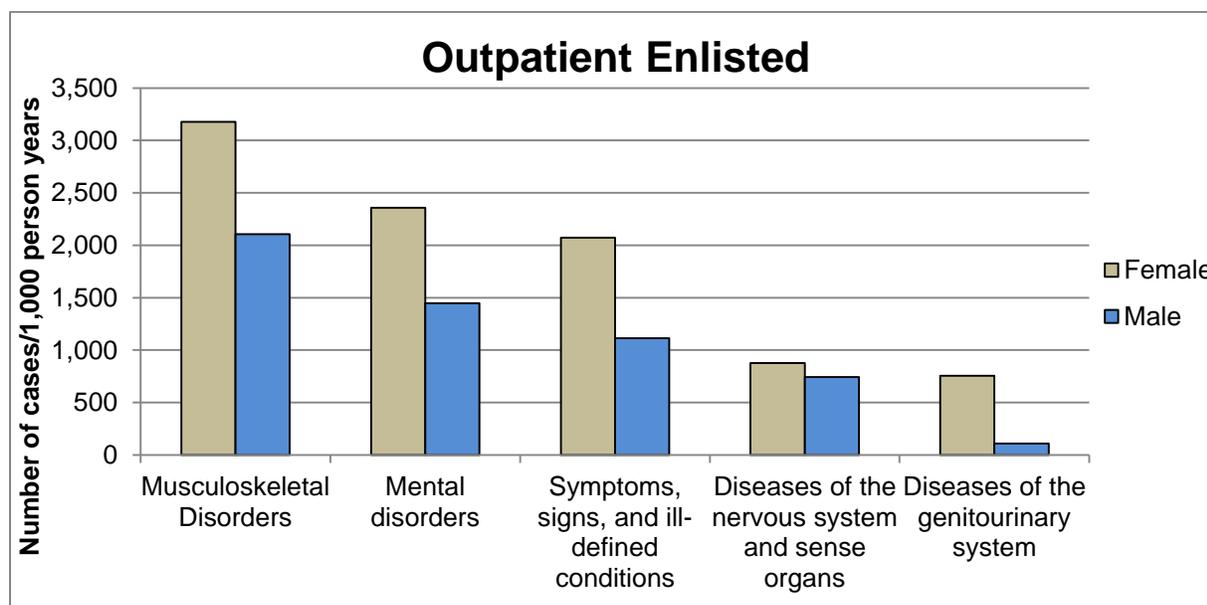


Figure 38. Top five diagnosed ICD-9 chapters for outpatient enlisted females, alongside male comparison data.

Table 11 shows the top five diagnosed chapters for officers overall, as well as split out for women and men. Among officers in an outpatient setting, the most highly diagnosed chapter was Musculoskeletal Disorders (paralleled in the enlisted data).

Table 11

Top Five Most Commonly Diagnosed Outpatient ICD-9 Chapters for Officer Personnel

ICD-9 Diagnostic Chapter	Overall Population Cases	Rate Ratio (F : M)	Female Officer (n = 39,321)		Male Officer (n = 197,509)	
			Number of cases	Rate per 1,000	Number of cases	Rate per 1,000
Musculoskeletal Disorders	502,118	1.4	110,665	2,814.4	391,453	1,982.0
Symptoms, Signs, and Ill-Defined Conditions	277,279	1.8	72,228	1,836.9	205,051	1,038.2
Nervous System and Sense Organs	198,126	1.1	34,895	887.4	163,231	826.4
Mental Disorders	168,336	2.0	48,769	1,240.3	119,567	605.4
Injury and Poisoning	107,976	1.1	19,708	501.2	88,268	446.9

Note. ICD-9 Diagnostic Chapter data was only available for all occurrences; this resulted in non-mutually exclusive data and some rates over 1 per person-year.

Figure 39 shows the top 5 diagnosed chapters for female officers, along with side-by-side male officer comparison data. The top four diagnostic chapters for female officers were the same as for males. The fifth highest chapter for male officers was Injury and Poisoning (paralleling the male enlisted outpatient data).

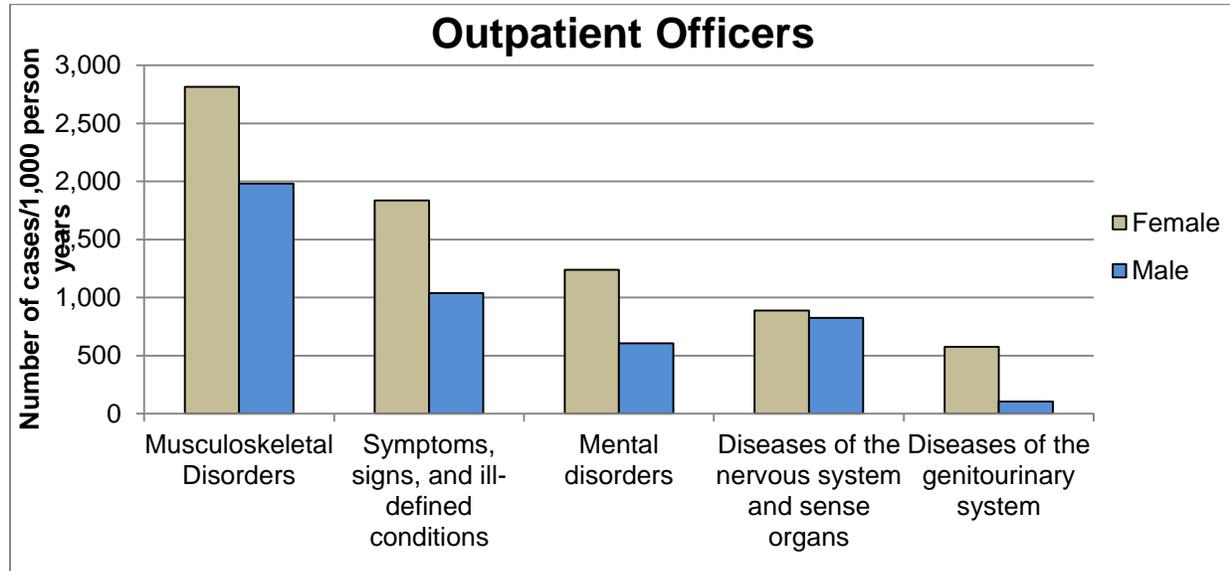


Figure 39. Top five diagnosed ICD-9 chapters for outpatient female officers, alongside male comparison data.

For every one of the fifteen ICD-9 chapters, females overall (in an outpatient setting) were significantly more likely to be diagnosed than males. For thirteen out of fifteen diagnosed ICD-9 chapters, women were between 1.1 and 2.0 times more likely to be diagnosed with a condition in that chapter than men. Research has shown that women are up to two times more likely to seek healthcare overall than men (Sandman, Simantov, & An, 2000; Wang, Hunt, Nazareth, Freemantle, & Petersen, 2013).

ICD-9 chapter rate ratios of women to men in the outpatient setting. Figure 40 presents the two ICD-9 chapters where the rate ratio for women to men was over 2.0. The rate ratio of enlisted outpatient women to enlisted outpatient men was 3.0 for Diseases of the Blood and Blood-Forming Organs (ranked 15th overall); this means that women were diagnosed with blood-related diseases 3 times more often than men. Diseases of the Genitourinary System (ranked 8th overall) were diagnosed 7 times more in women than in men. Among female officers in an outpatient setting, the trends for number of cases and rate ratios were similar to female enlisted personnel. Diseases of the Genitourinary System and Diseases of the Blood and Blood-Forming Organs were significantly more likely to be diagnosed among women than men. These two ICD-9 chapters may highlight diagnostic clusters of concern for military women.

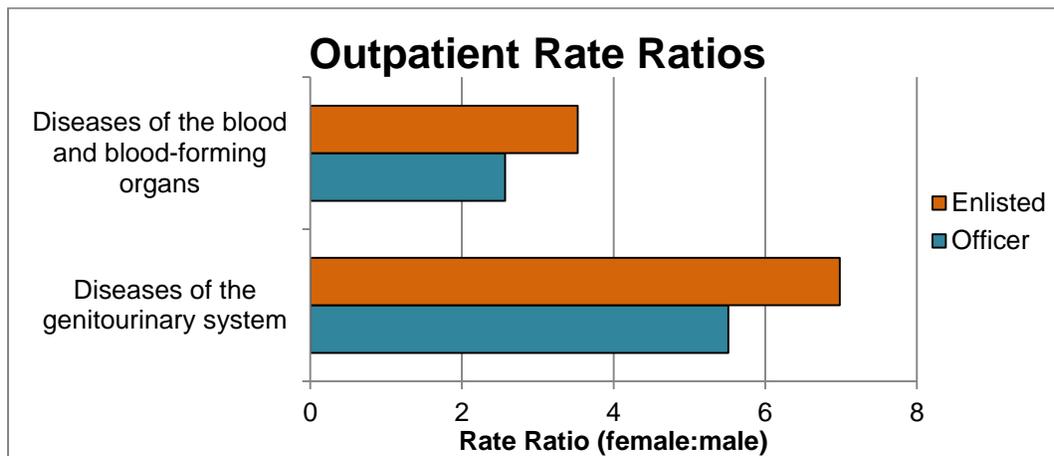


Figure 40. Rate ratios greater than 2 (female: male) for outpatient ICD-9 chapters.

Inpatient Setting. The top 5 diagnosed chapters for inpatient enlisted personnel overall, and by sex, are shown in Table 12. Among enlisted personnel in an inpatient setting, the most highly diagnosed ICD-9 chapter was Mental Disorders.

Table 12
Top Five Most Commonly Diagnosed Inpatient ICD-9 Chapters for Enlisted Personnel

ICD-9 Diagnostic Chapter	Overall Population Cases	Rate Ratio (F : M)	Female Enlisted (n = 162,556)		Male Enlisted (n = 939,574)	
			Number of cases	Rate per 1,000	Number of cases	Rate per 1,000
Mental Disorders	15,047	1.5	3,042	18.7	12,005	12.8
Injury and Poisoning	6,497	0.9	834	5.1	5,663	6.0
Diseases of the Digestive System	5,553	1.3	1,023	6.3	4,530	4.8
Musculoskeletal Disorders	4,989	0.9	660	4.1	4,329	4.6
Symptoms, Signs, and Ill-Defined Conditions	2,880	1.6	616	3.8	2,264	2.4

Figure 41 shows the top five diagnosed chapters for inpatient female enlisted service members, alongside male comparison data. Four out of the top five diagnostic chapters for females were also in the top five diagnoses for males. The fifth highest chapter for men was Symptoms, Signs, and Ill-Defined Conditions.

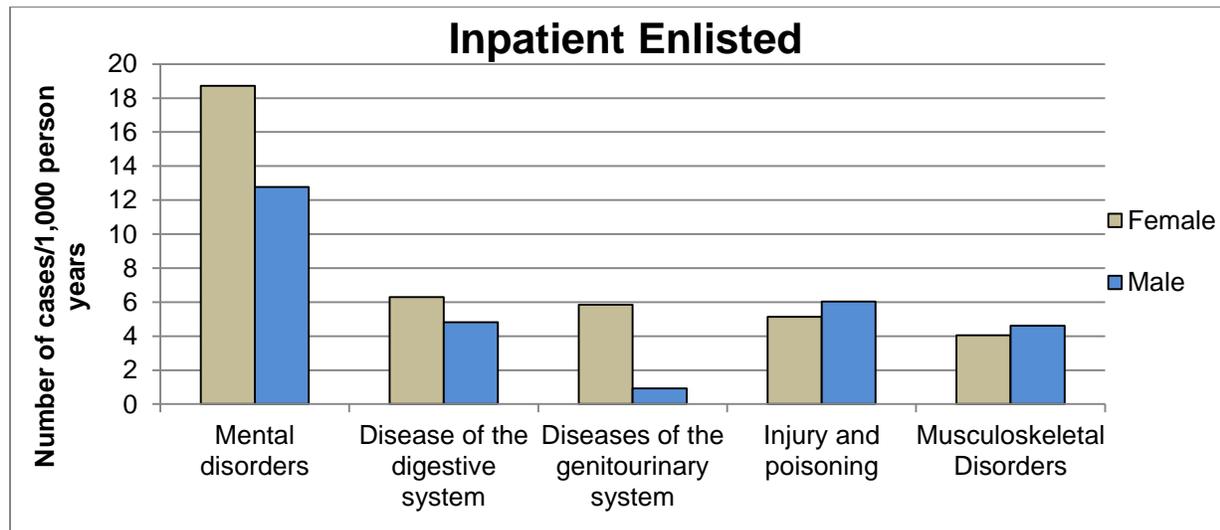


Figure 41. Top five diagnosed ICD-9 chapters for inpatient enlisted females, alongside male comparison data.

Table 13 shows the top 5 diagnosed chapters for officers overall, as well as split out for women and men. Among officers in an inpatient setting, the most highly diagnosed chapter was Musculoskeletal Disorders (a departure from the enlisted data).

Table 13
Top Five Most Commonly Diagnosed Inpatient ICD-9 Chapters for Officer Personnel

ICD-9 Diagnostic Chapter	Overall Population Cases	Rate Ratio (F : M)	Female Officer (n = 39,321)		Male Officer (n = 197,509)	
			Number of cases	Rate per 1,000	Number of cases	Rate per 1,000
Musculoskeletal Disorders	1,122	1.0	191	4.9	931	4.7
Diseases of the Digestive System	963	1.2	185	4.7	778	3.9
Injury and Poisoning	874	0.8	126	3.2	748	3.8
Mental Disorders	861	1.7	218	5.5	643	3.3
Symptoms, Signs, and Ill-Defined Conditions	534	1.3	107	2.7	427	2.2

Figure 42 shows the top five diagnosed chapters for inpatient female officers; the most common diagnostic chapter was Neoplasms (again, a departure from the enlisted data). In the inpatient setting, all chapters were much less prevalent among officers than among enlisted personnel.

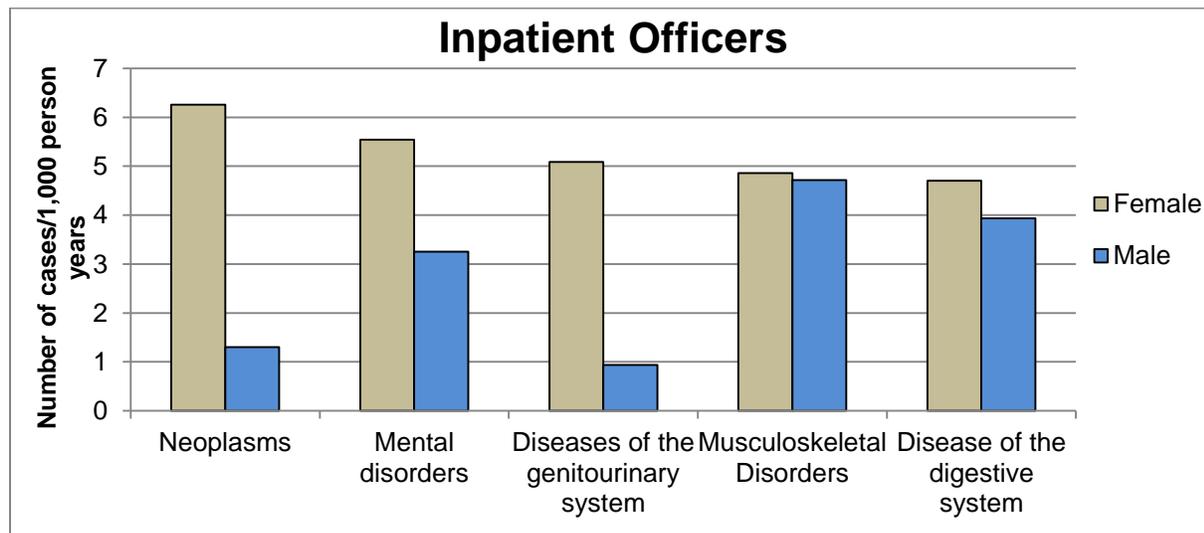


Figure 42. Top five diagnosed ICD-9 Chapters for inpatient female officers, alongside male comparison data.

ICD-9 chapter rate ratios of women to men in the inpatient setting. Figure 43 presents the four inpatient ICD-9 chapters where the rate ratio of women to men was over 2.0. These ICD-9 chapters may highlight diagnostic clusters of concern for women.

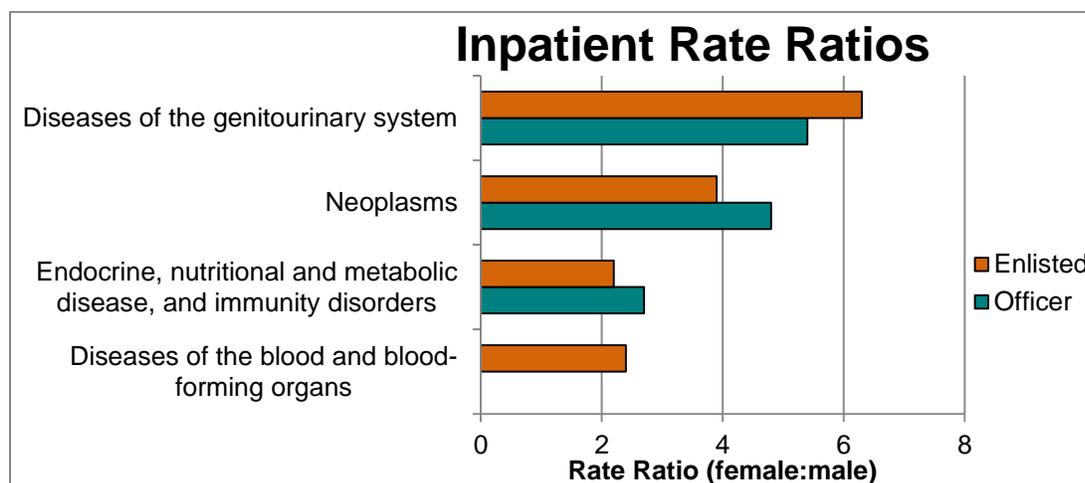


Figure 43. Rate ratios greater than 2 (female: male) for inpatient diagnosis chapters.

For enlisted women, Diseases of the Blood and Blood-Forming Organs (ranked 15th overall) was diagnosed 2.4 times more often in women than in men. Endocrine, Nutritional, and Metabolic Disease, and Immunity Disorders (ranked 13th overall), were diagnosed 2.2 times more often in enlisted women than in enlisted men; female officers were 2.7 times more likely to be diagnosed with a condition in this ICD-9 chapter than were male officers. Neoplasms (ranked 6th among officer personnel) were 4.8 times more likely to be diagnosed in female officers than in their male counterparts; for enlisted females, the diagnostic rate in this chapter was 3.9 times higher than for enlisted males. Diseases of the Genitourinary System (ranked 6th overall among enlisted personnel) was diagnosed 6.3 times more often in enlisted women than among enlisted men, and was 5.4 times more likely to be diagnosed in female officers than in male officers. This ICD-9 chapter (Diseases of the Genitourinary System) is more often diagnosed in women in both inpatient and outpatient settings, and across both enlisted and officer personnel.

Based on their higher number of cases in both inpatient and outpatient settings, three diagnostic ICD-9 chapters were further examined. These were: (1) Mental Disorders, (2) Musculoskeletal Disorders, and (3) Injury and Poisoning (which has a co-linear relationship with musculoskeletal concerns).

Further Analysis of the Mental Disorders ICD-9 Chapter

Outpatient setting. Counts and rates for commonly diagnosed ICD-9 categories within the Mental Disorders chapter were calculated for enlisted and officer personnel in the outpatient ambulatory setting.

Counts and rates for enlisted personnel. Table 14 contains the most commonly diagnosed mental health conditions for outpatient enlisted service members overall, as well as split out for females and males. Adjustment reaction was the most commonly diagnosed condition in the Mental Disorders chapter.

Table 14

Top Five Most Commonly Diagnosed Outpatient ICD-9 Categories for Enlisted Personnel within the Mental Disorders Chapter

Outpatient ICD-9 Diagnostic Category	Overall Population Cases	Rate Ratio (F : M)	Female Enlisted (n = 162,556)		Male Enlisted (n = 939,574)	
			Number of cases	Rate per 1,000	Number of cases	Rate per 1,000
Adjustment reaction	47,358	1.7	10,618	65.3	36,740	39.1
Neurotic disorders	31,211	1.8	7,393	45.5	23,818	25.3
Depressive disorder, not elsewhere classified	19,393	2.0	5,029	30.9	14,364	15.3
Nondependent abuse of drugs	17,774	0.7	2,032	12.5	15,742	16.8
Affective psychoses	13,054	2.1	3,461	21.3	9,593	10.2

Note. ICD-9 Diagnostic Category data was available for first occurrence of each category; this resulted in mutually exclusive data and all rates fewer than 1,000 per 1,000 person-years.

Figure 44 shows the top 5 diagnosed conditions for female enlisted service members, alongside male data. The most commonly diagnosed conditions were almost identical for women and men.

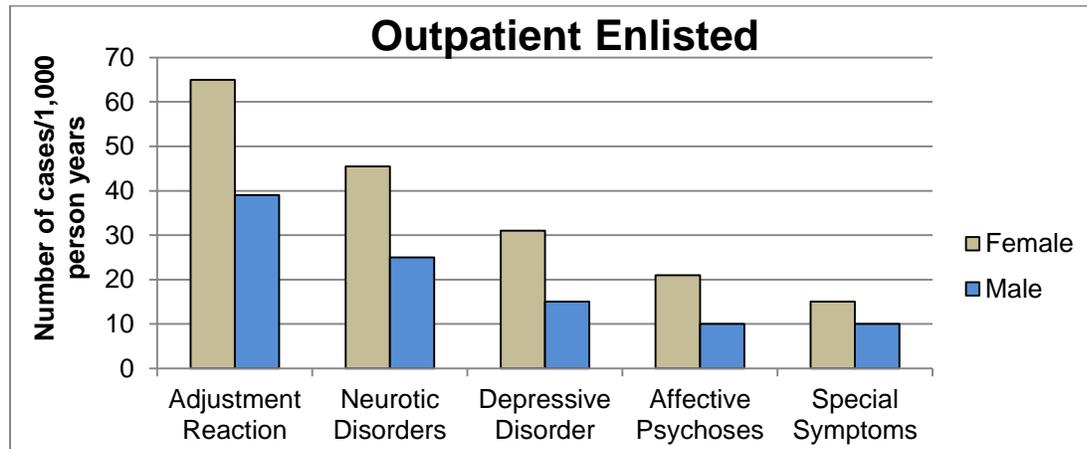


Figure 44. Top five diagnosed ICD-9 categories for outpatient enlisted females within the Mental Disorders chapter, alongside male comparison data.

For all services, the top 5 diagnoses were the same across female enlisted personnel, with slight rank order shifts between services.

Among male service members, the top 5 diagnoses were almost the same by branch, with slight rank order shifts. The only notable difference was among Navy and Marine Corps personnel; alcohol dependence syndrome ($n = 1,782$ male sailors and 1,441 male Marines) was one of the top 5 most common outpatient mental health diagnoses in these service branches.

In Table 15 (below), female to male rate ratios are shown by service branch, with the top three highlighted for each service. Personality disorders were in the top 3 outpatient conditions diagnosed more often for enlisted women than for enlisted men across all four service branches. Additionally, acute reaction to stress, depressive disorders, and affective psychoses were consistently diagnosed at least two times more often in women than in men across the services.

Table 15

Top Three Rate Ratios of Outpatient ICD-9 Categories within the Mental Disorders Chapter for Enlisted Females by Service Branch

ICD-9 Diagnostic Category	Army (n = 410,835)	Navy (n = 266,237)	Air Force (n = 256,712)	Marine Corps (n = 168,346)
Physiological malfunction arising from mental factors	2.8	**	**	**
Acute reaction to stress	2.6	2.2	3.5	3.7
Personality disorders	2.1	3.4	2.5	4.8
Psychic factors associated with diseases classified elsewhere	1.8	3.8	2.1	**
Neurotic disorders	1.6	2.4	2.0	2.2
Depressive disorder	2.0	2.3	2.2	2.4
Affective psychoses	2.0	2.3	2.1	2.5

Note. Highlighting indicates that a diagnosis was in the top three diagnoses for that branch. Other values are provided for comparisons between branches. **= Numbers too small to test for significant difference.

For comparison, Table 16 shows the most diagnosed conditions within the ICD-9 chapter of Mental Disorders for enlisted men by branch of service. In comparison to women, men were more often diagnosed with alcohol dependence syndrome across the service branches shown.

Table 16

Top Three Rate Ratios of Outpatient ICD-9 Categories within the Mental Disorders Chapter for Enlisted Males by Service Branch

ICD-9 Diagnostic Category	Army (n = 410,835)	Navy (n = 266,237)	Air Force (n = 256,712)
Sexual deviations and disorders	6.6	**	3.2
Other organic psychotic conditions organic	1.8	**	***
Alcohol dependence syndrome	1.7	1.5	1.5
Drug dependence	1.6	1.5	***
Nondependent abuse of drugs	1.4	1.2	1.3
Alcoholic psychoses	1.6	***	1.8

Note. Highlighting indicates that a diagnosis was in the top three diagnoses for that branch. Other values are provided for comparisons between branches. The Marine Corps had no more than 30 cases in both males and females; consequently no rate ratios are reported. **= Numbers too small to test for significant difference. ***= No significant difference between males and females in rate of diagnosis.

Further exploration of enlisted data. Of interest, the categories of adjustment reaction and neurotic disorders were investigated further as they were the top two diagnosed conditions within the outpatient Mental Disorders ICD-9 chapter. Among both male and female enlisted personnel, the most common diagnosis subcategory within adjustment reaction was adjustment reaction with predominant disturbance of other emotions (42.5 outpatient cases per 1,000 enlisted female person-years and 22.6 outpatient cases per 1,000 enlisted male person-years). The most common subcategory for neurotic disorders among women was anxiety states with a rate of 38.5 outpatient cases per 1,000 enlisted female person-years. Within the category of nondependent abuse of drugs, the two most common diagnoses among male enlisted service members were alcohol (9.01 per 1,000 person-years) and tobacco use disorder (7.75 per 1,000 person-years).

Drug dependency in enlisted men was investigated further and it was found that amphetamine and other psychostimulant dependence was the most common with 2.1 outpatient diagnoses per 1,000 enlisted male person-years. The next most common, opioid type dependence had 0.65 cases per 1,000 person-years. Investigation into the category of sexual and gender identity disorders among enlisted males in the Army and Air Force found that although the rates were higher among males than females, the actual numbers of diagnoses among males was still low in each of the subcategories. There were 12 or fewer diagnosed cases in the Army of any of the three disorders (trans-sexualism, gender identity disorder in child, gender identity disorder in adolescent or adult). In the Air Force there were 5 or fewer cases of any of the subcategory diagnoses.

Counts and rates for officer personnel. Table 17 contains the most commonly diagnosed outpatient conditions within the Mental Disorders ICD-9 chapter among officers overall, as well as split out by women and men. Adjustment reaction was the top diagnostic category for the combined population, as well as for female and male officers individually.

Table 17

Top Five Most Commonly Diagnosed Outpatient ICD-9 Categories for Officer Personnel within the Mental Disorders Chapter

Outpatient ICD-9 Diagnostic Category	Overall Population Cases	Rate Ratio (F : M)	Female Officer (n = 39,321)		Male Officer (n = 197,509)	
			Number of cases	Rate per 1,000	Number of cases	Rate per 1,000
Adjustment reaction	4,283	1.9	1,186	30.2	3,097	15.7
Neurotic disorders	3,438	1.9	945	24.0	2,493	12.6
Special symptoms or syndromes, not elsewhere classified	2,013	1.3	415	10.6	1,598	8.1
Depressive disorder, not elsewhere classified	1,758	2.2	538	13.7	1,220	6.2
Affective psychoses	1,252	2.5	419	10.7	833	4.2

The top five diagnosed conditions for officers and enlisted personnel were remarkably similar; even the rank order was the same for female enlisted service members and female officers.

Figure 45 shows the top 5 diagnosed conditions for female officers, alongside male data. The most commonly diagnosed condition for men and women within the Mental Disorders ICD-9 chapter was Adjustment Reaction, paralleling the enlisted data.

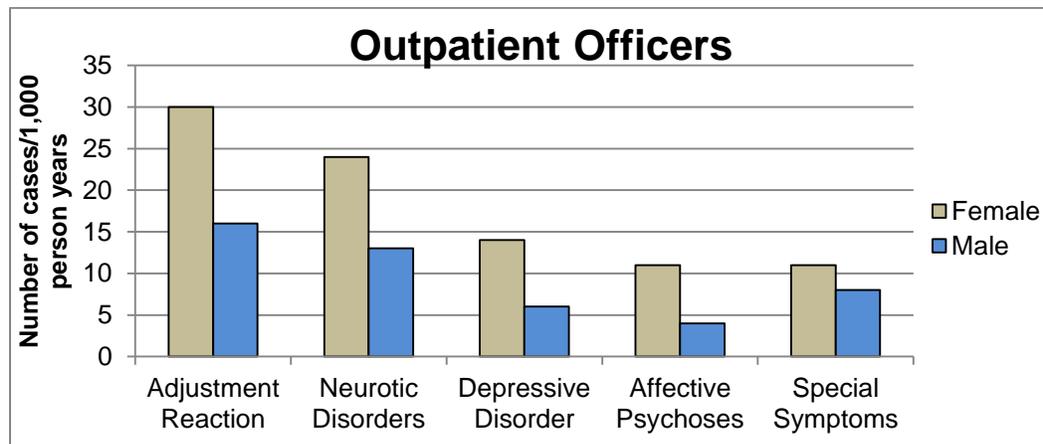


Figure 45. Top five diagnosed ICD-9 categories for outpatient female officers within the Mental Disorders chapter, alongside male comparison data.

In all branches, the top 5 diagnosed conditions for female officers were the same as for the overall mixed gender population. The only notable exception was for male officers in the Navy and the Marine Corps; nondependent abuse of drugs displaced affective psychoses in the top five most commonly diagnosed conditions. Male officers were more likely to be diagnosed with alcohol dependence syndrome (1.7 times more likely), and nondependent abuse of drugs (1.7 times more likely), relative to women. Due to small numbers (fewer than 30 cases for either males, females, or both) male officers were not significantly more likely to be diagnosed with any other mental health condition in an outpatient setting.

In Table 18, female to male rate ratios are shown by service branch, with the top three highlighted for each service. Across all three service branches shown, affective psychoses were in the top 3 outpatient conditions diagnosed more often for female officers than male officers.

Table 18

Top Three Rate Ratios of Outpatient ICD-9 Categories within the Mental Disorders Chapter for Female Officers by Service Branch

ICD-9 Diagnostic Category	Army (n = 98,086)	Navy (n = 54,122)	Air Force (n = 63,429)
Acute reaction to stress	4.2	**	**
Affective psychoses	2.4	2.3	3.0
Transient organic psychotic conditions	2.1	**	**
Depressive disorder	1.9	2.7	3.0
Neurotic disorders	1.7	2.3	2.5
Adjustment reaction	1.7	2.0	2.6

Note. Highlighting indicates that a diagnosis was in the top three diagnoses for that branch. Other values are provided for comparisons between branches. The Marine Corps had no more than 30 cases in both males and females; consequently, no rate ratios are reported. **= Numbers too small to test for significant difference.

The only diagnostic category in which male officers were significantly more likely to receive a diagnosis than female officers was nondependent abuse of drugs. Male Army officers were 1.5 times more likely to be diagnosed with nondependent abuse of drugs than female Army officers.

Further exploration of officer data. The ICD-9 category of adjustment reaction, which was the number one outpatient diagnosis among both female and male officers, was further explored. The most common subcategory diagnosed within adjustment reaction was ‘adjustment reaction with predominant disturbance of other emotions’ (20.1 outpatient diagnoses per 1,000 female officer person-years and 8.9 outpatient diagnoses per 1,000 male officer person-years). ‘Special symptoms or syndromes, not elsewhere classified’ was the fifth most commonly diagnosed subcategory for female officers, and the third most commonly diagnosed subcategory for male officers. Further investigation found that the most commonly diagnosed subcategory among both female and male officers was ‘specific disorders of sleep of nonorganic origin’ (8.75 cases per 1,000 female officer person-years and 7.57 cases per 1,000 male officer person-years). The next most common for both was ‘pain disorders related to psychological factors’ (1.60 cases per 1,000 female officer person-years and 0.60 cases per 1,000 male officer person-years).

ICD-9 category rate ratios of women to men in the outpatient setting. Figure 46 shows the ICD-9 categories within the Mental Disorders chapter where the rate ratio for women to men was over 2.0.

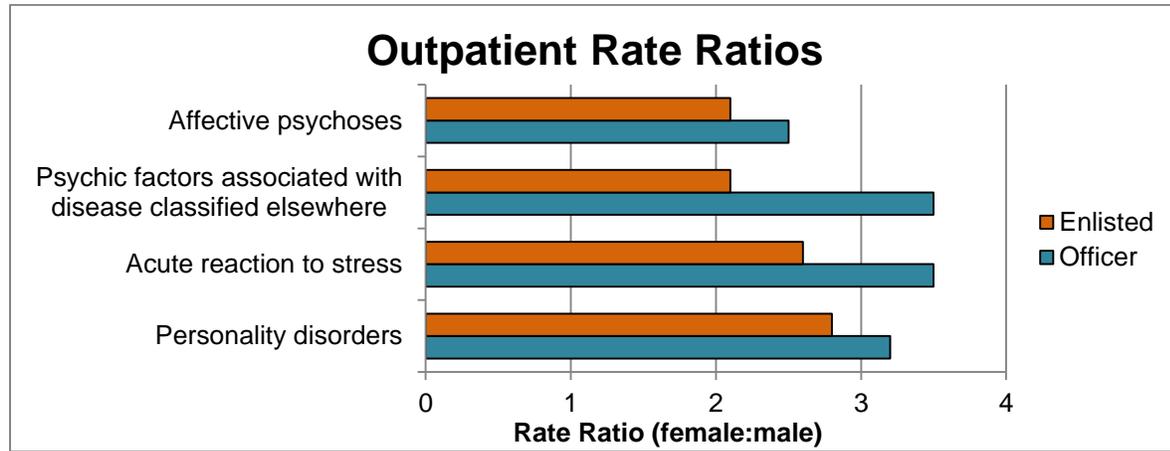


Figure 46. Rate ratios greater than 2.0 (female: male) within the outpatient Mental Disorders ICD-9 chapter for enlisted and officer service women.

For both enlisted and officer women, the following conditions were over two times more likely to be diagnosed in women than in men: affective psychoses, psychic factors associated with disease classified elsewhere, acute reaction to stress, and personality disorders. These may indicate mental health diagnostic clusters of concern for women. Additionally within the Mental Disorders chapter, enlisted personnel were 2.6 times more likely to be diagnosed with ‘disturbances of emotions specific to childhood and adolescence,’ and 3.1 times more likely to be diagnosed with ‘physiological malfunctions arising from mental factors’ than their enlisted male counterparts. Female officers were also 2.2 times more likely to be diagnosed with ‘depressive disorder, not elsewhere classified’ and 2.4 times more likely to be diagnosed with ‘other nonorganic psychoses’ than their male officer peers.

Inpatient setting. Counts and rates for commonly diagnosed ICD-9 categories within the Mental Disorders chapter were calculated for enlisted and officer personnel in the inpatient hospital setting.

Counts and rates for enlisted personnel. Table 19 contains the most commonly diagnosed inpatient conditions within the Mental Disorders ICD-9 chapter among enlisted overall, as well as split out by women and men. The most commonly diagnosed condition for men and women within the Mental Disorders ICD-9 chapter was Adjustment Reaction, paralleling the outpatient data. The top 5 most common inpatient diagnoses were almost the same for male and female enlisted personnel, with slight rank order variations.

The top four most common ICD-9 categories within the Mental Disorders chapter among enlisted female service members were the same in outpatient and inpatient settings, although ranking order varied.

Table 19

Top Five Most Commonly Diagnosed Inpatient ICD-9 Categories for Enlisted Personnel within the Mental Disorders Chapter

Inpatient ICD-9 Diagnostic Category	Overall Population Cases	Rate Ratio (F : M)	Female Enlisted (n = 162,556)		Male Enlisted (n = 939,574)	
			Number of cases	Rate per 1,000	Number of cases	Rate per 1,000
Adjustment reaction	4,431	1.6	972	6.0	3,459	3.7
Affective psychoses	2,509	1.9	618	3.8	1,891	2.0
Alcohol dependence syndrome	1,209	0.9	157	1.0	1,052	1.1
Neurotic disorders	1,028	1.6	220	1.4	808	0.9
Depressive disorder, not elsewhere classified	1,017	1.7	235	1.5	782	0.8

Figure 47 shows the top 5 diagnosed ICD-9 categories for enlisted women, alongside male comparison data. The most commonly diagnosed condition for inpatient enlisted women and men was Adjustment Reaction (paralleling the outpatient data for enlisted and officer personnel).

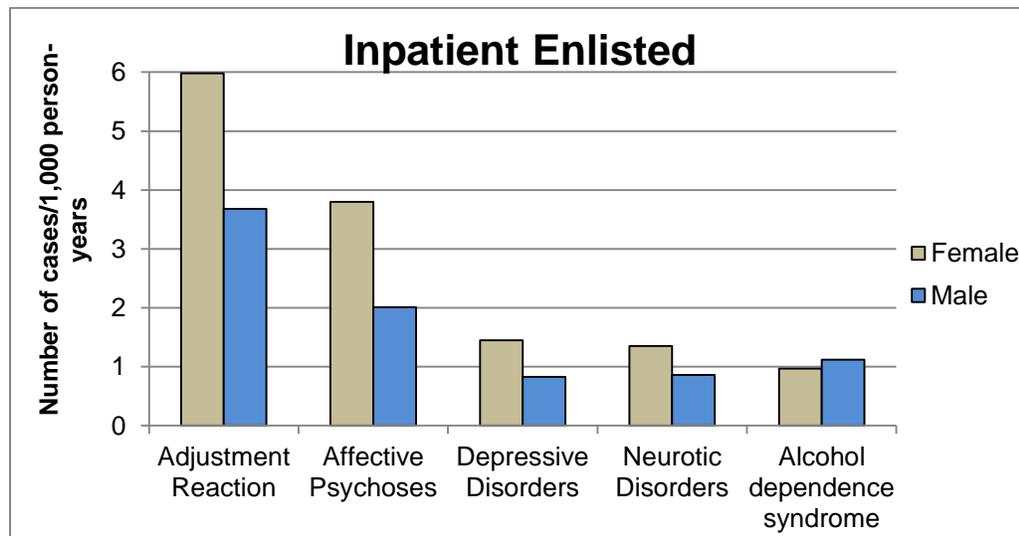


Figure 47. Top five diagnosed ICD-9 categories for inpatient female enlisted personnel within the Mental Disorders chapter, alongside male comparison data.

Among female enlisted service members in the Navy, the fourth most common inpatient diagnoses was alcohol dependence syndrome ($n = 60$ females). Otherwise the top five conditions shown in Figure 47 were the same across all other service branches.

Overall male enlisted service members in the inpatient setting were significantly more likely to be diagnosed with nondependent abuse of drugs (1.7 times more likely than females). There were no other mental health conditions in which males were significantly more likely to be diagnosed than females.

