



Telehealth Services Designed for Women: An Evidence Map

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PREFACE

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

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

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

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

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

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

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This report is based on research conducted by the Evidence-based Synthesis Program (ESP) Center located at the **Durham VA Medical Center, Durham, NC**, funded by the Department of Veterans Affairs, Veterans Health Administration, Office of Research and Development, Quality Enhancement Research Initiative. The findings and conclusions in this document are those of the author(s) who are responsible for its contents; the findings and conclusions do not necessarily represent the views of the Department of Veterans Affairs or the United States government. Therefore, no statement in this article should be construed as an official position of the Department of Veterans Affairs. No investigators have any affiliations or financial involvement (eg, employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties) that conflict with material presented in the report.

Stakeholder and Technical Expert Panel

In designing the study questions and methodology at the outset of this report, the ESP consulted several technical and content experts. We sought broad expertise and perspectives. Divergent and conflicting opinions are common and perceived as healthy scientific discourse that results in a thoughtful, relevant systematic review. Therefore, in the end, study questions, design, methodologic approaches, and/or conclusions do not necessarily represent the views of individual technical and content experts.

The list of stakeholders and members of the Technical Expert Panel (TEP) who provided input to this report follows.

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EVIDENCE REPORT

INTRODUCTION

Telehealth is an important mechanism for delivering patient-centered health care outside the time and location restrictions of a traditional face-to-face medical encounter. According to the US Health Resources & Services Administration, telehealth is defined as “the use of electronic information and telecommunication technologies to support and promote long-distance clinical health care, patient and professional health-related education, public health and health administration.”¹ Telehealth encompasses a variety of technologies and approaches to connect individual patients to health care resources with the goal of improving personalization, efficiency, access to care, and secure sharing of health information. Nationally, telehealth strategies have flourished due to an increased emphasis on the efficiency of health care delivery in recent health policies.² Within VA, telehealth and advanced health information technology has long been an area of innovation.^{3,4} VA supports the use of telehealth^{5,6} and has experience with specific modalities such as mobile health applications (mHealth), clinical videoconferencing between patient and care providers, and asynchronous telehealth methods such as store-and-forward clinical information or home self-monitoring with data transmission via phone lines.⁷ Such technology-based strategies are appealing for VA as they accommodate a geographically diverse Veteran population while providing patient-centered care.

One population within the Veterans Health Administration (VHA) that benefits from the flexibility and personalized delivery approach offered by telehealth modalities is women Veterans. Women Veterans are the fastest-growing population receiving care in the VHA, with the total number of women doubling between fiscal years 2003 and 2012.⁸ Despite this growth, the absolute number of women at any particular VA health care system or community-based outpatient clinic (CBOC) can be quite small. This lack of density creates challenges to providing high-quality, efficient, and cost-effective gender-specific care for women within the VHA. Further, at least one-quarter of women Veterans reside in rural areas,⁸ and women Veterans living in rural areas are more likely to depend on the VA as their primary health care compared to urban-dwelling women.⁹ For women living in rural areas, affordability and transportation are significant issues when making health care choices.⁹ In particular, women Veterans have expressed a preference for receiving specialty health care services closer to home,¹⁰ which is challenging for those living in rural areas. Even women living in urban areas face barriers to obtaining timely health care, including difficulty obtaining time off from work.⁹ Faced with the mandate to provide quality health care to the growing and complex population of women Veterans, the VHA has prioritized improving the quality of health care for women Veterans.¹¹

Telehealth may be a good fit for addressing the needs of women Veterans because alternate forms of health care communication are already in use by this population. Compared with men, women Veterans are more likely to contact their health care team by telephone (63% vs 55%) and make a higher number of contacts via phone (4.6 vs 4.2 average encounters by phone).⁸ Women use other forms of telehealth (*eg*, video conferencing, home telehealth, and store and forward) at similar rates as men.⁸ Examples of gender-specific VA telehealth endeavors include remote consultations for gynecology and telephone-based maternity care coordination.^{12,13} By overcoming the challenges of low-density and geographic dispersion, technology-based communication offers innovative ways to deliver high-quality, gender-specific health care to women Veterans in a modality that is well-suited to this population.

This report's objective is to describe the current landscape of telehealth interventions that have been *designed specifically for women*.

METHODS

TOPIC DEVELOPMENT

In consultation with our stakeholders, and in keeping with the principles of evidence mapping,¹⁴ our intent was to provide high-level information about a broad question rather than detailed information on a narrow set of questions. Also in keeping with evidence mapping, our intent was to describe the landscape of high-quality literature in the field of telehealth for women that would support effectiveness determinations rather than a focused analysis of the effectiveness of any particular telehealth approach. Thus the key question (KQ) for this report was:

KQ: What are the quantity, distribution, and characteristics of evidence assessing the effectiveness of telehealth services designed specifically for women?

Of note, our inclusion of the language “designed specifically for women” was done purposely and after significant deliberation for the following reasons. This language was put forth by our operations partners as being of particular interest, and in collaboration with our partners we operationalized it to mean *interventions designed for a female-predominant condition or interventions that affected both sexes but are customized for, and assessed among, women*. In a previous ESP project, we conducted an evidence map assessing sex and gender-based analysis in trials of depression, diabetes, and chronic pain.¹⁵ In that evidence map, we found that only 10% of eligible reviews including analyses of sex effects. Thus, we did not expect that the inclusion of telehealth interventions in mixed-gender populations would offer a significant yield of relevant sex-effect subanalyses.

The term *telehealth* can be used to encompass a wide variety of strategies and approaches in the context of health care. For the purposes of this project, we operationalized telehealth broadly based on input from our stakeholders, our technical expert panel, and definitions used in the literature and by government and other organizations. Specifically, we considered telehealth to mean any bidirectional technology or tactic used to synchronously or asynchronously transmit clinical information across a distance between patients and members of the medical/mental health care team or provider-to-provider interactions for the purpose of diagnosis, consultation, treatment, and/or prevention. Examples of telehealth technologies are telephone, short message service (SMS)/text messaging, electronic consultation, video conferencing, and interactive voice response systems. Based on the interests of our stakeholders, we also explicitly included tele-gynecology, tele-colposcopy, tele-mental health, tele-pharmacy, tele-care coordination, tele-primary care, and tele-wellness.

We followed a standard protocol for this review. Each step was pilot-tested to train and calibrate study investigators. The PROSPERO registration number is CRD42017065965.

SEARCH STRATEGY

In collaboration with an expert reference librarian, we searched MEDLINE[®] (via PubMed[®]) and Embase[®] to identify relevant articles and systematic reviews (SRs) published between inception and December 29, 2016. Because our stakeholders were interested in the literature that assessed the effectiveness of telehealth strategies, our search strategy was informed by the Cochrane

Effective Practice and Organization of Care (EPOC) Group¹⁶ – criteria developed to capture both randomized and nonrandomized study designs with prospective data collection best suited to assess the effects of health system interventions like telehealth. We used a combination of medical subject headings (MeSH), keywords, and selected free-text terms for women’s health and telemedicine (Appendix A). All citations were imported into 2 electronic databases (for referencing, EndNote® Version X7, Thomson Reuters, Philadelphia, PA; for data abstraction, DistillerSR; Evidence Partners Inc., Manotick, ON, Canada).

STUDY SELECTION

Using prespecified inclusion/exclusion criteria (Table 1), 2 reviewers independently evaluated titles and abstracts to identify potentially eligible primary studies and SRs. Studies then advanced to the full-text review phase. To be eligible at the full-text review stage, studies had to meet all eligibility criteria. If we were unable to assess an eligibility criterion due to missing information, the study was excluded. We chose to restrict eligible studies to those that included at least 100 patient participants (regardless of whether the unit of randomization was at the provider or system level) in order to concentrate our efforts on those studies with sufficient sample sizes to provide useful effectiveness information.

Due to the large volume of primary studies, we assessed the feasibility of a conducting single review at the full-text article stage. To test the feasibility of single review, we conducted a pilot to assess the concordance of reviewers at the full-text review phase. This pilot produced an inter-rater reliability of 87%, which we deemed as an acceptable level to proceed with single full-text review. To assess the rigor of the single full-text review process, we conducted an ongoing evaluation of single review by conducting a random dual screening by another senior investigator (JMG, KMG). An interim examination of the random sample demonstrated acceptable concordance on excluded studies but poor concordance on included studies. Thus all studies categorized as included by single review went through a dual full-text review by senior investigators (KMG, JMG).

The SRs were examined separately by 2 team members. Disagreements were resolved by consensus between the 2 investigators or by a third investigator. Articles meeting all eligibility criteria were included for data abstraction.

Table 1. Study Eligibility Criteria

Study Characteristic	Inclusion Criteria	Exclusion Criteria
Population	Adult biological or transgender women only	<ul style="list-style-type: none"> • Children • Men
Intervention	<p>Eligible telehealth interventions must meet the following 4 criteria:</p> <ol style="list-style-type: none"> 1. Intended for any of the following categories of conditions: <ul style="list-style-type: none"> • <u>Women-specific conditions:</u> <ul style="list-style-type: none"> ○ Obstetric ○ Gynecologic • <u>Conditions that predominantly affect women:</u> <ul style="list-style-type: none"> ○ Migraine ○ Fibromyalgia 	<ul style="list-style-type: none"> • Static portals without an interactive component • One-way communication (eg, automatic reminder telephone calls) • Use of technologies and tactics (eg, secure messaging, text messaging^a, e-consultation, video-conferencing, interactive voice response) for data