In Table 20, female to male ratios are shown by service branch, with the top three categories highlighted for each service. Personality disorders were more likely to impact enlisted female service members across branches.

Table 20

Top Three Rate Ratios of Inpatient ICD-9 Categories within the Mental Disorders Chapter for Enlisted Females by Service Branch

ICD-9 Diagnostic Category	Army (n = 410,835)	Navy (n = 266,237)	Air Force (n = 256,712)	Marine Corps (n = 168,346)
Personality disorders	2.8	3.4	*	
Depressive disorder	1.8	1.6	1.5	
Affective psychoses	1.8	2.2	1.6	
Adjustment reaction	1.5	2.6	1.7	2.2
Neurotic disorders	1.4	1.8	2.4	

Note. Highlighting indicates that a diagnosis was in the top three diagnoses for that branch. Other values are provided for comparisons between branches. **= numbers too small to test for significant difference

The only two diagnoses which male enlisted service members were statistically more likely to receive compared to females was nondependent abuse of drugs (1.7 times more likely) and alcohol dependence syndrome (1.5 times more likely), both only among Army personnel. Looking at variations among male enlisted service personnel by service branch, the number 5 most commonly diagnosed inpatient condition within the Mental Disorders chapter was alcoholic psychoses in the Navy and Air Force (n = 118 sailors, n = 83 airmen). Nondependent abuse of drugs was the fourth most common inpatient diagnosis among Marine enlisted personnel (n = 106).

Further exploration of enlisted data. For both male and female enlisted personnel, the most common subcategory of adjustment reaction diagnosed in an inpatient setting was 'adjustment disorder with depressed mood' (2.1 diagnoses per 1,000 enlisted female person-year and 1.2 diagnoses per 1,000 enlisted male person-year).

Counts and rates for officer personnel. Table 21 contains the most commonly diagnosed ICD-9 categories within the Mental Disorders chapter for inpatient officers overall, as well as split out by females and males.

Table 21

Top Five Most Commonly Diagnosed Inpatient ICD-9 Categories for Officer Personnel within the Mental Disorders Chapter

Inpatient ICD-9 Diagnostic Category	Overall Population Cases	Rate Ratio (F : M)	Female Officer (n = 39,321)		Male Officer (n = 197,509)	
			Number of cases	Rate per 1,000	Number of cases	Rate per 1,000
Affective psychoses	172	2.2	53	1.4	119	0.6
Adjustment reaction	165	2.1	48	1.2	117	0.6
Alcohol dependence syndrome	92	**	6	0.2	86	0.4
Neurotic disorders	61	**	13	0.3	48	0.2
Alcoholic psychoses	45	**	2	0.1	43	0.2
Depressive disorder, not elsewhere classified	45	**	8	0.2	37	0.2

Note. **=Numbers too small to test for significant difference.

Although all ICD-9 categories had small numbers of cases, Figure 48 shows the top five commonly diagnosed categories for officer women, alongside male comparison data. In a departure from the outpatient enlisted and officer data, and from the inpatient enlisted data, Adjustment Reaction was not the top diagnosis for men and women, but was the second most frequently diagnosed condition in the Mental Disorders chapter for inpatient officers.

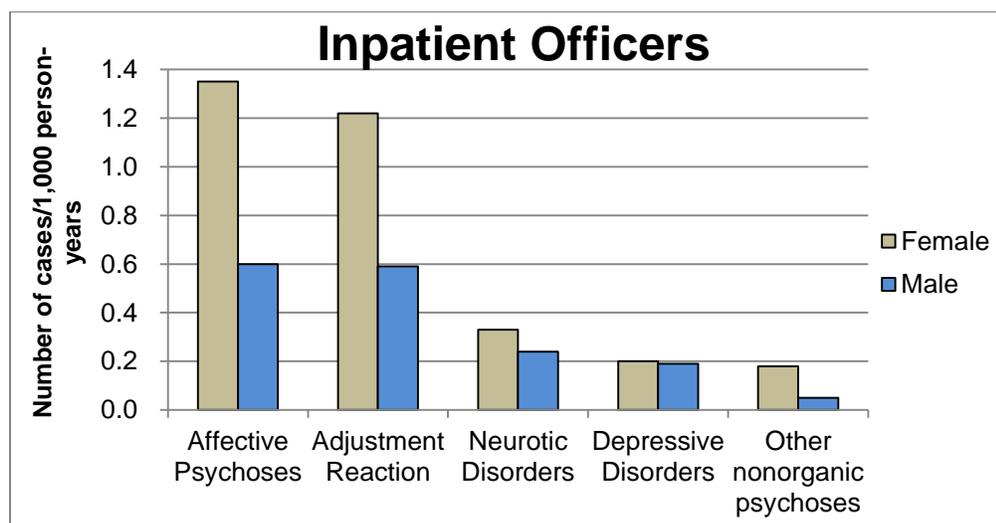


Figure 48. Top five diagnosed ICD-9 categories for inpatient female officers within the Mental Disorders chapter, alongside male comparison data.

There were not enough cases across service branches to report female to male rate ratios for officers in an inpatient setting. Due to the small number of cases (n < 30 for most diagnoses across

branches), statistical significance tests could not be performed in most cases. Only two inpatient mental health diagnoses among officers had enough cases to test for statistical significance. The two diagnoses were affective psychoses and adjustment reaction. Both diagnoses were significantly more likely to impact female officers than male officers.

Further exploration of officer data. For both female and male officers in an inpatient setting the most common subcategory under adjustment reaction was 'other specified adjustment reactions' (0.7 cases per 1,000 female officer person-years and 0.3 cases per 1,000 male officer person-years).

ICD-9 category rate ratios of women to men in the inpatient setting. Figure 49 shows the ICD-9 categories within the Mental Disorders chapter where the rate ratio for women to men was over 2.0 in an inpatient setting. Special symptoms or syndromes were 8.3 times more likely to be diagnosed in enlisted women than in men; personality disorders were 3.2 times more likely to be diagnosed in enlisted women than in men. Affective psychoses and adjustment reaction were over 2 times more likely to be diagnosed in female officers than in male officers. There was no overlap between enlisted and officer service members in ICD-9 categories with rate ratios greater than 2.0.

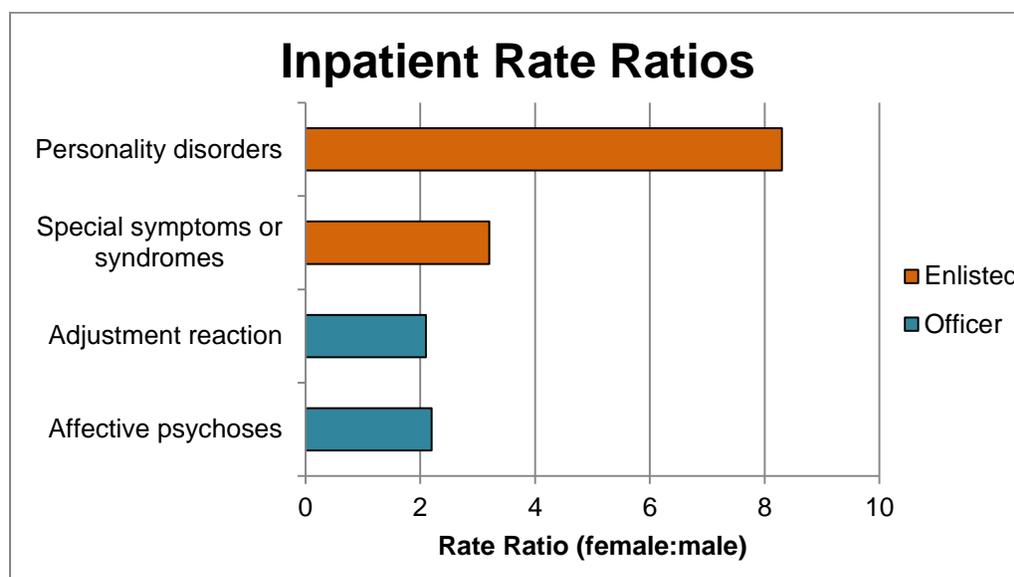


Figure 49. Rate ratios greater than 2.0 (female: male) within the inpatient Mental Disorders ICD-9 chapter for enlisted and officer service women.

Further Analysis of the Musculoskeletal Disorders ICD-9 Chapter

Outpatient setting. Counts and rates for commonly diagnosed ICD-9 categories within the Musculoskeletal Disorders chapter were calculated for enlisted and officer personnel in the outpatient ambulatory setting.

Counts and rates for enlisted personnel. Table 22 shows the 5 most commonly diagnosed ICD-9 categories within the Musculoskeletal Disorders chapter for outpatient enlisted service members overall, as well as split out for females and males. Other and unspecified disorders of the joint was the most common diagnostic category for both female and male enlisted personnel.

Table 22

Top Five Most Commonly Diagnosed Outpatient ICD-9 Categories for Enlisted Personnel within the Musculoskeletal Disorders Chapter

Outpatient ICD-9 Diagnostic Chapter	Overall Population Cases	Rate Ratio (F : M)	Female Enlisted (n = 162,556)		Male Enlisted (n = 939,574)	
			Number of cases	Rate per 1,000	Number of cases	Rate per 1,000
Other and unspecified disorders of joint	98,069	1.2	17,188	105.7	80,881	86.1
Other and unspecified disorders of back	67,809	1.3	12,275	75.5	55,534	59.1
Other disorders of soft tissues	56,493	1.4	11,087	68.2	45,406	48.3
Peripheral enthesopathies	35,494	1.3	6,380	39.2	29,114	31.0
Disorders muscle, ligament, and fascia	30,638	1.6	6,500	40.0	24,138	25.7

Figure 50 shows the top 5 diagnosed conditions for female enlisted service members, with side-by-side male comparison data. The most commonly diagnosed category was 'Other and unspecified disorders of joint' for enlisted women and men.

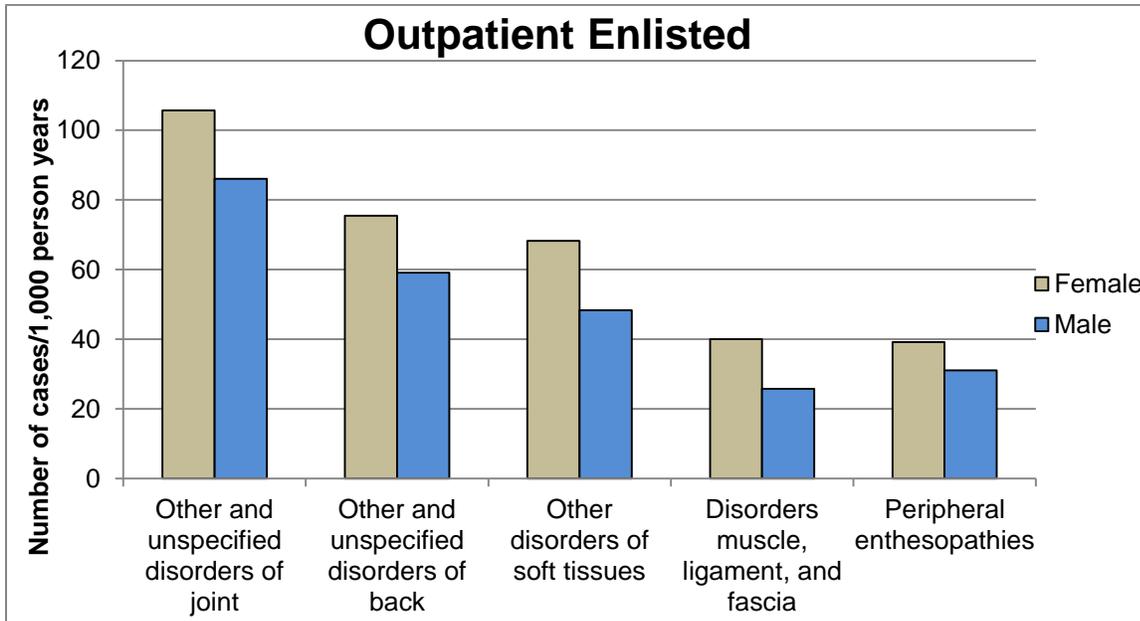


Figure 50. Top five diagnosed ICD-9 categories for outpatient female enlisted personnel within the Musculoskeletal Disorders chapter, alongside male comparison data.

Male enlisted personnel were significantly more likely to be diagnosed with osteochondropathies (1.6 times more likely), other acquired musculoskeletal deformities (1.2 times more likely), and osteoarthritis and related disorders (1.1 times more likely), relative to their female peers.

In Table 23, female to male rate ratios are shown by service branch, with the top three categories highlighted for each service. 'Ankylosing spondylitis and other inflammatory spondylopathies,' 'acquired deformities of the toe,' and 'curvature of spine' were consistently diagnosed at least two times as often in women than in men across the services.

Table 23

Top Three Rate Ratios of Outpatient ICD-9 Categories within the Musculoskeletal Disorders Chapter for Enlisted Females by Service Branch

ICD-9 Diagnostic Category	Army (n = 410,835)	Navy (n = 266,237)	Air Force (n = 256,712)	Marine Corps (n = 168,346)
Diffuse disease connective tissue	6.2	**	6.5	**
Rheumatoid arthritis and inflammatory polyarthropathies	2.8	**	2.6	**
Curvature of spine	2.7	2.1	2.3	2.6
Osteomyelitis, periotitis, and other infections involving bones	**	3.6	**	**
Acquired deformities toe	2.4	3.3	2.7	3.7
Anklosing spondylitis and other inflammatory spondylopathies	2.6	3.3	2.7	4.4

Note. Highlighting indicates that a diagnosis was in the top three diagnoses for that branch. Other values are provided for comparisons between branches. **= Numbers too small to test for significant difference.

There were very few musculoskeletal outpatient diagnoses that male enlisted service members were significantly more likely to have than females when examined by branch. Males were significantly more likely in both the Army and the Navy to receive a diagnosis of osteochondropathy (1.7 and 1.6 times more likely respectively), relative to their female peers. Male Army personnel were also 1.3 times more likely to be diagnosed with 'other acquired musculoskeletal deformities' and male Navy personnel were 1.3 times more likely to be diagnosed with 'osteoarthritis and related disorders' than their female counterparts.

Further exploration of enlisted data. Within the category of other and unspecified disorders of joint, the top subcategories for women and men was 'pain in joint'. Other and unspecified disorders of back were investigated further and 'lumbago' was the most common subcategory with 81.1% of women (61 cases per 1,000 person-years) and 84.1% of men (50 cases per 1,000 person-years) within this category. Looking at other disorders of soft tissues, the most common subcategory was 'pain in limb' for women (61 cases/1,000 person-years) and men (43.7 cases/ 1,000 person-years).

Counts and rates for officer personnel. Table 24 contains the most commonly diagnosed ICD-9 categories within the Musculoskeletal chapter among officers overall, as well as split out by females and males. The top 5 categories overall are identical to those for outpatient enlisted personnel.

Table 24

Top Five Most Commonly Diagnosed Outpatient ICD-9 Categories for Officer Personnel within the Musculoskeletal Disorders Chapter

Outpatient ICD-9 Diagnostic Category	Overall Population Cases	Rate Ratio (F : M)	Female Officer (n = 39,321)		Male Officer (n = 197,509)	
			Number of cases	Rate per 1,000	Number of cases	Rate per 1,000
Other and unspecified disorders of joint	12,563	1.1	2,310	58.7	10,253	51.9
Other and unspecified disorders of back	10,356	1.1	1,920	48.8	8,436	42.7
Other disorders of soft tissues	7,784	1.3	1,616	41.1	6,168	31.2
Peripheral enthesopathies	6,509	1.1	1,128	28.7	5,381	27.2
Disorder muscle, ligament, and fascia	5,507	1.4	1,196	30.4	4,311	21.8

Figure 51 shows the top 5 diagnosed categories for female officers, alongside male comparison data. The most commonly diagnosed ICD-9 category for men and women within the Musculoskeletal Disorders chapter was ‘other and unspecified disorders of joint,’ paralleling the enlisted data.

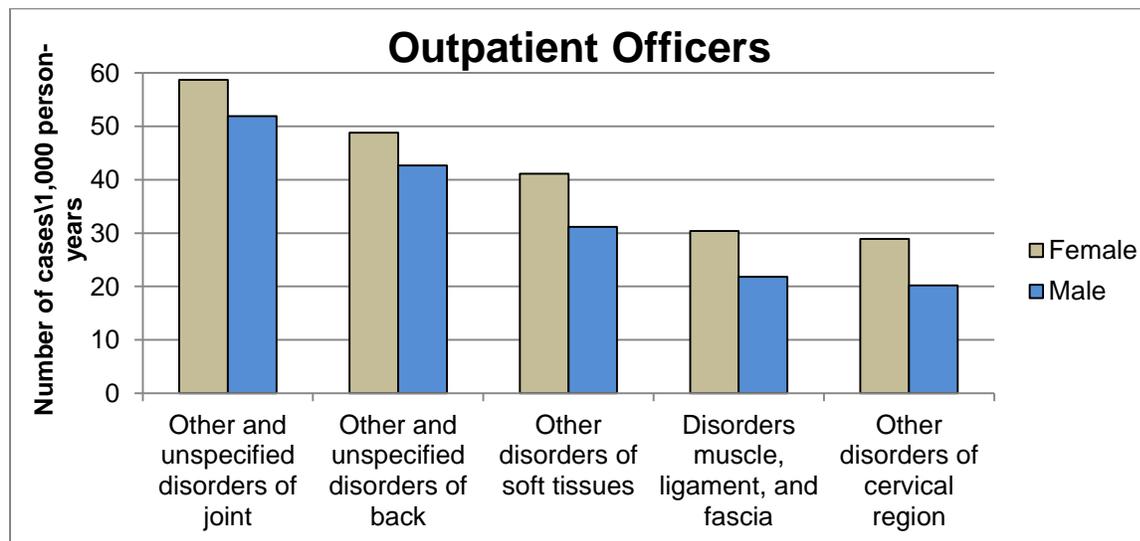


Figure 51. Top five diagnosed ICD-9 categories for outpatient female officers within the Musculoskeletal Disorders chapter, alongside male comparison data.

In Table 25, female to male ratios are shown by service branch, with the top three highlighted for each service. Acquired deformities of the toe were consistently diagnosed in female officers more than two times as often than in male officers across the service branches.

Table 25

Top Three Rate Ratios of Outpatient ICD-9 Categories within the Musculoskeletal Disorders Chapter for Female Officers by Service Branch

ICD-9 Diagnostic Category	Army (n = 98,086)	Navy (n = 54,122)	Air Force (n = 63,429)	Marine Corps (n = 21,193)
Curvature of spine	2.1	**	3.0	**
Acquired deformities toe	2.0	2.9	2.5	**
Anklosing spondylitis and other inflammatory spondylopathies	1.9	2.3	2.6	**
Other disorders of synovium, tendon and bursa	1.4	1.8	1.5	**
Internal derangement of knee	***	***	3.9	**
Other disorders of cervical region	1.4	1.4	1.4	1.5
Other disorders of soft tissues	1.2	1.3	1.4	1.5
Disorder muscle ligament and fascia	1.3	1.4	1.6	1.4

Note. Highlighting indicates that a diagnosis was in the top three diagnoses for that branch. Other values are provided for comparisons between branches.

**= Numbers too small to test for significant difference.

***= Not significantly more likely among females.

Male officers were not significantly more likely to receive any outpatient musculoskeletal diagnosis compared to female officers.

Further exploration of officer data. The results of further exploration into the top three subcategories paralleled the results from the enlisted data. The top subcategory of other and unspecified disorders of joint was 'pain in joint.' The most diagnosed subcategory of other and unspecified disorders of back was 'lumbago.' Examination of other disorders of soft tissue found that 'pain in limb' was the most common subcategory among women with 37.0 cases/1,000 person years and among men with 27.9 cases/1,000 person years. The most common acquired deformity of the toe among enlisted women was 'hallux valgus' (i.e. a bunion) and was diagnosed in an outpatient setting among 739 women.

ICD-9 category rate ratios of women to men in the outpatient setting. Figure 52 shows the ICD-9 categories within the Musculoskeletal Disorders chapter where the rate ratio for women to men was over 2.0. All of the conditions more likely to be diagnosed in female officers than their male peers, were also more likely to be diagnosed in female enlisted personnel than their male peers. Of the five conditions, diffuse disease of the connective tissue had the highest rate ratio, indicating that women were 5 to 6 times more likely to be diagnosed with a condition in this category than their male counterparts. Among enlisted women, osteomyelitis, periostitis, and other infections involving the bone were 2.6 times more likely to be diagnosed than in enlisted men. These categories may indicate diagnostic clusters of concern for military women.

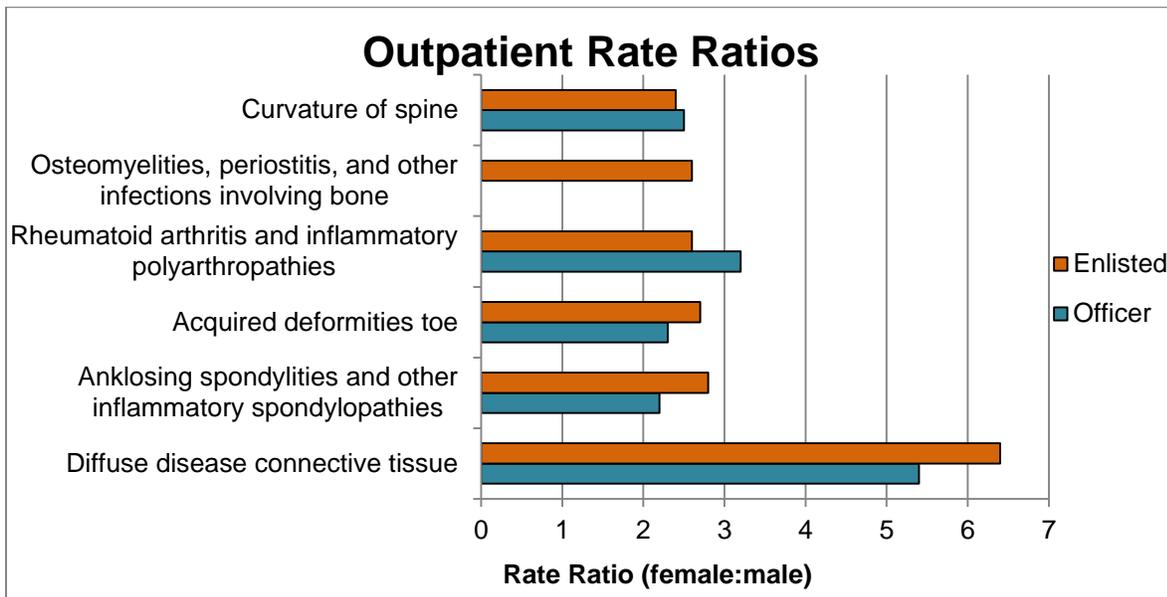


Figure 52. Rate ratios greater than 2.0 (female: male) within the outpatient Musculoskeletal ICD-9 chapter for enlisted and officer service women.

Inpatient setting. Counts and rates for commonly diagnosed ICD-9 categories within the Musculoskeletal Disorders chapter were calculated for enlisted and officer personnel in the inpatient hospital setting.

Counts and rates for enlisted personnel. Table 26 contains the most commonly diagnosed inpatient ICD-9 categories within the Musculoskeletal Disorders chapter among enlisted overall, as well as split out by women and men. The most common ICD-9 category overall, and among female and male enlisted personnel individually, was intervertebral disc disorders. The top 5 most common inpatient ICD-9 categories were almost the same for female and male enlisted personnel, with slight rank order variations.

Table 26

Top Five Most Commonly Diagnosed Inpatient ICD-9 Categories for Enlisted Personnel within the Musculoskeletal Disorders Chapter

Inpatient ICD-9 Diagnostic Category	Overall Population Cases	Rate Ratio (F : M)	Female Enlisted (n = 162,556)		Male Enlisted (n = 939,574)	
			Number of cases	Rate per 1,000	Number of cases	Rate per 1,000
Intervertebral disc disorders	1,313	0.7	143	0.9	1,170	1.3
Disorder muscle ligament and fascia	506	0.8	64	0.4	442	0.5
Spondylosis and allied disorders	412	0.9	57	0.4	355	0.4
Other and unspecified disorders of back	346	0.7	38	0.2	308	0.3
Other disorders of bone and cartilage	248	1.7	56	0.3	192	0.2

Figure 53 shows the top 5 diagnosed conditions for enlisted women, alongside male comparison data. The top 3 categories for enlisted women were identical to the top 3 categories for enlisted men.

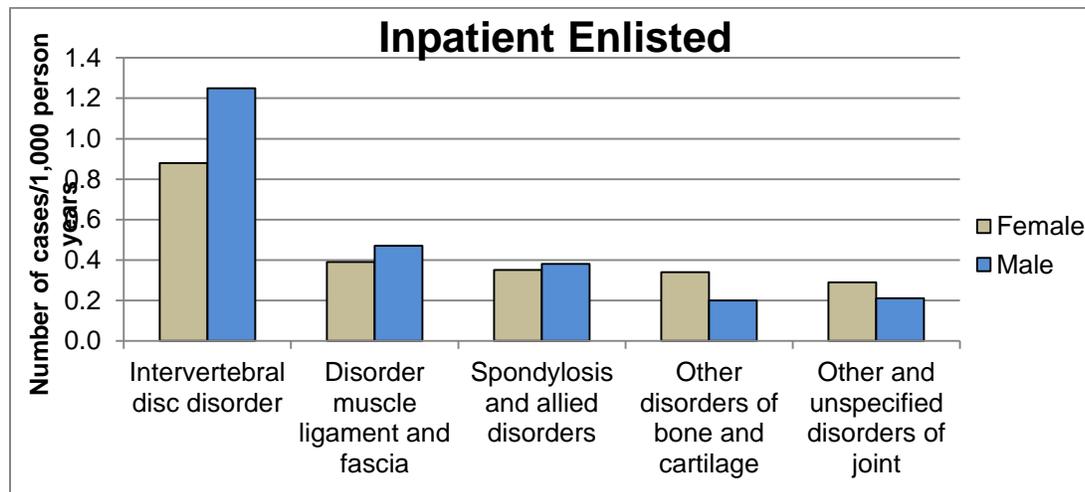


Figure 53. Top five diagnosed ICD-9 categories for inpatient female enlisted personnel within the Musculoskeletal Disorders chapter, alongside male comparison data.

Overall male enlisted service members in the inpatient setting were significantly more likely to be diagnosed with intervertebral disc disorders (1.5 times more likely than females).

Except for 7 categories, few rate ratio comparisons could be carried out due to small numbers of cases ($n < 30$). Of these seven categories, only two showed significant differences in rate ratio between female and male service members. One of these two was intervertebral disc disorders (discussed above) and the second was 'other and unspecified disorders of joint.' Female enlisted personnel were 1.4 times more likely to be diagnosed with this condition in an inpatient setting than their male peers.

Counts and rates for officer personnel. Table 27 contains the most commonly diagnosed ICD-9 categories within the Musculoskeletal Disorders chapter for inpatient officers overall, as well as split out by females and males. The most commonly diagnosed ICD-9 category for the overall population was intervertebral disc disorders, which paralleled the enlisted data.

Table 27

Top Five Most Commonly Diagnosed Inpatient ICD-9 Categories for Officer Personnel within the Musculoskeletal Disorders Chapter

Inpatient ICD-9 Diagnostic Category	Overall Population Cases	Rate Ratio (F : M)	Female Officer (n = 39,321)		Male Officer (n = 197,509)	
			Number of cases	Rate per 1,000	Number of cases	Rate per 1,000
Intervertebral disc disorders	284	1.3	57	1.5	227	1.2
Osteoarthritis and related disorders	157	**	22	0.6	135	0.7
Spondylosis and allied disorders	112	**	25	0.6	87	0.4
Disorder muscle, ligament, and fascia	70	**	14	0.4	56	0.3
Other disorder of cervical region	52	**	12	0.3	40	0.2

Note. **= Numbers too small to test for significant difference.

The only inpatient ICD-9 category among officers that had over 30 cases in both females and males was intervertebral disc disorders. Female officers were 1.3 times more likely to be diagnosed in an inpatient setting with intervertebral disc disorders when compared to male officers.

Although all ICD-9 categories had small numbers of cases, Figure 54 shows the top five categories for female officers within the Musculoskeletal Disorders chapter, alongside male comparison data.

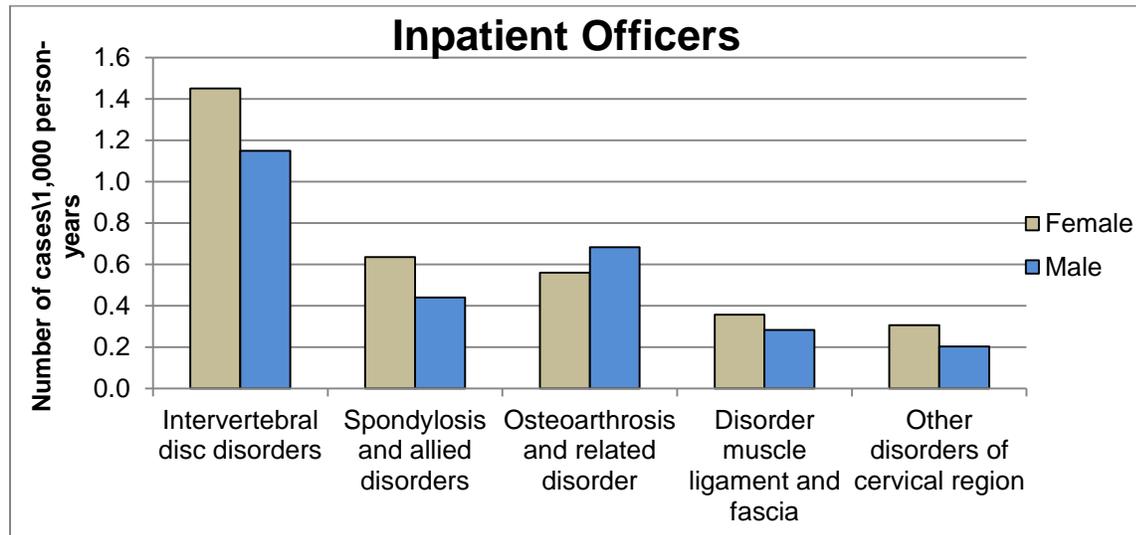


Figure 54. Top five diagnosed ICD-9 categories for inpatient female officer personnel within the Musculoskeletal Disorders chapter, alongside male comparison data.

There were not enough cases across service branches to report female to male rate ratios for officers. Due to the small number of cases ($n < 30$ for all diagnoses in all branches), statistical significance tests could only be performed on the intervertebral disc disorders category (1.3 rate ratio females to males).

ICD-9 chapter rate ratios of women to men in the inpatient setting. None of the female to male rate ratios for inpatient ICD-9 categories within the Musculoskeletal Disorders chapter were above 2.0. Female enlisted personnel were significantly more likely to be diagnosed with other disorders of bone and cartilage (1.5 times more likely), and other and unspecified disorders of joint (1.4 times more likely), relative to their male counterparts. Female officers were significantly more likely to be diagnosed with intervertebral disc disorders (1.3 times more likely) relative to their male peers.

Further Analysis of the Injury and Poisoning ICD-9 Chapter

Outpatient setting. Counts and rates for commonly diagnosed ICD-9 categories within the Injury and Poisoning chapter were calculated for enlisted and officer personnel in the outpatient ambulatory setting.

Counts and rates for enlisted personnel. Table 28 contains the most commonly diagnosed ICD-9 categories within the Injury and Poisoning chapter for outpatient enlisted service members overall, as well as split out for females and males. Sprains and strains of joints and adjacent muscles was by far the most common injury overall.

Table 28

Top Five Most Commonly Diagnosed Outpatient ICD-9 Categories for Enlisted Personnel within the Injury and Poisoning Chapter

Outpatient ICD-9 Diagnostic Category	Overall Population Cases	Rate Ratio (F : M)	Female Enlisted (n = 162,556)		Male Enlisted (n = 939,574)	
			Number of cases	Rate per 1,000	Number of cases	Rate per 1,000
Sprains and strains, joints and adjacent muscles	301,188	1.2	52,626	323.7	248,562	264.5
Trauma complications and unspecified injuries	49,677	1.0	7,389	45.5	42,288	45.0
Fracture of upper limb	48,892	0.7	5,098	31.4	43,794	46.6
Fracture of lower limb	38,710	1.0	5,703	35.1	33,007	35.1
Superficial injury	35,683	1.5	7,271	44.7	28,412	30.2

Figure 55 shows the top 5 diagnosed conditions for female enlisted personnel, alongside male data. The most commonly diagnosed condition for men and women within the Injury and Poisoning ICD-9 chapter was ‘sprains and strains of joints and adjacent muscles’.

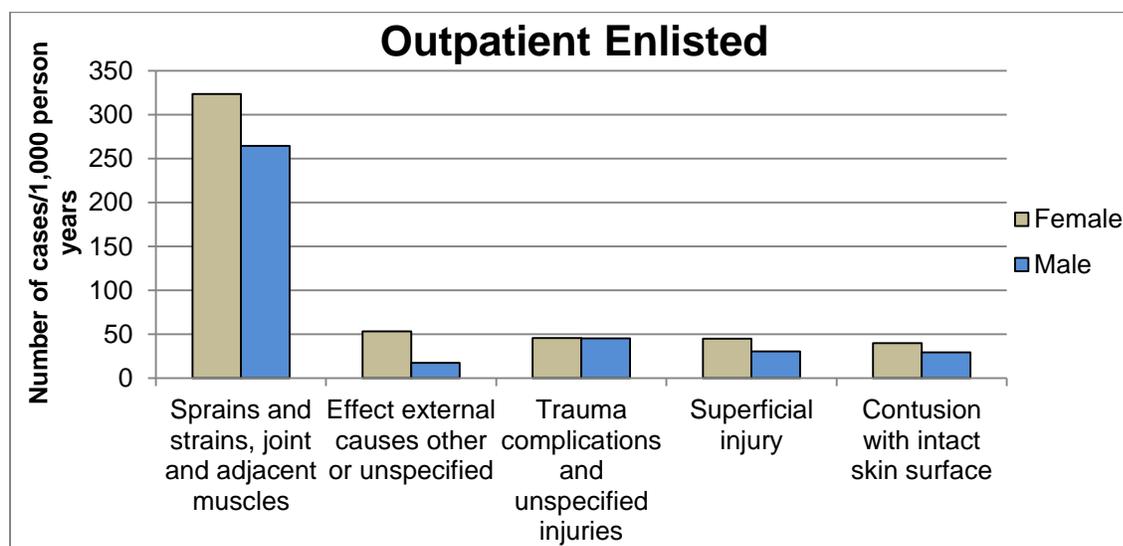


Figure 55. Top five diagnosed ICD-9 categories for outpatient female enlisted personnel within the Injury and Poisoning chapter, alongside male comparison data.

Male enlisted service members were significantly more likely to be diagnosed with fractures of the skull (2.2 times more likely), injury to blood vessels (1.8 times more likely), late effect of injury, poison, toxin and other external cause (1.8 times more likely), intracranial injury, excluding skull fractures (1.6 times more likely), and open wound, head, neck and trunk (1.6 times more likely), relative to their female counterparts.

In Table 29, female to male rate ratios are shown by service branch, with the top three highlighted for each service. Across all three service branches shown, women were consistently 2 to 5 times more likely to be diagnosed with 'effect external causes, other or unspecified' and 'poisoning by drugs, medicinal, or biological substances' than men.

Table 29

Top Three Rate Ratios of Outpatient ICD-9 Categories within the Injury and Poisoning Chapter for Female Enlisted Personnel by Service Branch

ICD-9 Diagnostic Category	Army (n = 410,835)	Navy (n = 266,237)	Air Force (n = 256,712)	Marine Corps (n = 168,346)
Effect external causes, other or unspecified	3.8	4.7	2.7	2.7
Poisoning by drugs, medicinal and biological substances	2.2	5.0	2.7	3.4
Superficial injury	1.7	2.4		1.8
Complications of surgical and medical care, not elsewhere specified	1.5	2.7	2.1	1.4
Toxic effect of a chiefly nonmedicinal substance	1.5	2.1	1.1	3.7

Note. Highlighting indicates that a diagnosis was in the top three diagnoses for that branch. Other values are provided for comparisons between branches.

Male enlisted personnel in the Air Force and the Marine Corps were significantly more likely to be diagnosed with the ICD-9 category 'internal injury of thorax, abdomen, and pelvis' relative to their female peers (rate ratio of 3.1, and 2.1, respectively).

Further exploration of enlisted data. Sprains and strains of joints and adjacent muscles were the most common diagnosis for both males and females in all branches of service. The most common sprains and strains were of the ankle and foot (32.1 cases per 1,000 enlisted service women; 27.0 cases per 1,000 enlisted service men), knee and leg (29.6 cases per 1,000 service women; 22.7 cases per 1,000 enlisted service men) and other and unspecified parts of back (26.0 cases per 1,000 enlisted service women; 19.0 cases per 1,000 enlisted service men).

Under the category of 'effect external cause, other or unspecified' the two subcategories with the highest rate of cases among female enlisted personnel were 'allergy, unspecified' (7.8 cases per 1,000 enlisted female service members) and 'other specified adverse effects' (6.3 cases per 1,000 enlisted female service members). The subclassification under 'other specified adverse effects' with the most cases among enlisted female service members was 'adult sexual abuse' (673 diagnoses, 4.1 cases per 1,000).

The category of 'poisoning by drugs, medicinals and biological substances,' was further explored among enlisted female personnel. The most common subcategory was 'poisoning by other and unspecified drugs and medicinal substances' with 1.9 cases per 1,000 enlisted service women. The next most common subcategories were 'poisoning by analgesics, anti-pyretics and anti-rheumatics' (1.0/1,000 enlisted service women) and 'poisoning by psychotropic agents' (0.9/1,000 enlisted service women). The most common subcategory under 'toxic effect of other substances, chiefly nonmedicinal' was toxic effect of venom with 2.2 diagnoses per 1,000 person-years; among Marine females particularly, there were 5.0 diagnoses per 1,000 person-years.

Counts and rates for officer personnel. Table 30 contains the most commonly diagnosed outpatient ICD-9 categories within the Injury and Poisoning chapter among officers overall, as well as split out by women and men. The number one most commonly diagnosed ICD-9 category among officers was 'sprains and strains of joints and adjacent muscles,' paralleling the enlisted data.

Table 30

Top Five Most Commonly Diagnosed Outpatient ICD-9 Categories for Officer Personnel within the Injury and Poisoning Chapter

Outpatient ICD-9 Diagnostic Category	Overall Population Cases	Rate Ratio (F : M)	Female Officer (n = 39,321)		Male Officer (n = 197,509)	
			Number of cases	Rate per 1,000	Number of cases	Rate per 1,000
Sprains and strains, joints and adjacent muscles	46,419	1.1	8,608	218.9	37,811	191.4
Trauma complications and unspecified injuries	6,727	1.0	1,075	27.3	5,652	28.6
Fracture of lower limb	6,643	1.4	1,437	36.5	5,206	26.4
Dislocation	6,237	0.6	685	17.4	5,552	28.1
Fracture of upper limb	6,087	1.0	989	25.2	5,098	25.8

Figure 56 shows the top 5 diagnosed ICD-9 categories for female officers, alongside male data. Again, the most common diagnosis for male and female officers was sprains and strains of joints and adjacent muscles, which paralleled the outpatient enlisted data.

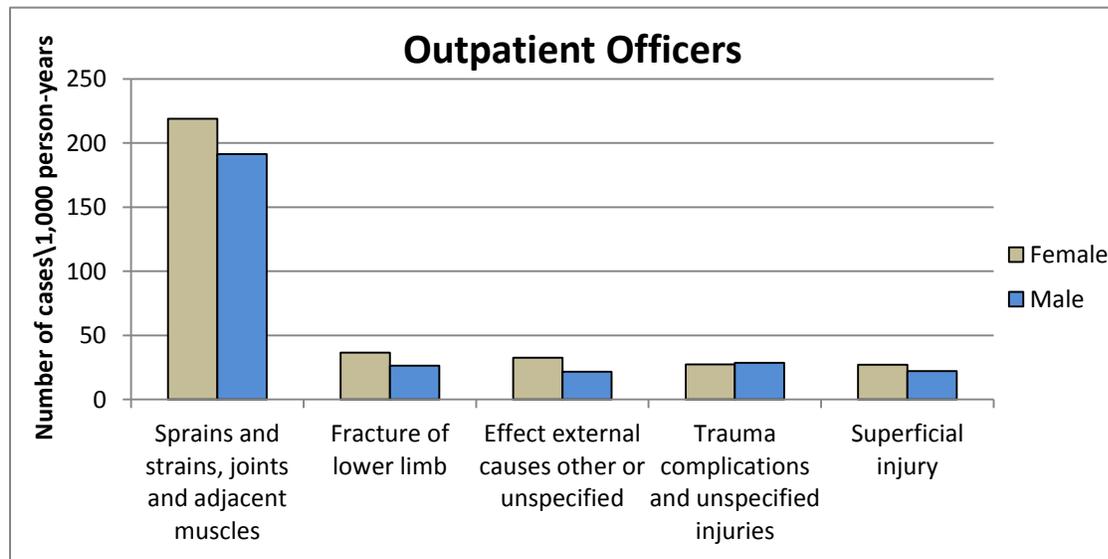


Figure 56. Top five diagnosed ICD-9 categories for outpatient female officers within the Injury and Poisoning chapter, alongside male comparison data.

Male officers were significantly more likely to be diagnosed with fracture of neck and trunk (1.9 times more likely), open wound, head, neck and trunk (1.7 times more likely), dislocation (1.6 times more likely), open wound lower limb (1.4 times more likely), and fractures of the skull (1.3 times more likely), relative to their female peers.

In Table 31, female to male rate ratios are shown by service branch, with the top three highlighted for each service. Partly as the result of small cell sizes, there was little ICD-9 category overlap between services.

Table 31

Top Three Rate Ratios of Outpatient ICD-9 Categories within the Injury and Poisoning Chapter for Female Officer Personnel by Service Branch.

ICD-9 Diagnostic Category	Army (n = 98,086)	Navy (n = 54,122)	Air Force (n = 63,429)	Marine Corps (n = 21,193)
Poisoning by drugs, medicinal and biological substances	3.5	**	**	**
Injury to nerves and spinal cord Effect external cause, other or unspecified	3.0	**	**	**
Superficial Injury	2.3	1.7	***	**
Contusion with intact skin surface	1.2	1.3	1.2	1.4
Late effect injury, poison, toxin and other external cause	1.2	1.2	1.2	1.6
Intracranial injury, excludes skull fractures	1.4	**	3.7	4.0
Complications surgical and medical care, not elsewhere specified	1.1	0.4	3.1	2.1
	1.5	1.2	2.2	**

Note. Highlighting indicates that a diagnosis was in the top three diagnoses for that branch. Other values are provided for comparisons between branches. **= Numbers too small to test for significant difference. ***= No significant difference between males and females in rate of diagnosis.

Of interest, one of the highest rate ratios for female officers in the Air Force and the Marine Corps was ‘intracranial injury, excluding skull fractures’ which was negatively associated with rate ratios for female Navy officers. In other words, male Navy officers were more likely to receive the outpatient ICD-9 category of intracranial injury compared to female Navy officers, while Air Force and Marine Corps female officers were more likely than their male counterparts to receive the ICD-9 category of intracranial injury. Male Navy officers were 2.4 times as likely to be diagnosed with ‘intracranial injury, excluding skull fractures’ than their female counterparts.

Further exploration of officer data. Examining sprains and strains of the joints and adjacent muscles more closely for both female and male officers, the most common sprains and strains were of the ankle and foot (16.8 cases per 1,000 service women; 13.9 cases per 1,000 service men).

ICD-9 category rate ratios of women to men in the outpatient setting. Figure 57 shows the ICD-9 categories within the Injury and Poisoning chapter where the rate ratio for women to men was over 2.0. Both female officers and enlisted personnel were 2-3 times more likely to be diagnosed with the ICD-9 category of 'poisoning by drugs, medicinal, or biological substances.' Additionally, female enlisted personnel were over 3 times more likely to be diagnosed with the ICD-9 category of 'effect external causes, other or unspecified.' Based on the deeper exploration of enlisted data for 'effect external causes', the top two subcategories were 'allergy, unspecified' and 'other specified adverse effects.' The top subclassification within 'other specified adverse effects' was 'adult sexual abuse.' These diagnosis codes may indicate diagnostic clusters of concern for military women.

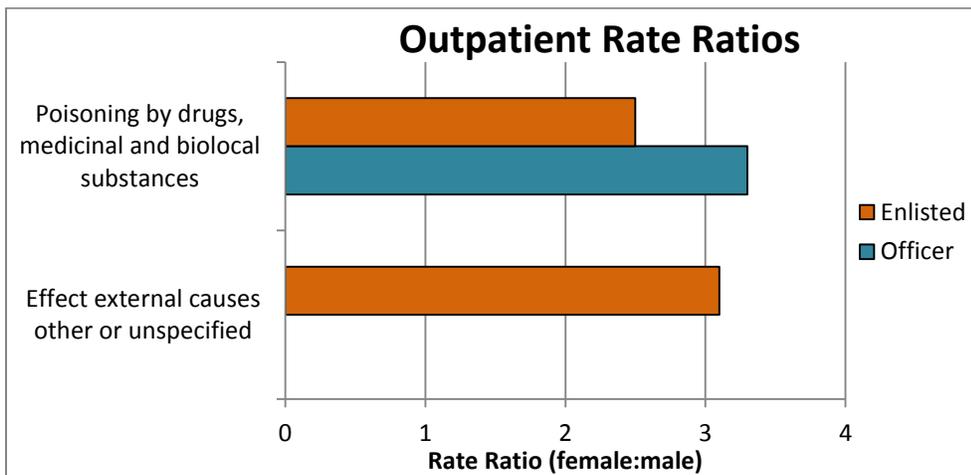


Figure 57. Rate ratios greater than 2.0 (female: male) within the outpatient Injury and Poisoning ICD-9 chapter for enlisted and officer service women.

Inpatient setting. Counts and rates for commonly diagnosed ICD-9 categories within the Injury and Poisoning chapter were calculated for enlisted and officer personnel in the inpatient hospital setting.

Counts and rates for enlisted personnel. Table 32 contains the most commonly diagnosed inpatient ICD-9 categories within the Injury and Poisoning chapter among enlisted overall, as well as split out by women and men. The most commonly diagnosed ICD-9 category for both male and female service members was 'complications, surgical and medical.'

Table 32

Top Five Most Commonly Diagnosed Inpatient ICD-9 Categories for Enlisted Personnel within the Injury and Poisoning Chapter

Inpatient ICD-9 Diagnostic Category	Overall Population Cases	Rate Ratio (F : M)	Female Enlisted (n = 162,556)		Male Enlisted (n = 939,574)	
			Number of cases	Rate per 1,000	Number of cases	Rate per 1,000
Complications surgical and medical	1,294	1.2	216	1.3	1,078	1.2
Fracture lower limb	880	0.7	101	0.6	779	0.8
Poisoning by drugs, medicinal and biological substances	571	2.5	173	1.1	398	0.4
Fracture of upper limb	520	0.4	36	0.2	484	0.5
Fractures of skull	431	**	24	0.2	407	0.4

Note. **= Numbers too small to test for significant difference.

Figure 58 shows the top five diagnosed inpatient ICD-9 categories within the Injury and Poisoning chapter for enlisted women, alongside male data. The second most common diagnosis for enlisted women was poisoning by drugs, medicinal, and biological substances; this was also a common diagnosis in the outpatient setting.

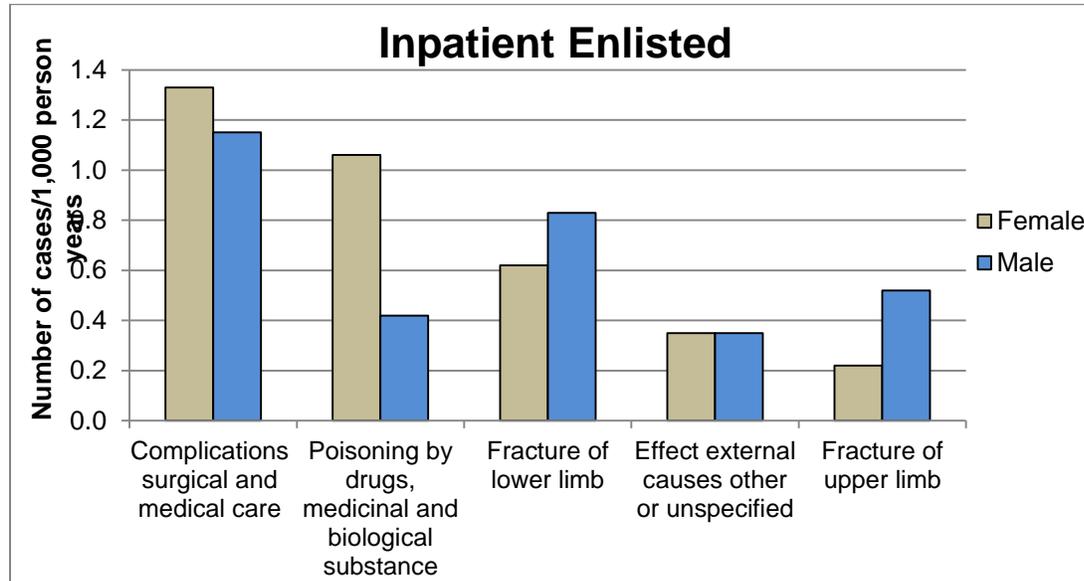


Figure 58. Top five diagnosed ICD-9 categories for inpatient female enlisted personnel within the Injury and Poisoning chapter, alongside male comparison data.

Overall male enlisted service members in the inpatient setting were significantly more likely to be diagnosed with fracture of upper limb (2.5 times more likely than female enlisted personnel), fracture of neck and trunk (1.7 times more likely) and fracture of lower limb (1.4 times more likely), relative to their female peers.

In Table 33, female to male rate ratios are shown by service branch, with the top three highlighted for each service. Due to small numbers of inpatient injury and poisoning diagnoses, few statistically significant service differences were noted.

Table 33

Top Three Rate Ratios of Inpatient ICD-9 Categories within the Mental Disorders Chapter for Female Enlisted Personnel by Service Branch

ICD-9 Diagnostic Category	Army (<i>n</i> = 98,086)	Navy (<i>n</i> = 54,122)	Air Force (<i>n</i> = 63,429)
Poisoning by drugs, medicinal and biological substance	2.0	4.3	**
Complications of surgical and medical care	***	***	1.4

Note. Highlighting indicates the top diagnoses for that branch. The Marine Corps had no more than 30 cases in both males and females; consequently, no rate ratios are reported. ** = Numbers too small to test for significant difference. *** = No significant difference between males and females in rate of diagnosis

Further exploration of enlisted data. Upon further investigation, the top subcategory within 'poisoning by drugs, medicinal, or biological substances' was 'poisoning by analgesics, anti-pyretics and anti-rheumatics' (0.3 cases per 1,000 service women), followed by 'poisoning by psychotropic agents' with 0.3 cases per 1,000 service women.

Counts and rates for officer personnel. Table 34 contains the most commonly diagnosed inpatient ICD-9 categories within the Injury and Poisoning chapter among officers overall, as well as split out by women and men. The top ICD-9 category overall was 'complications of surgical and medical care.'

Table 34

Top Five Most Commonly Diagnosed Inpatient ICD-9 Categories for Officer Personnel within the Injury and Poisoning Chapter

Inpatient ICD-9 Diagnostic Category	Overall Population Cases	Rate Ratio (F : M)	Female Officer (<i>n</i> = 39,321)		Male Officer (<i>n</i> = 197,509)	
			Number of cases	Rate per 1,000	Number of cases	Rate per 1,000
Complications surgical and medical care	234	1.3	49	1.3	185	0.9
Fracture of lower limb	128	**	16	0.4	112	0.6
Effect external causes other or unspecified	74	**	3	0.1	71	0.4
Sprains and strains, joints and adjacent muscles	62	**	8	0.2	54	0.3
Fracture of upper limb	60	**	9	0.2	51	0.3

Note. * = Numbers too small to test for significant difference.

Although all ICD-9 categories had small numbers of cases, Figure 59 shows the top five diagnosed conditions for female officers, alongside male comparison data.

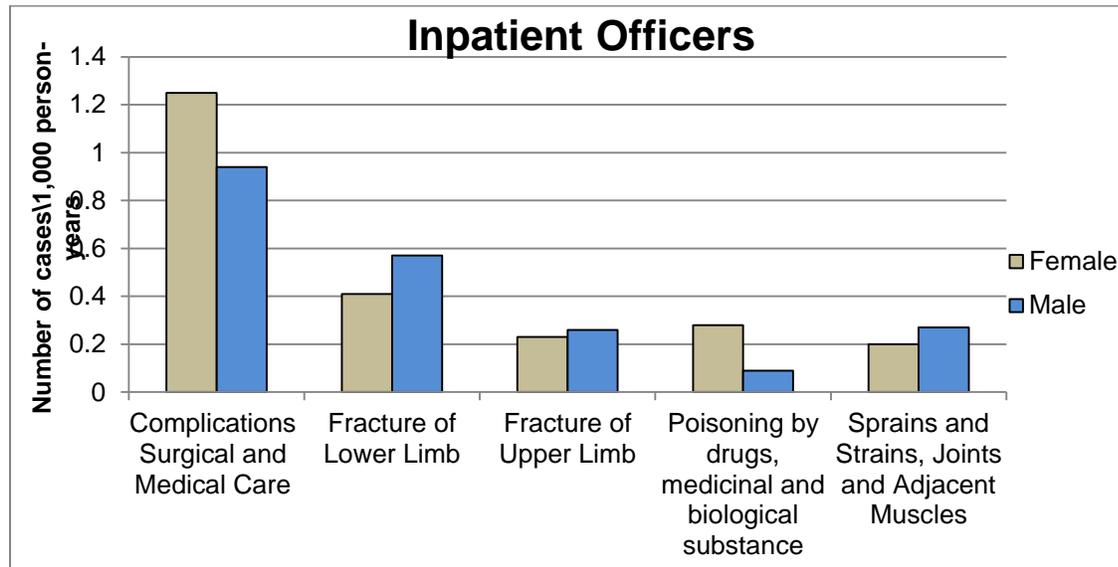


Figure 59. Top five diagnosed ICD-9 categories for inpatient female officers within the Injury and Poisoning chapter, alongside male comparison data.

The only injury or poisoning diagnosis in an inpatient setting with more than 30 cases in both female and male officers was ‘complications of surgical and medical care, not elsewhere classified.’ There were 49 cases among female officers and 185 cases among male officers. Female officers were 1.3 times more likely to receive an inpatient diagnosis of complications of surgical and medical care. Except in the category of ‘complications of surgical and medical care,’ there were not enough cases across service branches to report female to male rate ratios for enlisted personnel.

ICD-9 category rate ratios of women to men in the inpatient setting. Figure 60 shows the one inpatient ICD-9 category within the Injury and Poisoning chapter where the rate ratio for women to men was greater than 2.0. None of the rate ratios for officers were above 2.0. Female enlisted personnel in the inpatient setting were significantly more likely to be diagnosed with 'poisoning by drugs, medicinal, or biological substances' than male enlisted personnel. This may indicate a diagnostic cluster of concern for enlisted service women.

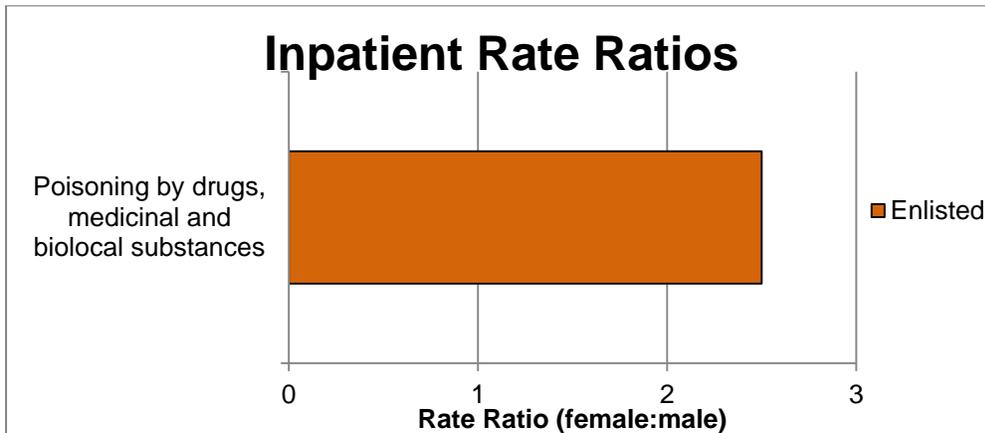


Figure 60. Rate ratios greater than 2.0 (female: male) within the inpatient Injury and Poisoning ICD-9 chapter for enlisted service women.

DMED Summary

Musculoskeletal Disorders and Mental Disorders are commonly diagnosed conditions for enlisted and officer personnel in both inpatient and outpatient settings. Although there were some marked differences between utilization patterns for men and women, there is overlap in many of the top ICD-9 diagnostic chapters. In outpatient settings, females were overall significantly more likely than their male colleagues to be diagnosed with a condition within each of the 15 ICD-9 chapters examined.

Within the Mental Disorders ICD-9 chapter, the top 5 conditions diagnosed in outpatient settings for officers and enlisted personnel were remarkably similar; even the rank order was the same for female enlisted and officer personnel. Adjustment reactions and neurotic disorders were among the top 5 most commonly diagnosed ICD-9 categories in both inpatient and outpatient settings for female enlisted and officer personnel.

Analysis of the Musculoskeletal Disorders chapter showed that the overall top 5 diagnostic categories in outpatient settings were identical for enlisted and officer personnel. Nonspecific joint and back disorders were the top two categories for men and women. Intervertebral disc disorders were more commonly diagnosed in enlisted men than their female peers, but the same category was more commonly diagnosed in female officers than in male officers. Across rank in the outpatient setting, women were 5 to 6 times more likely than men to be diagnosed with a condition in the diffuse connective tissue disease category.

Within the Injury & Poisoning chapter, sprains & strains were by far the most common diagnosis for both enlisted and officer personnel in the outpatient setting. Lower extremity sprains and strains were the most prevalent across ranks. In the inpatient setting, the most common ICD-9 category across ranks was Surgical and Medical Complications. Female enlisted personnel in the inpatient and outpatient setting were 2.5 times more likely to be diagnosed with poisoning than their male peers.

Limitations. One inherent limitation of using the DMED data comes from the nature of medical encounter data; someone must seek medical care in order to be included within the database. Thus, some cases of disease may be missed by patients who ignore symptoms, self-treat, or seek care outside the military health system. This limitation is especially problematic for mental health diagnoses, which carry a certain stigma, such that service members may want to hide these concerns from their chain of command.

The data within DMED was initially intended to be used for billing purposes; although this data is amenable to research, this data was not primarily designed for research purposes. Conversely, one strength of the data is that it was primarily used for reimbursement; that purpose would tend to incentivize correct and timely documentation of all disease conditions. The massive amounts of data within DMED were challenging to organize, and translate into clear tables and figures. With such a broad scope, it was also sometimes difficult to decide if and when further data collection was warranted.

PDTs Healthcare Services Usage by Gender

Population descriptive statistics. A total of 4,826 different prescription products dispensed in 2010 were examined. All of the information included in this section reflects data from calendar year 2010. Exactly 177,199 female service members, and 936,956 male service members, received at least one prescription. Among those that received at least one prescription, females received an average of 12.71 prescriptions a year (*SD*: 12.63) and males received an average of 7.93 prescriptions a year (*SD*: 10.34).

The total DoD force strength for calendar year 2010 included 203,536 female person years and 1,213,895 male person years, which is the epidemiological reporting format that DMED uses. In Table 35, the individual service branch populations are broken out by gender. Based on this data, 87% of service women and 77% of service men were issued at least one prescription in 2010.

Table 35

Person Year Population Totals by Service Branch and Gender

	Women (person years)	Men (person years)
Army	75,382	484,666
Air Force	63,770	267,187
Marines	13,348	189,164
Navy	51,036	272,878
Total	203,536	1,213,895

Gender analysis by therapeutic class. Table 36 shows the rates of utilization across the 22 pharmacologic therapeutic class categories investigated in this report. This data is shown for service personnel overall, as well as split out by women and men. There was only one TCC where men were more likely to receive a prescription than women, and that was in the cardiovascular drugs TCC.

Table 36

Therapeutic Class Category Prescription Data for Service Members, 2010

Therapeutic Class Category	Overall Population Cases	Rate Ratio (F : M)	Women (N = 203,536)		Men (N = 1,213,895)	
			n	Rate ⁺	n	Rate ⁺
Contraceptives	4,834	83.57	4,512	22.2	322	0.3
Blood Formation, Coagulation, and Thrombosis Agents	16,949	10.41	10,774	52.9	6,175	5.1
Vitamins / Dietary Supplements	53,014	10.00	33,214	163.2	19,800	16.3
Hormones and Synthetic Substitutes	184,853	6.74	98,124	482.1	86,729	71.4
Smooth Muscle Relaxants	3,459	4.29	1,447	7.1	2,012	1.7
Electrolytic, Caloric, and Water Balance Agents	50,701	3.78	19,655	96.6	31,046	25.6
Antineoplastic Agents	3,660	3.72	1,406	6.9	2,254	1.9
Pharmaceutical Aids	4,915	2.57	1,482	7.3	3,433	2.8
Skin and Mucous Membrane Preparations	264,757	1.96	65,461	321.6	199,296	164.2
Medical Devices	25,242	1.87	6,023	29.6	19,219	15.8
Gastrointestinal Drugs	276,426	1.79	63,886	313.9	212,540	175.1
Serums, Toxoids, and Vaccines	14,280	1.79	3,296	16.2	10,984	9.0

Table 36 (continued)

Therapeutic Class Category Prescription Data for Service Members, 2010

Therapeutic Class Category	Overall Population Cases	Rate Ratio (F : M)	Women (N = 203,536)		Men (N = 1,213,895)	
			n	Rate ⁺	n	Rate ⁺
Antihistamines	288,507	1.75	65,441	321.5	223,066	183.8
Respiratory Tract Agents	258,258	1.50	51,849	254.7	206,409	170.0
Anti-Infectives	577,033	1.43	111,635	548.5	465,398	383.4
Eye, Ear, Nose and Throat Preparations	406,060	1.36	75,433	370.6	330,627	272.4
Autonomic Drugs	354,419	1.34	65,187	320.6	289,232	238.3
Central Nervous System Drugs	838,949	1.18	138,332	679.6	700,617	577.2
Miscellaneous Therapeutic Agents	65,921	1.13	10,477	51.5	55,444	45.7
Cardiovascular Drugs	118,865	0.65	11,645	57.2	107,220	88.3

Note. Excludes Gold Compounds, Heavy Metal Antagonists, Radioactive Agents, Enzymes, Dental Agents, Disinfectants, Blood Derivatives, and Oxytocics. ⁺= Rate per 1,000 person years.

The contraceptives class was the top TCC in which women were more likely to be prescribed a medication than men. Women were 83.6 times more likely to receive at least one prescription in this category compared to men. Women were 10.4 times more likely to receive a prescription within the blood formation, coagulation and thrombosis TCC compared to men. The third most commonly prescribed TCC was vitamins; women were exactly 10 times more likely to receive a prescription in this category compared to men.

Table 37 shows the top three most commonly prescribed medications within the three most utilized TCCs for military women, alongside male comparison data. The most common therapeutic class category (TCC) in 2010 for both men and women was central nervous system agents (679.6 per 1,000 person years for women and 577.2 per 1,000 person years for men). The most common medications in this category for both women and men were ibuprofen, acetaminophen, and naproxen. The second most common TCC for both male and female service members was anti-infective agents (548.5 per 1,000 person years for women vs. 383.4 per 1,000 person years for men). The most common prescriptions in this category for women were azithromycin, doxycycline, and metronidazole. Metronidazole was a top prescription for women, but was not a top prescription for men. The most common prescriptions in this category for men were doxycycline, azithromycin, and bicillin LA (in the penicillin family, data not shown).

Table 37

Top Three Most Commonly Prescribed Medications Within the Three Most Highly Utilized TCCs for Women, Alongside Male Comparison Data

	Women 203,536 person years		Men 1,213,895 person years	
	<i>n</i>	Rate ⁺	<i>N</i>	Rate ⁺
<i>Central Nervous System Agents</i>				
Ibuprofen	84,937	417.3	377,593	311.1
Acetaminophen	40,681	199.9	161,113	132.7
Naproxen	37,438	183.9	175,023	144.2
<i>Anti-Infective Agents</i>				
Azithromycin	29,538	145.1	104,389	86.0
Doxycycline hyclate	19,776	97.2	129,198	106.4
Metronidazole	18,656	91.7	*	*
<i>Hormones and synthetic substitutes</i>				
Yaz	13,727	67.4	N/A	N/A
NuvaRing	12,113	59.5	N/A	N/A
Prednisone	9,025	43.4	36,380	30.0

Note. ⁺= Rate per 1,000 person years. *=Not one of the top three prescriptions for men.

The third most common TCC differed for men and women. Hormones and synthetic substitutes were the third most common TCC for women. The rate for women receiving a prescription in this category was 482.1 per 1,000 person years, compared to 71.4 per 1,000 person years per men. For women, the most common prescriptions in this category were Yaz, NuvaRing, and prednisone. For men, the most common prescriptions were prednisone, methylprednisolone, and synthroid.

For males, the third most common TCC was Eye, Ear, Nose and Throat (EENT) Preps. Although EENT Preps were not in the top 3 TCCs for women, military women were prescribed them in higher rates (370.6 per 1,000 person years), than military men (274.4 per 1,000 person years). The most common prescriptions in this category for women were Cepacol Sore Throat, Flonase, and Nasal Decongestant. The most common prescriptions for men were Cepacol Sore Throat, Flonase, and Periogard.

Descriptive statistics by branch of service. Figure 61 shows the prescription utilization rates for men and women across all branches of service, with specific details for the Central Nervous System (CNS) TCC. Within the CNS TCC, women in the Marine Corps had the highest prescription utilization rates compared to women in any of the other service branches (795.4 per 1,000 person years). Men in the Army had the highest prescription utilization rates within the CNS TCC when compared to men in the other service branches (639.9 per 1,000 person years). This pattern was similar for the Anti-Infective Agents TCC.

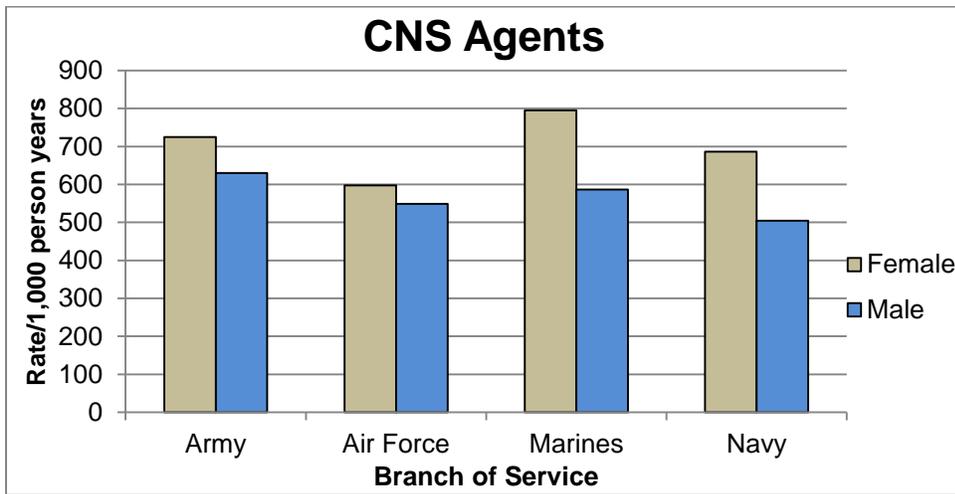


Figure 61. Service members receiving at least one Central Nervous System Agent Prescription.

Gender analysis by individual prescriptions. Figure 62 shows the top 5 most commonly prescribed over-the-counter (OTC) medications for military women, alongside male comparison data. The most common OTC prescription for both men and women was ibuprofen, (417.31 per 1,000 person years for females and 311.06 per 1,000 person years for males). The top three OTC prescriptions (ibuprofen, acetaminophen, and naproxen) are generally prescribed for pain and/or inflammation. The fourth and fifth most common prescriptions are generally prescribed for cold and flu related symptoms. Across all five top OTC medications, women were more likely than men to be prescribed one of these medications.

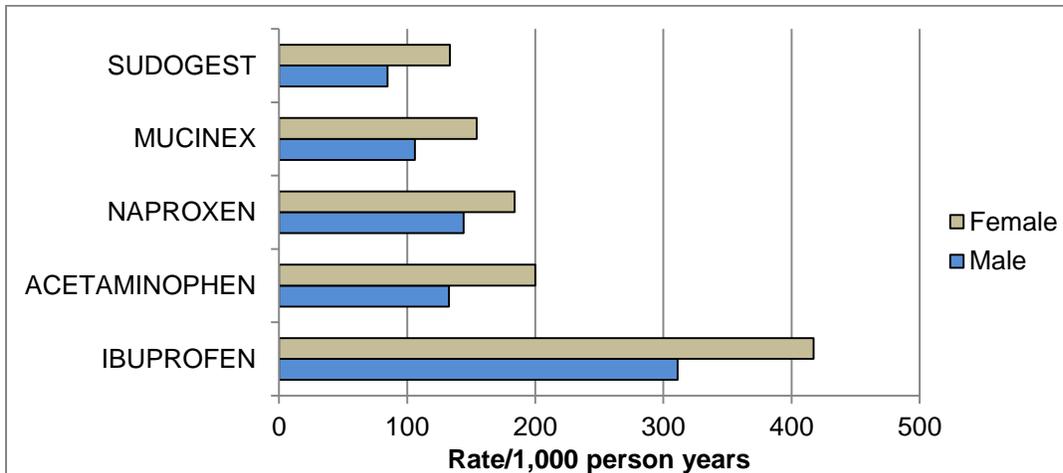


Figure 62. The top five most commonly prescribed OTC medications for military women, alongside male comparison data.

Figure 63 shows the top six most common prescription medications for military women, alongside comparison data for military men. The top two most common medication prescriptions were for opioid analgesics that are generally prescribed for pain (hydrocodone-acetaminophen and oxycodone-acetaminophen). Females were more likely to be prescribed these medications than males. Two other highly utilized medications were azithromycin and doxycycline hyclate; both are anti-infective agents. Cyclobenzaprine HCL, a muscle relaxant, was the fourth most common prescription for males; however, females still had higher prescription rates compared to males.

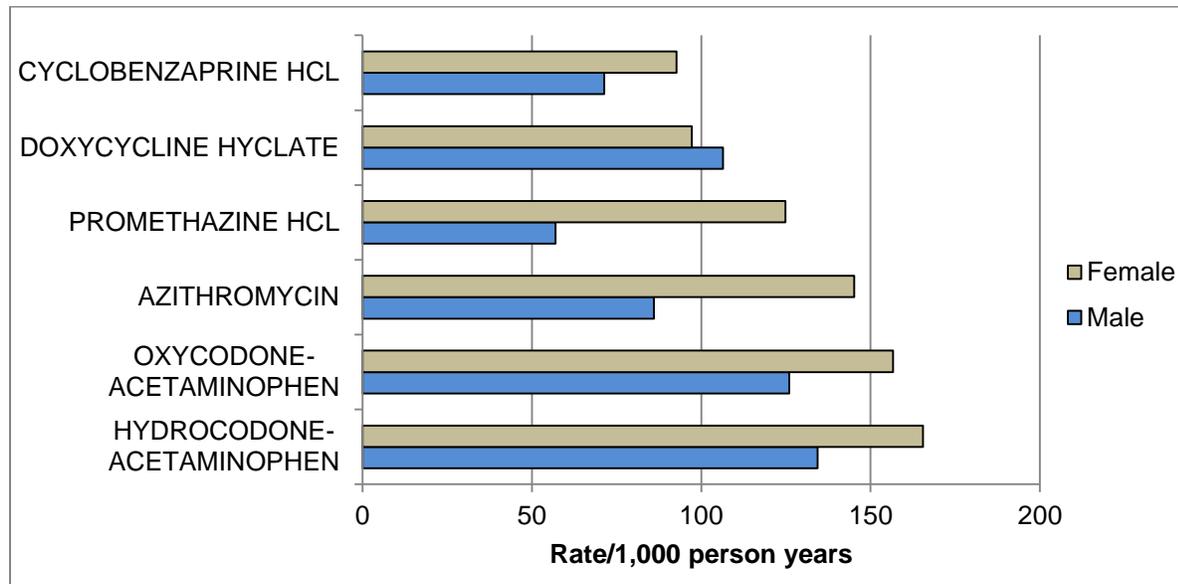


Figure 63. The top six most commonly prescribed non-OTC medications for military women, alongside male comparison data.

PDTS Summary

The most common therapeutic class categories (TCC) in 2010 for both men and women were central nervous system agents and anti-infective agents. On average, women received more prescriptions than men. Across all but one of 22 TCCs of medications, women were more likely than men to receive a prescription in each of the TCCs. The one category in which men were more likely to receive a prescription than women was the cardiovascular TCC. Women were 83.6 times more likely to be prescribed a medication in the contraceptives TCC than men. Women in the Marine Corps had the highest prescription utilization rates compared to women in any other service branch. Overall, the most commonly prescribed medications (both OTC and non-OTC) were medications most commonly prescribed for pain and/or inflammation.

Limitations. The PDTS extract used in this research did not link prescriptions to specific diagnoses. As a result, the data available was applicable to very broad categories, precluding more specific analyses. Specific prescription information would have been useful to make more robust gender comparisons across disease categories. In addition, because the PDTS dataset was not linked to personnel data, it was not possible to conduct analyses that included pertinent demographic information, such as paygrade and age. There was also no information available on prescriptions obtained through non-TRICARE sources, or prescriptions issued in-theater during combat deployments. Lastly, although personnel were prescribed the medications found in PDTS, there is no guarantee that they consumed them.

Denominator data for PDTS analyses were obtained from DMED, and included the cumulative person-years calculated from longitudinal personnel data. As a result, it was not possible to independently verify the accuracy of the denominator, or determine whether the PDTS sample was included in the denominator calculation. In addition, the PDTS data was obtained from 2010, and it would have been optimal to have had data from 2014 to match the DMED information collected.

PDTS data is a comprehensive secondary data source and common data-quality issues inherent to large administrative healthcare databases are relevant. Specifically, miscoding errors or failure to document dispensed prescriptions may impact the overall quality of PDTS and the data cannot be independently verified. However, because PDTS is primarily used for reimbursement, hospitals, clinics, and pharmacies have an incentive to correctly document all prescriptions as they are dispensed.

Methods - Question 4: Are there Research Gaps that Need to be Addressed?

Population Selection

The articles were selected as noted in Methods – Question 1, quality data was extracted and calculated as noted in Methods – Question 2, and healthcare utilization data was extracted as noted in Methods – Question 3.

Data Extraction

There are few clear guidelines on how to conduct a gap analysis within the research literature; many of the existing resources are from the business or organizational quality literature (Agency for Healthcare Research and Quality, 2016; Bunse, Vodicka, Schönsleben, Brühlhart, & Ernst, 2011; Hawes, 2009; Mikoluk, 2013; Pusnik, Al-Mansour, Sucic, & Gubina, 2016). Common elements of these types of gap analysis methodologies include evaluation of the current status of the existing element under review, determination of the desired future status of the target element, and development of steps to bridge that gap. Other sources compare existing supply of products or personnel to future demand in order to identify gaps (Hanser, Miller, Shukiar, & Newsome, 2008; Riedel, Roehrling, Czypionka, & Kasper, 2014). Resources on conducting gap analyses within the research literature are less common (Carey et al., 2012; Robinson, Saldanha, & Mckoy, 2011), particularly when the primary data is from a scoping review (Bragge et al., 2011; Daudt, van Mossel, & Scott, 2013). Common elements from these resources suggest that determination of insufficient information on a topic may be one way to identify gaps in the research literature. However, little guidance is provided on how to determine whether the existing information is sufficient.

Because of the paucity of gap analysis resources, the research team strategized how to conduct a reliable gap assessment with the large amounts of data collected so far. The team included some of the gap analysis elements listed above, such as assessment of insufficient information on a topic, or comparison of the supply of research articles on a topic with the demand demonstrated in the healthcare utilization data. Gap Analysis Matrices (GAMs) were developed to aggregate the various forms of data and improve data visualization for reliable gap identification. These GAMs included data on subtopic article frequency and quality (Question 1 and 2) as well as recent healthcare utilization data (Question 3). Data that were extracted from the scoping review included the following: subtopic definition, number of articles within each subtopic, and percentage of both excellent and low quality articles within each subtopic. DMED data were extracted by ICD-9 diagnostic clusters (i.e. chapters, categories, subcategories, sub-classifications) and matched to appropriate subtopics within the scoping review. When applicable to the subtopic, PDTS data were extracted by specific pharmacologic therapeutic class category (TCC).

Additionally, evaluation of differences in subtopic representation by branch was reviewed in terms of branch force strength. According to the 2014 Demographics Profile of the Military Community (DoD, 2015), the force strength of each branch is as follows: Army at 47.3%, Air Force at 21.3%, Navy at 17.4%, Marines at 12.1%, and Coast Guard at 2.0%. Following a method that is similar to

evaluating for clinical importance (LeFebvre, 2011; Leung, 2001; Man-Son-Hing et al., 2002), branches of service were considered to be over or under represented within a given subtopic if the percentage of articles in that subtopic was $\pm 15\%$ from the force strengths listed above. Since the U.S. Coast Guard has such a small footprint in the military research literature, Coast Guard samples were further highlighted if representation within a topic was at or above 4%.