Study Characteristic	Inclusion Criteria	Exclusion Criteria
	<ul style="list-style-type: none"> ○ Breast cancer (eg, risk assessments like the Gail model and genetic counseling; management decision-making for women at high risk for breast cancer such as counseling for pharmacoprophylactic treatment; behavioral counseling for survivors focused on pain, diet, weight management) ○ Intimate partner or sexual violence, military sexual trauma, or domestic violence ● <u>Gender nonspecific conditions, but intervention is designed specifically for women</u> <p>2. Use technologies and tactics (eg, secure messaging, text messaging,^a e-consultation, video-conferencing, interactive voice response) to deliver health care services for the purpose of diagnosis, consultation, treatment, and/or prevention, including tele-gynecology, tele-colposcopy, tele-mental health, tele-pharmacy, tele-care coordination, tele-primary care, tele-wellness</p> <p>3. Involve transmission of clinical information via a telecommunication technology between patients and members of the medical/mental health care team^b or provider-to-provider interactions who are at a distance</p> <p>4. Include bidirectional synchronous or asynchronous communication</p>	<p>collection or recruitment only</p> <ul style="list-style-type: none"> ● Studies promoting breast cancer screening for <i>average risk</i> women will be excluded ● Interventions whose only telehealth component promotes a hotline or offers <i>ad hoc</i> calls from the participant without specifically requiring them as part of the intervention protocol
Comparator	Any (requires an active or inactive control)	No comparator
Outcomes	<ul style="list-style-type: none"> ● Patient health outcomes, condition-specific: <ul style="list-style-type: none"> ○ Readiness/motivation to change ○ Access to care (eg, no-show rates) ○ Patient satisfaction ○ Treatment adherence ○ Patient engagement ● Provider-level outcomes ● System-level outcomes 	<ul style="list-style-type: none"> ● Outcomes on enhancing data collection only ● Outcomes on enhancing recruitment only
Timing	Any duration of follow-up	None
Setting	<ul style="list-style-type: none"> ● Any clinical setting ● Any country (assessed country and categorized according to low/middle/high income status) 	None
Study design	<ul style="list-style-type: none"> ● EPOC criteria studies that have prospective data collection: <ul style="list-style-type: none"> ○ Randomized controlled trials (RCTs) ○ Nonrandomized controlled studies ○ Controlled before-after studies ○ Interrupted time-series or repeated-measures studies 	<ul style="list-style-type: none"> ● Self-identified pilot studies ● Studies of small sample sizes (n<100 patient participants) ● Not a clinical study (eg, editorial, nonsystematic review, letter to the editor) ● Uncontrolled clinical study

Study Characteristic	Inclusion Criteria	Exclusion Criteria
	<ul style="list-style-type: none"> Relevant systematic reviews or patient-level meta-analyses: <ul style="list-style-type: none"> Must have search strategy, eligibility criteria, and analysis/synthesis plan Must be a systematic review of telehealth interventions for women Must have at least 50% of the included articles be relevant to the topic (women's telehealth interventions) 	<ul style="list-style-type: none"> Qualitative studies Prospective and retrospective observational studies Clinical guidelines Systematic reviews of telehealth that includes both sexes
Publication type	<ul style="list-style-type: none"> English language studies only Peer-reviewed articles 	<ul style="list-style-type: none"> Non-English articles Abstracts only

^aText messaging systems that are interactive based on a predetermined algorithm are included even if there is not real-time human participation on the clinical end of the interaction.

^bTeam member can include those who are without formal medical training (*eg*, health coaches, nonskilled health care workers).

DATA ABSTRACTION

Data from primary studies were abstracted into a customized DistillerSR database by 1 reviewer, and a random sample of 10% were overread by 1 of 3 senior reviewers. Any disagreements were resolved by consensus between the senior reviewers or arbitrated by the study team. Data from SRs were abstracted into an Excel database and overread by senior reviewers. Disagreements were resolved by consensus between the reviewers.

Data elements included descriptors to characterize the type of study, intervention, comparator, outcomes reported, and study population. Additional elements for abstraction were requested from and provided by the technical expert panel and stakeholders. The telehealth interventions were further categorized by direction (*eg*, provider to patient), primary telehealth modality, and intervention timing (synchronous or asynchronous).

We also evaluated studies based on the centrality of the telehealth portion of the intervention as follows:

- Telehealth as a *central* component: Telehealth technologies (*eg*, text messaging, mobile applications, telephone) were the primary mode of intervention delivery; if the intervention contained multiple components, the non-telehealth components (*eg*, written materials or in-person contact) had to play a minor role relaying intervention content, impacting outcomes, or delivering health care.
- Telehealth as a *non-central* component: Telehealth technologies were ancillary to a suite of other intervention strategies. Most of the health care services and information content were conveyed via non-telehealth technologies (*eg*, face-to-face visits), and telehealth technologies were not a central design feature of the intervention.

QUALITY ASSESSMENT

Because this was an evidence mapping study, we did not collect data to assess the quality of individual studies. A formal assessment of individual study methodological rigor was beyond the scope of a mapping project.

DATA SYNTHESIS

We mapped the literature by the focused areas of research that emerged from our search – informed by both the interests of our stakeholders and organization of clinical care. The results are ordered from largest to smallest number of identified studies as follows: (1) maternal health, (2) prevention, (3) disease management, (4) family planning, (5) high-risk breast cancer assessment, (6) mental health, and (7) intimate partner violence (IPV). In some instances, study topics could have been categorized into more than a single area of research (*eg*, mental health care for pregnant women). In such instances, we categorized by the affected population (*eg*, maternal care for any intervention with pregnant women) and not by the target of the intervention (*eg*, improving mental health). Further, we identified 18 studies with more than 1 active telehealth arm.¹⁷⁻³⁴ For these studies, we collapsed across conditions so that each study is represented only 1 time in graphical depictions of the data. We summarize the data narratively and include tabular and graphical formats to convey key features of the literature. These included demographics; recruitment site; intervention components, interventionist and length of intervention; type of outcomes (*ie*, patient-, provider-, system-level).

PEER REVIEW

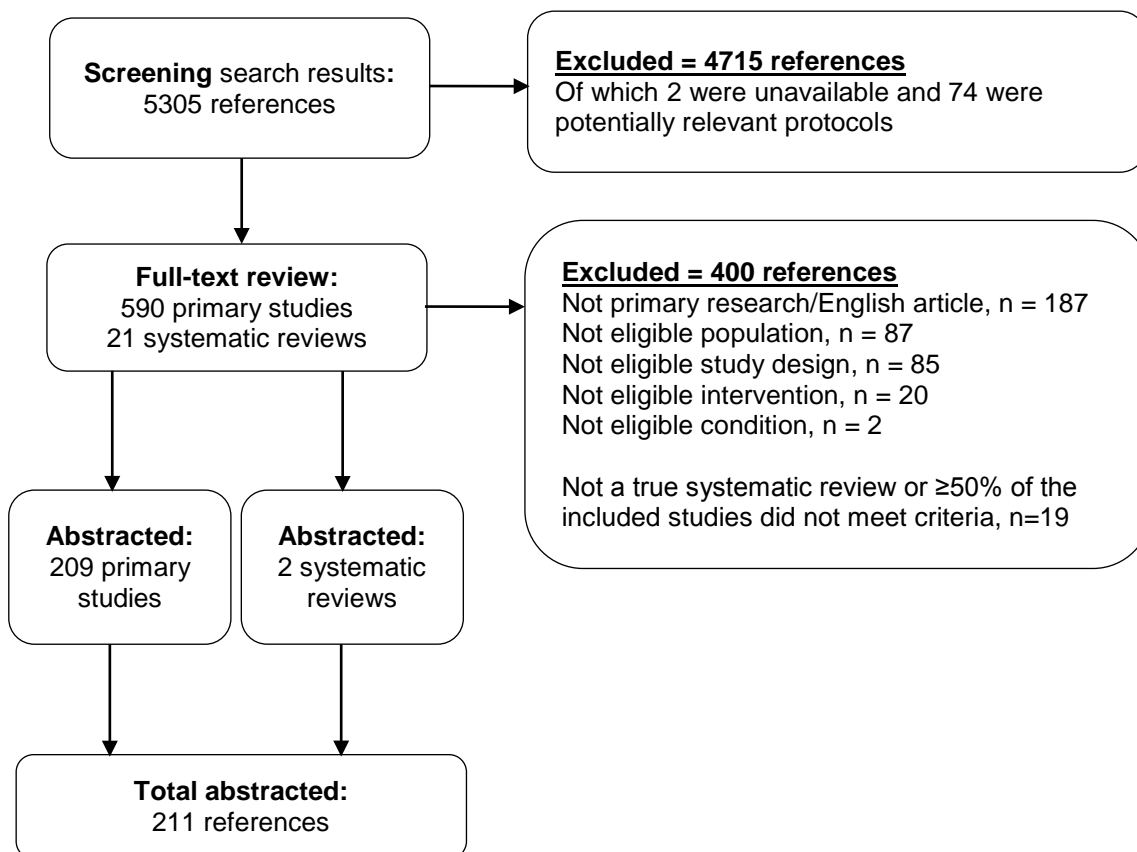
A draft version of this report was reviewed by technical experts and clinical leadership. A transcript of their comments and our responses is in Appendix B.

RESULTS

LITERATURE FLOW

Figure 1 shows the flow of articles through the search and review process. The literature search identified 5305 unique citations from a combined search of MEDLINE[®] (via PubMed[®]) and Embase. After applying inclusion and exclusion criteria at the title-and-abstract screening level, 590 primary studies and 21 systematic reviews (SRs) were promoted to full-text review. Of these, 209 studies and 2 SRs were retained for data abstraction (total of 211 references). The oldest study meeting inclusion criteria was published in 1987.

Figure 1. Literature Flow Diagram



Key Question: What are the quantity, distribution, and characteristics of evidence assessing the effectiveness of telehealth services designed specifically for women?

Description of Included Studies by Focused Area of Research

In the results, we organize the findings for the 211 references by the 7 areas of research shown in Table 2. Please refer to the reference list for full study citations and to Appendix C for study characteristics of all included primary studies. Appendix D lists the primary outcomes by focused area of research.

Table 2. Studies by Focused Area of Research

Focused Area	Primary Studies (n=209)	Systematic Reviews (n=2)
Maternal health	81 studies ^{17,21,22,33,35-111}	1 SR ¹¹²
Prevention	56 studies ^{18,29,30,32,113-164}	0
Disease management	43 studies ^{19,20,23-28,31,34,165-197}	0
Family planning	11 studies ¹⁹⁸⁻²⁰⁸	0
High-risk breast cancer assessment	7 studies ²⁰⁹⁻²¹⁵	0
Mental health	6 studies ²¹⁶⁻²²¹	0
Intimate partner violence	5 studies ²²²⁻²²⁶	1 SR ²²⁷

MATERNAL HEALTH

Key Points

- The largest area of focus within the identified women's telehealth literature was maternal health. Among this body of literature, the largest group of studies addressed prenatal health.
- Most maternal health studies had 500 or fewer participants, and the overwhelming majority were conducted in high-income countries.
- Telephone was the most common modality of telehealth used to convey intervention content.
- There was a wide variety of interventionist types among the studies in this focus area, with the most common being registered nurses, midwives, and peer or lay health workers.
- One study examining smoking cessation during pregnancy recruited women from an active military base. No maternal health studies were conducted within the VA.

Synthesis of Findings

Study Characteristics and Demographics

Of the 81 studies in the maternal health area of research, 21 focused on prenatal health (*eg*, labor preparation and management and reducing substance use during pregnancy),^{22,37,39,41,42,48,55,57,64,70,72,73,76,79,80,85,86,91,106,108,109} 16 on lactation,^{21,35,43-45,50,51,56,59,60,67,74,90,102,105,110} 14 on mental health issues related to pregnancy (*eg*, postpartum depression and parenting stress),^{52,62,63,65,66,75,77,78,83,84,88,89,104,107} 9 on issues during the postpartum period (*eg*, maternal and infant care and maternal physical activity),^{36,40,47,61,68,81,92,100,101} 8 on

smoking cessation during the peripartum period,^{33,46,54,69,71,82,87,103} 8 on weight management during or after pregnancy,^{38,53,94-99} and 5 on issues related to gestational diabetes.^{17,49,58,93,111}

Most studies (n=78) were RCTs. The single SR¹¹² included 2 RCTs and 2 nonrandomized trials. The greater proportion of maternal health studies included 500 or fewer participants (n=54; 66%); 14 studies (17%) had 501 to 1,000 participants, and 13 studies had more than 1001 participants (16%). Most studies in this focus area included women of a mean age of 20-39 years (n=65); 10 studies reported age without a measure of central tendency (12%), and age was not reported in 6 studies (7%). Just over half of included studies (n=44, 54%) did not report the racial/ethnic make-up of participants. Twenty-one studies were majority white (26%), 6 were majority black (7%), and 10 had another race as the most common (12%) (Figure 2, panel I). Most studies were conducted in World Bank high-income countries (n=66), with 37% (n=30) conducted within the United States specifically; 13 studies were completed in middle-income countries and 2 in low-income countries. Sixty-two studies recruited patients from the outpatient or community setting (77%), while 17 studies recruited from inpatient areas (mostly labor and delivery floors); 2 studies recruited from other settings (*eg*, military base and national database) (Figure 1, panel II). The single study that recruited from a military base was conducted within a hospital for active military addressing smoking cessation during pregnancy.⁸²

Intervention Details

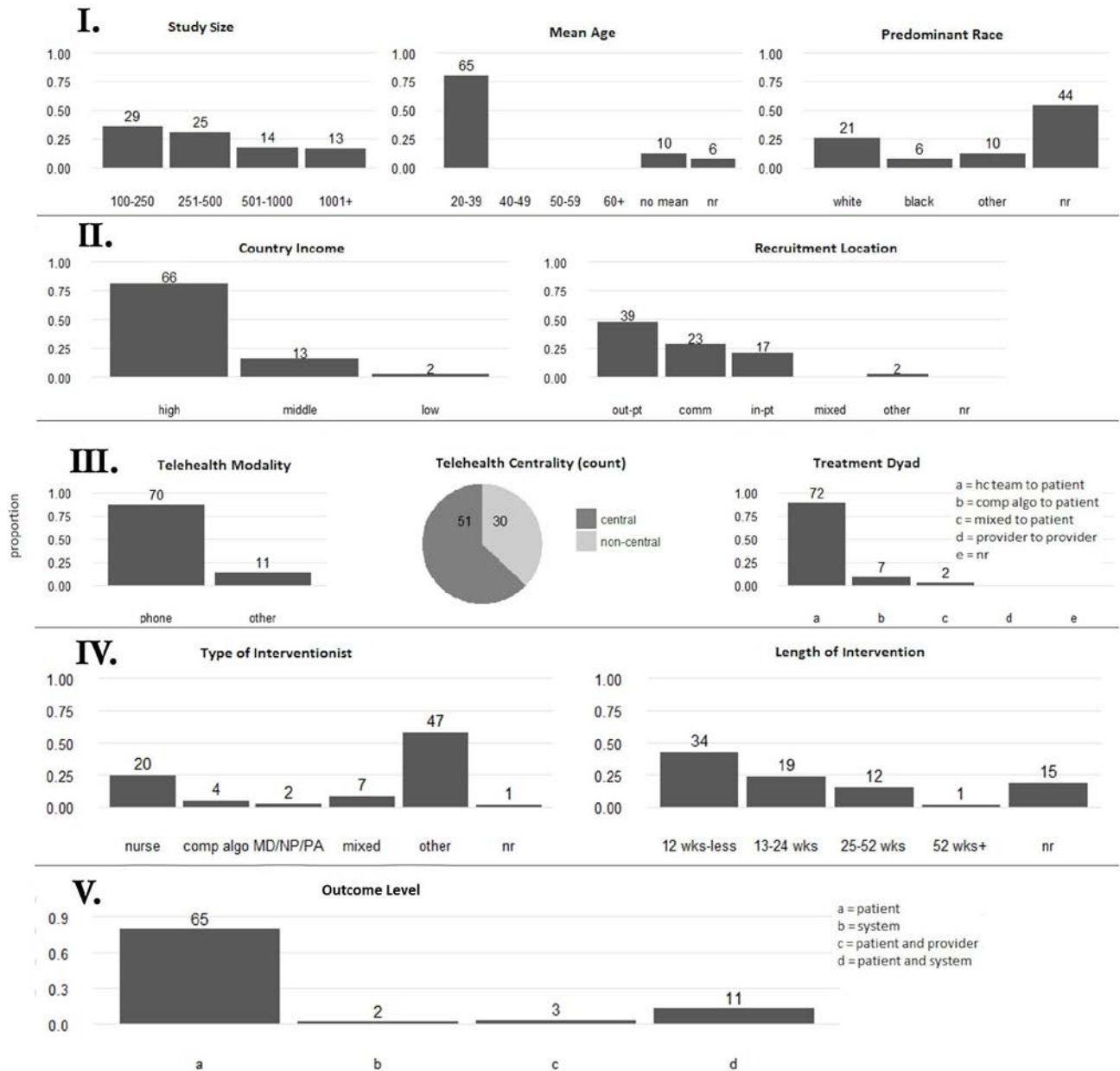
We also categorized studies based on the prominence of the role of telehealth in the study (central or non-central). Most studies employed a telehealth modality as a central feature of the intervention (n=51, 63%); and for most of the studies the telehealth modality chosen was telephone (n=70, 86%) (Figure 2, panel III). Of those studies that did not use telephone as the primary modality, 5 used text messaging or SMS,^{74,76,79,87,92} 3 used an interactive website,^{35,37,55} and 1 each used Facebook[®],⁹⁰ a mobile application,¹⁰⁶ and videoconferencing.¹⁰⁰ Seven studies reported using a secondary telehealth modality. Five studies added telephone communication as a second modality: 1 combined phone with Facebook[®],⁹⁰ 2 with text messaging,^{79,111} 1 with an interactive website use,³⁷ 1 with videoconferencing,¹⁰⁰ and 1 with computer algorithm-delivered communication.⁹² Only 8 studies used asynchronous communication (*eg*, email exchanges and online discussion boards) and the rest were synchronous (*eg*, telephone counseling). Most studies used telehealth modalities to communicate between a health care team member and the patient (n=72, 89%) compared with only 7^{35,55,71,74,76,87,92} that used a computer algorithm to tailor communication to individual patients and 2 that used multiple communication strategies (Figure 2, panel III).

There was a wide variety of credentials and expertise among the interventionists in this area of study. The 3 most common types of interventionists were registered nurses (n=20; 25%), midwives (n=13; 16%) and peer or lay health workers (n=12, 15%) (note that midwives and peer/lay workers are included in the “other” category in Figure 2, panel IV). The most common intervention length was 12 weeks or less (n=34; 42%), 31 studies were 13-52 weeks, and only 1 study was longer than 52 weeks and addressed lactation and infant feeding.⁷⁴ Fifteen studies did not report the intervention length. Just under half of telehealth studies about pregnancy and maternal health reported adherence to the intervention (n=39, 48%). Twenty studies for this focus area reported using a theoretical framework for their intervention. Of those theories reported, the most common was Social Cognitive Theory²²⁸ (n=6)^{33,47,71,85,87,93} and the Transtheoretical Model²²⁹ (n=2).^{71,86}

Outcomes Evaluated

Sixty-nine studies (85%) designated a primary outcome (Appendix D). No studies reported a primary outcome that was focused on provider issues (eg, provider satisfaction). Common specific primary outcomes at the patient level were breastfeeding (n=13), mental health symptoms (n=14), pregnancy outcomes (n=12), and smoking cessation (n=8). The system-level primary outcomes were utilization, quality-of-care indicators, economic outcomes, and access to care. Of all outcomes measured and reported, the most common type was patient-level outcomes (n=65, 80%) followed by patient- and provider-level outcomes (n=3) (Figure 2, panel V).

Figure 2. Evidence Map for Maternal Health Area of Research



Systematic Review Findings

The single relevant SR that focused on maternal mental health evaluated web-based treatments with interventionist support for perinatal mood disorder.¹¹² Of the 4 studies included in the SR, 2 RCTs met our inclusion/exclusion criteria (n=1138). Kersting et al (2013; n=228) recruited German participants of mean age 34 years after a loss of pregnancy. Response to a 5-week intervention consisting of ten 45-minute web-based writing assignments (with therapist feedback) led to a significant decreases in grief, depression, and anxiety compared with a waitlist control (with continued improvement in depression scores at 3- and 12-month follow-up). In the second study, O'Mahen et al (2013; n=910) conducted a study in the United Kingdom with postnatal women of mean age 32 years. The 15-week intervention included eleven 40-minute online sessions with homework focused on behavioral activation, and also provided access to weekly text-based synchronous chat with an interventionist. Depressive symptoms decreased for more participants in the treatment group when compared with those receiving treatment as usual.