However, one gap analysis element that was lacking from the data collected was the input of expert organizational stakeholders with perspective on military women's healthcare research. Ideally, expert stakeholders would provide guidance to determine how the data collected so far aligned with current military women's health priorities. The funding constraints of this project made an in-person conference with subject matter expert consultation untenable. Therefore, a comprehensive search of online resources was performed to identify military female-specific healthcare and research priorities identified by reputable national organizations. The following sources were used: recent literature review findings from the Department of Veterans Affairs (VA) (Bean-Mayberry et al., 2011; Yano et al., 2011), the Defense Health Affairs (DHA) report to Congress on Women's Health Deployment (Office of the Assistant Secretary of Defense Health Affairs, 2015), recent publication data from the American College of Obstetrics and Gynecology (ACOG) on healthcare for military women (American College of Obstetricians and Gynecologists (ACOG), 2012), data from the Department of Defense (DoD) (Deployment Health Clinical Center (DHCC), 2011), recommendations from the Institute of Medicine (IOM) for research on military women's health (Institute of Medicine (IOM), 1995), report findings from the Committee on Body Composition, Nutrition, and Health (IOM, 1998), and priorities from the Defense Women's Health Research Program (Military Operational Medicine Research Program (MOMRP), 1994). The specific priorities were collated into one document for use while evaluating if a subtopic was specifically highlighted by any one organization or report.

Analyses of Data

Gap Analysis Matrices (GAMs) allowed for the aggregation of all relevant data on each subtopic to more easily determine whether a gap existed. Important elements from the scoping review (Questions 1 and 2), the healthcare utilization data (Question 3), and the organizational priority lists were selected for inclusion in the GAMs (Appendix K). Within the gap assessment for each subtopic, nine specific criteria were considered (listed below). If any of the following criteria were met, this was considered important in determining whether a gap existed.

Scoping Review:

- The number of articles within a subtopic was at or below 20
- The percentage of low quality articles was at or above 20%
- The number of excellent quality articles was at or below 10%

Healthcare Utilization Data:

- Subtopics mapped to the top 5 most commonly utilized ICD-9 diagnostic chapters and categories for women

- Female to male ratios were at or above 2.0 in those diagnostic clusters
- The prescription therapeutic class category (TCC) was in the top 10 most highly utilized categories for women
- Female to male ratios were at or over 2.0 in those TCCs

Organizational Priorities:

- If three or more organizations listed a subtopic as a priority
- If at least one organization in the past 10 years highlighted a subtopic as a priority

Each of the criteria listed above were considered in aggregate. Meeting any one of the criteria did not necessarily mean that a gap existed for that subtopic. The combined criteria were used to determine if a gap existed within each subtopic. Many subtopics could not be mapped onto DMED or PDTS data; in these cases, more consideration was given to the scoping review items and the organizational priorities when making gap analysis determinations. For each one of the 73 subtopics, one of the following three recommendations was made:

None at this time: This recommendation was made when research on the subtopic appeared sufficient, and/or the subtopic was one in which men were diagnosed more often than women (e.g. alcohol use), and/or the subtopic was too broad to make a recommendation (e.g. other organ systems), and/or the subtopic did not require gender-inclusive research (e.g. aeromedical evacuations).

Continue Ongoing Research Trajectory: This recommendation was used for a subtopic that had a robust body of research literature, and was important to the health and readiness of service women. This recommendation was made for a subtopic in which women were diagnosed at least two times more often than men, and/or when a subtopic had been highlighted as a priority within the past 10 years, and/or when a subtopic posed significant harm to military women and men (e.g. IPV, suicide). This recommendation indicated that research on a subtopic should be continued, but the subtopic was not considered a gap in the literature.

Gap Identified in the Existing Research: This recommendation was used for subtopics that were identified as gaps in the existing literature based on meeting multiple criteria within the aggregated data from the scoping review, healthcare utilization data, and existing organizational priorities. Research on these subtopics should be considered as highly relevant to the health of military women, and can guide future research agendas and funding organizations.

Quality Assurance

After entry of all pertinent data into each subtopic GAM, team meetings were held to discuss gap analysis evaluations. Each GAM was evaluated and discussed on at least two different occasions. GAMs for each subtopic were reviewed by all members of the research team and gap analysis determinations were made by unanimous decision. If all research team members did not agree on a determination, group discussions continued until a determination could be made. For each subtopic

GAM where gap analysis determinations were unclear or borderline, group discussion occurred on at least four separate occasions. All GAM evaluations were required to be unanimous in order for a gap analysis recommendation to be final.

Results and Discussion – Question 4: Are there Research Gaps that Need to be Addressed?

After collection of all study data, a comprehensive gap analysis of the literature was conducted. This analysis incorporated the scoping review results, the healthcare utilization data, and past organizational reports on priorities for military women's health and research. The results of this comprehensive gap analysis are summarized below.

Research Gap Overview

Figure 64 represents the number of articles in each research topic area across the service branches. Data is represented as a line even though there was no time trend component to the data in order to clearly show the differences among service branches by topic. In comparison to other services, there were a larger number of articles containing a U.S. Army sample in every major topic covered by this analysis. This is likely due to the relatively larger size of the U.S. Army force.

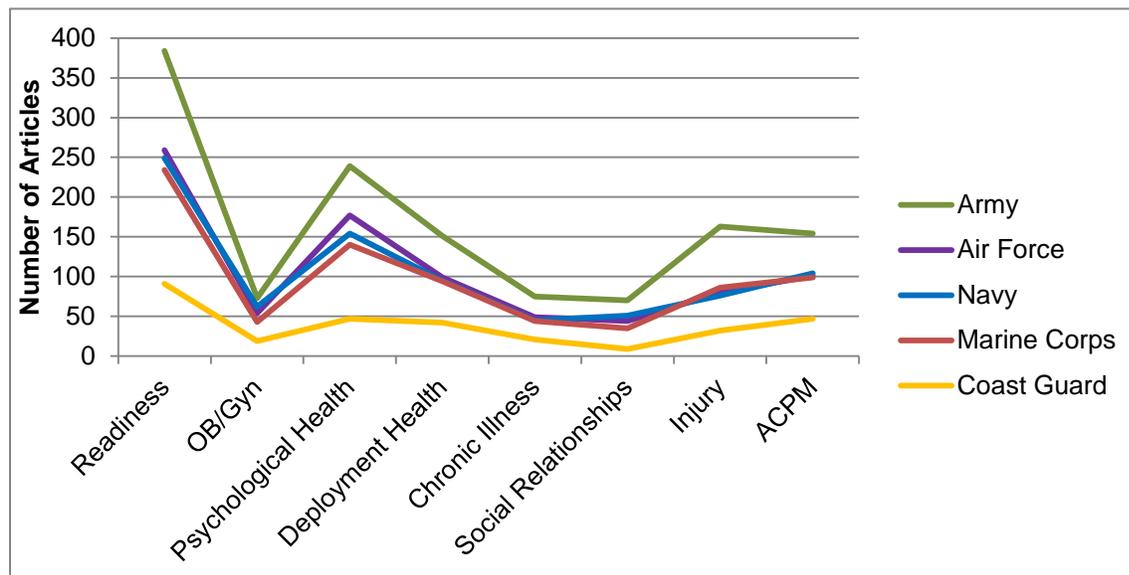


Figure 64. Number of articles by topic, stratified by service branch.

However, in the area of obstetrical and gynecological (OB/Gyn) health, there were approximately the same number of articles containing an Army sample as there were containing a sample from the other branches of service. The number of articles on this topic was also proportionately small compared to the number of articles on other topics. One striking comparison was that the number of articles about OB/Gyn topics was approximately similar to the number of articles on Chronic Illness. Due to the relatively young and healthy military population, it is not surprising that there are comparatively few articles about chronic illness. It is, however, surprising that OB/Gyn articles were not more prolific considering that the military has a substantial young, healthy population of women who are mostly in their prime reproductive years.

The following sections are broken out by the 8 major topic areas identified in the scoping review. Each main topic area includes analyses of branch specific frequencies of articles by subtopic. Subtopics which were evaluated as gaps within the current literature were also discussed in relation to service branch data. Brief synopses of the rationale behind research gap determinations in each topic area are given. Supplemental analyses are also included, where applicable.

Additionally, Gap Analysis Matrices (GAMs) for all subtopics with an identified gap (n=26) follow each topic summary to provide full transparency. The following are abbreviations found within the matrices: ACOG (American College of Obstetrics and Gynecology), DHA (Defense Health Affairs), DoD (Department of Defense), IOM (Institute of Medicine), MOMRP (Military Operational Medicine Research Program), and VA (Department of Veterans Affairs). The GAMs provide a visual representation of how the research team identified gaps in the existing literature. To view the GAMs for each one of the 73 subtopics, please see Appendix K.

Psychological Health: Research Gap Analysis

Representation among the service branches. Figure 65 displays all Psychological Health subtopics by service branch. Within the Psychological Health topic, the Marine Corps was consistently over-sampled in all areas relative to force strength. Similarly, Navy samples were over-represented in the following categories: TAD, mood disorders & anxiety, general mental disorders, mental healthcare utilization, and resilience factors. Despite their small size, Coast Guard samples were over-represented in all topics in which they were included. The Air Force was over-represented within the TAD, distress, resilience factors, and suicide subtopics, but under-represented in the PTSD subtopic. Finally, the Army was under-represented in every category shown, except for cognition research. The Army was over-represented in this area, and this was the one area in which the Navy was under-represented.

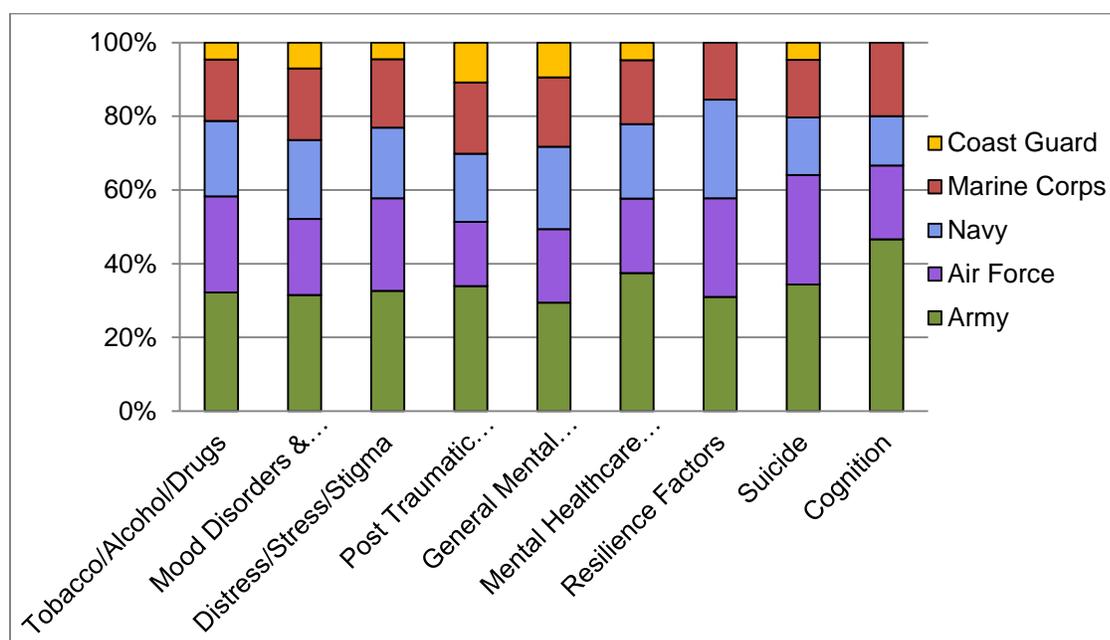


Figure 65. Psychological Health subtopics by service branch.

Note. Tobacco/Alcohol/Drug includes all articles from the Tobacco, Alcohol, or Drug subtopics. Distress/Stress/Stigma includes all articles from the Distress, Stress, and Stigma subtopics. General Mental Disorders includes all articles from the Adjustment Disorders, Personality Disorders, Eating Disorders, and Other Mental Disorders subtopics.

Gaps in research. Table 38 shows the identified gaps within the Psychological Health topic. Other than the Army, general mental disorders were relatively well-represented across service branches. However, the number of articles related to adjustment, eating, and personality disorders (included within “general mental disorders”) was quite small ($n = 10$, $n = 6$, $n = 10$ respectively). Within the ICD-9 Mental Disorders chapter, the top diagnostic category for women across ranks (enlisted and officer) and across settings (inpatient and outpatient) was adjustment disorders. Furthermore, women in both enlisted and officer ranks were two times more likely to be diagnosed with an adjustment disorder across settings than their male peers. The outpatient diagnostic category of

'special symptoms' (of which eating disorders is a subcategory) was in the top 5 within the Mental Disorders chapter for women across ranks. In addition, outpatient female enlisted personnel were 4 times more likely to be diagnosed with eating disorders than their male peers. Personality disorder diagnoses were the number 2 inpatient ICD-9 category within the Mental Disorders chapter for female enlisted personnel. Females across ranks were approximately 3 times more likely to be diagnosed with a personality disorder in outpatient settings than their male peers, and between 6 and 8 times more likely to be diagnosed with a personality disorder in inpatient settings than their male peers. Other than the Army, all service branches were well-represented in research related to distress/stress/stigma. However, the actual number of articles published on the stigma subtopic was quite small ($n = 13$). The mental health of service members, as well as the associated stigma of seeking care, is of particular concern because it can impact individual, as well as socially-accepted, beliefs about mental health and treatment-seeking behavior. These are areas of concern, and further high-quality research is needed.

Table 38

Identified gaps within the Psychological Health topic

Psychological Health
Stigma
Adjustment Disorders
Personality Disorders
Eating Disorders

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Stigma	Topic Psychological Health	ICD-9 Chapter N/A	Mental/Psychological Health * MOMRP (1994) * IOM (1995) * VA (2011) * ACOG (2012) * DHA (2015) * DoD (2016)	There was no DMED or PDTS data on this subtopic. Mental health was recognized as a research priority by 6 out of the 7 research priority lists consulted for this project, with 3 highlighting mental health within the past 5 years. Although the quality of the existing research on this subtopic is good to excellent overall, the number of articles in this area is scant. This means that female service members may not be well-studied in terms of mental health stigma.		
	Number of Articles 13	Top 5 Utilized N/A				
	Excellent Quality 38%	F:M ratio N/A		Based on this information, there is a significant gap in the existing gender-inclusive literature on this subtopic.		
	Low Quality 0%					
	Definition Self-reported individual barriers to seeking mental healthcare	TCC Rank N/A		Recommendations		
		F:M Rate Ratio N/A				

Figure 66. Gap Analysis Matrix for the Stigma subtopic

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis			
Subtopic: Adjustment Disorders	Topic Psychological Health	ICD-9 Chapter Mental & Behavioral Disorders (290-319)	Mental/Psychological Health * MOMRP (1994) * IOM (1995) * VA (2011) * ACOG (2012) * DHA (2015) * DoD (2016)	Mental and behavioral disorders were in the top most utilized ICD-9 chapters, and adjustment disorders were one of the top most utilized ICD-9 categories. Women were close to two times more likely to be diagnosed with an adjustment disorder than men across setting and rank. Six organizations highlighted mental/psychological disorders as a research priority and four of these were within the past six years. Although the quality for all articles was good to excellent, the number of articles is extremely low. This means that female service members may not be well-studied in terms of adjustment disorders.			
	Number of Articles 10	ICD-9 Category Adjustment Reaction (309)					
	Excellent Quality 30%	Top 5 Utilized Chapter & Category					
	Low Quality 0%	F:M ratio Adjustment Reaction (309) <i>Outpatient</i> Enlisted: 1.7 Officer: 1.9					
	Definition Diagnosis and treatment of adjustment disorders	<i>Inpatient</i> Enlisted: 1.6 Officer: 2.1		TCC Rank Central Nervous System Agents #1 of 26 Miscellaneous Therapeutic Agents #14 of 26	Based on this information, there is a significant gap in the existing literature on adjustment disorders.		
		F:M Rate Ratio Central Nervous System Agents 1.18					
		Miscellaneous Therapeutic Agents 1.13					
				Recommendations			
				Gap identified in existing research	Continue ongoing research trajectory	None at this time	

Figure 67. Gap Analysis Matrix for the Adjustment Disorders subtopic

	Scoping Review	Healthcare Utilization Data (DMED & PDTs)	Organizational Priorities	Reviewer Synthesis					
Subtopic: Personality Disorders	Topic Psychological Health	ICD-9 Chapter Mental & Behavioral Disorders (290-319) ICD-9 Category Personality Disorders (301)	Mental/Psychological Health * MOMRP (1994) * IOM (1995) * VA (2011) * ACOG (2012) * DHA (2015) * DoD (2016)	This subtopic falls within the top 5 diagnosed chapters and categories within DMED data. Personality disorders were the 2 nd most common diagnosis within the Mental Disorders chapter for enlisted women. Women across ranks and settings were much more likely to be diagnosed with a personality disorder than men. CNS agents were the top most utilized therapeutic class category. Mental health continues to be highlighted as a research priority for the military by many organizations.					
	Number of Articles 10	Top 5 Utilized Chapter & Category					Bearing this information in mind, the scant number of articles in this subtopic is alarming. There is a significant gap in the existing gender-inclusive literature on personality disorders.		
	Excellent Quality 30%	F:M ratio Personality Disorders (301)		Recommendations					
	Low Quality 0%	<i>Outpatient</i> Enlisted: 2.8 Officer: 3.2							
	Definition Diagnosis and treatment of personality disorders (e.g. Antisocial Personality, Narcissistic Personality Disorder)	<i>Inpatient</i> Enlisted: 8.3 Officer: 6.3					Gap identified in existing research		
		TCC Rank Central Nervous System Agents #1 of 26 Miscellaneous Therapeutic Agents #14 of 26							
	F:M Rate Ratio Central Nervous System Agents 1.18 Miscellaneous Therapeutic Agents 1.13	None at this time							

Figure 68. Gap Analysis Matrix for the Personality Disorders subtopic

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis					
Subtopic: Eating Disorders	Topic Psychological Health	ICD-9 Chapter Mental & Behavioral Disorders (290-319) ICD-9 Category Special Symptoms, not elsewhere classified (307) ICD-9 Subcategories Eating Disorders (307.5)	Eating Disorders * IOM (1995) * VA (2011) * DOD (2016)	Service members may be at a higher risk for disordered eating. They are held to pre-determined physical fitness and weight criteria throughout their career, and can be separated from service if these criteria are not consistently met.					
	Number of Articles 6	Anorexia Nervosa (307.1)					This subtopic was within the top 5 most utilized chapters and categories within the DMED data. Women across ranks and settings were significantly more likely to be diagnosed with an eating disorder than their male peers. This is an area that has been identified as a research priority by three different organizations, two in the past 10 years.		
	Excellent Quality 50%	Top 5 Utilized Chapter & Category		Bearing this in mind, the scant number of articles within this subtopic is very concerning. There is a significant gap in the existing gender-inclusive literature on eating disorders.					
	Low Quality 0%	F:M ratio Eating Disorders & Anorexia Nervosa (307.1 & 307.5) <i>Outpatient</i> Enlisted: 4.1							
	Definition Specific risk factors for, and diagnosis and treatment of, eating disorders	TCC Rank Central Nervous System Agents #1 of 26 Miscellaneous Therapeutic Agents #14 of 26		Recommendations					
		F:M Rate Ratio Central Nervous System Agents 1.18 Miscellaneous Therapeutic Agents 1.13					Gap identified in existing research	Continue ongoing research trajectory	None at this time

Figure 69. Gap Analysis Matrix for the Eating Disorders subtopic

Readiness: Research Gap Analysis

Representation among the service branches. Figure 70 displays all Readiness subtopics by service branch. Within the Readiness topic, the Marine Corps was consistently over-sampled in all areas relative to force strength. The Coast Guard was over-represented in healthcare utilization, health behaviors, and sleep. These areas were also over-represented within Navy samples, in addition to the areas of work environment, and mortality. Conversely, the Army was under-represented in every area in which the Navy was over-represented. The Navy and Air Force were both under-represented in the areas of physical fitness and training, but the Army was over-sampled relative to force strength in the area of training.

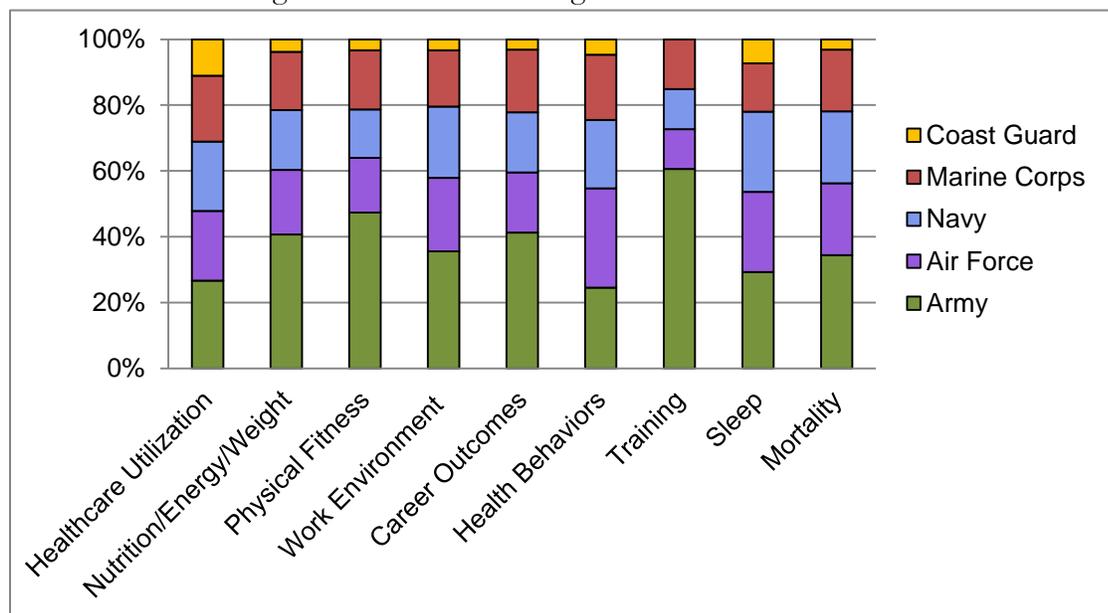


Figure 70. Readiness subtopics by service branch.

Gaps in research. Table 39 shows the identified gaps within the Readiness topic. Besides the Army, all other service branches were well-represented in sleep research, but the actual number of articles published on this subtopic was very small ($n = 19$). Within the ICD-9 Mental Disorders chapter, the outpatient diagnostic category of ‘special symptoms’ (of which sleep is a subcategory) was in the top 5 for women across ranks; furthermore, sleep disorder diagnoses were in the top 5 conditions within this subcategory for outpatient women across ranks. Sleep is critical for physical health, mental health, work and home safety, as well as quality of life (Institute of Medicine (IOM) Committee on Sleep Medicine and Research, 2006). Service members may be particularly susceptible to sleep difficulties due to stress, duty schedules, and other characteristics of the military environment. The lack of gender-inclusive evidence in this area is concerning and further research is needed.

Table 39

Identified gaps within the Readiness topic

Readiness
Sleep

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Sleep	Topic Readiness	ICD-9 Chapter Mental & Behavioral Disorders (290-319)	Sleep * VA (2011) Performance * MOMRP (1994) * IOM (1995)	While shift work and variable sleeping schedules are common in both civilian and military sectors, service personnel may be more susceptible to sleep difficulties by virtue of their unpredictable work schedules and locations.		
	Number of Articles 16	ICD-9 Category Special Symptoms, not elsewhere classified (307) ICD-9 Subcategory				
	Excellent Quality 25%	Specific disorders of sleep of nonorganic origin (307.4)		Sleep disorders were in the top 5 most utilized chapters and categories for outpatient officers. Three organizations highlighted sleep and performance as a military priority, one in the past six years. While over 90% of the research was of good to excellent quality, the number of articles in this area were scant, which may indicate that service women are not well studied in terms of sleep.		
	Low Quality 6%	Top 5 Utilized Chapter & Category				
	Definition Factors contributing to alteration in sleeping habits or circadian rhythm	F:M ratio Specific disorders of sleep of nonorganic origin (307.4) <i>Outpatient</i> Officer: 1.2		Based on this information, there is a significant gap in the existing gender-inclusive literature on sleep.		
		TCC Rank #1 Central Nervous System Agents				
	F:M Rate Ratio 1.18	Recommendations				
		Gap identified in existing research	Continue ongoing research trajectory	None at this time		

Figure 71. Gap Analysis Matrix for the Sleep subtopic

Injury: Research Gap Analysis

Representation among the service branches. Figure 72 displays all Injury subtopics by service branch. Within the Injury topic, the Marine Corps was consistently over-sampled in all areas relative to force strength. This was also true of the Coast Guard, except in the area of musculoskeletal injury. The Army and Air Force were not under-represented in any area. The Navy was over-represented within the traumatic brain injury (TBI) subtopic, but under-represented in the general injury subtopic. The Air Force was also under-represented in the general injury subtopic, as well as in the traumatic injury and deployment injury areas. Finally, the Army was also under-represented in the traumatic injury and deployment injury areas, as well as in the TBI, heat/cold/altitude, and eye/ear injury subtopics.

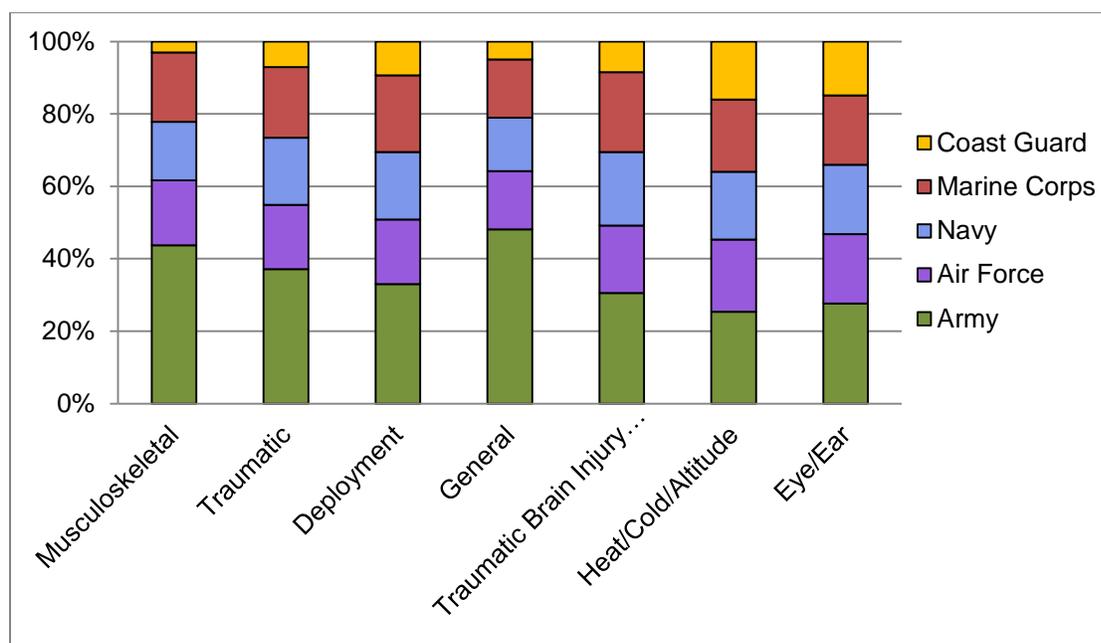


Figure 72. Injury subtopics by service branch.

Gaps in research. Table 40 shows that no research gap areas were identified within the Injury topic. Injury research was found to be robust, as evidenced by the high quality and high volume research in this field, and the close alignment with healthcare utilization data. In addition, the field of injury research aligns well with military priorities for returning injured service members back to duty in a timely manner.

Table 40

Identified gaps within the Injury topic

Injury
No gaps identified

Acute Care & Preventive Medicine: Research Gap Analysis

Representation among the service branches. Figure 73 displays all Acute Care and Preventive Medicine (ACPM) subtopics by service branch. Within the ACPM topic, the Marine Corps and the Coast Guard were consistently over-sampled in all subtopics relative to force strength. By contrast, the Army was under-represented in every subtopic, except cardiovascular health. The Air Force was under-represented in the subtopics of cardiovascular health and sexually transmitted infections. Conversely, the Navy was over-sampled in the subtopics of STIs, other organ systems, infectious disease, and vaccinations.

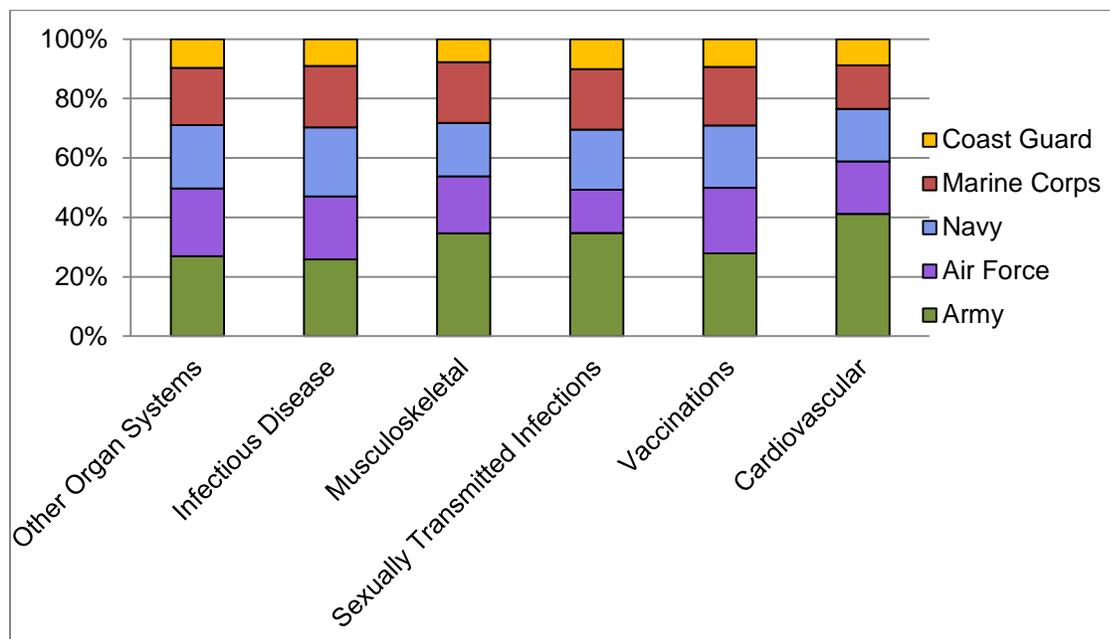


Figure 73. Acute Care & Preventive Medicine subtopics by service branch.

Gaps in research. Table 41 shows that STIs were one of the identified gaps within the ACPM topic. Other than the Air Force and Army, all other service branches were well- represented in research related to STIs. However, considering this is an area that has been highlighted by multiple organizations, the actual number of articles published on this subtopic was relatively minimal ($n = 37$), with almost 15% being of low quality. Of particular concern are diagnosis rates for chlamydia; women across ranks are 3.3 to 5.0 times more likely to be diagnosed with chlamydia than their male peers. STIs are prevalent among military and civilian populations. However, service members may be at greater risk of contracting such infections given certain environmental factors (e.g. long deployments, close living quarters). This is an area of concern and further research is needed.

Table 41

Identified gaps within the Acute Care & Preventive Medicine topic

Acute Care & Preventive Medicine (ACPM)
Sexually Transmitted Infections (STI)

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis								
Subtopic: Sexually Transmitted Infections	Topic Acute Care and Preventative Medicine (ACPM)	ICD-9 Chapter Infectious and Parasitic Diseases (001-139) ICD-9 Categories Other diseases due to viruses and chlamydiae (070-079) Chlamydia (078-079) Syphilis and other venereal diseases (090-099) Gonococcal (098) Venereal disease (099)	Gynecological/genitourinary health * MOMRP (1994) * IOM (1995) * VA (2011) * ACOG (2012) * DHA (2015)	<p>Although this subtopic is not in the top utilized ICD-9 chapters/categories, outpatient women across rank were much more likely to be diagnosed with an STI than men. Anti-infective medications were also the 2nd most highly prescribed TCC for women. Five organizations highlighted various areas of reproductive health as priorities for military populations. Of these organizations, three were within the past 10 years. The number of articles in this area was relatively light given the high priority given to this subtopic by multiple organizations.</p> <p>Based on this information, there is a significant gap in the existing gender-inclusive literature on STIs.</p>								
	Number of Articles 37	Top 5 Utilized N/A	Reproductive health * IOM (1995) * VA (2011) * ACOG (2012)									
	Excellent Quality 19%	F:M ratio <i>Outpatient</i> Syphilis (090-099) Enlisted: 2.3	Sexually Transmitted Diseases (STDs) * MOMRP (1994) * IOM (1995)	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th colspan="3">Recommendations</th> </tr> </thead> <tbody> <tr> <td style="background-color: #f4a460;">Gap identified in existing research</td> <td>Continue ongoing research trajectory</td> <td>None at this time</td> </tr> </tbody> </table>			Recommendations			Gap identified in existing research	Continue ongoing research trajectory	None at this time
	Recommendations											
	Gap identified in existing research	Continue ongoing research trajectory	None at this time									
	Low Quality 14%	Officer: 0.8 Viral Warts (078.1) Enlisted: 0.8 Officer: 0.9 Chlamydia (078.88) Enlisted: 3.3	Communicable diseases * IOM (1995)									
Definition Sexually transmitted infections including Trichomonas vaginalis, chlamydia, and genital warts; excludes HIV and Hepatitis A/B/C	Officer: 0.7 Other chlamydia (079.88) Enlisted: 3.5 Officer: 5.0 Unspecified chlamydial (079.98) Enlisted: 4.7 Officer: 2.0											
	TCC Rank #2 Anti-Infectives											
	F:M Rate Ratio 1.43											

Figure 74. Gap Analysis Matrix for the Sexually Transmitted Infections (STI) subtopic

Deployment Health: Research Gap Analysis

Representation among the service branches. Figure 75 displays all Deployment Health subtopics by service branch. Within the Deployment Health topic, the Army was the only service branch to be consistently under-sampled in all areas relative to force strength. The Coast Guard was consistently over-represented in all areas; the Marine Corps was also over-represented in all areas, except for gynecological care during deployment. The Navy was over-represented in gynecological care, symptomatic conditions, aeromedical evacuations, and mental health. The Air Force was over-represented in gynecological care, symptomatic conditions, aeromedical evacuations, and mental health. The Air Force was not over- or under-represented in any of the areas.

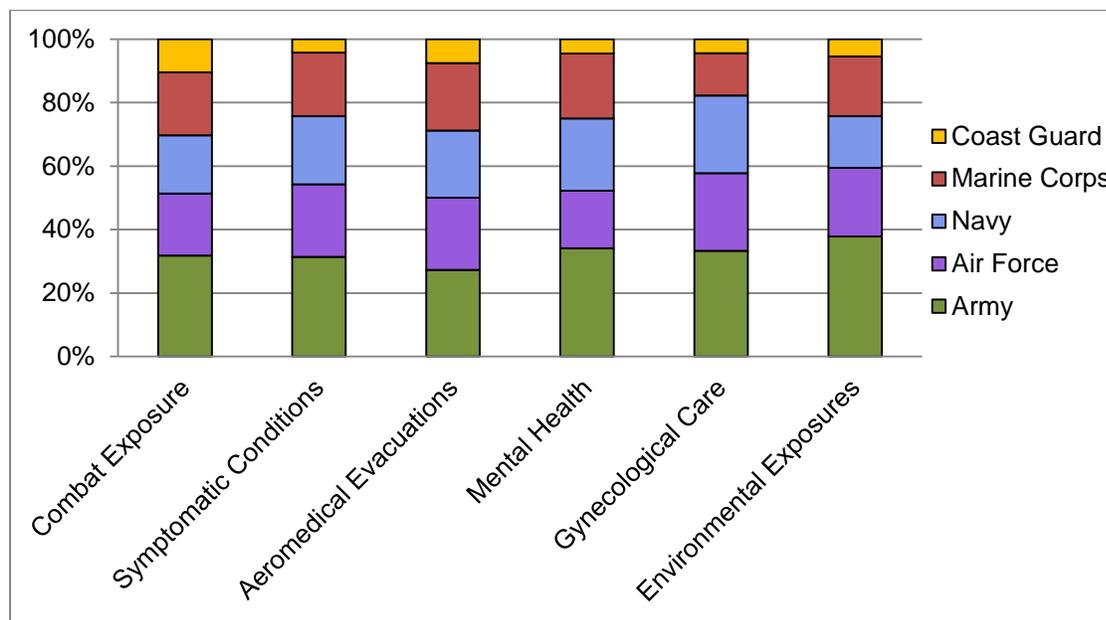


Figure 75. Deployment Health subtopics by service branch.

Gaps in research. Table 42 shows that gynecological care was the one identified gap in the Deployment Health topic. Other than the Army, all other service branches were well-represented in research related to deployment gynecological care; however, the actual number of articles published on this subtopic was scant ($n = 19$). Healthcare utilization data in DMED showed that Diseases of the Genitourinary System were in the top 5 most commonly diagnosed ICD-9 chapters for women across ranks and across settings. Additionally, women are between 5 and 7 times more likely to be diagnosed with a condition in this chapter than their male counterparts across rank and across setting. The importance of gender-inclusive research in this area cannot be over-emphasized; more evidence to guide long-range healthcare and policy is needed.

Table 42

Identified gaps within the Deployment Health topic

Deployment Health
Gynecological Care

Additional analyses. Figure 76 shows how deployment related research has shifted over time. Each bar represents all of the articles about a deployment setting that were published within a given year. As expected, the trend in the location of deployment research dramatically changed in the years following the initiation of Operations Enduring Freedom, Iraqi Freedom, and New Dawn (OEF/OIF/OND). Across the years of this report, many deployment-related studies did not report a specific location of engagement. Although this may have been intentional due to the sensitive nature of military operations, it is lost data that might have been able to clarify how different deployments impact the health of service members in various ways. Stating that research was conducted in a generic deployment setting does not allow for fine-grained and accurate interpretation of results.