Subcategories Within Maternal Health Studies

To further elucidate studies focused on maternal health, we examined the studies by smaller areas of focus within this category. Specifically, we characterized interventions for the following 7 subcategories: prenatal care, lactation, mental health, postpartum, smoking cessation, weight management, and gestational diabetes (Figures 3-6).

Prenatal Care

As noted above, the largest subcategory in the maternal health literature was prenatal care (n=21, 26%). Prenatal interventions primarily targeted prevention of pregnancy complications for mother and/or infant (eg, perineal massage to reduce frequency of episiotomy,¹⁰⁶ reducing risk of alcohol¹⁰⁹ or cocaine use,³⁷ or preterm birth prevention⁴²). The study size for prenatal interventions ranged from 100 to 18,186 participants with 8 studies in the 100-250 participant range^{37,39,41,55,64,106,108,109} and 8 studies in the 1001 or more range.^{42,72,73,76,79,80,85,86} The largest intervention⁷⁶ involved a national campaign to promote influenza vaccination among pregnant women already enrolled in a text messaging service. All but 4 studies in this area of the literature were conducted in high-income countries (n=16, 76%). Most of the prenatal interventions employed a telehealth modality as the central feature (n=13, 62%), and for 16 studies the telehealth modality was telephone (76%). Other modalities used for prenatal interventions were a mobile application,¹⁰⁶ SMS/text messaging,^{76,79} and interactive website.^{37,55} There were no provider-to-provider directed telehealth interventions for prenatal care, and the interventionists in this subcategory were predominantly nurses or midwives (n=14, 67%). Seven prenatal studies were relatively short in duration lasting 12 weeks or less (33%), with none lasting longer than a year. Most primary outcomes were patient level (n=17, 81%), none were provider level, and 3 were system level.^{79,80,86} The primary outcome was unclear in 1 study.⁵⁷ Examples of patient-level primary outcomes included rate of cesarean delivery,⁷³ gestation age at delivery,⁴² and perceived social support during pregnancy.⁶⁴ System-level outcomes for prenatal trials included access to care,⁸⁰ quality of care,⁷⁹ and economic outcomes.⁸⁶

Lactation

This subcategory had 16 trials (20%). The size of studies ranged from 103 to 1885 participants, with 7 studies having 251-500 participants (44%).^{43,50,51,56,59,67,105} While 7 studies were conducted in the United States (44%),^{43,50,51,56,59,67,105} studies from outside the US were most often from Asian countries (n=5, 31%).^{60,67,74,105,110} As with the literature on prenatal

interventions, lactation interventions featured telehealth modalities as a central part of the intervention (n=14, 88%) and were most often telephone-based (n=13, 81%). The most common interventionist type was peer or lay health worker (n=7, 44%).^{21,45,50,51,90,102,110} The largest proportion of these studies included interventions lasting 13-24 weeks (n=7, 44%).^{44,45,56,67,102,105,110} All trials that clearly reported primary outcomes were at the patient level (n=13, 81%) and focused on duration and exclusivity of breastfeeding.

Mental Health

Fourteen RCTs used telehealth to target mental health conditions among perinatal women (17%). The mental health condition most frequently targeted was postpartum depression (n=8, 57%).^{52,65,75,77,78,84,88,104} Overall, study sizes ranged from 100 to 771 participants. The studies were all from middle-income (n=5)^{63,65,75,77,84} and high-income (n=9) countries.^{52,62,66,78,83,88,89,104,107} Recruitment was mostly outpatient or community-based (n=10; 71%), and only 4 recruited women from inpatient settings.^{65,84,88,89} Most of the mental health literature included interventions of shorter duration, with 10 RCTs lasting 12 weeks or less (71%). Half the mental health trials featured telehealth as a central modality of the intervention (n=7, 50%); however, telephone was the only modality used and telehealth communication was health care team-to-patient in all trials; no trials used computer algorithms. All trials evaluating mental health used patient-level primary outcomes that were focused on patient-reported symptomatology.

Postpartum

The postpartum-focused telehealth literature included 9 RCTs (11%). Postpartum issues addressed supporting new mothers in self-care and infant care. Eight trials (11%) were smaller in size ranging from 100 to 388 participants, and 1 study included 1598 participants.¹⁰⁰ This larger study examined videoconferencing for postpartum follow-up compared with traditional in-person evaluations in Catalonia, Spain. All trials on postpartum care were conducted in middle- and high-income countries, and all but 2^{68,81} recruited from outpatient clinics or community. While 1 trial did not report intervention duration,¹⁰⁰ of those that did, half were 12 weeks or less (n=4, 44%).^{40,61,81,101} Most featured telehealth as a central modality (n=7, 78%), and most used telephone (n=7, 78%). The 2 other modalities were SMS/text messaging⁹² and videoconferencing with the patient at home.¹⁰⁰ Three postpartum trials had patient-level outcomes (treatment adherence,³⁹ pregnancy outcomes,⁶⁸ and infant development markers),⁴⁷ and 2 had system-level outcomes (utilization⁴⁷ and access to care⁹²). Two trials did not clearly identify primary outcomes.^{61,101}

Smoking Cessation

There were 8 telehealth trials on smoking cessation during and after pregnancy. All but 1 of these included at least 200 participants, and 1 included 105 participants.⁵⁴ All were conducted in high-income countries with 5 in the United States.^{33,46,54,82,103} All but 1 trial⁶⁹ recruited patients from the outpatient or community setting, and 1 specifically recruited women though the Womack Army Medical Center (listed as “other” in the figure).⁸² Telehealth was central in most smoking cessation studies (n=6, 75%),^{33,46,71,82,87,103} and the majority of these trials were telephone-based with 1 study that used SMS/text messaging⁸⁷ through a computer algorithm. Smoking cessation trials most often lasted 12 weeks or less (n=5, 63%).^{46,69,71,87,103} One smoking cessation trial did not describe a clear primary outcome,⁷¹ but the other 7 all used a patient-level primary outcome that was centered on cessation or abstinence from smoking.

Weight Management

Weight management during and after pregnancy was addressed in 8 telehealth interventions (10%). This literature focused on both limiting gestational weight gain and losing weight during the postpartum period. Study size for weight management trials ranged from 119 to 2212 participants and all were conducted in high-income countries. All trials recruited from the outpatient or community setting. While similar to other subcategories within maternal health, trials on weight management only used telephone as the modality, and this literature differed in that most used telehealth modalities as an ancillary component of the intervention (n=6, 75%).^{38,53,94-97} All weight management trials featured communication between health care team members and patients, with none using computer algorithms. These trials tended to last longer than trials in the other topic areas, with only 1 study with a duration of 12 weeks or less.⁹⁸ Seven of the 8 weight management studies used a patient-level primary outcome, and 1 was unclear.⁹⁴ Examples of patient-level primary outcomes included rates of pregnancy complications,⁹⁸ postpartum weight retention,⁹⁵ and incidence of infants born large for gestation age.⁵³

Gestational Diabetes

Gestational diabetes was addressed in 5 trials (some trials also included women with type 1 diabetes, and one included women with gestational diabetes or type 2 diabetes).^{49,111} Two studies intervened to reduce postpartum consequences for women with gestational diabetes,^{58,93} 2 addressed diabetes management during pregnancy,^{49,111} and 1 aimed to prevent the development of gestational diabetes among women at risk.¹⁷ Four of these 5 studies were RCTs and 1 was a nonrandomized trial.⁴⁹ Study sizes ranged from 100 to 2280 participants, and 2 were conducted in the United States.^{58,111} All used telephone as the telehealth modality, and 2 studies used it as a central part of the intervention.^{49,111} There was 1 study that used physicians to deliver the intervention,⁴⁹ which was relatively unusual across the larger field of women's telehealth literature. Three of the 5 studies lasted 13 to 24 weeks,^{17,49,58} and 2 were 12 weeks or less.^{93,111} Primary outcomes for gestational diabetes studies were patient-level when reported (n=4)^{17,58,93,111} and included weight,^{17,58,93} fasting glucose,^{17,93} and mean self-monitoring blood glucose compliance rate.¹¹¹

Figure 3. Evidence Map for Maternal Health Subcategories (Study Size, Age, Race)