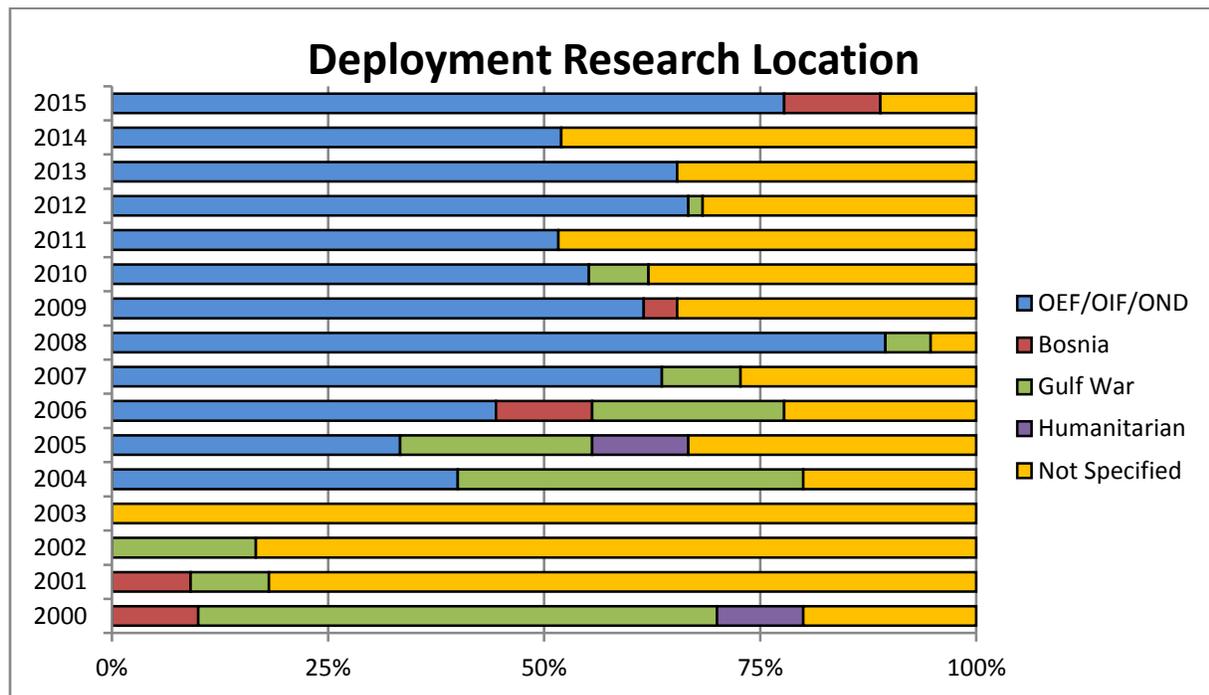


Figure 76. Percent of articles about each deployment setting by publication year

Also of note is the very small body of research that has been conducted on humanitarian deployments. Over the 10 year period, only 2 articles were published on how humanitarian deployments may impact the health of female service members. The mental and physical exposures of humanitarian deployments differ from combat deployments. Considering U.S. military forces are often deployed to support natural disaster relief efforts and provide humanitarian assistance, the lack of research on humanitarian deployments presents a significant research gap. It should also be noted that although the Gulf War ended in 1991, gender-focused research on that engagement is still being conducted, specifically looking at long-term health outcomes of service personnel.

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Gynecological Care	Topic Deployment Health	ICD-9 Chapter Disease of the genitourinary system (580-629)	Bacterial Vaginosis * ACOG (2012) * DHA (2015)	The ICD-9 chapter for Diseases of the Genitourinary System is among the top utilized chapters. Women were far more likely to be diagnosed with genitourinary conditions than men. Three different organizations, two within the past 5 years, have identified gynecological care in deployment as a research priority. The number of articles for this subtopic was scant, which may indicate that service women are not well-studied in relation to deployment gynecological health. Additionally, 21% of the articles in this subtopic were of low quality.		
	Number of Articles 19	Top 5 Utilized Chapter	Cervical Cancer Screening * ACOG (2012)			
	Excellent Quality 11%	F:M ratio Disease of the genitourinary system (580-629) <i>Outpatient</i> Enlisted: 7.0 Officer: 5.5	Contraception * ACOG (2012) * DHA (2015)	Based on the current information, there is a significant gap in the existing gender-inclusive literature.		
	Low Quality 21%	<i>Inpatient</i> Enlisted: 6.3 Officer: 5.4	Facilities and Hygiene in Deployment * ACOG (2012) * DHA (2015)			
	Definition Gynecological care during deployment, includes access to care or necessary supplies	TCC Rank N/A	Gynecological/ Genitourinary Health in Deployment * DHA (2015) * MOMRP (1994)	Recommendations		
		F:M Rate Ratio N/A	Menstruation * ACOG (2012) * DHA (2015)			
		Pregnancy * ACOG (2012) * DHA (2015)				

			UTIs * ACOG (2012) * DHA (2015)			
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Figure 77. Gap Analysis Matrix for the Gynecological Care subtopic

Social Relationships: Research Gap Analysis

Representation among the service branches. Figure 78 displays all Social Relationships subtopics by service branch. Within the Social Relationships topic, the Coast Guard was over-sampled in all areas in which it was represented. The Navy was also over-represented in every subtopic, except for military work relationships. The Air Force was under-represented in the areas of sexual harassment, child abuse, and physical assault, and over-represented in the area of intimate partner violence. For the first time, the Marine Corps was under-represented, and this was in the area of intimate partner violence. Also unique to this topic, the Marine Corps was not over-represented in every other category, but only in the areas of sexual assault, military family relationships, military work relationships, and sexual harassment. The Army was under-represented in every subtopic, except in the areas of child abuse and physical assault.

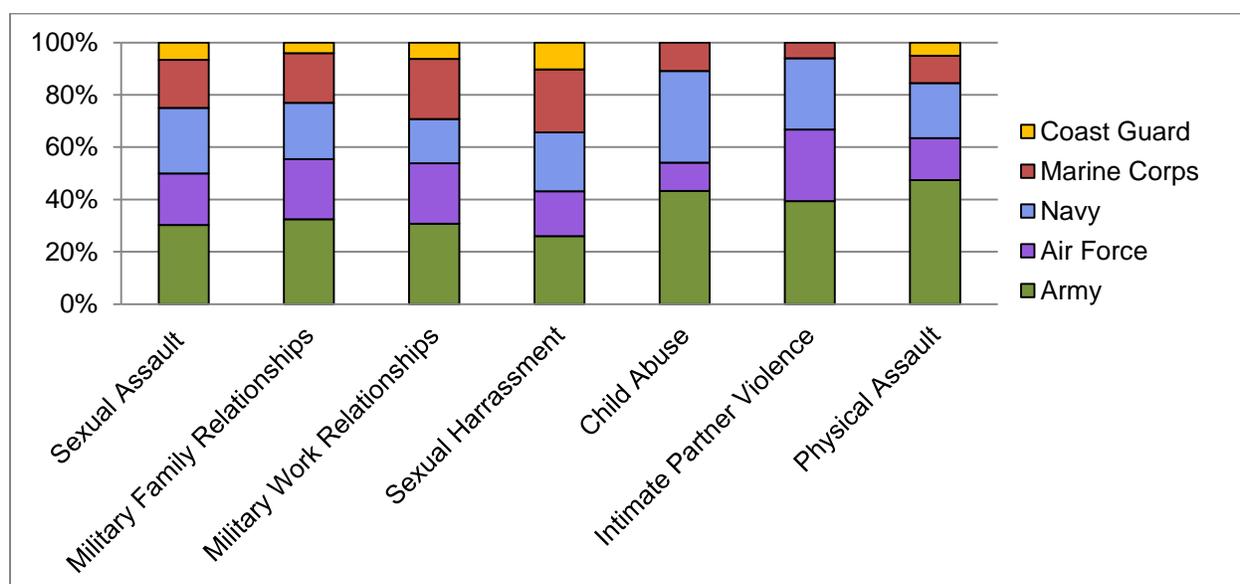


Figure 78. Social Relationships subtopics by service branch.

Gaps in research. Table 43 shows the two identified gaps within the Social Relationships topic: sexual assault and physical assault. Other than the Army, all other service branches were well-represented in research related to sexual assault. This area has been highlighted by multiple organizations as a priority topic. The amount of research published in the area of sexual assault was relatively modest ($n = 47$), with over one third of the articles being of excellent quality. It was not possible to specifically characterize sexual assault within the DMED data, but the category of 'adult sexual abuse' was used as a proxy. Within the healthcare utilization data, the most commonly diagnosed outpatient category within the ICD-9 Injury and Poisoning chapter was 'other and unspecified effects of external causes' within which the diagnosis of 'adult sexual abuse' occurs. Women across ranks in the outpatient setting were between 22 and 25 times more likely to be diagnosed with 'adult sexual abuse' than their male peers. This is of concern, and more research is called for in this area.

Table 43

Identified gaps within the Social Relationships topic

Social Relationships
Sexual Assault
Physical Assault

Other than the Air Force, all other service branches were well-represented in research related to physical assault. However, the number of articles within this topic area was scant ($n = 12$). It was not possible to specifically characterize physical assault within the DMED data, but similar to sexual assault above, the category of 'adult physical abuse' was used as a proxy. Women across ranks in the outpatient setting were approximately 3 times more likely to be diagnosed with 'adult physical abuse' than men. Additionally, the ICD-9 Injury and Poisoning chapter is among the top most commonly diagnosed chapters across ranks in the inpatient setting, and the Musculoskeletal Disorders chapter (which includes diagnoses for potential post-physical assault symptoms) is within the top five most commonly diagnosed chapters for women across settings and across rank. This is an area of concern, and further research is needed.

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis				
Subtopic: Sexual Assault	Topic Social Relationships	ICD-9 Chapter Injury and Poisoning (800-999) ICD-9 Categories Other and Unspecified Effects (990-995) Certain adverse effects (995) ICD-9 Subcategory Other specified adverse effects, not otherwise specified (995.8) ICD-9 Subclassification Adult sexual abuse (995.83)	Military Sexual Trauma * VA (2011) Sexual Assault * MOMRP (1994) * IOM (1995) * ACOG (2012) Intimate Relationships * DOD (2016) Intimate Partner Violence * DOD (2016)	There was no PDTS data for this subtopic. There were a fair number of articles on this subtopic and over 85% were of good to excellent quality. However, this subtopic was in the most utilized ICD-9 chapters. Women were far more likely to receive a sexual assault diagnosis compared to men, and rate ratios were significantly higher for women compared to men. Sexual assault has been highlighted by five different organizations, three in the past six years.				
	Number of Articles 47						Based on the current information, there is a significant gap in the existing gender-inclusive literature on this subtopic.	
	Excellent Quality 34%	Recommendations						
	Low Quality 13%				<table border="1"> <tr> <td>Gap identified in existing research</td> <td>Continue ongoing research trajectory</td> <td>None at this time</td> </tr> </table>			Gap identified in existing research
	Gap identified in existing research	Continue ongoing research trajectory		None at this time				
	Definition Sexual assault experienced or perpetrated by military populations, includes military sexual trauma	Top 5 Utilized Chapter F:M ratio Adult sexual abuse (995.83) <i>Outpatient</i> Enlisted: 24.6 Officer: 22.3						
	TCC Rank N/A F:M Rate Ratio N/A							

Figure 79. Gap Analysis Matrix for the Sexual Assault subtopic

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis								
Subtopic: Physical Assault	Topic Social Relationships	ICD-9 Chapter Injury and Poisoning (800-999) ICD-9 Categories Injury and Poisoning Other and Unspecified Effects (990-995) ICD-9 Subcategory Certain adverse effects (995.8) ICD-9 Subclassification Adult physical abuse (995.81)	N/A	<p>There was no PDTS data on physical assault. This subtopic was within the top 5 most utilized ICD-9 chapters. Females were over twice as likely as males to be diagnosed with physical abuse in an outpatient setting. Physical assault would also be coded clinically specific to particular bodily injuries, and as the potential diagnoses would be so wide-ranging, rate ratios in other diagnostic clusters could not be calculated. No organizations referenced in this report highlighted physical assault as a research priority for military populations. The number of articles in this area was scant, meaning that only 6 of the 12 articles in this subtopic were of excellent quality.</p> <p>Based on the current information, there is a significant gap in the existing gender-inclusive literature on this subtopic.</p>								
	Number of Articles 12	Top 5 Utilized Chapter										
	Excellent Quality 50%	F:M ratio Adult physical abuse (995.81) <i>Outpatient:</i> Enlisted: 2.8 Officer: 3.5		<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th colspan="3">Recommendations</th> </tr> </thead> <tbody> <tr> <td style="background-color: #f4a460;">Gap identified in existing research</td> <td>Continue ongoing research trajectory</td> <td>None at this time</td> </tr> </tbody> </table>			Recommendations			Gap identified in existing research	Continue ongoing research trajectory	None at this time
	Recommendations											
	Gap identified in existing research	Continue ongoing research trajectory					None at this time					
	Low Quality 8%	Female rate is 1.77 per 1,000 years										
Definition Violence experienced or perpetrated by military members, excludes violence from/against partners or children	TCC Rank N/A											
	F:M Rate Ratio N/A											

Figure 80. Gap Analysis Matrix for the Physical Assault subtopic

Obstetrics and Gynecology: Research Gap Analysis

Representation among the service branches. Figure 81 displays all Ob/Gyn subtopics by service branch. Within the Ob/Gyn topic, the Army was consistently under-represented in all areas relative to force strength, except in the area of general obstetrics. By contrast, the Navy was over-represented in all areas except uterine health. For only the second time across any topic, the Marine Corps was under-represented; this was in the breast health area. Also atypical of prior results, the Marine Corps was not over-represented in every other category, but only in the areas of uterine health, family planning, pregnancy, sexual health, and birth outcomes & infant health. The Coast Guard was over-represented in every area, except sexual health, birth outcomes & infant health, and general obstetrics. The Air Force was under-represented in the areas of sexual health and general obstetrics, but over-represented in the area of breast health.

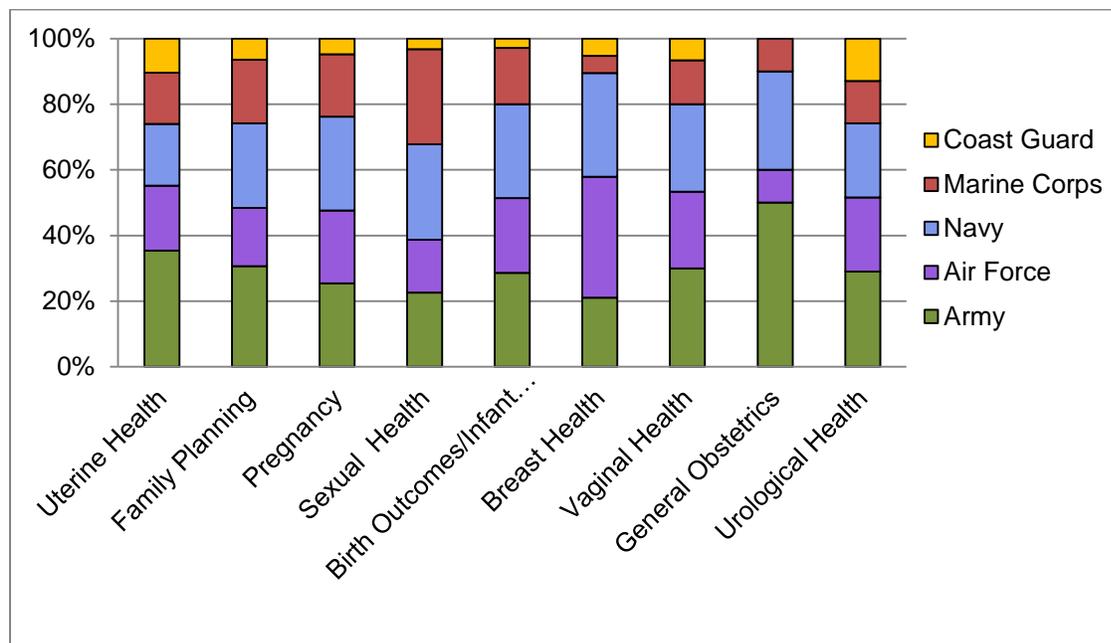


Figure 81. Obstetrics and Gynecology (Ob/Gyn) subtopics by service branch.

Note. Family Planning includes all articles from the Contraception, Unplanned Pregnancy, and Fertility subtopics. Uterine Health includes all articles from the Uterine Wellness, Menstruation, and Menstrual Suppression subtopics. Pregnancy includes all articles from the Postpartum, Antepartum, and Intrapartum subtopics. Breast Health includes all articles from the Breast Wellness and Breastfeeding subtopics.

Gaps in research. Table 44 shows all of the identified gaps found within the Ob/Gyn main topic. Every subtopic except sexual health was identified as a research gap. The combination of scant research in these subtopics with a high proportion of low quality articles highlighted many subtopic areas as having insufficient information. Further high quality research is needed.

Table 44

Identified gaps within the Obstetrics and Gynecology topic

Obstetrics and Gynecology (OB/Gyn)
Contraception
Uterine Wellness
Menstruation
Menstrual Suppression
Antepartum
Intrapartum
Postpartum
Birth Outcomes/Infant Health
Vaginal Health
General OB
Urological health
Unplanned Pregnancy
Breast Wellness
Breastfeeding
Fertility

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Contraception	Topic Obstetrics and Gynecology	ICD-9 Chapter N/A	Contraception * IOM (1995) * IOM (1998) * VA (2011) * ACOG (2012) * DHA (2015)	There was no DMED data for this subtopic. PDTS data showed that women were overwhelmingly more likely to be prescribed contraception compared to men. Five organizations, three within the past six years, highlighted contraception as a research priority for military populations. There were a relatively light number of articles on contraception, and of these, 31% were of low quality.		
	Number of Articles 29	Top 5 Utilized N/A				
	Excellent Quality 21%	F:M ratio N/A		Based on the current information, there is a significant gap in the existing gender-inclusive literature on this subtopic.		
	Low Quality 31%					
	Definition Contraception used for any purpose (e.g. birth control, menstrual suppression), including male condoms	TCC Rank Hormones and synthetic substitutes #3 of 26 Contraceptives #16 of 26		Recommendations		
	F:M Rate Ratio Hormones: 6.74 Contraceptives: 83.6	Gap identified in existing research	Continue ongoing research trajectory			

Figure 82 . Gap Analysis Matrix for the Contraception subtopic

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Uterine Wellness	Topic Obstetrics and Gynecology	ICD-9 Chapter Diseases of the genitourinary system (580-629)	Cervical Cancer Screening * VA (2011) * ACOG (2012)	<p>There was no PDTS data on uterine wellness. This subtopic was within the top 5 most utilized ICD-9 chapters. Women were over five times more likely to be diagnosed with genitourinary diseases compared to men across setting and rank. Two organizations within the past six years highlighted uterine wellness as a research priority. The number of articles in this area was light with over 30% of articles being of low quality.</p> <p>Based on the current information, there is a significant gap in the existing gender-specific literature on this subtopic.</p>		
	Number of Articles 24	Top 5 Utilized Chapter				
	Excellent Quality 17%	F:M ratio Diseases of the genitourinary system (580-629) <i>Outpatient</i> Enlisted: 7.0 Officer: 5.5				
	Low Quality 33%	<i>Inpatient</i> Enlisted: 6.3 Officer: 5.4				
	Definition Health outcomes involving the uterus or cervix, including pap smears	TCC Rank N/A				
		F:M Rate Ratio N/A				
				Recommendations		
				Gap identified in existing research	Continue ongoing research trajectory	None at this time

Figure 83. Gap Analysis Matrix for the Uterine Wellness subtopic

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Menstruation	Topic Obstetrics and Gynecology	ICD-9 Chapter Diseases of the genitourinary system (580-629)	Menstruation * MOMRP (1994) * IOM (1995) * ACOG (2012) * DHA (2015)	There was no PDTS data on menstruation. This subtopic was within the top 5 most utilized ICD-9 chapters. Women were over five times more likely to be diagnosed with a genitourinary disease compared to men across setting and rank. Four organizations, two within the past five years, highlighted menstruation as a research priority. The number of articles on menstruation research is scant and an alarming 47% of those articles were of low quality.		
	Number of Articles 17	Top 5 Utilized Chapter				
	Excellent Quality 18%	F:M ratio Diseases of the genitourinary system (580-629) <i>Outpatient</i> Enlisted: 7.0 Officer: 5.5		Based on this information, there is a significant gap in the existing gender-specific literature on this subtopic.		
	Low Quality 47%	<i>Inpatient</i> Enlisted: 6.3 Officer: 5.4				
	Definition Menstruation, but not menstrual suppression	TCC Rank N/A		Recommendations		
		F:M Rate Ratio N/A		Gap identified in existing research	Continue ongoing research trajectory	None at this time

Figure 84 . Gap Analysis Matrix for the Menstruation subtopic

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Menstrual Suppression	Topic Obstetrics and Gynecology	ICD-9 Chapter N/A	Menstruation *MOMRP (1994) * IOM (1995) * ACOG (2012) * DHA (2015) Contraception * IOM (1995) * ACOG (2012) * DHA (2015)	No DMED data was available on the subtopic of menstrual suppression. Women were over six times more likely to be prescribed hormones and synthetic substitutes compared to men. Four organizations, two within the past five years, highlighted this subtopic as a research priority. There were very few articles on menstrual suppression with an alarming 60% being of low quality.		
	Number of Articles 10	Top 5 Utilized N/A				
	Excellent Quality 10%	F:M ratio N/A		Based on the current information, there is a significant gap in the gender-specific existing literature on this subtopic.		
	Low Quality 60%					
	Definition Menstrual suppression and/or regulation	TCC Rank Hormones and Synthetic Substitutes #3 of 26		Recommendations		
	F:M Rate Ratio 6.74	Gap identified in existing research	Continue ongoing research trajectory			

Figure 85. Gap Analysis Matrix for the Menstrual Suppression subtopic

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Antepartum	Topic Obstetrics and Gynecology	ICD-9 Chapter N/A	Pregnancy * MOMRP (1994) * IOM (1995) * IOM (1998) * VA (2011) * ACOG (2012) * DHA (2015) * DOD (2016)	There was no DMED data for antepartum diagnoses; however, women were more likely to be prescribed vitamins/dietary supplements than men which may reflect the use of prenatal vitamins in the antepartum period. Seven organizations highlighted pregnancy as a research priority; four within the past six years. The number of articles in this area was extremely low and 27% were of low quality.		
	Number of Articles 11	Top 5 Utilized N/A				
	Excellent Quality 9%	F:M ratio N/A		Based on this information, there is a significant gap in the existing gender-specific literature on this subtopic.		
	Low Quality 27%					
	Definition Medical care given during pregnancy but before the mother is in active labor	TCC Rank #10 Vitamins/ Dietary Supplements		Recommendations		
		F:M Rate Ratio 1.63				

Figure 86 . Gap Analysis Matrix for the Antepartum subtopic

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Intrapartum	Topic Obstetrics and Gynecology	ICD-9 Chapter N/A	Pregnancy * MOMR (1994) * IOM (1995) * IOM (1998) * VA (2011) * ACOG (2012) * DHA (2015) * DOD (2016)	There was no DMED or PDTS data for this subtopic. Seven organizations, four within the past six years, highlighted pregnancy as a research priority. The number of articles on intrapartum health outcomes was very low and 50% were of low quality.		
	Number of Articles 6	Top 5 Utilized N/A				
	Excellent Quality 0%	F:M ratio N/A		Based on this information, there is a significant gap in the existing gender-specific literature.		
	Low Quality 50%					
	Definition Medical care given during the period from the start of active labor to delivery of an infant	TCC Rank N/A		Recommendations		
		F:M Rate Ratio N/A				

Figure 87. Gap Analysis Matrix for the Intrapartum subtopic

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Postpartum	Topic Obstetrics and Gynecology	ICD-9 Chapter N/A	Birth and Postpartum Outcomes * MOMRP (1994) * IOM (1995) * IOM (1998) * ACOG (2012)	There was no DMED or PDTS data for this subtopic. Four organizations, one within the past five years, highlighted birth and postpartum outcomes as a research priority. The number of articles in this area is scant with only 6% being of excellent quality.		
	Number of Articles 16	Top 5 Utilized N/A				
	Excellent Quality 6%	F:M ratio N/A		Recommendations		
	Low Quality 19%					
	Definition Medical care given following the delivery of the child	F:M Rate Ratio N/A				

Figure 88. Gap Analysis Matrix for the Postpartum subtopic

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Birth Outcomes/Infant Health	Topic Obstetrics and Gynecology	ICD-9 Chapter N/A	Birth and postpartum outcomes * MOMRP (1994) * IOM (1995) * IOM (1998) * ACOG (2012)	<p>There was no DMED or PDTS data on this subtopic. Four organizations, one within the past five years, highlighted birth and postpartum outcomes as a research priority. There were a scant number of articles on this subtopic and 25% were of low quality.</p> <p>Based on this information, there is a significant gap in the existing literature on this subtopic.</p>		
	Number of Articles 16	Top 5 Utilized N/A				
	Excellent Quality 6%	F:M ratio N/A				
	Low Quality 25%					
	Definition Delivery of the baby, and health outcomes for both the mother and baby	TCC Rank N/A		Recommendations		
		F:M Rate Ratio N/A				

Figure 89. Gap Analysis Matrix for the Birth Outcomes/Infant Health subtopic

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis				
Subtopic: Vaginal Health	Topic Obstetrics and Gynecology	ICD-9 Chapter Diseases of the Genitourinary System (580-629)	Bacterial Vaginosis * MOMRP (1994) * ACOG (2012) * DHA (2015)	There was no PDTS data on vaginal health. This subtopic was within the top 5 most utilized ICD-9 chapters. Women were five to seven times more likely to be diagnosed with genitourinary diseases than men across setting and rank. Five organizations, three within the past six years, highlighted various genitourinary concerns as research priorities. There were a very scant number of research articles on this area and over 40% were of low quality.				
	Number of Articles 12	Top 5 Utilized Chapter					Facilities and hygiene * MOMRP (1994) * ACOG (2012) * DHA (2015)	Based on this information, there is a significant gap in the existing gender-specific literature.
	Excellent Quality 8%	F:M ratio Diseases of the Genitourinary System (580-629) <i>Outpatient</i> Enlisted: 7.0 Officer: 5.5		Gynecological/ Genitourinary Health * MOMRP (1994) * IOM (1995) * VA (2011) * ACOG (2012) * DHA (2015)				
	Low Quality 42%	<i>Inpatient</i> Enlisted: 6.3 Officer: 5.4	Recommendations					
	Definition Related to the vaginal health of the female genital tract, as well as related conditions and diseases	TCC Rank N/A	<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="background-color: #ffe0b2;">Gap identified in existing research</td> <td>Continue ongoing research trajectory</td> <td>None at this time</td> </tr> </table>			Gap identified in existing research	Continue ongoing research trajectory	None at this time
	Gap identified in existing research	Continue ongoing research trajectory				None at this time		
	F:M Rate Ratio N/A							

Figure 90. Gap Analysis Matrix for the Vaginal Health subtopic

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: General Obstetrics	Topic Obstetrics and Gynecology	ICD-9 Chapter N/A	Pregnancy * MOMRP (1994) * IOM (1995) * IOM (1998) * VA (2011) * ACOG (2012) * DHA (2015) * DOD (2016) Gynecological/ Genitourinary Health * MOMRP (1994) * IOM (1995) * VA (2011) * ACOG (2012) * DHA (2015) * DOD (2016) Reproductive Health * IOM (1995) * VA (2011) * ACOG (2012) * DOD (2016)	There was no DMED data for general obstetrics; women were more likely to be prescribed vitamins than men. Seven organizations, four within the past six years, highlighted gynecological and pregnancy topics as priorities for research. There were a very low number of articles on general obstetrics and 22% of them were of low quality. Based on the current information there is a significant gap in the existing gender-specific literature.		
	Number of Articles 9	Top 5 Utilized N/A				
	Excellent Quality 11%	F:M ratio N/A		Recommendations		
	Low Quality 22%					
	Definition Non-medical care aspects of pregnancy	TCC Rank Vitamins/ Dietary Supplements #10 of 26		Gap identified in existing research	Continue ongoing research trajectory	None at this time
		F:M Rate Ratio 1.63				

Figure 91. Gap Analysis Matrix for the General Obstetrics subtopic

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Urological Health	Topic Obstetrics and Gynecology	ICD-9 Chapter Diseases of the Genitourinary System (580-629)	UTIs * MOMRP (1994) * ACOG (2012) * DHA (2015) Gynecological/ Genitourinary Health * IOM (1995) * VA (2011) * ACOG (2012) * DHA (2015)	There was no PDTS data on urological health. This subtopic was within the top 5 most utilized ICD-9 chapters. Women were five to seven times more likely to be diagnosed with genitourinary diseases compared to men across settings and rank. Five organizations, three within the past six years, highlighted priorities on urological health. A very low number of articles were reported on this subtopic, and 22% were of low quality.		
	Number of Articles 9	Top 5 Utilized Chapter				
	Excellent Quality 22%	F:M ratio Diseases of the Genitourinary System (580-629) <i>Outpatient</i>		Based on the current information, there is a significant gap in the existing gender-inclusive literature.		
	Low Quality 22%	Enlisted: 7.0 Officer: 5.5 <i>Inpatient</i>				
	Definition Male and female urinary tracts and related medical conditions, such as urinary tract infections (UTIs) and urinary stones	Enlisted: 6.3 Officer: 5.4 TCC Rank N/A		Recommendations		
		F:M Rate Ratio N/A		Gap identified in existing research	Continue ongoing research trajectory	None at this time

Figure 92. Gap Analysis Matrix for the Urological Health subtopic

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Unplanned Pregnancy	Topic Obstetrics and Gynecology	ICD-9 Chapter N/A	Unintended Pregnancy * ACOG (2012) * DHA (2015)	There was no DMED or PDTS data for unplanned pregnancy. Two organizations within the past five years highlighted this subtopic as a research priority. There were an extremely low number of articles in this area and 29% were of low quality, and none were of excellent quality.		
	Number of Articles 7	Top 5 Utilized N/A				
	Excellent Quality 0%	F:M ratio N/A		More research is needed to reduce the number of unintended pregnancies, and to promote family planning and health birth spacing. Based on current information there is significant gap in the existing gender-inclusive literature on this subtopic.		
	Low Quality 29%					
	Definition Rates, and prevention of, unintended pregnancies	TCC Rank N/A		Recommendations		
F:M Rate Ratio N/A		Gap identified in existing research	Continue ongoing research trajectory			

Figure 93. Gap Analysis Matrix for the Unplanned Pregnancy subtopic

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Breast Wellness	Topic Obstetrics and Gynecology	ICD-9 Chapter Diseases of the Genitourinary System (580-629)	Breast Cancer Screening/Care * VA (2011)	Breast Wellness was within the top 5 most utilized ICD-9 chapters. One organization with the past six years highlighted breast care as a research priority. The number of articles on this subtopic was scant; the 7 articles within the subtopic were of good to excellent quality.		
	Number of Articles 7	Top 5 Utilized Chapter				
	Excellent Quality 43%	F:M ratio Diseases of the Genitourinary System (580-629) <i>Outpatient</i>		Based on this information, there is a significant gap in the existing gender-inclusive literature.		
	Low Quality 0%	Enlisted: 7.0 Officer: 5.5 <i>Inpatient</i>				
	Definition Breast cancer and breast examinations, such as mammograms	Enlisted: 6.3 Officer: 5.4		Recommendations		
		TCC Rank Antineoplastic Agents #21 of 26				
	F:M Rate Ratio 3.72	Gap identified in existing research	Continue ongoing research trajectory	None at this time		

Figure 94. Gap Analysis Matrix for the Breast Wellness subtopic

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Breastfeeding	Topic Obstetrics and Gynecology	ICD-9 Chapter N/A	Breastfeeding/ Lactation * IOM (1995) * IOM (1998)	<p>There was no DMED or PDTS data for this subtopic. Two organizations highlighted breastfeeding/lactation as a research priority; however, both organizations cited this priority near two decades ago. There were an extremely low number of research articles on this subtopic and 40% were of low quality, and none were of excellent quality.</p> <p>Based on the current information, there is a significant gap in the existing gender-specific literature.</p>		
	Number of Articles 5	Top 5 Utilized N/A				
	Excellent Quality 0%	F:M ratio N/A				
	Low Quality 40%					
	Definition Breastfeeding practices, including studies of breastfeeding experiences, and rates of breastfeeding					
		TCC Rank N/A		Recommendations		
	F:M Rate Ratio N/A	Gap identified in existing research	Continue ongoing research trajectory	None at this time		

Figure 95. Gap Analysis Matrix for the Breastfeeding subtopic

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis			
Subtopic: Fertility	Topic Obstetrics and Gynecology	ICD-9 Chapter Diseases of the Genitourinary System (580-629)	Reproductive Health * IOM (1995) * VA (2011) * ACOG (2012)	<p>There was no PDTS data on this subtopic. Fertility was within the top 5 most utilized ICD-9 chapters. Seven organizations, four within the past six years, highlighted pregnancy and/or reproductive health as research priorities. The number of articles in this area was miniscule; all 3 articles on this subtopic were of good or excellent quality. Based on this information, there is a significant gap in the existing gender-inclusive literature on this subtopic.</p>			
	Number of Articles 3	Top 5 Utilized Chapter					
	Excellent Quality 33%	F:M ratio Diseases of the Genitourinary System (580-629) <i>Outpatient</i> Enlisted: 7.0 Officer: 5.5					
	Low Quality 0	<i>Inpatient</i> Enlisted: 6.3 Officer: 5.4	Pregnancy * MOMRP (1994) * IOM (1995) * IOM (1998) * VA (2011) * ACOG (2012) * DHA (2015) * DOD (2016)	Recommendations			
	Definition Rates of infertility among active duty service women	TCC Rank N/A					Gynecological/ Genitourinary Health * IOM (1995) * VA (2011) * ACOG (2012)
		F:M Rate Ratio N/A					

Figure 96. Gap Analysis Matrix for the Fertility subtopic

Chronic Illness: Research Gap Analyses

Representation among the service branches. Figure 97 displays all Chronic Illness subtopics by branch of service. Within the Chronic Illness topic, Marine Corps samples were consistently over-sampled relative to force strength. Similarly, Coast Guard samples were over-represented in all areas, except for musculoskeletal chronic illness. The Army was under-represented in the following areas: other organ systems, multisystem illness, cancer, and pain. The Air Force was also under-represented in pain, as well as cardiovascular chronic illness. The Air Force was over-represented in multisystem illness, and cancer. Navy samples were also over-represented in cancer, and other organ systems.

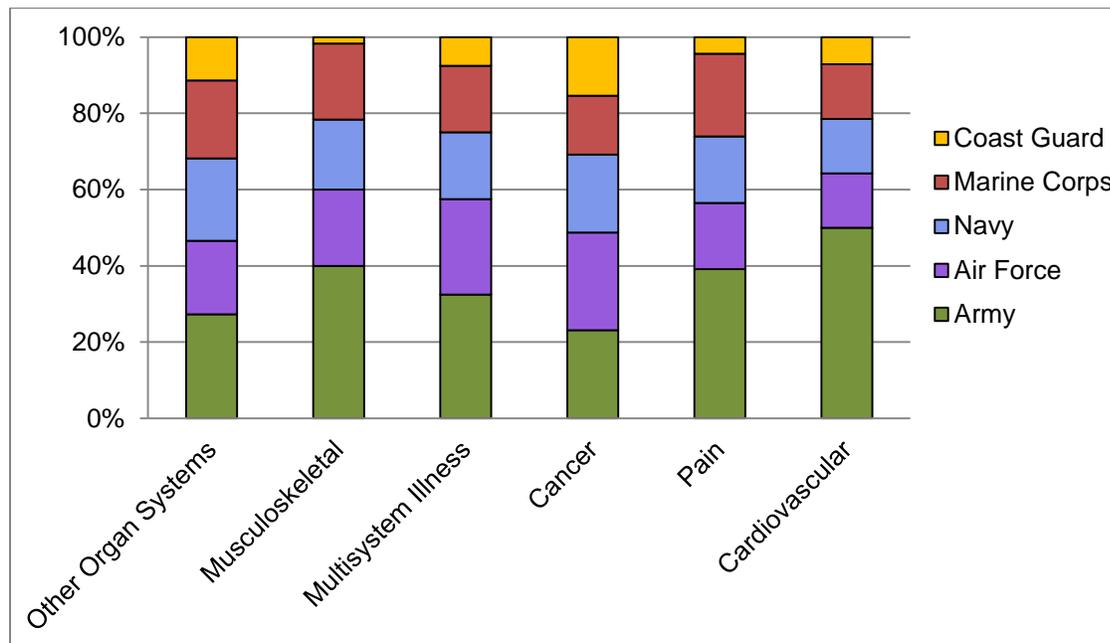


Figure 97. Chronic Illness subtopics by branch of service.

Gaps in research. Table 45 shows the two subtopic areas within Chronic Illness that were identified as gaps: cancer and multisystem illness. Despite the relative over-representation among the services for cancer research, the actual number of gender-inclusive articles published on this topic was quite small ($n = 14$). Across the 15 ICD-9 chapters reviewed for this project, the Neoplasms chapter was the number one diagnosis for inpatient female officers; additionally, women across ranks in the inpatient setting were approximately 4 times more likely to be diagnosed with cancer than their male peers. This is concerning, and further research is need in this area.

Table 45

Identified gaps within the Chronic Illness topic

Chronic Illness
Cancer
Multisystem Illness

The Army was the only branch in which multisystem illness was under-represented. This subtopic mostly encompassed studies on HIV and Gulf War Syndrome. The combined published number of articles on these two disease entities was scant ($n = 20$). There was no healthcare services data available, but the quality analysis of the existing articles showed that only 10% were of excellent quality, and 35% were of low quality. These complicated diagnostic clusters are challenging to treat; more high quality research with gender-inclusive samples is needed in these areas.

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Cancer	Topic Chronic Illness	ICD-9 codes Neoplasms (140-239)	Chronic disease * VA (2011) Cervical Cancer screening * VA (2011) * ACOG (2012)	Neoplasms were among the top 5 most utilized ICD-9 chapters. Women were more likely than men to be diagnosed with neoplasms across rank and setting. Two organizations within the past six years highlighted cancer as a research priority. Despite the fact that all of the articles in this subtopic were of good to excellent quality, the scant number of articles ($n = 14$) may indicate that service women are not well-studied in relation to cancer diagnoses.		
	Number of Articles 14	Top 5 Utilized Chapter (Inpatient)				
	Excellent Quality 29%	F:M ratio Neoplasms (140-239) <i>Outpatient</i> Enlisted: 2.0				
	Low Quality 0%	Officer: 1.7 <i>Inpatient</i> Enlisted: 3.9 Officer: 4.8				
	Definition Diagnosis and treatment of any type of cancer	TCC Rank Antineoplastic Agents #21 of 26				
		F:M Rate Ratio 3.72		Recommendations		
		Gap identified in existing research	Continue ongoing research trajectory	None at this time		

Figure 98. Gap Analysis Matrix for the Cancer subtopic

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Multisystem Illness	Topic Chronic Illness	ICD-9 Chapter N/A	Chronic Disease * VA (2011) Chronic physical conditions * MOMRP (1994)	<p>There was no DMED or PDTS data for this subtopic. Two organizations, one within the past six years, highlighted multisystem illness as a research priority. There were a scant number of articles on this topic and 35% were of low quality.</p> <p>Based on this information, there is a significant gap in the existing gender-inclusive literature.</p>		
	Number of Articles 20	Top 5 Utilized N/A				
	Excellent Quality 10%	F:M ratio N/A				
	Low Quality 35%					
	Definition Non-specific chronic illness (e.g. Gulf War syndrome) or a chronic illness that affects multiple body systems (e.g. HIV/AIDS)					
		TCC Rank N/A		Recommendations		
		F:M Rate Ratio N/A		Gap identified in existing research	Continue ongoing research trajectory	None at this time

Figure 99. Gap Analysis Matrix for the Multisystem Illness subtopic

Limitations of Research Gap Analyses

Looking at results by force distribution was not entirely representative, as numbers of articles in some categories were very low; additionally, if one service branch was under-represented, it was inevitable within a 100% total, that another service branch would be over-represented. This could lead to misleading interpretations of findings. However, the GAMs provided overall perspective, as they aggregated data from multiple sources. While the research gaps discovered using this particular methodology were comprehensive, it is possible that there are additional gaps in more specific areas that were not identified within the existing topic and subtopic categorizations.

It is beyond the scope of this review to compare the military-specific body of literature to civilian literature, or to delineate the many possible factors which could explain the article frequency or level of quality within each subtopic. The data elements for each subtopic were considered in aggregate to make the most well-informed determinations on research gaps, given the broad scope of the literature on military women's health. Organizational research priorities were included in the gap analysis in order to provide a measure of expert stakeholder opinion on priority research areas.

Not all subtopics were addressed by the various organizational reports that were included for pertinence, and some of these organizational reports were more than 20 years old. The Defense Women's Health Research Program, a special Congressional appropriation in FY94, is now defunct. This is alarming, since full gender integration of men and women is ongoing in the military, and there is a need for cutting edge research on treatment of military women's health issues. Another limitation related to the organizational reports is that despite searching across more than 25 different reputable national organizations, there were only 7 found which addressed military women's health priorities, and of these, only 4 had published reports within the past 10 years. This is a limitation, but also a concern for military women's health research.

The process of determining research gaps includes some subjectivity. The GAMs were developed as an objective way to collect many sources of information in one place, allowing for easier identification of research gaps. In addition, each GAM was reviewed by a multidisciplinary team of health researchers and clinicians. However, not all subtopics could be matched to healthcare utilization data for several reasons: either because a subtopic was not a diagnosable condition (e.g. Physical Fitness), or the subtopic was too broad to determine an appropriate diagnosis (e.g. Other Organ Systems), or because the available healthcare utilization data could not address the subtopic (e.g. Deployment Injury). When a subtopic was matched to healthcare utilization data, the ICD-9 diagnostic clusters were sometimes imperfectly aligned; sometimes the specific ICD-9 clusters of interest were not part of the analytic data pool for comparison. Pharmaceutical data was not illuminating in most areas, as this data was not tied to diagnoses, and the data available was only applicable to very broad areas. Some subtopics included sparse numbers of articles, and some subtopics were not always considered of interest in relation to gender-focused or gender-inclusive research.

Military Women's Health Gap Study

Conclusion

The scope of this research project was vast; this was an intentional decision. The end goal was to survey the landscape of military women's health research, and identify the peaks and valleys within the science. Because of this wide-lens focus, multiple modalities and sources of information were used to obtain the report presented here. It is important to reiterate here the critical nature of the need to distinguish not only whether research was being conducted in a specific area, but whether the quality of that existing research was sufficient. From this report it is clear that the field of obstetrics and gynecology could benefit from high-quality research in a wide range of areas. Psychological health for military women has been highlighted as an area of concern by many organizations, and the data in this report shows that this research priority is still current, on target, and relevant. Many smaller subtopics within the other larger topic areas were also identified as gaps. Injury was the only topic area in which no gaps were identified, indicating that this area of research has a robust base of activity, conducted by scientists with solid and stable funding.

Limitations

No project of this scope can be conducted without the presence of limitations in staff turnover and logistics. However, the investigators were diligent in ensuring that limitations in the scientific methodology and analyses were minimized. The quality instrument that was developed for the scoping review (the QIC) was adapted from several existing quality instruments, but has not been assessed for validity or reliability. Research staff with varying degrees of experience extracted data for each article within the scoping review; however, quality assurance measures were employed to ensure reliable extraction. Within the healthcare utilization data, cases of disease may have been missed by patients who ignored symptoms, self-treated, or sought care outside the military health system. This limitation is especially problematic for mental health diagnoses, which continue to carry a certain stigma, such that service members may want to hide these concerns. For the gap analysis, the Gap Analysis Matrices (GAMs) were developed as a way to collect all of the pertinent information in one place, and make reliable assessments regarding research gaps. However, not all subtopics could be matched to healthcare utilization data, and not all subtopics were addressed by the various organizational reports that were consulted; some of these publications were more than 20 years old. In addition, the determination of research gaps is by nature a subjective process. The GAMs were developed as an objective way to collect many sources of information in one place, allowing for easier identification of research gaps. For greater reliability, each GAM was reviewed by a multi-disciplinary team of healthcare researchers and clinicians. Despite its limitations, this report conclusively provides direction to clinicians, researchers, and policy makers on what research has already been done, and where the future leads.

Scoping Review: Content and Quality of Research

The scoping review winnowed the initial search from 14,999 articles down to 979 specific articles that included female-only samples, or included males and females, with gender-specific analyses. All

979 articles dealt with some aspect of military women's health, and these articles were then categorized into 8 large topic areas, with smaller subtopics within each of them. The 8 main topic areas were: Psychological Health, Readiness, Injury, Acute Care & Preventive Medicine (ACPM), Deployment Health, Social Relationships, Obstetrics and Gynecology (Ob/Gyn), and Chronic Illness. Overall, only 10.2% of the 979 articles were determined to be of low quality. However, within the area of Ob/Gyn health, 21% were of low quality. This was notably more striking than in any other area: the two topics with the next highest percentage of low quality articles were Readiness and Chronic Illness, both with 11%. This considerable difference in quality married with the presence of only 17% excellent quality articles presents a concern for Ob/Gyn research, and can have implications for the health of military women. In contrast, the two topics with the highest percentage of excellent quality articles were Social Relationships and Injury with 36% and 32%, respectively. These areas were identified as having healthy and robust research, in addition to being timely and relevant to the health of military women and men.

Healthcare Utilization Analyses by Gender

The healthcare utilization data assessed both diagnostic and pharmaceutical information across gender. From this analysis, several significant findings were noted. Overall, women were at least three times more likely than men to be diagnosed with Diseases of the Genitourinary System, and Neoplasms. Within the Mental Disorders category, enlisted women were more than two times as likely to be diagnosed with personality disorders compared with their male peers, across both inpatient and outpatient settings. Within the Musculoskeletal Disorders category, both female enlisted and officer personnel were at least five times more likely than their male counterparts to be diagnosed with diffuse disease of the connective tissue in the outpatient setting. Within the Injury and Poisoning category, enlisted women were more than twice as likely to be diagnosed with poisoning by drugs, medicinal, or biological substances as their male peers across inpatient and outpatient settings. These areas may indicate diagnostic clusters of concern for military women. Across gender, the top two prescribed over-the-counter (OTC) medications were ibuprofen and acetaminophen, and the top two prescription medications were hydrocodone-acetaminophen, and oxycodone-acetaminophen. The most common indication for these highly prescribed medications is pain and/or inflammation. These pharmaceutical findings provide strong evidence to support the current direction of the high frequency and quality of research that has been performed within the Injury topic.

Analyses of Research Gaps

Research gaps were identified in 7 out of 8 major topic areas; 26 out of 73 specific subtopics were determined to have insufficient evidence. These gaps are summarized in Table 46, below. This data shows that more high quality research is needed in the Ob/Gyn and Psychological Health major topic areas, but also in the smaller subtopic areas of sleep, sexually transmitted infections, deployment gynecological care, sexual and physical assault, multisystem illness, and cancer.

Table 46.

Identified gaps within each of the 8 major topic areas

Psychological Health
Stigma
Adjustment Disorders
Personality Disorders
Eating Disorders
Readiness
Sleep
Injury
No gaps identified
Acute Care & Preventive Medicine (ACPM)
Sexually Transmitted Infections (STI)
Deployment Health
Gynecological Care
Social Relationships
Sexual Assault
Physical Assault
Obstetrics and Gynecology (OB/Gyn)
Contraception
Uterine Wellness
Menstruation
Menstrual Suppression
Antepartum
Intrapartum
Postpartum
Birth Outcomes/Infant Health
Vaginal Health
General OB
Urological health
Unplanned Pregnancy
Breast Wellness
Breastfeeding
Fertility
Chronic Illness
Cancer
Multisystem Illness

Future Directions

While this research has served a vital purpose in being the first of its kind to thoroughly examine the state of research in military women's health, it is only the beginning. Forging ahead with progress in specific fields of research requires additional systematic reviews and meta-analyses on targeted healthcare questions highlighted by this report. Systematic reviews and meta-analyses can specifically address research questions within a subtopic area, such as mental health stigma or contraception, using methods to minimize bias, while synthesizing outcomes from the research, and illuminating more clearly where precise gaps in the research lie. This type of targeted analysis was outside the scope of this review. The aim of this project was to describe trends and patterns in the scientific literature, and by using multiple sources of data, to highlight research gaps related to the health of U.S. military women.

This report and the online repository of 979 gender-specific and gender-inclusive research articles can be useful to researchers, practitioners and policy makers in many ways. It is an invaluable resource that can be used by DoD health policy makers and funding organizations when developing long range strategies for research prioritization, as it highlights areas of research that are currently inadequately studied. Additionally, the online repository of articles reviewed for this report (<http://triservicenursing.org/database/womenshealth/>) provides clinicians with an easily accessible entry-point into the existing peer-reviewed literature within their clinical specialties to aid them in making evidence-based decisions to help improve the health outcomes of their patients. This report also helps health researchers by outlining the existing literature within specific fields of inquiry, and providing a reminder that more gender-focused and gender-inclusive research is needed in future endeavors.

This report and the online data repository provide a unique contribution to military medical research through a scientifically sound approach to assessing the status of military women's health, which is instrumental to all organizations and personnel who form the critical components of the Military Health System. Targeted research can ensure that the health needs of service women and men are being properly studied, which in turn optimizes the wellbeing and readiness of the entire military force.

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Appendix A: Gender-Specific and Gender-Inclusive Articles (n = 979)

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Appendix B: Subject Matter Experts (SMEs)

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Ms. Morgan Anderson	Cynthia Bush, MPH
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May Rose I. Dela Cruz, Dr.P.H. University of Hawaii	CAPT Cynthia Jean Gantt
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Appendix C: Medical Subject Heading (MeSH) Terms

Women's health	Urination	Gynecological care	Aeromedical evacuation
Neoplasms by site	Early detection of cancer	Reproductive techniques	Body weight
Contraception	Sexually transmitted diseases	Maternal health services	Body composition
Postpartum period (lactation)	Menstruation	Field sanitation	Sex offenses
Women's health education	Immunization	Unintended pregnancy	<i>rape</i>
Congenital abnormalities	Vaccines	Resilience, psychological	<i>child sexual abuse</i>
Female urogenital diseases	Interpersonal violence	Combat injury	High-g /acceleration
<i>vaginal diseases</i>	Cardiovascular diseases (HTN)	Therapeutics	Disease nonbattle injury
<i>urological diseases</i>	Circadian rhythm	<i>hygiene</i>	Behavior and behavior mechanisms
<i>female genital diseases</i>	Disability	<i>complementary therapies</i>	<i>dangerous behavior</i>
Pregnancy complications	Physical fitness	<i>emergency treatment</i>	<i>suicide</i>
<i>spontaneous abortion</i>	Metabolic syndrome X	Environmental pollution	<i>drinking behavior</i>
<i>gestational diabetes</i>	Overnutrition	<i>environmental exposure</i>	<i>impulsive behavior</i>
<i>fetal death</i>	Mental disorders	<i>inhalation exposure</i>	<i>risk-taking</i>
<i>perinatal death</i>	<i>traumatic stress disorders</i>	<i>maternal exposure</i>	<i>unsafe sex</i>
<i>preterm labor</i>	<i>combat disorders</i>	<i>occupational exposure</i>	<i>tobacco use</i>
<i>infertility</i>	<i>post-traumatic stress disorder</i>	<i>noise</i>	Occupational diseases
<i>miscarriage</i>	<i>acute stress disorder</i>	Violence	<i>sleep disorders</i>
<i>polycystic ovary syndrome</i>	<i>substance-related disorder</i>	<i>domestic violence</i>	<i>circadian rhythm</i>
<i>eclampsia</i>	<i>alcohol use</i>	<i>child abuse</i>	Nutritional physiological phenomena
<i>uterine cervical diseases</i>	<i>tobacco use</i>	<i>child maltreatment</i>	<i>nutritional requirements</i>
Infection	<i>eating disorders</i>	Respiratory tract diseases	<i>nutritional status</i>
Exercise	<i>mood disorders</i>	Urological injury	<i>diet</i>
Deployment	<i>personality disorders</i>	Performance-enhancing substances	<i>energy intake</i>
Protective equipment	Overweight	Non-deployable status	Body armor
Musculoskeletal diseases	Hot temperature (extreme heat)	Pathologic processes	Wounds and injuries
<i>musculoskeletal pain</i>	Pain	<i>dehydration</i>	<i>stress fractures</i>
<i>spinal diseases</i>	<i>back pain</i>	<i>acute disease</i>	Body composition
<i>bone diseases</i>	<i>chronic pain</i>	<i>chronic disease</i>	

Appendix D: Literature Search Terms

Acceptability of healthcare	Acupuncture	Adolescent pregnancy
Aeromedical evacuation	Alternative medicine	Alternative therapy(s)
Alternative treatment(s)	Aromatherapy	Assisted reproductive technology
Asthma	Behavior and behavior mechanisms	Behavioral and mental disorders
Body armor	Body composition	Body mass index
Body weight	Breastfeeding	Cancer screening
Cardiovascular diseases	Child abuse	Child maltreatment
Childhood trauma	Chiropractic	Chiropractic treatment
Chronic back pain	Chronic pain	Circadian rhythm
Cold effects	Combat injury(s)	Combat stress
Combat wounds	Complementary and alternative medicine	Complementary medicine
Congenital abnormality(s)	Congenital disorders	Contraception
Contraceptive	Death	Delivery of healthcare
Deployment	Diabetes mellitus, gestational	Disability
Disease nonbattle injury	Domestic violence	Eating disorders
Early detection of cancer	Eclampsia	Emergency medical services
Emergency services	Environmental effects	Environmental exposure
Ergogenic product(s)	Exercise	Eye protection
Faith healing	Female(s)	Female genital disease
Female urogenital disease(s)	Field hygiene	Field sanitation
Folk medicine	General obstetric care	Genital diseases, female
Gynecology	Gynecological care	Healthcare delivery
Health services	Hearing protection	Heat
Heat effects	Hematologic cancer	High-g acceleration
Hot temperature	Immunization(s)	Infants
Infection(s)	Infectious disorders	Infertility
Injury	Interpersonal violence	Intimate partner violence
Intrapersonal violence	Lactation	Lactation consultants
Lung disorders	Massage	Maternal health services
Medicine	Menstruation	Mental disorders
Metabolic syndrome (x)	Military deployment	Military medicine
Military psychology	Mindfulness	Mindfulness based stress reduction
Miscarriage	Musculoskeletal diseases	Neoplasms (by site)
Nondeployable status	Nutrition	Nutritional and metabolic diseases

Literature Search Terms (continued)

Nutritional physiological phenomena	Obesity	Obstetric care
Occupational disease(s)	Occupational exposure	Occupational stress
Overnutrition	Overweight	Pain disability
Pathologic processes	Patient acceptance of healthcare	Patient care
Patient transport	Patient(s)	Performance-enhancing substances
Performance enhancing drugs	Performance enhancing product(s)	Perinatal death
Perinatal loss	Perinatal period	Physical fitness
Poisoning	Polycystic ovary syndrome	Postpartum issues
Postpartum period	Posttraumatic stress disorder, PTSD	Pregnancy
Pregnancy complications	Pregnancy outcomes	Prenatal care
Preterm labor	Protective devices	Protective equipment
Psychology	Psychiatric diagnosis	Psychiatric treatment
Psychological resilience	Psychotherapy	Pulmonary disease
Rape	Reproductive techniques, assisted	Reproductive and urinary physiology
Resilience	Respiratory tract diseases	Risk taking behavior
Sex	Sex offense(s)	Sexually transmitted diseases
Sexual transmitted diseases, viral	Sexually transmitted infection	Sexual trauma
Sleep disorders	Spontaneous abortion	Sterility
Stress	Stress disorders, post-traumatic	Therapeutics
Transportation of patients	Unintended pregnancy	Urination
Urogenital injury or urological injury	Vaccine(s)	Vaginitis
Violence	War	War injuries
War wounds	Weight control	Weight control program
Weight gain	Weight loss	Weight reduction programs
Women	Women's health	Women's health issues
Working women	Wounds and injuries	

Appendix E: Level 3 Article Review Form

Today's date (mm/dd/yyyy) *
 

Reviewer last name * Reference ID *

Is this article appropriate for level 2B review? *
 Yes
 No (please specify)
 *

2. Theoretical or conceptual framework? *
 Yes
 No

3. Research question or hypothesis? *
 Yes
 No

4. Sample Size & Response Rate

Total sample size Unknown?
 total sample unknown

Response rate (if applicable):

5. Males

Male sample: Unknown?
 male sample unknown

6. Females

Female sample: Unknown?
 female sample unknown

7. Branch of Service (select all that apply):

	Army	Air Force	Navy	Marines	Coast Guard	Unknown
Active Duty	<input type="checkbox"/>					
Reserve	<input type="checkbox"/>					
National Guard	<input type="checkbox"/>					

8. Sample Characteristics

Demographics:

	Officer	Enlisted	Recruit	Age	Gender	Occupation
Demographics	<input type="checkbox"/>					

Specific occupation(s)

9. Selection Criteria:

Inclusion:

Exclusion

10. Study Design *

- Experimental
- Quasi-experimental
- Case-Control
- Cohort
- Correlational
- Descriptive: Cross-sectional
- Descriptive: Longitudinal
- Qualitative
- Meta-analysis
- Other - Write In (Required)

*

11. Hierarchy of Evidence Rating System (Modified from Meinyk & Fineout-Overholt, 2010)

- I. **Meta-analysis**: A meta-analysis of evidence from all relevant randomized controlled trials
- II. **Experimental**: An experiment in which subjects are **randomized** to a treatment group or control group
- III. **Quasi-Experimental**: An experiment in which subjects are **non-randomly** assigned to a treatment group or control group
- IV. **Case-control study**: a comparison of subjects with a condition (case) with those who don't have the condition (control) to determine characteristics that might predict the condition
 - Cohort study**: an observation of a group(s) (cohort[s]) to determine the development of an outcome(s) such as disease
 - Correlational study**: determines whether a relationship or association exists between 2 or more variables, but does not determine causality
- V. **Meta-synthesis**: A synthesis of evidence from qualitative or descriptive studies to answer a clinical question
- VI. **Qualitative** study: gathers data on human behavior to understand why and how decisions are made
 - Descriptive** study: provides background information on the what, where, and when of a topic of interest

12. Sampling Method *

- | | |
|--|--|
| <input type="checkbox"/> Randomized | <input type="checkbox"/> Purposive |
| <input type="checkbox"/> Convenience | <input type="checkbox"/> Snowball |
| <input type="checkbox"/> Convenience - recruitment within a unit/group setting | <input type="checkbox"/> Entire Population |
| <input type="checkbox"/> Stratified non-random | <input type="checkbox"/> Other - Write In (Required) |
| | <input type="text"/> |

*

13. Method of Data Collection *

- | | | |
|--|---|--|
| <input type="checkbox"/> Record/Chart review | <input type="checkbox"/> Program evaluation | <input type="checkbox"/> Survey: anonymous |
| <input type="checkbox"/> Extracted from database | <input type="checkbox"/> Real time clinical data collection | <input type="checkbox"/> Survey: confidential/identified |
| <input type="checkbox"/> Part of a larger study | <input type="checkbox"/> Focus group | <input type="checkbox"/> Other - Write In (Required) |
| <input type="checkbox"/> Secondary analysis | <input type="checkbox"/> Interview (specify type) | <input type="text"/> |
| | <input type="text"/> | * |

14. Research Setting (check all that apply)

	Data collected in this setting	Data about this setting
Military treatment facility (MTF)	<input type="checkbox"/>	<input type="checkbox"/>
Member's duty station	<input type="checkbox"/>	<input type="checkbox"/>
Fleet/Ship (related to shipboard setting)	<input type="checkbox"/>	<input type="checkbox"/>
Field exercise/physical training	<input type="checkbox"/>	<input type="checkbox"/>
Basic training/bootcamp	<input type="checkbox"/>	<input type="checkbox"/>
Speciality/advanced training school	<input type="checkbox"/>	<input type="checkbox"/>
Multi-site study	<input type="checkbox"/>	<input type="checkbox"/>
Record Review/database	<input type="checkbox"/>	<input type="checkbox"/>

15. Specific Research Location(s)

16. Setting for Deployment Data Collection

	Pre (in setting)	During (in setting)	Post (in setting)	Pre (about setting)	During (about setting)	Post (about setting)
OEF/OIF/OND - (2001-2014)	<input type="checkbox"/>					
Bosnia - (1996-2004)	<input type="checkbox"/>					
Gulf War (Persian) - (1990-1991)	<input type="checkbox"/>					
Vietnam - (1961 to 1975)	<input type="checkbox"/>					
Not specified	<input type="checkbox"/>					
Humanitarian	<input type="checkbox"/>					

17. Time Frame of Data Collection:

From Month: From Year:

0 0

To Month: To Year:

0 0

18. Source of Database Records

- CHAMPS (Career History Archival Medical and Personnel System)
- DEERS (Defense Enrollment Eligibility Reporting System)
- DMDC (Defense Manpower Data Center)
- DMED (Defense Medical Epidemiology Database)
- DMSS (Defense Medical Surveillance System)
- TMDS (Theatre Medical Data System)
- MDR (Military Health System Data Repository)
- Source of data unknown

19. Other Database Sources not listed above :

Database

20. Specific Research Instruments Used:

Instrument

Validated?

Yes No **21. List Physiologic/Clinical/Other Measures Collected:****22. Are Study Limitations Addressed? *** Yes No**23. Does the Study Make Sense Throughout? *** Yes No**24. Is this a Qualitative Study? *** Yes No**25. Is this a Quantitative Study? *** Yes No

26. You indicated that this study is both qualitative and quantitative.
Is it a mixed methods study design?

- Yes
- No

27. *Discussion about steps to ensure researchers were consistent in the way they asked questions or gathered data?*

or was data gathered via eForms/survey/database/online?

- Yes
- No

28. *Do the results of the research apply to other contexts or settings for military servicewomen?*

- Yes
- No

29. *Was there documentation of checking data, analyses, or potential biases with other team members?*

- Yes
- No

Appendix F: Level 4 SME Survey

Study Question: Please describe the purpose or study question(s) from the article.

Overall Findings: Please describe the overall findings/conclusions from the article. This could include answers to the research question posed by the author(s), or other general findings.

Gender Specific Findings: Check each box below as appropriate, based on the findings of the article

- No statistically significant differences found between men and women
- Statistically significant differences found between men and women
- No findings by gender

Please note gender specific findings: Please describe findings by the author(s) that are gender specific (e.g. NO differences in stress levels between men and women following deployment; some differences in healthcare utilization between servicemen and women). Any findings in which author(s) discuss gender specific results should be listed below.

Limitations: Please describe the limitations as listed by the author(s). If you feel there are other limitations to the study that were not addressed, please write these as well.

General Comments: Please provide your general comments about the article you reviewed. This could include what this study adds to current knowledge about the topic, suggestions for further research on this topic, or other comments that could benefit the broad review of literature of women in the U.S. military.

Appendix G: Phase I Topics and Subtopics

Phase I Report Topics and Subtopics		
Readiness/Health Promotion/Disease Prevention	Deployment Health	Chronic Disease
Exercise/Fitness	Disease Non-Battle Injury	Chronic Back Pain
Complementary & Alternative Medicine	Aeromedical Evacuation	Pulmonary Disease
Vaccines	Body Armor	Cardiovascular
Nutrition/Energy/Weight	Healthcare Utilization	Chronic Pain
Healthy and Risky Behaviors	Gynecological Care	Disability
Eyes, Ears, Nose, Throat	Environmental & Occupational Exposures	Stem Cell/Hematological Cancers
Musculoskeletal Injury	Infectious Disease	Obstetrics/Postpartum/Fertility
Healthcare Utilization	Chemical and Miscellaneous Harmful Exposures	General Obstetric Care
Acute Illness	High-Level Acceleration	Postpartum Issues
Nondeployable Status	Gynecological Health	Preterm Labor
Psychological Health	Menstruation	Prenatal Care
Mental Healthcare Utilization	Contraception	Breastfeeding
Addictions (Tobacco, Alcohol)	STI	Interpersonal Violence/Sexual Trauma
Stress	Hygiene	Intimate Partner Violence
Suicide	Sexual Health	Sexual Trauma
Eating Disorders	Vaginal Health	Child Maltreatment/Abuse
Mood Disorders	Urological Health	
PTSD	Cervical Cancer	
Personality Disorder	Breast Cancer	

Appendix H: Detailed Description on Article Quality

Summative scores from the QIC questions were calculated after the data were exported to SPSS. Quality was scored across the six domains.

1. The conceptual framing subscale was comprised of two items for all article types. Points were assigned in the following manner: “1” (item present in article) or “0” (item not present in article). Articles could receive up to two points.
2. The appropriateness subscale was comprised of five items for all article types. Points were assigned in the following manner: “.4” (item present in article) or “0” (item not present in article). Articles could receive up to a total of two points.
3. The transparency subscale was comprised of five items for all article types. Points were assigned in the following manner: “.4” (item present in article) or “0” (item not present in article). Articles could receive up to two points.
4. The validity subscale was comprised of two items for quantitative articles, one item for qualitative articles, and all three items for mixed methods articles. Alternative scoring rubrics were necessary, as each study design employed different data collection methods (e.g. many qualitative studies gathered data through focus groups, not standardized questionnaires). Points were assigned in the following manner:
 - Quantitative: “2” (66-100% of instruments used within the study were valid), “1” (33-65.99% of instruments used within the study were valid), or “0” (<33% of instruments used within the study were valid). Quantitative articles could receive up to two points.
 - Qualitative: “2” (results of the research do apply to other contexts or settings for military service women) or “0” (results of the research do not apply to other contexts or settings for military service women). Qualitative articles could receive up to two points.
 - Mixed methods: “2”, “1”, or “0” (proportion of instruments used within the study that were valid) and “2” or “0” (whether results of the research apply to other contexts or settings for military service women). Points for each component were summed, and mixed methods articles could receive up to four points.
5. The reliability subscale was comprised of one item for quantitative articles, one item for qualitative articles, and both items for mixed methods articles. As previously stated, study design necessitated alternative scoring rubrics. Points were assigned in the following manner:

- Quantitative and Qualitative: “2” (item present in article) or “0” (item not present in article). Quantitative and qualitative articles could receive up to two points each.
 - Mixed methods: “2” or “0” (was there discussion about steps to ensure that researchers were consistent in the way they asked questions or gathered data?) and “2” or “0” (whether there was documentation of checking data, analyses, or potential biases with other team members). Mixed methods articles could receive up to four points.
6. The cogency subscale was comprised of two items for all article types. Points were assigned in the following manner: “1” (item present in article) or “0” (items not present in article). Articles could receive up to two points.

Exclusively quantitative and qualitative study designs provide researchers with well-established approaches for understanding various phenomena. However, compared with mixed methods study designs, exclusively quantitative and qualitative study designs need fewer objective criteria to achieve the same level of quality. To account for these differences, the team scaled the base quality scores. Quantitative articles were scored out of a total of 10 points if instruments were not used (e.g. surveillance studies), and out of a total of 12 points if instruments were used. Qualitative articles were scored out of a total of 12 points, and mixed methods articles were scored out of a total of 16 points. The base quality score was divided by the appropriate number of points, and the resulting score was called the “scaled quality score”. The “scaled quality score” was then multiplied by 100, and the resulting score was called the “scaled quality score percentage.”

Appendix I: Quality Scoring Example

Subscale	Items	Points
Conceptual Framing	Theoretical Framework	0
	Research Question/Hypothesis	1
Appropriateness	Sampling Method	.4
	Research Setting	.4
	Study Design	.4
	Timeframe of Data Collection	.4
	Number of Female Participants	.4
Transparency	Age	.4
	Sex	.4
	Rank	.4
	Sample Size	.4
	Service Branch	.4
Validity	At least one-third of instruments/measures used valid?	N/A
	66% or more instruments/measures used validated?	N/A
Reliability	Discussion about steps to ensure researchers were consistent in way they asked questions/gathered data? Data gather online/e-format?	2
Cogency	Study limitations addressed?	1
	Study makes sense throughout?	1
Base Quality Score		9
Scaled Quality Score % ^a		90
Quality Rating		Excellent

Note. ^aDivide base quality score by 10 if quantitative article without instruments. Multiply by 100.

Appendix J: Article Author Affiliations

Research Disciplines	Topic Count	Percent (%)
Aerospace Medicine	1	0.19
Anesthesiology	1	0.19
Anthropology	4	0.77
Audiology	1	0.19
Behavioral Science	2	0.38
Biology	2	0.38
Cardiovascular Medicine	5	0.96
Communication	2	0.38
Dentistry	5	0.96
Deployment Health	2	0.38
Dermatology	1	0.19
Disease Prevention	1	0.19
Economics	2	0.38
Emergency Medicine	1	0.19
Endocrinology	1	0.19
Epidemiology	109	20.88
General Medicine	6	1.15
General Surgery	1	0.19
Health Policy	4	0.77
Health Promotion	1	0.19
Human Development And Aging	1	0.19
Immunology	3	0.58
Infectious Disease	16	3.07
Injury	3	0.58
Kinesiology	3	0.58
Nephrology	1	0.19
Neuroscience	5	0.96
Nursing	27	5.17
Nutrition	15	2.87
Ob/Gyn	15	2.87
Occupational Medicine	6	1.15
Occupational Therapy	1	0.19
Oncology	1	0.19
Optometry	3	0.58
Orthopedics	34	6.51
Otolaryngology	1	0.19
Pain	1	0.19
Pediatrics	4	0.77

Article Author Affiliations (continued)

Research Disciplines	Topic Count	Percent (%)
Physical Therapy	3	0.58
Physiology	8	1.53
Podiatry	1	0.19
Preventative Medicine	11	2.11
Psychiatry	45	8.43
Psychology	106	20.31
Public Health	28	5.36
Pulmonology	1	0.19
Radiology	1	0.19
Social Psychology	1	0.19
Social Work	3	0.58
Sociology	4	0.77
Speech Pathology	1	0.19
Sports Medicine	9	1.72
Statistics	5	0.96
Urology	1	0.19
Women's Health	3	0.58

Appendix K: Gap Analysis Matrices

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis					
Subtopic: Mood Disorders & Anxiety	Topic Psychological Health	ICD-9 Chapter Mental & Behavioral Disorders (290-319) ICD-9 Categories Anxiety, dissociative, and somatoform disorders (300) ICD-9 Subcategories Anxiety (300.0)	Mental Health * MOMRP (1994) * IOM (1995) * VA (2011) * ACOG (2012) * DHA (2015) * DOD (2016)	Anxiety and mood disorders were in the top most utilized ICD-9 chapter; across outpatient and inpatient settings, and across ranks, the Mental Disorders chapter was in the top 5 for women. Enlisted women were over 2 times more likely to be diagnosed with depressed mood than their male peers. Numerous organizations have identified mental health as a research priority; three of them within the past 5 years. There was a wealth of research on mood disorders and anxiety, with 39% being of excellent quality.					
	Number of Articles 140	Depressed Mood (309.0, 309.1)	Depression * IOM (1995) * VA (2011) * ACOG (2012) * DOD (2016)						
	Excellent Quality 39%	Top 5 Utilized Chapter		With these factors in mind, there is not a significant gap in the existing gender-inclusive literature on this subtopic.					
	Low Quality 6%	F:M ratio Anxiety, dissociative, and somatoform disorders (300)							
	Definition Anxiety and mood disorders, such as depression and bipolar disorder	<u>Outpatient</u> Enlisted: 1.8 Officer: 1.9 <u>Inpatient</u> Enlisted: 1.6 Officer: 1.4 ^{NS} Depression (309.0 & 309.1) <u>Outpatient</u> Enlisted: 1.9 Officer: 2.4 <u>Inpatient</u> Enlisted: 1.8 Officer: 1.5		Recommendations					
		TCC Rank Central Nervous System Agents #1 of 26					Gap identified in existing research	Continue ongoing research trajectory	None at this time
		F:M Rate Ratio 1.18							

Note. NS indicates F:M ratio was not significant

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Post-Traumatic Stress Disorder (PTSD)	Topic Psychological Health	ICD-9 Chapter Mental & Behavioral Disorders (290-319) ICD-9 Category Adjustment reaction (309) ICD-9 Classification PTSD (309.81)	PTSD/Depression * IOM (1995) * VA (2011) * ACOG (2012) * DOD (2016) Traumatic Stress * IOM (1995) Combat * IOM (1995)	<p>Military populations are at higher risk for PTSD than civilian populations; service members are the first line of defense in peacekeeping or combat operations. Being included in combat operations can lead to a higher likelihood of living through challenging experiences, such as defending wounded comrades, or handling dead bodies, all of which can contribute to PTSD symptomology.</p> <p>PTSD was within the top 5 ICD-9 chapters and categories within DMED. Females were more likely than males to be diagnosed with PTSD in an outpatient setting but these values were not greater than 2. Multiple organizations have specifically targeted PTSD as a research priority; two within the past 5 years. Within the large number of articles on this subtopic, more than a third was of excellent quality.</p> <p>Based on this information, there is not a significant gap in the existing gender-inclusive literature on PTSD.</p>		
	Number of Articles 115	Top 5 Utilized Chapter & Category				
	Excellent Quality 37%	F:M ratio PTSD (309.81) <u>Outpatient</u> Enlisted: 1.5 Officer: 1.5				
	Low Quality 6%	TCC Rank Central Nervous System Agents #1 of 26				
	Definition Diagnostic evaluations and treatments for Post-Traumatic Stress Disorder (PTSD)	F:M Rate Ratio 1.18				
				Recommendations		
				Gap identified in existing research	Continue ongoing research trajectory	None at this time

	Scoping Review	Healthcare Utilization Data (DMED & PDTs)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Alcohol	Topic Psychological Health	ICD-9 Chapter Mental & Behavioral Disorders (290-319) ICD-9 Category Alcohol dependence syndrome (303) Nondependent Abuse of Drugs (305)	Substance Abuse * IOM (1995) * VA (2011) * ACOG (2012) * DOD (2016)	<p>There was no PDTs data on this subtopic. Alcohol abuse was within the top 5 ICD-9 chapters. Men were more likely to be diagnosed with alcohol dependence syndrome and nondependent abuse of drugs than women. This was true across rank (officer vs. enlisted) and setting (inpatient vs. outpatient). Four organizations have highlighted substance abuse as a research priority; two of them in the past 5 years. There is a relatively large body of literature on alcohol abuse within the military population; almost one third is of high quality.</p> <p>Based on this information, there is not a significant gap in the existing gender-inclusive literature on alcohol abuse.</p>		
	Number of Articles 107	Top 5 Utilized Chapter				
	Excellent Quality 32%	F:M ratio Alcohol Dependence Syndrome (303) <u>Outpatient</u> Enlisted: 0.7 Officer: 0.6 <u>Inpatient</u> Enlisted: 0.9 Officer: 0.4				
	Low Quality 8%	Nondependent Abuse of Drugs (305) <u>Outpatient</u> Enlisted: 0.7 Officer: 0.6 <u>Inpatient</u> Enlisted: 0.6 Officer: 1.2 ^{NS}				
	Definition Alcohol use (whether occasional or chronic) and abuse of alcohol	TCC Rank N/A				
		F:M Rate Ratio N/A				
				Recommendations		
				Gap identified in existing research	Continue ongoing research trajectory	None at this time

Note. NS indicates F:M ratio was not significant

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Tobacco	Topic Psychological Health	ICD-9 Chapter Mental & Behavioral Disorders (290-319) ICD-9 Category Nondependent abuse of drugs (305)	Substance Abuse * IOM (1995) * VA (2011) * ACOG (2012) * DOD (2016)	Tobacco abuse was within the top 5 ICD-9 chapters. Men were more significantly more likely to be diagnosed with tobacco abuse than women. This was true across rank (officer vs. enlisted) and setting (inpatient vs. outpatient).		
	Number of Articles 85	Top 5 Utilized Chapter				
	Excellent Quality 15%	F:M ratio Nondependent abuse of drugs (305) <i>Outpatient</i> Enlisted: 0.7 Officer: 0.6		There was no PDTS data for this subtopic. Tobacco abuse fits under the substance abuse umbrella. Four organizations have highlighted substance abuse as a research priority; two of them in the past 5 years. There is a relatively large body of literature on tobacco abuse within the military population. It is concerning that 20% of the research was of low quality.		
	Low Quality 20%	<i>Inpatient</i> Enlisted: 0.6 Officer: 1.2 ^{NS}				
	Definition Tobacco use (occasional or chronic)	TCC Rank N/A		Recommendations		
		F:M Rate Ratio N/A				

Note. NS indicates F:M ratio was not significant

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Drug	Topic Psychological Health	ICD-9 Chapter Mental & Behavioral Disorders (290-319)	Substance Abuse * IOM (1995) * VA (2011) * ACOG (2012) * DOD (2016)	Due to the military's "zero tolerance" policy on drug use, in combination with random drug testing, substance abuse cases are relatively infrequent across the military population.		
	Number or Articles 37	ICD-9 Categories Drug Dependence (304) Nondependent Abuse of Drugs (305)				
	Excellent Quality 32%	Top 5 Utilized Chapter				
	Low Quality 11%	F:M ratio Drug Dependence (304)				
	Definition Illegal drug use (e.g. marijuana, cocaine) or drug rehabilitation and treatment programs	<u>Outpatient</u> Enlisted: 0.6 Officer: 1.0 ^{NS}				
		<u>Inpatient</u> Enlisted: 0.8 ^{NS} Officer: 2.3 ^{NS}				
		Nondependent Abuse of Drugs (305)			Recommendations	
	<u>Outpatient</u> Enlisted: 0.7 Officer: 0.6					
	<u>Inpatient</u> Enlisted: 0.6 Officer: 1.2 ^{NS}		Gap identified in existing research	Continue ongoing research trajectory	None at this time	
	TCC Rank N/A					
	F:M Rate Ratio N/A					

Note. NS indicates F:M ratio was not significant

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis					
Subtopic: Stress	Topic Psychological Health	ICD-9 Chapter Mental & Behavioral Disorders (290-319) ICD-9 Category Acute reaction to stress (308)	Stress-Related Disorders * MOMRP (1994)	Stresses experienced by service members are often different than those experienced by civilians (e.g. deployment separations, combat exposures).					
	Number of Articles 74	Top 5 Utilized Chapter					There was no PDTS data on this subtopic. It was difficult to map stress to a diagnosis within DMED; 'acute reaction to stress' was used, and this was within the top 5 diagnosed ICD-9 chapters. This ICD-9 category was more than twice as likely to be diagnosed in women as men for all ranks and settings for which data was available. One organization more than 20 years ago discussed stress-related disorders as a research priority. Of the numerous articles in this area, 22% are of excellent quality.		
	Excellent Quality 22%	F:M ratio Acute reaction to stress (308)		Based on this information, there is not a significant gap in the existing gender-inclusive literature on stress.					
	Low Quality 11%	<u>Outpatient</u> Enlisted: 2.6 Officer: 3.5							
	Definition Psychological or physiological stress	<u>Inpatient</u> Enlisted: 2.1 Officer: n/a		Recommendations					
		TCC Rank N/A					Gap identified in existing research	Continue ongoing research trajectory	None at this time
	F:M Rate Ratio N/A								