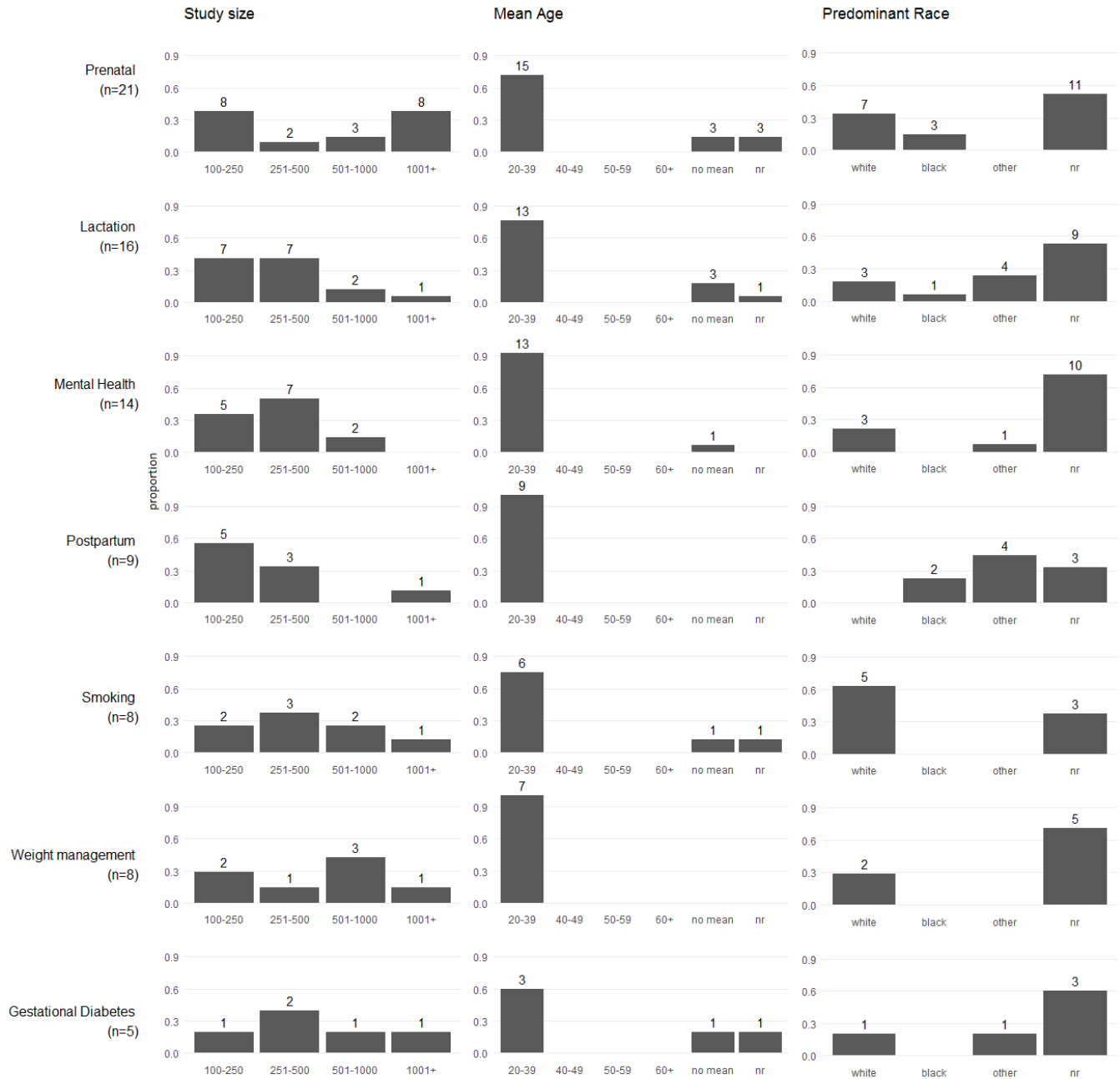


Figure 4. Evidence Map for Maternal Health Subcategories (Modality, Centrality, Dyad)

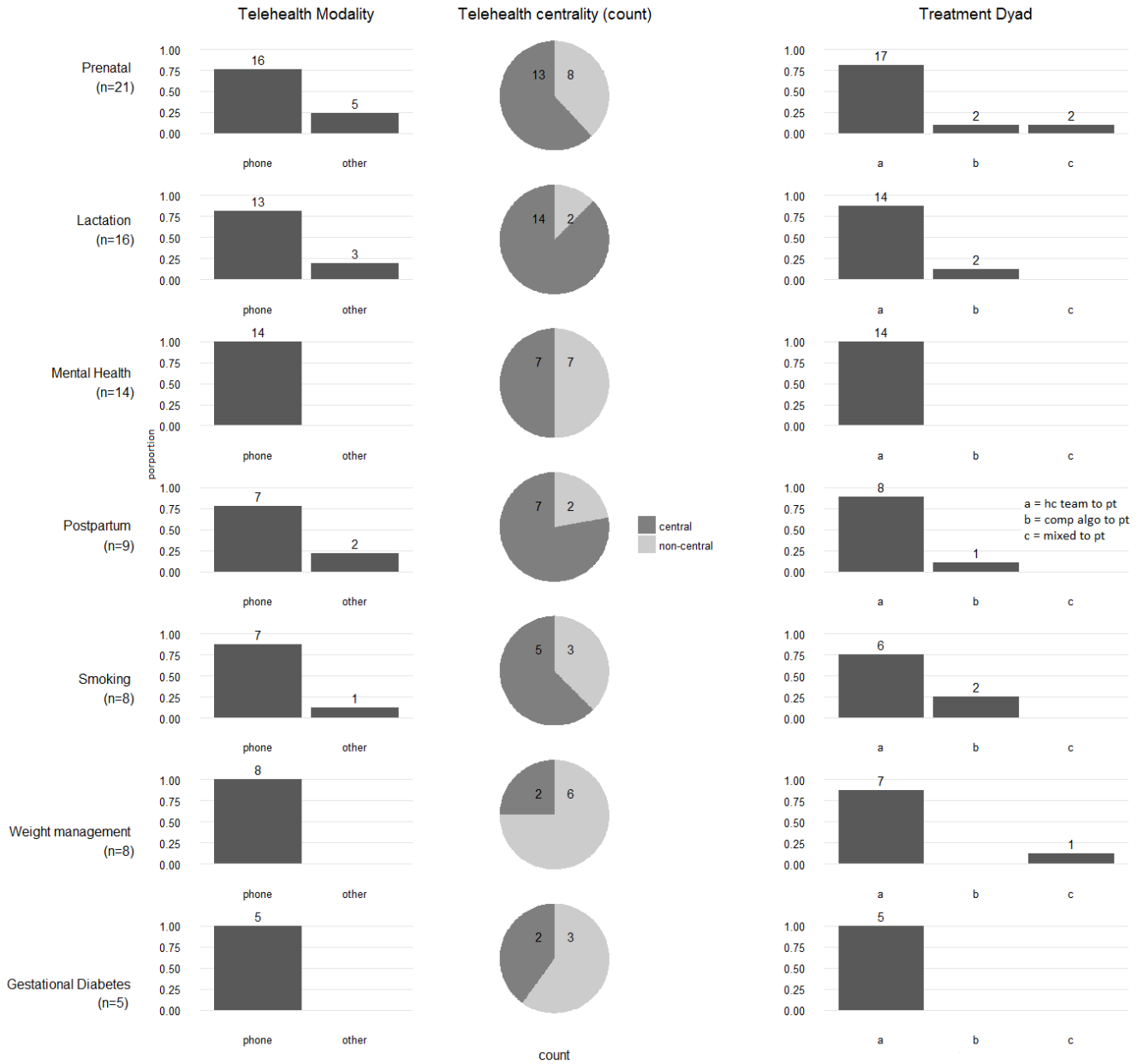


Figure 5. Evidence Map for Maternal Health Subcategories (Income, Recruitment Location)

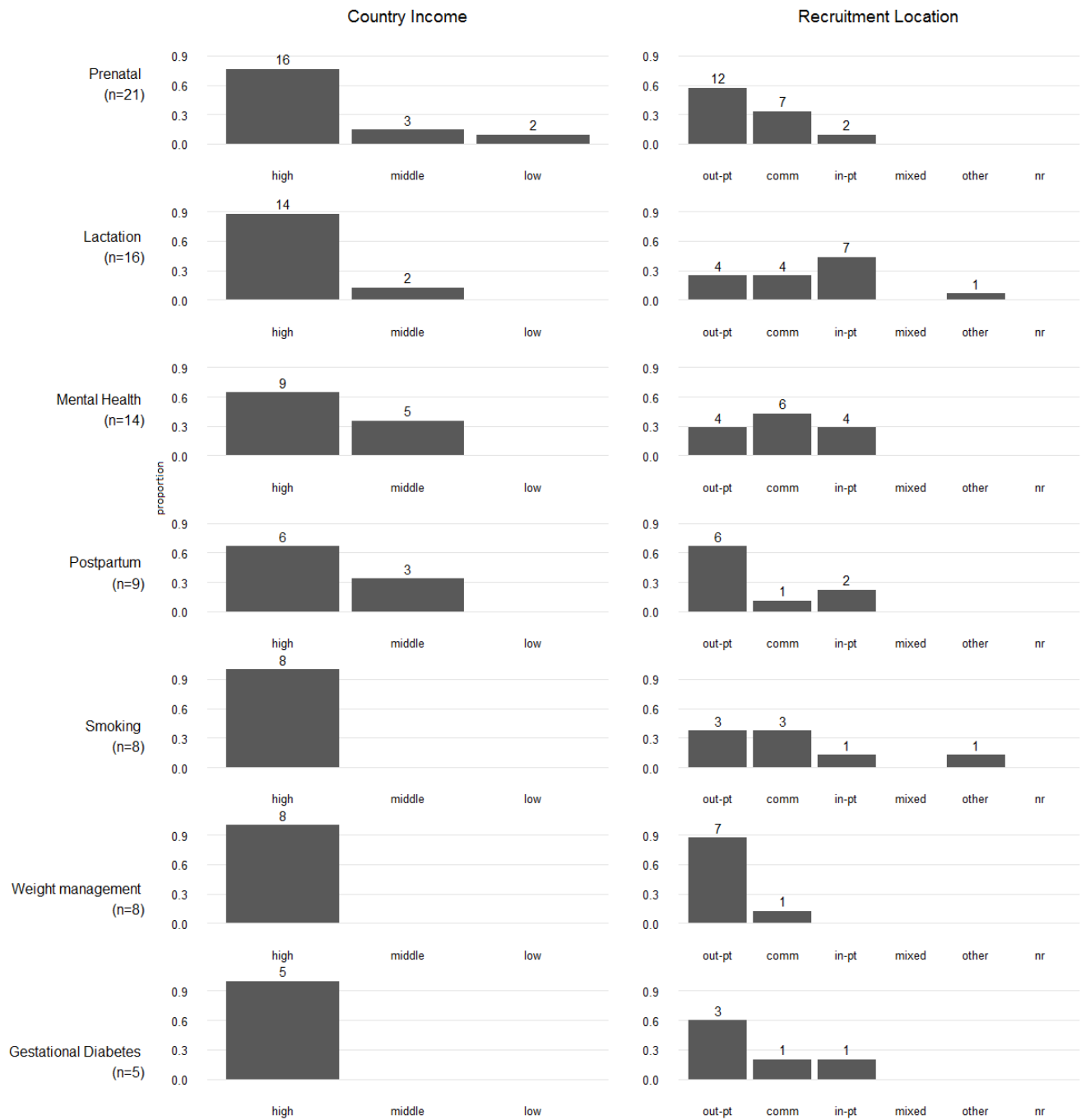
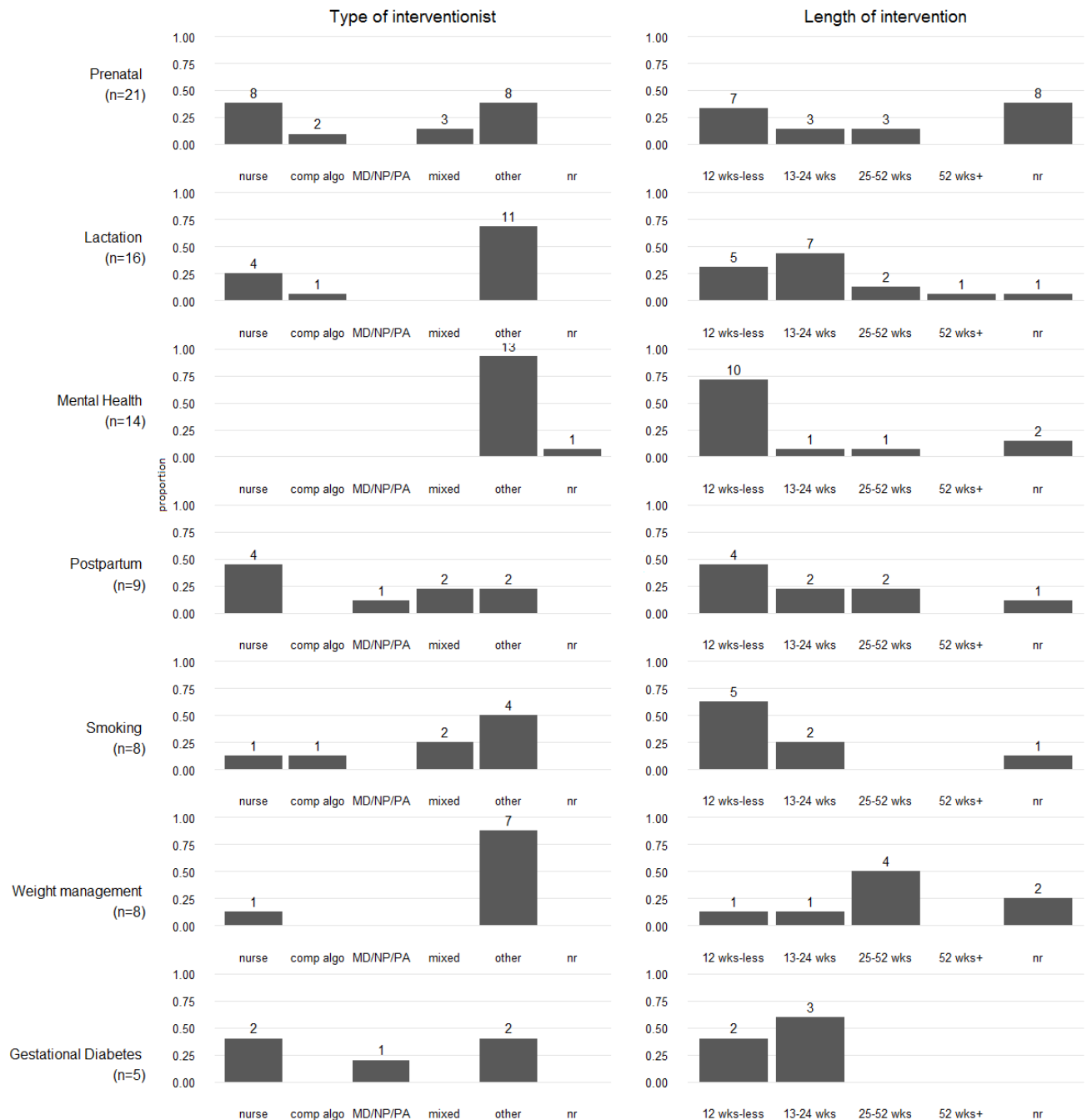


Figure 6. Evidence Map for Maternal Health Subcategories (Interventionist, Length of Intervention)



PREVENTION

Key Points

- Beyond maternal health, the greatest amount of published literature focused on modifying behaviors associated with prevention; the largest subcategory of prevention-focused studies were devoted to increasing physical activity.

- The most common intervention length was 25-52 weeks, and telephone was the dominant telehealth modality.
- For the studies that delineated a primary outcome, all were at the patient level. A small minority of studies reported secondary outcomes at the provider and system level.
- One study addressed smoking cessation among active military service members on a Navy base. No prevention studies were conducted in the VA.

Synthesis of Findings

Study Characteristics and Demographics

The second largest area of telehealth interventions for women focused on prevention (n=56). These included 18 studies on increasing physical activity,^{18,30,118,126,127,129,132,133,137,138,140-143,149,150,155,158} 14 on cancer screening,^{29,32,115,120,123-125,130,134,135,148,151,157,162} 11 on weight management,^{113,114,117,122,128,131,136,139,152,159,163} 10 on smoking cessation,^{116,119,121,144,146,147,156,160,161,164} and 3 on diet.^{145,153,154} Nearly all of these studies were RCTs, with only 1 nonrandomized trial, a controlled before-and-after study.¹⁵⁹ Most studies had 500 or fewer participants (n=36; 64%), yet 21% had more than 1000 participants. The most common age category for this focus area were women with mean ages from 50 to 59 years (n=21; 36%), with only 4 studies focused on women with a mean age 60 years or older. Eight studies reported age with no measure of central tendency. In nearly half the studies, the recruitment populations were majority white (n=26; 46%), and 8 studies recruited populations that were majority black; 30% did not report race or ethnic data (Figure 7, panel I). Nearly all studies were conducted in countries categorized as high income by the World Bank (n=55), which included 43 from the United States, with only 1 study conducted in middle-income and none conducted in low-income countries. The most common recruitment site was the outpatient setting (n=25; 45%),^{29,115,117,121-124,128,129,131,133,134,136,140,144,145,148,150-152,154-156,163} followed by community settings n=23; 41%).^{18,30,113,114,118,120,122,125,127,130,132,137-139,141-143,149,153,157,161,162,164} One study recruited from a Navy base and addressed smoking cessation for new recruits¹¹⁹ (Figure 7, panel II).

Intervention Details

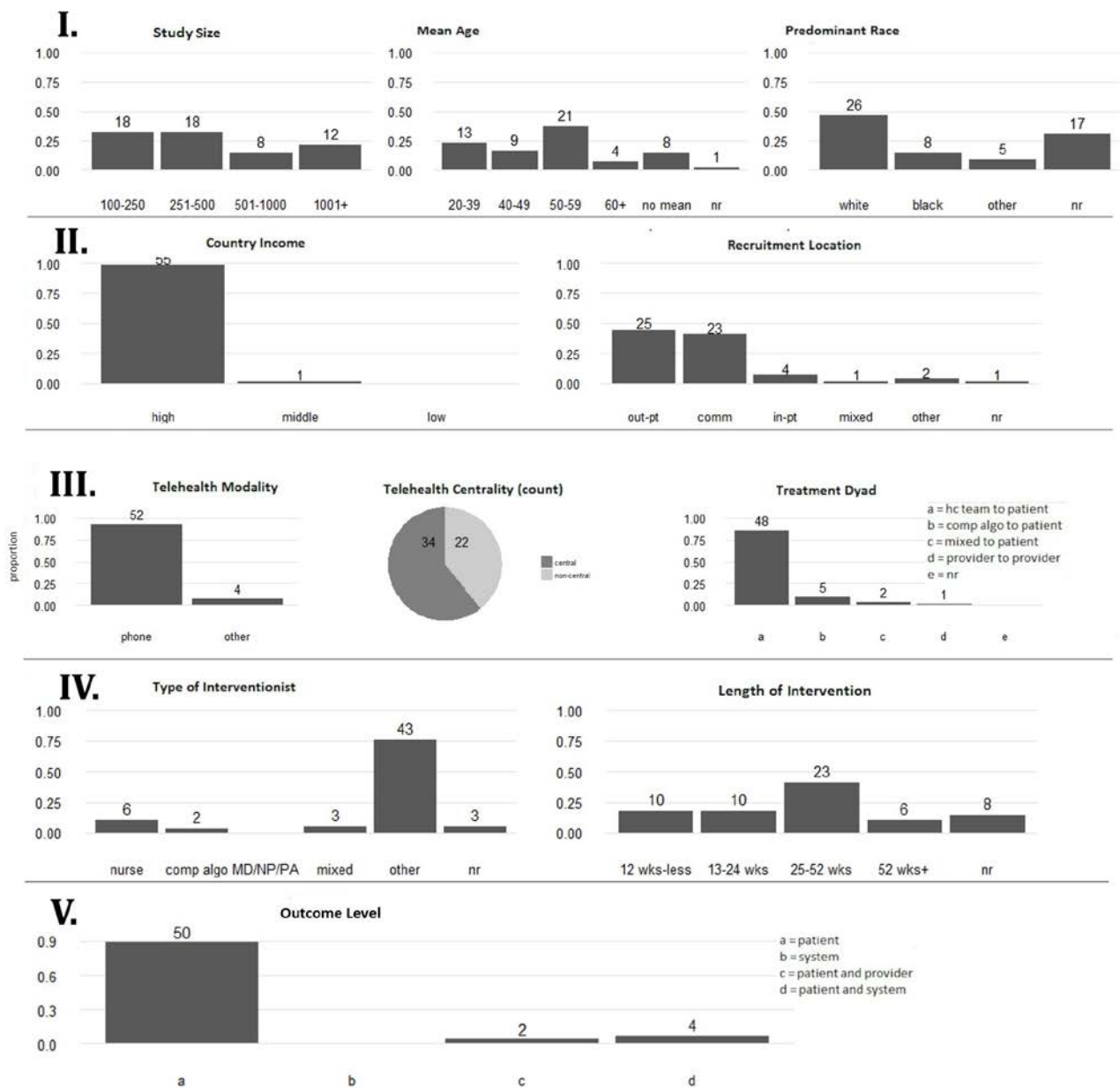
For prevention-focused studies, 61% used telehealth modalities as the central intervention strategy (n=34). The overwhelming majority used synchronous, person-to-person communication via telephone as the primary mode of telehealth delivery (n= 54; 93%). For the 4 studies that did not use telephone as the primary modality, 2 used texting,^{127,143} 1 used a mobile application,¹⁶⁴ and 1 used an interactive voice response (IVR) system¹⁶³ (Figure 7, panel III). The most common intervention length was 25-52 weeks (n=23; 40%). However, 18% of studies were only 12 weeks or less in duration (n=10). Conversely, 6 studies were 52 weeks or more (Figure 7, panel IV). We also categorized studies based on the participants involved in the telehealth communication (*ie*, the treatment dyad). For studies in this focus area, the majority (n=48; 86%) were focused on health care team member-to-patient communication. Five used telehealth interventions to direct strategies guided by computer algorithms to patients,^{121,127,133,135,164} 1 focused on communications from one provider to another provider,¹⁴⁶ and 2 were focused on a mix of provider-to-patient plus IVR communications¹⁶³ or provider to patient plus provider to provider communications.¹⁴¹ Many types of individuals served as interventionists in prevention-focused studies with a wide mix of backgrounds and credentialing. Many studies used nonmedical professionals such as community worker or peer support personnel (n=9), health educators (n=5), health coaches (n=3), and a combination of other nonmedical professionals with