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Distress	Topic Psychological Health	ICD-9 Chapter N/A	Mental/Psychological Health * IOM (1995) * VA (2011) * DHA (2015) * DOD (2016)	There was no DMED or PDTS data on this diffuse topic; conditions in this subtopic are not specific to ICD-9 codes, which makes them difficult to track. There have been numerous organizations that have highlighted the topic of mental health as a concern. Three organizations have listed mental health as a research priority within the past 5 years. Despite the moderate number of articles on this topic, over 95% of these met a good quality threshold.		
	Number of Articles 34	Top 5 Utilized N/A				
	Excellent Quality 29%	F:M ratio N/A		Based on this information, there is not a significant gap in the existing gender-inclusive literature on this subtopic.		
	Low Quality 3%					
	Definition Areas that were not discussed as a mental health disorder, but included topics such as anger or grief	TCC Rank N/A		Recommendations		
		F:M Rate Ratio N/A				

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Stigma	Topic Psychological Health	ICD-9 Chapter N/A	Mental/Psychological Health * MOMRP (1994) * IOM (1995) * VA (2011) * ACOG (2012) * DHA (2015) * DOD (2016)	There was no DMED or PDTS data on this subtopic. Mental health was recognized as a research priority by 6 out of the 7 research priority lists consulted for this project, with 3 highlighting mental health within the past 5 years. Although the quality of the existing research on this subtopic is good to excellent overall, the number of articles in this area is scant. This means that female service members may not be well-studied in terms of mental health stigma.		
	Number of Articles 13	Top 5 Utilized N/A				
	Excellent Quality 38%	F:M ratio N/A		Based on this information, there is a significant gap in the existing gender-inclusive literature on this subtopic.		
	Low Quality 0%					
	Definition Self-reported individual barriers to seeking mental healthcare	TCC Rank N/A		Recommendations		
		F:M Rate Ratio N/A				

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis	
Subtopic: Mental Healthcare Utilization	Topic Psychological Health	ICD-9 Chapter Mental & Behavioral Disorders (290-319)	Mental Health * MOMRP (1994) * IOM (1995) * VA (2011) * ACOG (2012) * DHA (2015) * DOD (2016)	<p>Within DMED, the ICD-9 chapter of Mental Disorders was used as a proxy for this subtopic, which was within the top 5 utilized chapters. Multiple organizations have identified mental health as an area of concern for women in the military, but do not specifically target mental healthcare utilization. Within the numerous articles on this topic, over 95% were of good to excellent quality.</p> <p>Based on this information, there is not a significant gap in the existing gender-inclusive literature.</p>	
	Number of Articles 57	Top 5 Utilized Chapter			
	Excellent Quality 37%	F:M ratio Mental & Behavioral Disorders (290-319) <i>Outpatient</i> Enlisted: 1.6 Officer: 2.0	Physical/Mental Conditions * VA (2011)		
	Low Quality 2%	<i>Inpatient</i> Enlisted: 1.5 Officer: 1.7			
	Definition Includes rates of hospitalizations and outpatient encounters	TCC Rank Central Nervous System Agents #1 of 26	Recommendations		
		F:M Rate Ratio 1.18	Gap identified in existing research		Continue ongoing research trajectory

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis								
Subtopic: Resilience Factors	Topic Psychological Health	ICD-9 Chapter N/A	Resilience * VA (2011) * DOD (2016) Social Support * MOMRP (1994) * IOM (1995) * VA (2011) Job Satisfaction & Stress * IOM (1995) * MOMRP (1994)	There was no DMED or PDTS data on this subtopic. Resilience has been recognized by several organizations as a priority research area, with one naming it as recently as 2016. While there were no ICD-9 codes to measure psychological resilience factors, there were a surprising amount of articles that focused on this area. Within this subtopic, 32% of the articles were of excellent quality.								
	Number of Articles 50	Top 5 Utilized N/A					Based on the information, there is not a significant gap in the existing gender-inclusive literature.					
	Excellent Quality 32%	F:M ratio N/A		<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th colspan="3">Recommendations</th> </tr> </thead> <tbody> <tr> <td style="width: 33%;">Gap identified in existing research</td> <td style="width: 33%;">Continue ongoing research trajectory</td> <td style="width: 33%;">None at this time</td> </tr> </tbody> </table>						Recommendations		
	Recommendations											
	Gap identified in existing research	Continue ongoing research trajectory		None at this time								
	Low Quality 8%	TCC Rank N/A										
Definition Factors which enhance resilience, such as benefit finding, social support or spirituality	F:M Rate Ratio N/A											

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Suicide	Topic Psychological Health	ICD-9 Chapter N/A	Suicide * VA (2011) * DOD (2016)	<p>There was no DMED or PDTS data on this subtopic. Two recent reports in the past 6 years have highlighted suicide as a research priority concern. Of the numerous articles within this subtopic, over 90% were of good to excellent quality.</p> <p>There is not a significant gap in the gender-inclusive literature on suicide.</p>		
	Number of Articles 46	Top 5 Utilized N/A				
	Excellent Quality 37%	F:M ratio N/A				
	Low Quality 7%	TCC Rank N/A				
	Definition Suicide, suicide prevention, or suicidal ideation	F:M Rate Ratio N/A		Recommendations		
				Gap identified in existing research	Continue ongoing research trajectory	None at this time

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis					
Subtopic: Cognition	Topic Psychological Health	ICD-9 Chapter Diseases of the nervous system and sense organs (302-389)	Neurosensory Conditions * IOM (1995)	Many of the articles in this subtopic were related to measuring cognition in individuals before deficits ensued.					
	Number of Articles 12	Top 5 Utilized Chapter	TBI General Care * VA (2011) * ACOG (2012)	There was no PTSD data for this subtopic. This subtopic definition was difficult to map to DMED. Cognition does fall within the top 5 utilized ICD-9 chapters, but women were only slightly more likely to be diagnosed with a condition in this overall chapter than men. Cognition specifically has not been highlighted as a topic of concern, although TBI has been highlighted by 2 different organizations in the past 6 years. Of the very little research that has been done on cognition, over 80% is of good to excellent quality.					
	Excellent Quality 8%	F:M ratio Diseases of the nervous system and sense organs (302-389)		Based on this information, there is not a significant gap in the current gender-inclusive literature.					
	Low Quality 17%	<u>Outpatient</u> Enlisted: 1.2 Officer: 1.1		Recommendations					
	Definition Cognitive functioning or performance	TCC Rank N/A					Gap identified in existing research	Continue ongoing research trajectory	None at this time
		F:M Rate Ratio N/A							

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis								
Subtopic: Other Mental Disorders	Topic Psychological Health	ICD-9 Chapter Mental & Behavioral Disorders (290-319)	Mental/Psychological Health * MOMRP (1994) * IOM (1995) * VA (2011) * ACOG (2012) * DHA (2015) * DOD (2016) Chronic physical & mental conditions * MOMRP (1994) * VA (2011) * DHA (2015)	This category was broad, and could only be mapped generally to the Mental Disorders chapter within DMED, which was in the top 5 utilized chapters. Central Nervous System (CNS) agents were the top most utilized therapeutic class category (TCC). Women were slightly more likely to be diagnosed with a condition or a prescription in these categories than men. Six organizations highlighted this subtopic as a research priority, but only four within the past six years. The number of articles was fair and over 90% were of good to excellent quality.								
	Number of Articles 48	Top 5 Utilized Chapter					Based on the current information there is not a significant gap in the existing gender-inclusive literature.					
	Excellent Quality 21%	F:M ratio Mental & Behavioral Disorders (290-319) <i>Outpatient</i>		<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th colspan="3">Recommendations</th> </tr> </thead> <tbody> <tr> <td style="width: 33%;">Gap identified in existing research</td> <td style="width: 33%;">Continue ongoing research trajectory</td> <td style="width: 33%;">None at this time</td> </tr> </tbody> </table>						Recommendations		
	Recommendations											
	Gap identified in existing research	Continue ongoing research trajectory					None at this time					
	Low Quality 8%	Enlisted: 1.6 Officer: 2.0 <i>Inpatient</i>										
Definition Any diagnosed mental disorders which were not captured by other categories (e.g. ADHD)	Enlisted: 1.5 Officer: 1.7											
	TCC Rank Central Nervous System Agents #1 of 26 Miscellaneous Therapeutic Agents #14 of 26											
	F:M Rate Ratio Central Nervous System Agents 1.18 Miscellaneous Therapeutic Agents 1.13											

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis			
Subtopic: Adjustment Disorders	Topic Psychological Health	ICD-9 Chapter Mental & Behavioral Disorders (290-319)	Mental/Psychological Health * MOMRP (1994) * IOM (1995) * VA (2011) * ACOG (2012) * DHA (2015) * DOD (2016)	Mental and behavioral disorders were in the top most utilized ICD-9 chapters, and adjustment disorders were one of the top most utilized ICD-9 categories. Women were close to two times more likely to be diagnosed with an adjustment disorder than men across setting and rank. Six organizations highlighted mental/psychological disorders as a research priority and four of these were within the past six years. Although the quality for all articles was good to excellent, the number of articles is extremely low. This means that female service members may not be well studied in terms of adjustment disorders. Based on this information, there is a significant gap in the existing gender-inclusive literature on adjustment disorders.			
	Number of Articles 10	ICD-9 Category Adjustment Reaction (309)					
	Excellent Quality 30%	Top 5 Utilized Chapter & Category					
	Low Quality 0%	F:M ratio Adjustment Reaction (309) <i>Outpatient</i> Enlisted: 1.7 Officer: 1.9					
	Definition Diagnosis and treatment of adjustment disorders	<i>Inpatient</i> Enlisted: 1.6 Officer: 2.1					
		TCC Rank Central Nervous System Agents #1 of 26 Miscellaneous Therapeutic Agents #14 of 26					
		F:M Rate Ratio Central Nervous System Agents 1.18 Miscellaneous Therapeutic Agents 1.13					
				Recommendations			
				<table border="1" style="width: 100%;"> <tr> <td style="background-color: #f4a460;">Gap identified in existing research</td> <td>Continue ongoing research trajectory</td> <td>None at this time</td> </tr> </table>	Gap identified in existing research	Continue ongoing research trajectory	None at this time
Gap identified in existing research	Continue ongoing research trajectory	None at this time					

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis
Subtopic: Personality Disorders	Topic Psychological Health	ICD-9 Chapter Mental & Behavioral Disorders (290-319) ICD-9 Category Personality Disorders (301)	Mental/Psychological Health * MOMRP (1994) * IOM (1995) * VA (2011) * ACOG (2012) * DHA (2015) * DOD (2016)	<p>This subtopic falls within the top 5 diagnosed chapters and categories within DMED data. Personality disorders were the 2nd most common diagnosis within the Mental Disorders chapter for enlisted women. Women across ranks and settings were much more likely to be diagnosed with a personality disorder than men. CNS agents were the top most utilized therapeutic class category. Mental health continues to be highlighted as a research priority for the military by many organizations.</p> <p>Bearing this information in mind, the scant number of articles in this subtopic is alarming. There is a significant gap in the existing gender-inclusive literature on personality disorders.</p>
	Number of Articles 10	Top 5 Utilized Chapter & Category		
	Excellent Quality 30%	F:M ratio Personality Disorders (301)		
	Low Quality 0%	<i>Outpatient</i> Enlisted: 2.8 Officer: 3.2		
	Definition Diagnosis and treatment of personality disorders (e.g. Antisocial Personality, Narcissistic Personality Disorder)	<i>Inpatient</i> Enlisted: 8.3 Officer: 6.3		
		TCC Rank Central Nervous System Agents #1 of 26 Miscellaneous Therapeutic Agents #14 of 26		
F:M Rate Ratio Central Nervous System Agents 1.18 Miscellaneous Therapeutic Agents 1.13				
Recommendations				
		Gap identified in existing research	Continue ongoing research trajectory	None at this time

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis					
Subtopic: Eating Disorders	Topic Psychological Health	ICD-9 Chapter Mental & Behavioral Disorders (290-319) ICD-9 Category Special Symptoms, not elsewhere classified (307) ICD-9 Subcategories Eating Disorders (307.5) Anorexia Nervosa (307.1)	Eating Disorders * IOM (1995) * VA (2011) * DOD (2016)	Service members may be at a higher risk for disordered eating. They are held to predetermined physical fitness and weight criteria throughout their career, and can be separated from service if these criteria are not consistently met.					
	Number of Articles 6						This subtopic was within the top 5 most utilized chapters and categories within the DMED data. Women across ranks and settings were significantly more likely to be diagnosed with an eating disorder than their male peers. This is an area that has been identified as a research priority by three different organizations, two in the past 10 years.		
	Excellent Quality 50%			Bearing this in mind, the scant number of articles within this subtopic is very concerning. There is a significant gap in the existing gender-inclusive literature on eating disorders.					
	Low Quality 0%						Recommendations		
	Definition Specific risk factors for, and diagnosis and treatment of, eating disorders	Top 5 Utilized Chapter & Category F:M ratio Eating Disorders & Anorexia Nervosa (307.1 & 307.5) <i>Outpatient</i> Enlisted: 4.1		Gap identified in existing research	Continue ongoing research trajectory	None at this time			
		TCC Rank Central Nervous System Agents #1 of 26 Miscellaneous Therapeutic Agents #14 of 26 F:M Rate Ratio Central Nervous System Agents 1.18 Miscellaneous Therapeutic Agents 1.13							

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis				
Subtopic: Healthcare Utilization	Topic Readiness	ICD-9 Chapter N/A	Health Services (i.e. general health) * IOM (1995) * VA (2011) * DHA (2015) Database *IOM (1995) *IOM (1998) * DHA (2015) Medical Technology * IOM (1995) * VA (2011)	There was no DMED or PDTS data on this subtopic. Healthcare utilization was highlighted as a military research priority by four organizations, two in the past six years. There were a large number of articles in this area with almost one third of excellent quality.				
	Number of Articles 210	Top 5 Utilized N/A					Based on this information, there is not a significant gap in the existing gender-inclusive literature.	
	Excellent Quality 31%	F:M ratio N/A		Recommendations				
	Low Quality 6%						<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; text-align: center;">Gap identified in existing research</td> <td style="width: 33%; text-align: center;">Continue ongoing research trajectory</td> <td style="width: 33%; text-align: center;">None at this time</td> </tr> </table>	
	Gap identified in existing research	Continue ongoing research trajectory		None at this time				
	Definition Trends in hospitalizations and/or ambulatory care visits by service members and their families	TCC Rank N/A						
	F:M Rate Ratio N/A							

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Nutrition/Energy/Weight	Topic Readiness	ICD-9 Chapters Endocrine, Nutritional and Metabolic Diseases and Immunity Disorders (240-279) Symptoms, Signs, and Ill-Defined Conditions (780-799)	Anthropometry * MOMRP (1994) * IOM (1995) * IOM (1998) Performance * MOMRP (1994) * IOM (1995) Body Composition & Obesity * IOM (1995) * IOM (1998) * VA (2011) Bone Health * IOM (1995) Nutrition * IOM (1995) * IOM (1998) Anemia and blood disorders * IOM (1998)	This subtopic spans two different ICD-9 Chapters illustrating its broad nature. The 'Symptoms, Signs, and Ill-Defined Conditions' chapter was in top utilized codes within the outpatient setting. Females were more likely to be diagnosed with one of these conditions compared to males, and in the PDTS data had higher prescription rates for both vitamins and electrolytes. Four organizations identified this area as a research priority from performance to body composition, one within the past six years. This is a broad topic, with a large number of articles; of those 85% were or good to excellent quality. Based on this information, there is not a significant gap in the existing gender-inclusive literature.		
	Number of Articles 129					
	Excellent Quality 20%	Top 5 Utilized Chapter (Symptoms, Signs, and Ill-Defined Conditions)				
	Low Quality 15%	F:M ratio Symptoms, Signs, and Ill-Defined Conditions (780-799)				
	Definition Service member nutrition, energy levels, or weight including anthropometric assessments	<u>Outpatient</u> Enlisted: 1.9 Officer: 1.8 <u>Inpatient</u> Enlisted: 1.6 Officer: 1.3				
		TCC Rank Vitamins #10 of 26 Electrolytic, caloric, water balance #11 of 26				
	F:M Rate Ratio Vitamins: 10.0 Electrolytes: 3.78		Recommendations			
			Gap identified in existing research	Continue ongoing research trajectory	None at this time	

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Physical Fitness	Topic Readiness	ICD-9 Chapter N/A	Body Composition * IOM (1995) * IOM (1998) * VA (2011)	Physical fitness is a key aspect in the readiness of service members. Four organizations highlighted physical fitness as a research priority, but only one within the past decade. Due to the broad nature of the topic no single ICD-9 chapter was identified for DMED data, however, females were almost 4 times more likely to be prescribed electrolytes compared to males. There are a large number of articles in this subtopic, and over 80% are of good to excellent quality.		
	Number of Articles 105	Top 5 Utilized N/A	Physical fitness * MOMRP (1994) * IOM (1995) * IOM (1998)			
	Excellent Quality 15%	F:M ratio N/A	Performance * MOMRP (1994) * IOM (1995) * IOM (1998)	Based on this information, there is not a significant gap in the existing gender-inclusive literature.		
	Low Quality 18%					
	Definition Physical activity or fitness of service members, including Physical Fitness Testing (PFT)	TCC Rank #11 electrolytic, caloric, water balance	Load bearing * MOMRP (1994) * IOM (1995) * IOM (1998)	Recommendations		
		F:M Rate Ratio Electrolytes: 3.78				

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Work Environment	Topic Readiness	ICD-9 Chapter N/A	Occupational Health *MOMRP (1994) Job Satisfaction and Stress *MOMRP (1994) *IOM (1995) Protective Clothing and Equipment *MOMRP (1994) *IOM (1995)	There was no DMED or PDTS data for this subtopic. Only two organizations highlighted military work environment as a research priority. Both organizations highlighted this subtopic over two decades ago. There were many articles in this area, with over 85% being of good to excellent quality.		
	Number of Articles 91	Top 5 Utilized N/A				
	Excellent Quality 27%	F:M ratio N/A		Based on this information there is not a gap in the current gender-inclusive research on this subtopic.		
	Low Quality 14%					
	Definition How the work environment may impact health and/or readiness.	TCC Rank N/A		Recommendations		
		F:M Rate Ratio N/A				

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Career Outcomes	Topic Readiness	ICD-9 Chapter N/A	Job Satisfaction and Stress * MOMRP (1994) * IOM (1995) Occupational Health * MOMRP (1994)	There was no DMED or PDTS data for this subtopic. Two organizations highlighted this subtopic as a military research priority, but neither within the past decade. Both organizations recognized job satisfaction/stress and occupational health as important research areas. There are numerous articles in this subtopic, and over 95% are of good to excellent quality.		
	Number of Articles 80	Top 5 Utilized N/A				
	Excellent Quality 35%	F:M ratio N/A		Based on this information there is not a gap in the current gender-inclusive literature on this subtopic.		
	Low Quality 4%					
	Definition Career outcomes including service member retention and attrition	TCC Rank N/A		Recommendations		
		F:M Rate Ratio N/A				

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Health Behaviors	Topic Readiness	ICD-9 Chapter N/A	N/A	There was no DMED or PDTS data for this subtopic, and none of the organizations sampled for this project referred to health behaviors as a priority. This could be due to the broad scope of the subtopic. There were a moderate number of articles about health behaviors, but over 85% were of good to excellent quality.		
	Number of Articles 59	Top 5 Utilized N/A				
	Excellent Quality 15%	F:M ratio N/A		Based on this information there is not a gap in the current gender-inclusive literature on this subtopic.		
	Low Quality 15%					
	Definition Non-sexual behaviors that may impact the health and/or readiness of service members. May include both positive and negative behaviors and risk reduction interventions (e.g. tobacco cessation programs)					
		TCC Rank N/A		Recommendations		
	F:M Rate Ratio N/A	Gap identified in existing research	Continue ongoing research trajectory	None at this time		

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Training	Topic Readiness	ICD-9 Chapter N/A	Performance * MOMRP (1994) * IOM (1995)	There was no DMED or PDTS data for this subtopic. Two organizations indicated this subtopic as a military research priority, but not within the past twenty years. There was a relatively light body of literature on this topic, but over 90% were of good to excellent quality.		
	Number of Articles 27	Top 5 Utilized N/A	Load bearing * MOMRP (1994) * IOM (1995)			
	Excellent Quality 19%	F:M ratio N/A	Job satisfaction and stress * MOMRP (1994) * IOM (1995)	Based on this information there is not a gap in the current gender-specific literature on this subtopic.		
	Low Quality 7%					
	Definition How training for military specific tasks may impact the health and/or readiness of service members	TCC Rank N/A	Protective clothing and equipment * MOMRP (1994) * IOM (1995)	Recommendations		
		F:M Rate Ratio N/A				
			Gap identified in existing research	Continue ongoing research trajectory	None at this time	

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Sleep	Topic Readiness	ICD-9 Chapter Mental & Behavioral Disorders (290-319)	Sleep * VA (2011)	While shift work and variable sleeping schedules are common in both civilian and military sectors, service personnel may be more susceptible to sleep difficulties by virtue of their unpredictable work schedules and locations.		
	Number of Articles 16	ICD-9 Category Special Symptoms, not elsewhere classified (307)	Performance * MOMRP (1994) * IOM (1995)			
	Excellent Quality 25%	ICD-9 Subcategory Specific disorders of sleep of nonorganic origin (307.4)		Sleep disorders were in the top 5 most utilized chapters and categories for outpatient officers. Three organizations highlighted sleep and performance as a military priority, one in the past six years. While over 90% of the research was of good to excellent quality, the number of articles in this area were scant, which may indicate that service women are not well studied in terms of sleep.		
	Low Quality 6%	Top 5 Utilized Chapter & Category				
	Definition Factors contributing to alteration in sleeping habits or circadian rhythm	F:M ratio Specific disorders of sleep of nonorganic origin (307.4) <i>Outpatient</i> Officer: 1.2		Based on this information, there is a significant gap in the existing gender-inclusive literature on sleep.		
		TCC Rank #1 Central Nervous System Agents				
		F:M Rate Ratio 1.18				
				Recommendations		
				Gap identified in existing research	Continue ongoing research trajectory	None at this time

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Mortality	Topic Readiness	ICD-9 Chapter N/A	N/A	This subtopic included articles for all non-combat related deaths, such as motor vehicle crashes.		
	Number of Articles 14	Top 5 Utilized N/A		There was no DMED or PDTS data for this subtopic, and no organizations sampled for this project have highlighted non-combat mortality as an area of research concern. The number of articles in this area was quite small, and less than 80% were of good to excellent quality.		
	Excellent Quality 29%	F:M ratio N/A		Based on the current information, there is not a significant gap in the existing gender-inclusive literature in this area.		
	Low Quality 21%			Recommendations		
	Definition Non-combat related deaths (e.g. car accidents)	TCC Rank N/A				

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Musculoskeletal Injury	Topic Injury	ICD-9 Chapter Injury and Poisoning (800-999) ICD-9 Category Sprains and Strains (840-848)	Musculoskeletal * MOMRP (1994) * IOM (1995) * IOM (1998) * DHA (2015)	Musculoskeletal injury was among the top most utilized ICD-9 chapters in an outpatient setting for both enlisted and officer personnel. Men and women were equally as likely to experience a musculoskeletal injury.		
	Number of Articles 97	Top 5 Utilized Chapter				
	Excellent Quality 35%	F:M ratio Sprains and Strains (840-848) <i>Outpatient</i>		Four organizations highlighted musculoskeletal injury as a military research priority; one within the past five years. There were a large number of articles in this area and 90% were of good to excellent quality.		
	Low Quality 10%	Enlisted: 1.2 Officer: 1.1 <i>Inpatient</i> Enlisted: 0.6 Officer: 0.7 ^{NS}				
	Definition Injuries to the musculoskeletal system; may include overuse or acute injuries	TCC Rank Central Nervous System Agents #1 of 26		Recommendations		
	F:M Rate Ratio 1.18	Gap identified in existing research	Continue ongoing research trajectory			

Note. NS indicates F:M ratio was not significant

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Traumatic Injury	Topic Injury	ICD-9 Chapter Injury and Poisoning (800-999) ICD-9 Categories Injury Cluster:	Polytrauma & TBI * VA (2011) * ACOG (2012)	Traumatic injury was among the top most utilized ICD-9 chapters and categories for both outpatient and inpatient settings. Females were less likely than males to be diagnosed with traumatic injury. However they were more likely to be prescribed central nervous system agents according to PDTS data. Two organizations within the past six years have indicated this area as research priority for military populations. The numbers of articles for this subtopic was fair and over 95% of articles in this area were of good to excellent quality.		
	Number of Articles 54	Certain traumatic complications and unspecified injuries (958-959) Fractures (800-829) Dislocation (830-839)				
	Excellent Quality 37%	Open wounds (870-897) Crushing Injuries (925-929)		Based on this information, there is not a significant gap in the existing gender-inclusive literature in this area.		
	Low Quality 4%	Top 5 Utilized Chapter & Category (Traumatic Injuries: 958-959)				
	Definition Injury caused by trauma (includes intentional and accidental injuries)	F:M ratio Injury Cluster <u>Outpatient</u> Enlisted: 0.8 Officer: 0.7 <u>Inpatient</u> Enlisted: 0.3 Officer: 0.6		Recommendations		
		TCC Rank Central Nervous System Agents #1 of 26				
		F:M Rate Ratio 1.18				

	Scoping Review	Healthcare Utilization Data (DMED & PDTs)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Traumatic Brain Injury (TBI)	Topic Injury	ICD-9 Chapter Injury and Poisoning (800-999) ICD-9 Category Intracranial injury (850-854)	TBI General Care * VA (2011) * ACOG (2012)	Traumatic brain injury (TBI) was listed among the top most utilized ICD-9 chapters and categories. Women officers were slightly more likely than men to be diagnosed with an intracranial injury in an outpatient setting than male officers. Two organizations within the past six years have highlighted TBI as a military research priority. Although the number of articles for this subtopic was relatively light, all were of good to excellent quality.		
	Number of Articles 24	Top 5 Utilized Chapter				
	Excellent Quality 50%	F:M ratio Intracranial injury (850-854) <u>Outpatient</u> Enlisted: 0.6 Officer: 1.3 <u>Inpatient</u> Enlisted: 0.4 Officer: 0.4 ^{NS}		Considering the impact this type of injury may have on the health of affected service members, research on this subtopic should continue. However, based on current information, there is not a significant gap in the existing gender-inclusive literature in this area.		
	Low Quality 0%					
	Definition Traumatic brain injuries (TBI) include concussions and mild TBI	TCC Rank N/A		Recommendations		
		F:M Rate Ratio N/A				

Note. NS indicates F:M ratio was not significant

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Deployment Injury	Topic Injury	ICD-9 Chapter N/A	Musculoskeletal Injuries on Deployment * DHA (2015) Polytrauma * VA (2011)	There was no DMED or PDTS data available for this subtopic. Two organizations within the past six years highlighted this area as a military research priority. There were a moderate number of articles with over 90% being of good to excellent quality.		
	Number of Articles 51	Top 5 Utilized N/A				
	Excellent Quality 41%	F:M ratio N/A				
	Low Quality 6%					
	Definition Injuries sustained specifically during deployment (combat and non-combat related)	TCC Rank N/A		Recommendations		
		F:M Rate Ratio N/A				

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: General Injury	Topic Injury	ICD-9 Chapter Injury and poisoning (800-999)	Musculoskeletal Injuries * MOMRP (1994) * IOM (1995) * IOM (1998) * DHA (2015)	Injury overall was among the top most utilized ICD-9 chapters across outpatient and inpatient settings. Men and women were just as likely to receive diagnoses of general injuries. Four organizations identified musculoskeletal injuries as a research priority, but only one organization has done so in the past 5 years. There were a fair number of articles on this subtopic and over 85% were of good to excellent quality.		
	Number of Articles 43	Top 5 Utilized Chapter				
	Excellent Quality 23%	F:M ratio Injury and poisoning (800-999) <i>Outpatient</i>		Due to the broad and non-specific nature of this subtopic, research could be done on specific injuries covered elsewhere. There is not a significant gap in the existing gender-inclusive literature.		
	Low Quality 12%	Enlisted: 1.1 Officer: 1.1 <i>Inpatient</i>				
	Definition Injuries that do not fit into any other 'Injury' Subtopic areas; includes non-specific injury types or locations	Enlisted: 0.9 Officer: 0.8 ^{NS}		Recommendations		
		TCC Rank Central Nervous System Agents #1 of 26				
	F:M Rate Ratio 1.18	Gap identified in existing research	Continue ongoing research trajectory	None at this time		

Note. NS indicates F:M ratio was not significant

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis					
Subtopic: Heat/Cold/Altitude	Topic Injury	ICD-9 Chapter Injury and poisoning (800-999) ICD-9 Categories Other and unspecified effects (990-995)	Stress responses (i.e. temperature and pressure) * MOMRP (1994) * IOM (1995)	Health/Cold/Altitude was in the top most utilized ICD-9 chapters and categories; however numbers for female to male comparisons were too low to calculate rate ratios and PDTS data was not available. Two organizations highlighted this area as a research priority, but both were from over two decades ago. The number of articles in this area is relatively light, however all are of good to excellent research quality.					
	Number of Articles 22	Top 5 Utilized Chapter & Category					Based on this current information, there is not a significant gap in the existing gender-inclusive literature.		
	Excellent Quality 23%	F:M ratio Other and unspecified effects (991,992, 993)		Recommendations					
	Low Quality 0%	Female rate is 3.08 per 1,000 years.							
	Definition Injuries to service members related to extremes of heat, cold, or altitude	TCC Rank N/A					Gap identified in existing research	Continue ongoing research trajectory	None at this time
		F:M Rate Ratio N/A							

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Eye/Ear Injury	Topic Injury	ICD-9 Chapter Injury and poisoning (800-999) ICD-9 Categories Certain traumatic complications/unspecified injuries (958-959) Open wounds (870-879) Crushing injuries (925-929)	Otolaryngological conditions * IOM (1995) Noise/Hearing Loss * IOM (1995)	Ear/Eye injury was among the top most utilized ICD-9 chapters (Injury and Poisoning) and categories. All ratios calculated from DMED data were insignificant across all settings and personnel rankings. Two organizations identify this area as a research priority for military populations; however, both were recommendations from over two decades ago. Although the number of articles in this subtopic was scant, all articles were of good to excellent quality. Based on this current information, there is not a significant gap in the existing gender-inclusive literature.		
	Number of Articles 15					
	Excellent Quality 33%					
	Low Quality 0%					
	Definition Injuries of the eye and/or ear, including intracranial injury					
		Top 5 Utilized Chapter & Category (Certain traumatic complications/unspecified injuries: 958-959)		Recommendations		
		F:M ratio Certain traumatic complications/unspecified injuries (958-959) <u>Outpatient</u> Enlisted: 1.0 ^{NS} Officer: 1.0 ^{NS} <u>Inpatient</u> Enlisted: 0.7 ^{NS} Officer: 0.5 ^{NS}				
	TCC Rank Eye, Ear, Nose, and Throat Preparations #4 of 26					
	F:M Rate Ratio 1.4					

Note. NS indicates F:M ratio was not significant.

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Other Organ Systems	Topic Acute Care and Preventative Medicine (ACPM)	ICD-9 Chapter N/A	Gastrointestinal conditions * IOM (1995)	There was no DMED or PDTS data for this subtopic. Two organizations highlighted multiple organ systems as research priorities, but both sources were published almost twenty years ago. There were a large number of articles on this subtopic and over 90% were of good to excellent quality.		
	Respiratory conditions * IOM (1995)	Endocrine * IOM (1995)	The subtopic is broad and priorities in this area could be covered under other subtopics. Based on this information, there is not a significant gap in the existing gender-inclusive literature.			
	Number of Articles 89	Top 5 Utilized N/A				Dermatological conditions * IOM (1995)
	Excellent Quality 24%	F:M ratio N/A	Neurosensory * IOM (1995)	Gap identified in existing research	Continue ongoing research trajectory	None at this time
	Low Quality 8%	Definition Acute or preventative care for other organ systems not covered in the other subtopics	ENT conditions * IOM (1995)			
	TCC Rank N/A		Anemia and blood disorders * IOM (1998)			
	F:M Rate Ratio N/A					

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Infectious Disease	Topic Acute Care and Preventative Medicine (ACPM)	ICD-9 Chapter Infectious and Parasitic Diseases (001-139)	Communicable diseases * IOM (1995)	Infectious Diseases were not among the top 5 most utilized ICD-9 chapters. Women were slightly more likely to be diagnosed with an infectious or parasitic disease than men across setting and rank. Women were also more likely to be prescribed an anti-infective prescription compared to men. One organization highlighted this topic as a research priority, but is cited over twenty years ago. Of the articles found for this topic, over 90% were of good to excellent quality. Based on this information there is not a significant gap in the existing gender-inclusive literature.		
	Number of Articles 58	Top 5 Utilized N/A				
	Excellent Quality 38%	F:M ratio Infectious and Parasitic Diseases (001-139) <i>Outpatient</i>				
	Low Quality 7%	Enlisted: 1.8 Officer: 1.3 <i>Inpatient</i>				
	Definition Most infectious diseases; including Hepatitis A/B/C and influenza; excluding other sexually transmitted infections	Enlisted: 1.3 Officer: 1.8				
		TCC Rank #2 Anti-Invectives				
	F:M Rate Ratio 1.43		Recommendations			
			Gap identified in existing research	Continue ongoing research trajectory	None at this time	

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Musculoskeletal	Topic Acute Care and Preventative Medicine (ACPM)	ICD-9 Chapter Diseases of the musculoskeletal system and connective tissue (710-739) ICD-9 Categories Other and Unspecified Disorders of the Joint (719) Other Disorders of Soft Tissues (729)	Musculoskeletal * MOMRP (1994) * IOM (1995) * IOM (1998) * DHA (2015)	This subtopic was in the top most utilized ICD-9 chapters/categories and central nervous system agents were the top ranked within PDTS data. Both men and women were almost equally likely to receive diagnoses for musculoskeletal conditions. Four organizations highlighted musculoskeletal issues as research priorities, but only one within the past five years. There were a fair number of articles for this subtopic and over 90% were of good to excellent quality.		
	Number of Articles 40					
	Excellent Quality 35%	Top 5 Utilized Chapter & Category		Based on this information there is not a significant gap in the existing gender-inclusive literature.		
	Low Quality 8%	F:M ratio Other/Unspecified Disorders of Joint (719) <i>Outpatient</i> Enlisted: 1.2 Officer: 1.1 <i>Inpatient</i> Enlisted: 1.4 Officer: 1.0 ^{NS} Other Disorders of Soft Tissues (729) <i>Outpatient</i> Enlisted: 1.4 Officer: 1.3 <i>Inpatient</i> Enlisted: 1.5 Officer: 1.8 ^{NS}				
	Definition Non-injury and non-chronic musculoskeletal diagnoses, including surgical repair, bone health, and other preventative measures			Recommendations		
		TCC Rank Central Nervous System Agents #1 of 26				
		F:M Rate Ratio 1.18		Gap identified in existing research	Continue ongoing research trajectory	None at this time

Note. NS indicates F:M ratio was not significant

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis					
Subtopic: Sexually Transmitted Infections	Topic Acute Care and Preventative Medicine (ACPM)	ICD-9 Chapter Infectious and Parasitic Diseases (001-139) ICD-9 Categories Other diseases due to viruses and chlamydiae (070-079) Chlamydia (078-079) Syphilis and other venereal diseases (090-099) Gonococcal (098) Venereal disease (099)	Gynecological/genitourinary health * MOMRP (1994) * IOM (1995) * VA (2011) * ACOG (2012) * DHA (2015)	Although this subtopic is not in the top utilized ICD-9 chapters/categories, outpatient women across rank were much more likely to be diagnosed with an STI than men. Anti-infective medications were also the 2nd most highly prescribed TCC for women. Five organizations highlighted various areas of reproductive health as priorities for military populations. Of these organizations, three were within the past 10 years. The number of articles in this area was relatively light given the high priority given to this topic by multiple organizations.					
	Number of Articles 37	Top 5 Utilized N/A	Reproductive health * IOM (1995) * VA (2011) * ACOG (2012)						
	Excellent Quality 19%			Based on this information, there is a significant gap in the existing gender-inclusive literature on STIs.					
	Low Quality 14%	F:M ratio <i>Outpatient</i> Syphilis (090-099) Enlisted: 2.3 Officer: 0.8 Viral Warts (078.1) Enlisted: 0.8 Officer: 0.9 Chlamydia (078.88) Enlisted: 3.3 Officer: 0.7 Other chlamydia (079.88) Enlisted: 3.5 Officer: 5.0 Unspecified chlamydial (079.98) Enlisted: 4.7 Officer: 2.0	Sexually Transmitted Diseases (STDs) * MOMRP (1994) * IOM (1995)						
	Definition Sexually transmitted infections including Trichomonas vaginalis, chlamydia, and genital warts; excludes HIV and Hepatitis A/B/C		Communicable diseases * IOM (1995)	Recommendations					
		TCC Rank #2 Anti-Infectives					Gap identified in existing research	Continue ongoing research trajectory	None at this time
		F:M Rate Ratio 1.43							

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Vaccinations	Topic Acute Care and Preventative Medicine (ACPM)	ICD-9 Chapter N/A	N/A	<p>There was no DMED data for this subtopic, and no organizations listed vaccinations as a priority. Vaccinations were not in the top 10 most utilized medications for women. The number of articles in this area was relatively light, but all were of good to excellent quality.</p> <p>A gender specific research focus may not be needed in this area. There is not a significant gap in the existing gender-inclusive literature.</p>		
	Number of Articles 35	Top 5 Utilized N/A				
	Excellent Quality 29%	F:M ratio N/A				
	Low Quality 0%					
	Definition Research on vaccine administration and immunity	TCC Rank #16 of 26		Recommendations		
		F:M Rate Ratio 1.79				

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Cardiovascular	Topic Acute Care and Preventative Medicine (ACPM)	ICD-9 Chapter Diseases of the Circulatory System (390-459)	Cardiovascular Health * IOM (1995)	<p>The ICD-9 chapter for cardiovascular health is not among the top 5 most utilized chapters. Men are more often diagnosed with circulatory diseases than women. This also holds true for the rate ratio of cardiovascular drug prescriptions. One organization listed cardiovascular health as a research priority for military populations, but this was cited over twenty years ago. Over 90% of the articles in this area are of good to excellent quality; however, the number of articles is relatively light. It may be that fewer studies have been done in military populations because the civilian literature has sufficient data to address these health concerns.</p> <p>Based on the current information, there is not a significant gap in the existing gender-inclusive literature.</p>		
	Number of Articles 24	Top 5 Utilized N/A				
	Excellent Quality 25%	F:M ratio Diseases of the Circulatory System (390-459) <u>Outpatient</u> Enlisted: 1.1 Officer: 1.0 ^{ns}				
	Low Quality 8%	<u>Inpatient</u> Enlisted: 0.8 Officer: 0.6				
	Definition Acute cardiovascular conditions (such as syncope) or preventative measures, such as evaluation of lipid panels	TCC Rank Cardiovascular Drugs #12 of 26				
		F:M Rate Ratio 0.65				
				Recommendations		
				Gap identified in existing research	Continue ongoing research trajectory	None at this time

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Combat Exposure	Topic Deployment Health	ICD-9 Chapter N/A	Polytrauma * ACOG (2012) TBI (General Care) * VA (2011) * ACOG (2012)	There was no DMED or PDTS data for combat exposure. Two organizations from the past six years highlighted this subtopic as a research priority. The number of articles in this area was quite large and 95% were of good to excellent quality. Research on this topic is likely to continue as combat exposure is a main concern for military populations.		
	Number of Articles 149	Top 5 Utilized N/A				
	Excellent Quality 36%	F:M ratio N/A		Based on the current information, there is not a significant gap in the existing gender-inclusive literature.		
	Low Quality 5%					
	Definition Exposure to combat during deployment	TCC Rank N/A		Recommendations		
		F:M Rate Ratio N/A				