unspecified credentialing or training (*eg*, interventionist trained by study staff) (n=14) (Figure 7, panel IV). There was also a wide variety of other credentialed professionals such as dietitians (n= 6), behavioral health specialists (n=3), and registered nurses (n=6) that served as interventionists. However, no physicians, nurse practitioners, or physician assistants served as interventionist in any of the identified studies. We also assessed if studies provided data on adherence to the intervention; for prevention-focused studies, 53% did not provide this information (n=30). Also the majority of studies did not delineate a theoretical framework (n=33; 59%). Of those that did, the most commonly named models were the Social Cognitive Theory²²⁸ (n=14) and the Transtheoretical Model²²⁹ (n=9).

Outcomes Evaluated

For prevention-focused studies, all primary outcomes were on the patient level (Appendix D). No studies reported provider- or system-level outcomes as a primary outcome. Of those studies designating a primary outcome (n=49, 85%), the most common primary outcomes were cancer screening rates (n=12) and physical activity (n=11), followed by smoking cessation (n=8) and weight (n=7). When looking at secondary outcomes for the prevention-focused studies, there were 6 studies that included additional secondary outcomes at the provider (n=2) or system level (n=4) (Figure 7, panel V).

Figure 7. Evidence Map for Prevention Area of Research



DISEASE MANAGEMENT

Key Points

- The vast majority of studies that focused on disease management were RCTs and were mainly conducted in countries categorized as high income by the World Bank.
- The largest proportion of studies had fewer than 1000 participants, and most studies were conducted with middle-aged women.
- The most common mode of telehealth delivery was telephone and in a third of studies the interventionist was a nurse.

- The majority of studies focused on patient-level outcomes, the most common of which were quality of life and clinical symptoms.
- No disease management studies were conducted within the VA.

Synthesis of Findings

Study Characteristics and Demographics

Forty-three (20%) telehealth interventions were focused on disease management. The vast majority were RCTs (n=41; 95%); we identified only 2 nonrandomized studies. The majority of studies had 2 arms (n=26; 60%), with 10 studies having 3 arms and 7 having 4 arms. Sample size ranged from 100 to 6591, with most studies having 1000 or fewer participants (n=38; 88%), and only 5 studies having more than 1000 participants.^{19,168,185,186} The mean age ranged from 30 to 80 years. The most common age category was middle-aged women of mean age 40-60 years (n=24), with only 8 studies focused on women with mean age over 60 years (n=9, 20%); 8 studies did not report mean age and/or did not report age at all. Only 23 (53%) studies reported race and ethnicity, and across these studies the most commonly reported category was white (n=18, 41%) (Figure 8, panel I). Except for 1 study, which was conducted in Iran, a middle-income country,¹⁹⁷ all other studies were conducted in countries categorized as high income by the World Bank. Twenty-five studies (58%) were conducted in the United States.^{19,20,23,26-28,31,34,167-169,171,174-177,182-186,192-194,196} The most common recruitment site was specialty care settings (n=20, 45%) followed by community settings (n=9, 21%) and inpatient settings (n=3, 7%) (Figure 8, panel II).

Intervention Details

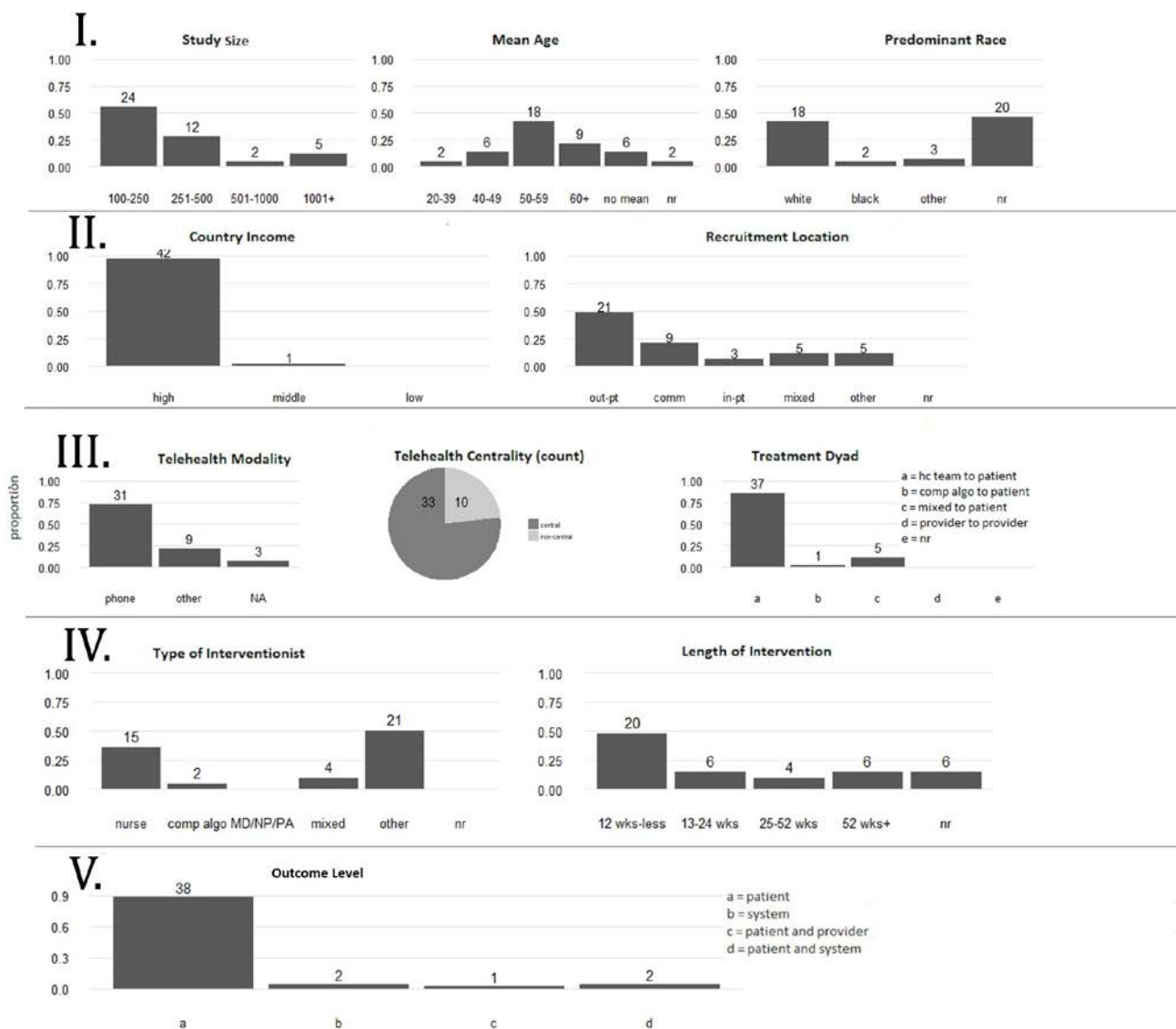
The most common intervention length was 12 weeks or less (n=20, 47%). Six studies were between 13 and 24 weeks,^{23,26,34,169,176,193} 4 studies between 24 and 52 weeks^{174,177,182,192} and 6 studies were 52 weeks or more.^{24,25,31,185,186,195} Six studies did not report intervention length. For disease management studies, 77% used telehealth modalities as the central intervention strategy (n=33). The most common mode of telehealth delivery was telephone (72%; n=31 studies). For the 9 studies that did not use telephone as the primary intervention modality, 7 used interactive website,^{23,172,173,177,179,189,191} 1 one used secure email,¹⁹⁰ and 1 used a mobile application.¹⁸⁰ Three studies use more than one modality: 1 added videoconferences to telephone communication as a second modality,²⁰ and 2 combined telephone with an interactive website^{26,34} (Figure 8, panel III). Overall, 84% (n=37) used synchronous communication, while 5 used asynchronous,^{179,180,189-191} and 2 used a hybrid approach.^{19,172}

We also categorized studies based on the participants involved in the telehealth communication. Telehealth communication was most commonly conducted between a health care team member and a patient (n = 37; 84%), followed by mixed or multiple types of communication with patients (n = 6; 14%).^{19,23,26,165,179,189} One study used a computer algorithm in patient communication.¹⁷² The most common type of interventionist was registered nurse (n=15, 35%). Three studies used a mix of interventionist (nurse and/or behavioral health specialist,^{31,180} nurse and computer algorithm¹⁷³), and 2 used computer algorithms^{34,172} (Figure 8, panel IV). We also assessed if studies provided data on adherence to the intervention; for this focus area, only half the studies provided this information (n=21). Twenty-six studies endorsed using various theoretical frameworks for their intervention, including a health promotion model²³⁰ (n=1¹⁷⁷), acceptance and commitment therapy²³¹ (n=1¹⁸⁰), and social cognitive theory²³² (n=1¹⁷⁹), among others.