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Symptomatic Conditions	Topic Deployment Health	ICD-9 Chapter Symptoms, Signs, and Ill-Defined Conditions (780-799)	N/A	<p>The ICD-9 chapter for Symptoms, Signs, and Ill-Defined conditions is among the top utilized codes for enlisted and officer personnel in an outpatient setting. No organizations referenced in this report highlighted this area as a research priority. The number of articles was relatively light, but over 85% were of good to excellent quality. Additionally, this subtopic is broad and non-specific, limiting interpretation of the data.</p> <p>Based on the current information, there is not a significant gap in the existing gender-inclusive literature.</p>		
	Number of Articles 31	Top 5 Utilized Chapter				
	Excellent Quality 13%	F:M ratio Symptoms, Signs, and Ill-Defined Conditions (780-799) <i>Outpatient</i> Enlisted: 1.9 Officer: 1.8				
	Low Quality 13%					
	Definition Illness that occurs during deployment, such as respiratory infections. Excludes injuries	<i>Inpatient</i> Enlisted: 1.6 Officer: 1.3				
		TCC Rank N/A				
	F:M Rate Ratio N/A	Recommendations				
		Gap identified in existing research	Continue ongoing research trajectory	None at this time		

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Aeromedical Evacuation	Topic Deployment Health	ICD-9 Chapter N/A	Stress responses (i.e. temperature and pressure) *MOMRP (1994) * IOM (1995)	<p>There was no DMED or PDTS data for aeromedical evacuation. This subtopic was highlighted by two organizations as a research priority, but not within the past 20 years. The number of articles in the subtopic were relatively light but over 95% were of good to excellent quality.</p> <p>A gender specific research focus may not be needed in this area. Based on the current information, there is not a significant gap in the existing gender-inclusive literature.</p>		
	Number of Articles 23	Top 5 Utilized N/A				
	Excellent Quality 39%	F:M ratio N/A	Noise and hearing loss * IOM (1995)	<p style="text-align: center;">Recommendations</p>		
	Low Quality 4%					
	Definition Aeromedical evacuation from a deployment setting, including evacuation for both combat and non-combat related injuries or illnesses					
		F:M Rate Ratio N/A		Gap identified in existing research	Continue ongoing research trajectory	None at this time

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Mental Health	Topic Deployment Health	ICD-9 Chapter Mental & Behavioral Disorders (290-319)	PTSD/Depression * VA (2011) Mental Health * DHA (2015)	Mental and behavioral disorders were among the top most utilized ICD-9 chapters. Women were more likely than men to be diagnosed with a mental or behavioral health disorder in both outpatient and inpatient settings. Two organizations within the past ten years have highlighted mental health as a research priority for military populations. The number of articles in this area is relatively light but all were of good to excellent quality. Conducting research on mental health in a deployed setting may be very difficult. Based on the current information, there is not a significant gap in the existing gender-inclusive literature.		
	Number of Articles 21	Top 5 Utilized Chapter				
	Excellent Quality 29%	F:M ratio Mental & Behavioral Disorders (290-319) <i>Outpatient</i> Enlisted: 1.6 Officer: 2.0				
	Low Quality 0%	<i>Inpatient</i> Enlisted: 1.5 Officer: 1.7				
	Definition Mental health during deployment, which includes access to care or other factors impacting the mental health of deployed service members	TCC Rank #1 Central Nervous System Agent				
		F:M Rate Ratio 1.18		Recommendations		
			Gap identified in existing research	Continue ongoing research trajectory	None at this time	

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis								
Subtopic: Gynecological Care	Topic Deployment Health	ICD-9 Chapter Disease of the genitourinary system (580-629)	Bacterial Vaginosis * ACOG (2012) * DHA (2015)	The ICD-9 chapter for Diseases of the Genitourinary System is among the top utilized chapters. Women were far more likely to be diagnosed with genitourinary conditions than men. Three different organizations, two within the past 5 years, have identified gynecological care in deployment as a research priority. The number of articles for this subtopic was scant, which may indicate that service women are not well studied in relation to deployment gynecological health. Additionally, 21% of the articles in this subtopic were of low quality.								
	Number of Articles 19	Top 5 Utilized Chapter	Cervical Cancer Screening * ACOG (2012)									
	Excellent Quality 11%	F:M ratio Disease of the genitourinary system (580-629)	Contraception * ACOG (2012) * DHA (2015)	Based on the current information, there is a significant gap in the existing literature.								
	Low Quality 21%	<u>Outpatient</u> Enlisted: 7.0 Officer: 5.5	Facilities and hygiene in Deployment * ACOG (2012) * DHA (2015)									
	Definition Gynecological care during deployment, includes access to care or necessary supplies	<u>Inpatient</u> Enlisted: 6.3 Officer: 5.4	Gynecological/ Genitourinary Health in Deployment * DHA (2015) * MOMRP (1994)	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th colspan="3">Recommendations</th> </tr> </thead> <tbody> <tr> <td style="background-color: #f4a460;">Gap identified in existing research</td> <td>Continue ongoing research trajectory</td> <td>None at this time</td> </tr> </tbody> </table>			Recommendations			Gap identified in existing research	Continue ongoing research trajectory	None at this time
	Recommendations											
	Gap identified in existing research	Continue ongoing research trajectory	None at this time									
	TCC Rank N/A	Menstruation * ACOG (2012) * DHA (2015)										
	F:M Rate Ratio N/A	Pregnancy * ACOG (2012) * DHA (2015)										
		UTIs * ACOG (2012) * DHA (2015)										

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Environmental Exposure	Topic Deployment Health	ICD-9 Chapter N/A	Occupational Health * MOMRP (1994)	There was no DMED or PTDS data for environmental exposure. Two organizations highlighted this area as a research priority for military populations but neither within the past twenty years. The number of articles in this area was scant but over 85% were of good to excellent quality. The scant number of articles may indicate that environmental exposures are not well-studied, so ongoing research in this area should continue.		
	Number of Articles 16	Top 5 Utilized N/A	Chemical defense * IOM (1995)			
	Excellent Quality 31%	F:M ratio N/A	Stress responses (i.e. temperature and pressure) * MOMRP (1994) * IOM (1995)	Based on the current information, there is not a significant gap in existing gender-inclusive research.		
	Low Quality 13%					
	Definition Environmental exposures during deployment	TCC Rank N/A	Toxins * MOMRP (1994) * IOM (1995)	Recommendations		
		Protective clothing and equipment * MOMRP (1994) * IOM (1995)	Gap identified in existing research	Continue ongoing research trajectory	None at this time	
		Noise and hearing loss * IOM (1995)				

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis								
Subtopic: Sexual Assault	Topic Social Relationships	ICD-9 Chapter Injury and Poisoning (800-999) ICD-9 Categories Other and Unspecified Effects (990-995) Certain adverse effects (995) ICD-9 Subcategory Other specified adverse effects, not otherwise specified (995.8) ICD-9 Subclassification Adult sexual abuse (995.83)	Military Sexual Trauma * VA (2011) Sexual Assault * MOMRP (1994) * IOM (1995) * ACOG (2012) Intimate Relationships * DOD (2016) Intimate Partner Violence * DOD (2016)	<p>There was no PDTS data for this subtopic. There were a fair number of articles on this subtopic and over 85% were of good to excellent quality. However, this subtopic was in the most utilized ICD-9 chapters. Women were far more likely to receive a sexual assault diagnosis compared to men, and rate ratios were significantly higher for women compared to men. Sexual assault has been highlighted by five different organizations, three in the past six years.</p> <p>Based on the current information, there is a significant gap in the existing gender-inclusive literature on this subtopic.</p>								
	Number of Articles 47	Top 5 Utilized Chapter										
	Excellent Quality 34%	F:M ratio Adult sexual abuse (995.83) <i>Outpatient</i> Enlisted: 24.6 Officer: 22.3		<table border="1"> <thead> <tr> <th colspan="3">Recommendations</th> </tr> </thead> <tbody> <tr> <td style="background-color: #f4a460;">Gap identified in existing research</td> <td>Continue ongoing research trajectory</td> <td>None at this time</td> </tr> </tbody> </table>			Recommendations			Gap identified in existing research	Continue ongoing research trajectory	None at this time
	Recommendations											
	Gap identified in existing research	Continue ongoing research trajectory	None at this time									
	Low Quality 13%	TCC Rank N/A										
Definition Sexual assault experienced or perpetrated by military populations, includes military sexual trauma	F:M Rate Ratio N/A											

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Military Family Relationships	Topic Social Relationships	ICD-9 Chapter N/A	Family Issues * IOM (1995) * VA (2011) * DOD (2016) Social Support * MOMRP (1994) * IOM (1995) * VA (2011)	There was no DMED or PDTS data for this subtopic. Four organizations, two in the past six years, highlighted family issues and social support as research priorities. The number of articles in this area was moderate and 90% were of good to excellent quality. Based on the current information, there is not a significant gap in the existing gender-inclusive literature.		
	Number of Articles 42	Top 5 Utilized N/A				
	Excellent Quality 33%	F:M ratio N/A				
	Low Quality 10%					
	Definition Social relationships between military members and their families, does not include child abuse or intimate partner violence					
		TCC Rank N/A		Recommendations		
	F:M Rate Ratio N/A	Gap identified in existing research	Continue ongoing research trajectory	None at this time		

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis								
Subtopic: Military Work Relationships	Topic Social Relationships	ICD-9 Chapter N/A	Job satisfaction and stress * MOMRP (1994) * IOM (1995) * VA (2011) Social support * MOMRP (1994) * IOM (1995) * VA (2011)	There was no DMED or PDTS data for this subtopic. Three organizations highlighted job satisfaction/stress and social support as research priorities, but only one within the past six years. The number of articles for this subtopic was fair and 85% were of good to excellent quality.								
	Number of Articles 40	Top 5 Utilized N/A					Based on the current information, there is not a significant gap in the existing gender-inclusive literature.					
	Excellent Quality 35%	F:M ratio N/A		<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th colspan="3">Recommendations</th> </tr> </thead> <tbody> <tr> <td>Gap identified in existing research</td> <td style="background-color: #f4a460;">Continue ongoing research trajectory</td> <td>None at this time</td> </tr> </tbody> </table>						Recommendations		
	Recommendations											
	Gap identified in existing research						Continue ongoing research trajectory	None at this time				
	Low Quality 15%	TCC Rank N/A										
Definition Social relationships between military members and either other military service members or their civilian co-workers	F:M Rate Ratio N/A											

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis					
Subtopic: Child Abuse	Topic Social Relationships	ICD-9 Chapter Injury and Poisoning (800-999)	Intimate Partner Violence * MOMRP (1994) * VA (2011) * ACOG (2012) * DOD (2016) Child Abuse * MOMRP (1994) * VA (2011) * ACOG (2012) * DOD (2016)	There was no PDTS data for this subtopic. This subtopic was among the top 5 most utilized ICD-9 chapters. Female to male rate ratios were unavailable due to low numbers within the DMED data. Four organizations, three within the last six years, highlighted child abuse as a research priority. The number of articles in the area was relatively light but all were of good to excellent quality.					
	Number of Articles 35	ICD-9 Categories Other and Unspecified Effects (990-995) Certain adverse effects (995)					Based on the current information, there is not a significant gap in the existing gender-inclusive literature.		
	Excellent Quality 46%	ICD-9 Subcategory Child maltreatment syndrome (995.5)		Recommendations					
	Low Quality 0%	Top 5 Utilized Chapter					Gap identified in existing research	Continue ongoing research trajectory	None at this time
	Definition Includes physical, emotional, and sexual maltreatment, abuse victimization and perpetration, and adult after-effects of child abuse	F:M ratio Child maltreatment syndrome (995.5) Female rate is 0.49 per 1,000 years (80 cases)							
		TCC Rank N/A							
	F:M Rate Ratio N/A								

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Sexual Harassment	Topic Social Relationships	ICD-9 Chapter N/A	Sexual harassment * MOMRP (1994) * VA (2011) * ACOG (2012)	<p>There was no DMED or PDTS data for sexual harassment. Three organizations, two within the past six years, highlighted this subtopic as a research priority. The number of articles in this subtopic was relatively light but over 90% were of good to excellent quality.</p> <p>Based on the current information, there is not a significant gap in the existing gender-inclusive literature.</p>		
	Number of Articles 32	Top 5 Utilized N/A				
	Excellent Quality 41%	F:M ratio N/A				
	Low Quality 9%					
	Definition Sexual harassment experienced or perpetrated by military populations	TCC Rank N/A		Recommendations		
		F:M Rate Ratio N/A				

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Intimate Partner Violence	Topic Social Relationships	ICD-9 Chapter Injury and Poisoning (800-999) ICD-9 Category Other and Unspecified Effects (990-995) ICD-9 Subcategory Certain adverse effects (995.8) ICD-9 Classification Forms of adult abuse (995.80-995.89)	Intimate Partner Violence * MOMRP (1994) * IOM (1995) * VA (2011) * ACOG (2012) * DOD (2016)	<p>There was no PDTS data for this subtopic. This subtopic was within the top 5 most utilized ICD-9 chapters. Five organizations, two within the past six years, highlighted this subtopic as a research priority. It was not possible to calculate rate ratios due to low numbers of cases for men. The number of articles in this subtopic was relatively low but over 90% are of good to excellent quality.</p> <p>Based on the current information, there is not a significant gap in the existing gender-inclusive literature.</p>		
	Number of Articles 28	Top 5 Utilized Chapter				
	Excellent Quality 50%					
	Low Quality 0%					
	Definition Violence experience or perpetrated by military members and/or their spouse/romantic partner	F:M ratio Certain adverse effects (995.8) Female rate is 6.29 per 1,000 years				
		TCC Rank N/A				
		F:M Rate Ratio N/A				
				Recommendations		
				Gap identified in existing research	Continue ongoing research trajectory	None at this time

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis			
Subtopic: Physical Assault	Topic Social Relationships	ICD-9 Chapter Injury and Poisoning (800-999) ICD-9 Categories Injury and Poisoning Other and Unspecified Effects (990-995) ICD-9 Subcategory Certain adverse effects (995.8) ICD-9 Subclassification Adult physical abuse (995.81)	N/A	There was no PDTS data on physical assault. This subtopic was within the top 5 most utilized ICD-9 chapters. Females were over twice as likely as males to be diagnosed with physical abuse in an outpatient setting. Physical assault would also be coded clinically specific to particular bodily injuries, and as the potential diagnoses would be so wide-ranging, rate ratios in other diagnostic clusters could not be calculated. No organizations referenced in this report highlighted physical assault as a research priority for military populations. The number of articles in this area was scant, meaning that only 6 of the 12 articles in this subtopic were of excellent quality.			
	Number of Articles 12						
	Excellent Quality 50%	Based on the current information, there is a significant gap in the existing gender-inclusive literature on this subtopic.					
	Low Quality 8%						
	Definition Violence experienced or perpetrated by military members, excludes violence from/against partners or children	Top 5 Utilized Chapter F:M ratio Adult physical abuse (995.81) <i>Outpatient:</i> Enlisted: 2.8 Officer: 3.5 Female rate is 1.77 per 1,000 years		Recommendations			
		TCC Rank N/A					Gap identified in existing research
	F:M Rate Ratio N/A						

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Contraception	Topic Obstetrics and Gynecology	ICD-9 Chapter N/A	Contraception * IOM (1995) * IOM (1998) * VA (2011) * ACOG (2012) * DHA (2015)	There was no DMED data for this subtopic. PDTS data showed that women were overwhelmingly more likely to be prescribed contraception compared to men. Five organizations, three within the past six years, highlighted contraception as a research priority for military populations. There were a relatively light number of articles on contraception, and of these, 31% were of low quality.		
	Number of Articles 29	Top 5 Utilized N/A				
	Excellent Quality 21%	F:M ratio N/A		Based on the current information, there is a significant gap in the existing gender-inclusive literature on this subtopic.		
	Low Quality 31%					
	Definition Contraception used for any purpose (e.g. birth control, menstrual suppression), including male condoms	TCC Rank Hormones and synthetic substitutes #3 of 26 Contraceptives #16 of 26		Recommendations		
		F:M Rate Ratio Hormones: 6.74 Contraceptives: 83.6				

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Uterine Wellness	Topic Obstetrics and Gynecology	ICD-9 Chapter Diseases of the genitourinary system (580-629)	Cervical Cancer Screening * VA (2011) * ACOG (2012)	<p>There was no PDTS data on uterine wellness. This subtopic was within the top 5 most utilized ICD-9 chapters. Women were over five times more likely to be diagnosed with genitourinary diseases compared to men across setting and rank. Two organizations within the past six years highlighted uterine wellness as a research priority. The number of articles in this area was light with over 30% of articles being of low quality.</p> <p>Based on the current information, there is a significant gap in the existing gender-specific literature on this subtopic.</p>		
	Number of Articles 24	Top 5 Utilized Chapter	Uterine Health * ACOG (2012)			
	Excellent Quality 17%	F:M ratio Diseases of the genitourinary system (580-629) <i>Outpatient</i> Enlisted: 7.0 Officer: 5.5		<p>Recommendations</p>		
	Low Quality 33%	<i>Inpatient</i> Enlisted: 6.3 Officer: 5.4				
	Definition Health outcomes involving the uterus or cervix, including pap smears	TCC Rank N/A		Gap identified in existing research	Continue ongoing research trajectory	None at this time
		F:M Rate Ratio N/A				

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Sexual Health	Topic Obstetrics and Gynecology	ICD-9 Chapter N/A	Sexual Health * VA (2011)	<p>There was no DMED or PDTS data for sexual health. One organization within the past six years highlighted this subtopic as a research priority. The number of articles for sexual health research is relatively light with over 85% being of good to excellent quality.</p> <p>Based on the current information, there is not a significant gap in the existing gender-inclusive literature.</p>		
	Number of Articles 23	Top 5 Utilized N/A				
	Excellent Quality 13%	F:M ratio N/A				
	Low Quality 13%					
	Definition Sexual behaviors, sexual education, or sexual interventions.	TCC Rank N/A		Recommendations		
		F:M Rate Ratio N/A		Gap identified in existing research	Continue ongoing research trajectory	None at this time

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Menstruation	Topic Obstetrics and Gynecology	ICD-9 Chapter Diseases of the genitourinary system (580-629)	Menstruation * MOMRP (1994) * IOM (1995) * ACOG (2012) * DHA (2015)	<p>There was no PDTS data on menstruation. This subtopic was within the top 5 most utilized ICD-9 chapters. Women were over five times more likely to be diagnosed with a genitourinary disease compared to men across setting and rank. Four organizations, two within the past five years, highlighted menstruation as a research priority. The number of articles on menstruation research is scant and an alarming 47% of those articles were of low quality.</p> <p>Based on this information, there is a significant gap in the existing gender-specific literature on this subtopic.</p>		
	Number of Articles 17	Top 5 Utilized Chapter				
	Excellent Quality 18%	F:M ratio Diseases of the genitourinary system (580-629) <i>Outpatient</i> Enlisted: 7.0 Officer: 5.5				
	Low Quality 47%	<i>Inpatient</i> Enlisted: 6.3 Officer: 5.4				
	Definition Menstruation, but not menstrual suppression	TCC Rank N/A		Recommendations		
		F:M Rate Ratio N/A		Gap identified in existing research	Continue ongoing research trajectory	None at this time

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Menstrual Suppression	Topic Obstetrics and Gynecology	ICD-9 Chapter N/A	Menstruation * MOMRP (1994) * IOM (1995) * ACOG (2012) * DHA (2015) Contraception * IOM (1995) * ACOG (2012) * DHA (2015)	No DMED data was available on the subtopic of menstrual suppression. Women were over six times more likely to be prescribed hormones and synthetic substitutes compared to men. Four organizations, two within the past five years, highlighted this subtopic as a research priority. There were very few articles on menstrual suppression with an alarming 60% being of low quality. Based on the current information, there is a significant gap in the existing gender-specific literature.		
	Number of Articles 10	Top 5 Utilized N/A				
	Excellent Quality 10%	F:M ratio N/A				
	Low Quality 60%					
	Definition Menstrual suppression and/or regulation	TCC Rank Hormones and Synthetic Substitutes #3 of 26				
		F:M Rate Ratio 6.74				
				Recommendations		
				Gap identified in existing research	Continue ongoing research trajectory	None at this time

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Postpartum	Topic Obstetrics and Gynecology	ICD-9 Chapter N/A	Birth and Postpartum Outcomes * MOMRP (1994) * IOM (1995) * IOM (1998) * ACOG (2012)	There was no DMED or PDTS data for this subtopic. Four organizations, one within the past five years, highlighted birth and postpartum outcomes as a research priority. The number of articles in this area were scant with only 6% being of excellent quality. Based on current information, there is a significant gap in the existing gender-specific literature.		
	Number of Articles 16	Top 5 Utilized N/A				
	Excellent Quality 6%	F:M ratio N/A				
	Low Quality 19%					
	Definition Medical care given following the delivery of the child	TCC Rank N/A				
		F:M Rate Ratio N/A				
				Recommendations		
				Gap identified in existing research	Continue ongoing research trajectory	None at this time

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Antepartum	Topic Obstetrics and Gynecology	ICD-9 Chapter N/A	Pregnancy * MOMRP (1994) * IOM (1995) * IOM (1998) * VA (2011) * ACOG (2012) * DHA (2015) * DOD (2016)	There was no DMED data for antepartum diagnoses; however, women were more likely to be prescribed vitamins/dietary supplements than men which may reflect the use of prenatal vitamins in the antepartum period. Seven organizations highlighted pregnancy as a research priority; four within the past six years. The number of articles in this area was extremely low and 27% were of low quality.		
	Number of Articles 11	Top 5 Utilized N/A				
	Excellent Quality 9%	F:M ratio N/A		Based on this information, there is a significant gap in the existing gender-specific literature.		
	Low Quality 27%					
	Definition Medical care given during pregnancy but before the mother is in active labor	TCC Rank #10 Vitamins/ Dietary Supplements		Recommendations		
	F:M Rate Ratio 1.63	Gap identified in existing research	Continue ongoing research trajectory			

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis								
Subtopic: Intrapartum	Topic Obstetrics and Gynecology	ICD-9 Chapter N/A	Pregnancy * MOMRP (1994) * IOM (1995) * IOM (1998) * VA (2011) * ACOG (2012) * DHA (2015) * DOD (2016)	There was no DMED or PDTS data for this subtopic. Seven organizations, four within the past six years, highlighted pregnancy as a research priority. The number of articles on intrapartum health outcomes was very low and 50% were of low quality.								
	Number of Articles 6	Top 5 Utilized N/A					Based on this information, there is a significant gap in the existing gender-specific literature.					
	Excellent Quality 0%	F:M ratio N/A		<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th colspan="3">Recommendations</th> </tr> </thead> <tbody> <tr> <td style="background-color: #f4a460;">Gap identified in existing research</td> <td>Continue ongoing research trajectory</td> <td>None at this time</td> </tr> </tbody> </table>						Recommendations		
	Recommendations											
	Gap identified in existing research	Continue ongoing research trajectory		None at this time								
	Low Quality 50%	TCC Rank N/A										
Definition Medical care given during the period from the start of active labor to delivery of an infant	F:M Rate Ratio N/A											

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Birth Outcomes/Infant Health	Topic Obstetrics and Gynecology	ICD-9 Chapter N/A	Birth and postpartum outcomes * MOMRP (1994) * IOM (1995) * IOM (1998) * ACOG (2012)	<p>There was no DMED or PDTS data on this subtopic. Four organizations, one within the past five years, highlighted birth and postpartum outcomes as a research priority. There were a scant number of articles on this subtopic and 25% were of low quality.</p> <p>Based on this information, there is a significant gap in the existing literature.</p>		
	Number of Articles 16	Top 5 Utilized N/A				
	Excellent Quality 6%	F:M ratio N/A				
	Low Quality 25%					
	Definition Delivery of the baby, and health outcomes for both the mother and baby	TCC Rank N/A		Recommendations		
		F:M Rate Ratio N/A				

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Vaginal Health	Topic Obstetrics and Gynecology	ICD-9 Chapter Diseases of the Genitourinary System (580-629)	Bacterial Vaginosis * MOMRP (1994) * ACOG (2012) * DHA (2015)	There was no PDTS data on vaginal health. This subtopic was within the top 5 most utilized ICD-9 chapters. Women were five to seven times more likely to be diagnosed with genitourinary diseases than men across setting and rank. Five organizations, three within the past six years, highlighted various genitourinary concerns as research priorities. There were a very scant number of research articles on this area and over 40% were of low quality.		
	Number of Articles 12	Top 5 Utilized Chapter	Facilities and hygiene * MOMRP (1994) * ACOG (2012) * DHA (2015)			
	Excellent Quality 8%	F:M ratio Diseases of the Genitourinary System (580-629) <i>Outpatient</i> Enlisted: 7.0 Officer: 5.5	Gynecological/ Genitourinary Health * MOMRP (1994) * IOM (1995) * VA (2011) * ACOG (2012) * DHA (2015)	Based on this information, there is a significant gap in the existing gender-specific literature.		
	Low Quality 42%	<i>Inpatient</i> Enlisted: 6.3 Officer: 5.4				
	Definition Related to the vaginal health of the female genital tract, as well as related conditions and diseases	TCC Rank N/A		Recommendations		
	F:M Rate Ratio N/A	Gap identified in existing research	Continue ongoing research trajectory	None at this time		

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: General Obstetrics	Topic Obstetrics and Gynecology	ICD-9 Chapter N/A	Pregnancy * MOMRP (1994) * IOM (1995) * IOM (1998) * VA (2011) * ACOG (2012) * DHA (2015) * DOD (2016) Gynecological/ Genitourinary Health * MOMRP (1994) * IOM (1995) * VA (2011) * ACOG (2012) * DHA (2015) * DOD (2016) Reproductive Health * IOM (1995) * VA (2011) * ACOG (2012) * DOD (2016)	There was no DMED data for general obstetrics; women were more likely to be prescribed vitamins than men. Seven organizations, four within the past six years, highlighted gynecological and pregnancy topics as priorities for research. There were a very low number of articles on general obstetrics and 22% of them were of low quality. Based on the current information there is a significant gap in the existing gender-specific literature.		
	Number of Articles 9	Top 5 Utilized N/A				
	Excellent Quality 11%	F:M ratio N/A		Recommendations		
	Low Quality 22%					
	Definition Non-medical care aspects of pregnancy	TCC Rank Vitamins/ Dietary Supplements #10 of 26		Gap identified in existing research	Continue ongoing research trajectory	None at this time
		F:M Rate Ratio 1.63				

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Urological Health	Topic Obstetrics and Gynecology	ICD-9 Chapter Diseases of the Genitourinary System (580-629)	UTIs * MOMRP (1994) * ACOG (2012) * DHA (2015)	There was no PDTS data on urological health. This subtopic was within the top 5 most utilized ICD-9 chapters. Women were five to seven times more likely to be diagnosed with genitourinary diseases compared to men across settings and rank. Five organizations, three within the past six years, highlighted priorities on urological health. A very low number of articles were reported on this subtopic, and 22% were of low quality.		
	Number of Articles 9	Top 5 Utilized Chapter	Gynecological/ Genitourinary Health * IOM (1995) * VA (2011) * ACOG (2012) * DHA (2015)			
	Excellent Quality 22%	F:M ratio Diseases of the Genitourinary System (580-629) <i>Outpatient</i>		Based on the current information, there is a significant gap in the existing gender-inclusive literature.		
	Low Quality 22%	Enlisted: 7.0 Officer: 5.5 <i>Inpatient</i>				
	Definition Male and female urinary tracts and related medical conditions, such as urinary tract infections (UTIs) and urinary stones	Enlisted: 6.3 Officer: 5.4		Recommendations		
		TCC Rank N/A				
	F:M Rate Ratio N/A		Gap identified in existing research	Continue ongoing research trajectory	None at this time	

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Unplanned Pregnancy	Topic Obstetrics and Gynecology	ICD-9 Chapter N/A	Unintended Pregnancy * ACOG (2012) * DHA (2015)	There was no DMED or PDTS data for unplanned pregnancy. Two organizations within the past five years highlighted this subtopic as a research priority. There were an extremely low number of articles in this area and 29% were of low quality, and none were of excellent quality.		
	Number of Articles 7	Top 5 Utilized N/A				
	Excellent Quality 0%	F:M ratio N/A		More research is needed to reduce the number of unintended pregnancies, and to promote family planning and health birth spacing. Based on current information there is significant gap in the existing gender-specific literature on this subtopic.		
	Low Quality 29%					
	Definition Rates, and prevention of, unintended pregnancies	TCC Rank N/A		Recommendations		
		F:M Rate Ratio N/A				

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Breast Wellness	Topic Obstetrics and Gynecology	ICD-9 Chapter Diseases of the Genitourinary System (580-629)	Breast Cancer Screening/Care * VA (2011)	Breast Wellness was within the top 5 most utilized ICD-9 chapters. One organization with the past six years highlighted breast care as a research priority. The number of articles on this subtopic was scant; the 7 articles within the subtopic were of good to excellent quality.		
	Number of Articles 7	Top 5 Utilized Chapter				
	Excellent Quality 43%	F:M ratio Diseases of the Genitourinary System (580-629) <i>Outpatient</i>		Based on this information, there is a significant gap in the existing literature.		
	Low Quality 0%	<i>Enlisted: 7.0</i> <i>Officer: 5.5</i> <i>Inpatient</i>				
	Definition Breast cancer and breast examinations, such as mammograms	<i>Enlisted: 6.3</i> <i>Officer: 5.4</i>		Recommendations		
	TCC Rank Antineoplastic Agents #21 of 26	F:M Rate Ratio 3.72				

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Breastfeeding	Topic Obstetrics and Gynecology	ICD-9 Chapter N/A	Breastfeeding/ Lactation * IOM (1995) * IOM (1998)	<p>There was no DMED or PDTS data for this subtopic. Two organizations highlighted breastfeeding/lactation as a research priority; however, both organizations cited this priority near two decades ago. There were an extremely low number of research articles on this subtopic and 40% were of low quality, and none were of excellent quality.</p> <p>Based on the current information, there is a significant gap in the existing gender-specific literature.</p>		
	Number of Articles 5	Top 5 Utilized N/A				
	Excellent Quality 0%	F:M ratio N/A				
	Low Quality 40%					
	Definition Breastfeeding practices, studies of breastfeeding experiences, and rates of breastfeeding					
		TCC Rank N/A		Recommendations		
	F:M Rate Ratio N/A	Gap identified in existing research	Continue ongoing research trajectory	None at this time		

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis								
Subtopic: Fertility	Topic Obstetrics and Gynecology	ICD-9 Chapter Diseases of the Genitourinary System (580-629)	Reproductive Health * IOM (1995) * VA (2011) * ACOG (2012)	<p>There was no PDTS data on this subtopic. Fertility was within the top 5 most utilized ICD-9 chapters. Seven organizations, four within the past six years, highlighted pregnancy and/or reproductive health as research priorities. The number of articles in this area was miniscule; all 3 articles on this subtopic were of good or excellent quality.</p> <p>Based on this information, there is a significant gap in the existing gender-inclusive literature on this subtopic.</p>								
	Number of Articles 3	Top 5 Utilized Chapter										
	Excellent Quality 33%	F:M ratio Diseases of the Genitourinary System (580-629) <i>Outpatient</i> Enlisted: 7.0 Officer: 5.5	Pregnancy * MOMRP (1994) * IOM (1995) * IOM (1998) * VA (2011) * ACOG (2012) * DHA (2015) * DOD (2016)	<table border="1"> <thead> <tr> <th colspan="3">Recommendations</th> </tr> </thead> <tbody> <tr> <td style="background-color: #f4a460;">Gap identified in existing research</td> <td>Continue ongoing research trajectory</td> <td>None at this time</td> </tr> </tbody> </table>			Recommendations			Gap identified in existing research	Continue ongoing research trajectory	None at this time
	Recommendations											
	Gap identified in existing research	Continue ongoing research trajectory					None at this time					
	Low Quality 0	<i>Inpatient</i> Enlisted: 6.3 Officer: 5.4										
Definition Rates of infertility among active duty service women	TCC Rank N/A	Gynecological/ Genitourinary Health * IOM (1995) * VA (2011) * ACOG (2012)										
	F:M Rate Ratio N/A											

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Other Organ Systems	Topic Chronic Illness	ICD-9 Chapter N/A	Chronic Disease * VA (2011)	<p>There was no DMED or PDTS data for this subtopic. Two organizations, one in the past six years, highlighted numerous research priorities on multiple organ systems. There were a relatively light number of articles on this subtopic, but over 95% were of good to excellent quality. This topic is broad and covers a wide array of conditions covered in other research areas.</p> <p>Based on this information, there is not a significant gap in the existing gender-inclusive literature.</p>		
	Number of Articles 29	Top 5 Utilized N/A	Anemia and other blood disorders * IOM (1995)			
	Excellent Quality 24	F:M ratio N/A	Gastrointestinal conditions * IOM (1995)			
	Low Quality 3%		Endocrine conditions * IOM (1995)			
	Definition Chronic illness in other organ systems, such as kidney disease, lung disease, or prostatic disease		Dermal conditions * IOM (1995)			
		TCC Rank N/A	Neurosensory conditions * IOM (1995)			
		F:M Rate Ratio N/A	ENT conditions * IOM (1995)	Gap identified in existing research	Continue ongoing research trajectory	None at this time
		Respiratory conditions * IOM (1995)				

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Musculoskeletal	Topic Chronic Illness	ICD-9 Chapter Diseases of the Musculoskeletal System and Connective Tissue (710-739)	Musculoskeletal * IOM (1995) * DHA (2015) Chronic physical conditions * MOMRP (1994) * VA (2011)	There was no PDTS data on this subtopic. Diseases of the musculoskeletal system were among the top most utilized ICD-9 chapters. Men and women were just as likely to be diagnosed with musculoskeletal disease. Four organizations, two within the past six years, highlighted this subtopic as a research priority. There were a relatively light number of articles and over 95% were of good to excellent quality.		
	Number of Articles 28	Top 5 Utilized Chapter				
	Excellent Quality 50%	F:M ratio Diseases of the Musculoskeletal System and Connective Tissue (710-739) <u>Outpatient</u> Enlisted: 1.5 Officer: 1.4 <u>Inpatient</u> Enlisted: 0.9 Officer: 1.0 ^{ns}		Based on this information, there is not a significant gap in the existing gender-inclusive literature.		
	Low Quality 4%					
	Definition Chronic musculoskeletal conditions (i.e. non-injury)			TCC Rank N/A	Recommendations	
		F:M Rate Ratio N/A		Gap identified in existing research		

Note. NS indicates F:M ratio was not significant

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Multisystem Illness	Topic Chronic Illness	ICD-9 Chapter N/A	Chronic Disease * VA (2011) Chronic physical conditions * MOMRP (1994)	There was no DMED or PDTS data for this subtopic. Two organizations, one with the past six years, highlighted multisystem illness as a research priority. There were a scant number of articles on this topic and 35% were of low quality. Based on this information, there is not a significant gap in the existing literature.		
	Number of Articles 20	Top 5 Utilized N/A				
	Excellent Quality 10%	F:M ratio N/A				
	Low Quality 35%					
	Definition Non-specific chronic illness (e.g. Gulf War syndrome) or a chronic illness that affects multiple body systems (e.g. HIV/AIDS)					
		TCC Rank N/A		Recommendations		
	F:M Rate Ratio N/A	Gap identified in existing research	Continue ongoing research trajectory	None at this time		

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Cancer	Topic Chronic Illness	ICD-9 codes Neoplasms (140-239)	Chronic disease * VA (2011) Cervical Cancer screening * VA (2011) * ACOG (2012)	Neoplasms were among the top 5 most utilized ICD-9 chapters. Women were more likely than men to be diagnosed with neoplasms compared to men across rank in an inseting. Two organizations within the past six years highlighted cancer as a research priority. There were a scant number of articles on this subtopic; all 14 articles were of good or excellent quality. Based on this information, there is a significant gap in the existing literature.		
	Number of Articles 14	Top 5 Utilized Chapter (Inpatient)				
	Excellent Quality 29%	F:M ratio Neoplasms (140-239) <i>Outpatient</i> Enlisted: 2.0 Officer: 1.7				
	Low Quality 0%	<i>Inpatient</i> Enlisted: 3.9 Officer: 4.8				
	Definition Diagnosis and treatment of any type of cancer	TCC Rank Antineoplastic Agents #21 of 26		Recommendations		
		F:M Rate Ratio 3.72		Gap identified in existing research	Continue ongoing research trajectory	None at this time

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Pain	Topic Chronic Illness	ICD-9 Chapter Diseases of the Nervous System and Sense organs (320-389)	N/A	This subtopic was within the top 5 most utilized ICD-9 chapters. Men and women were just as likely to be diagnosed with nervous system/sense organ diagnoses. None of the organizations referred to in this report highlighted pain as a research priority. Although there were a scant number of articles on this subtopic, over 90% were of good to excellent quality. Based on this information, there is not a significant gap in the existing gender-inclusive literature.		
	Number of Articles 11	Top 5 Utilized Chapter				
	Excellent Quality 27%	F:M ratio Diseases of the Nervous System and Sense organs (320-389) <i>Outpatient</i>				
	Low Quality 9%	Enlisted: 1.2 Officer: 1.1				
	Definition Chronic pain diagnosis and treatment	TCC Rank Central Nervous System Agents #1 of 26		Recommendations		
		F:M Rate Ratio 1.18		Gap identified in existing research	Continue ongoing research trajectory	None at this time

	Scoping Review	Healthcare Utilization Data (DMED & PDTS)	Organizational Priorities	Reviewer Synthesis		
Subtopic: Cardiovascular	Topic Chronic Illness	ICD-9 Chapter Diseases of the Circulatory System (390-459)	Cardiovascular health * IOM (1995)	Diseases of the circulatory system were not among the top 5 most utilized ICD-9 chapters. Men were more likely than women to be diagnosed with cardiovascular issues. Men were also more likely to be prescribed cardiovascular drugs than women. Two organizations, one within the past six years, highlighted cardiovascular health as a research priority. Although the number of articles in this area was very low, over 85% were of good to excellent quality. This could be due to the fact that civilian research is abundant in this area, and that the military is comprised of a mostly young and healthy population.		
	Number of Articles 7	Top 5 Utilized N/A	Chronic health * VA (2011)			
	Excellent Quality 29%	F:M ratio Diseases of the Circulatory System (390-459) <i>Outpatient</i>		Based on this information, there is not a significant gap in the existing gender-inclusive literature.		
	Low Quality 14%	Enlisted: 1.1 Officer: 1.0 ^{NS} <i>Inpatient</i>				
	Definition Chronic cardiovascular disease (e.g. congestive heart failure)	Enlisted: 0.8 Officer: 0.6		Recommendations		
		TCC Rank Cardiovascular drugs #12 of 26				
	F:M Rate Ratio 0.65		Gap identified in existing research	Continue ongoing research trajectory	None at this time	

Note. NS indicates F:M ratio was not significant