Outcomes Evaluated

Of the studies that reported a primary outcome, the majority had a patient-level primary outcome (n=35; 81%), 4 studies focused on system-level outcomes, and 4 studies did not report any specific primary outcome (Appendix D). Studies with a patient-level primary outcome mainly measured quality of life (n=13), clinical symptoms (n=14), and medication or treatment adherence (n=3, 7%).^{19,174,195} Studies with a system-level primary outcome measured cost,¹⁸⁹ utilization,¹⁷⁶ quality-of-care indicators,¹⁶⁸ and economic outcomes.²⁴ When looking across all outcomes reported (eg, primary and secondary outcomes), the majority reported patient-level outcomes only, 2 reported system-level outcomes, 1 reported both patient- and provider-level outcomes, and 2 reported patient- and system-level outcomes (Figure 8, panel V).

Figure 8. Evidence Map for Disease Management Area of Research



FAMILY PLANNING

Key Points

- Eleven studies used telehealth to address issues related to family planning. Of these, 6 addressed contraception use (eg, adherence, choice of, and co-administration with teratogenic medications), 2 addressed post-abortion care, 2 addressed issues related to assisted reproductive technology, and 1 addressed fertility and pregnancy among cancer survivors.
- Four studies had more than 1,000 participants, and half of those were conducted in high-income countries as defined by the World Bank.
- Most studies used telephone as the telehealth modality, and the role of telehealth was central to the intervention for a majority of studies.
- All but 1 study used telehealth to communicate between the health care team and the patient, but the actual credentials of the interventionist varied across studies.
- There were no VA-based studies.

Synthesis of Findings

Study Characteristics and Demographics

Eleven studies focused on telehealth interventions for family planning, addressing issues related to choice of contraception and contraception adherence (n=5, 45%),^{198,199,201,206,207} post-abortion care (n=3, 27%),^{202,203,205} infertility (n=2, 18%),²⁰⁰ and fertility and pregnancy among cancer survivors (n=1, 9%).²⁰⁴ Ten studies were RCTs, and 1 was a nonrandomized trial.²⁰¹ Study sizes ranged from 108 to 1,433 participants; 3 of the 4 largest studies, all with over 1,000 patients, addressed contraception choice and contraception adherence.^{198,199,201} As expected, the most common age category for this focus area was 20-39 years (n=8, 73%); 2 studies did not report age in a comparable way.^{198,205} Of note, 1 study had a mean age range between 51 and 60 years²⁰⁴ – this was a peer counseling study for African-American women survivors of breast cancer and addressed survivorship concerns across the reproductive spectrum from infertility and pregnancy to menopausal symptoms. Across the 10 studies, race was mostly not reported (n=8, 73%), while 1 study each was majority black,²⁰⁴ white,¹⁹⁹ and other¹⁹⁸ (Figure 9, panel I). The location in which the family planning studies were conducted was split between high-income (n=6, 55%)^{199,200,204,206-208} and middle-income countries (n=4, 36%),^{201-203,205} with only 1 study from a low-income country (Uganda).¹⁹⁸ Four studies were conducted in the United States.^{199,204,206,208}

Intervention Details

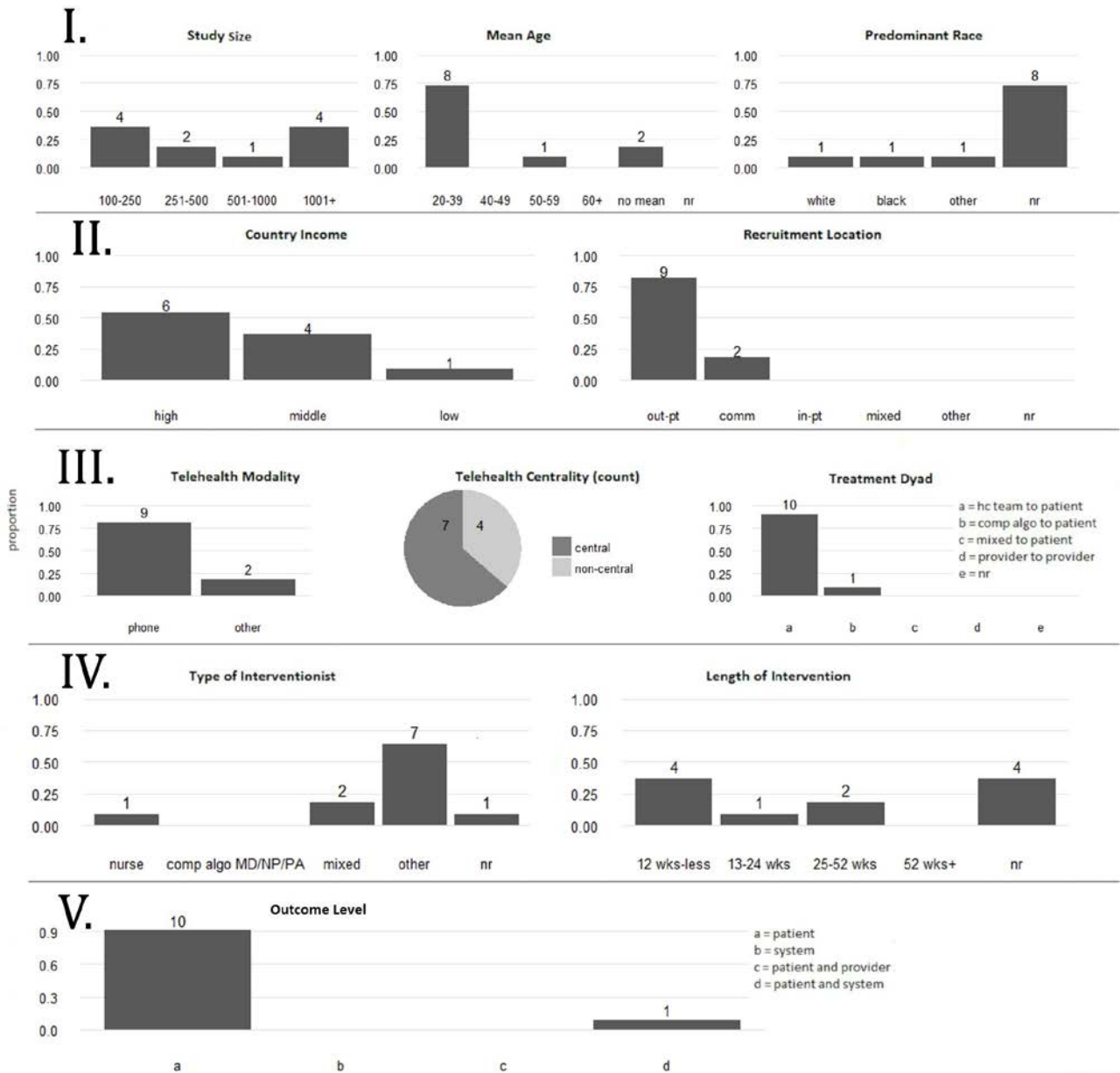
We also examined characteristics of the intervention type. As with other intervention focus areas, most of these studies used telephone as the mode of telehealth delivery (81%, n=9), while 1 used video conference to home,²⁰⁰ and 1 used an interactive website.²⁰⁶ Seven of the 11 studies featured a telehealth modality as a central feature of the intervention,^{199-201,205-208} while for 3 it was ancillary^{198,202,204} and nominal in 1.²⁰³ The majority of family planning studies used telehealth for communication between members of the health care team and patients; only 1 study used a computer algorithm to communicate with patients²⁰⁶ (Figure 9, panel II). Most studies utilized synchronous communication between involved parties, while 1 used asynchronous communication²⁰⁰ and 1 used a hybrid approach.²⁰⁵

The interventionists varied widely. Two studies used a peer or lay health worker,^{198,204} 2 used a health educator,^{201,206} 1 used a social worker,²⁰⁸ and 1 study each used the following interventionist types: unspecified counselor,²⁰⁵ provider,²⁰⁰ registered nurse,²⁰² unspecified nonprofessional,²⁰³ and multiple types of interventionists.¹⁹⁹ The credentials of the interventionist were not reported in 1 study.²⁰⁷ Of those studies that reported the length of the intervention, the most common length was 12 weeks or less (n = 4),^{203,205,207,208} with 2 lasting 25-52 weeks,^{201,204} and 1 lasting 13-24 weeks;¹⁹⁹ 4 studies did not report the length of the studied intervention^{198,200,202,206} (Figure 9, panel III). Of the studies using telephone as the telehealth modality, only one study reported the length of the telephone calls (30 minutes).²⁰⁴ Of the telephone-based studies that reported the number of phone contacts, 4 consisted of only 1 phone call,^{202-204,207} 1 had 2 phone calls,²⁰⁸ and 2 had 6 phone calls.^{199,205} Most studies did not report adherence to the study protocol (n=7, 64%),^{199,200,203-205,207} and only 1 study¹⁹⁹ reported basing the intervention design on an established theory, the Health Belief Model.²³³ All recruitment for the family planning studies occurred in either the outpatient or community setting (Figure 9, panel IV). There were no VA-based studies.

Outcomes Evaluated

All family planning studies had a patient-level primary outcome (Appendix D). The most common primary outcome was medication adherence (n=4), followed by physical symptoms (n=2), contraceptive use (n=2), mental symptoms (n = 2), and patient satisfaction (n=1). One study included a system-level outcome as a secondary outcome (Figure 9, panel V).

Figure 9. Evidence Map for Family Planning Area of Research



HIGH-RISK BREAST CANCER ASSESSMENT

Key Points

- We identified 7 studies that focused on risk assessment for breast cancer; all studies were synchronous, telephone-based, featured telehealth as the central intervention modality, and were designed for information flow from a provider to a patient.
- Most studies on high-risk breast cancer assessment compared telephone-based genetic counseling with in-person counseling, while 1 focused on promoting healthy behaviors including proper risk assessment among sisters of young women with breast cancer. One study provided social support to women known to carry genetic mutations that put them at high risk for breast cancer.
- Studies were conducted among high-income countries such as the United States and Australia. No studies about high-risk breast cancer assessment were conducted within VA.

Synthesis of Findings

Study Characteristics and Demographics

We identified 7 telehealth interventions related to identifying and managing women at high risk for breast cancer.²⁰⁹⁻²¹⁵ These included 5 interventions designed to test phone-based versus in-person genetic counseling,²¹⁰⁻²¹⁴ 1 providing emotional support to women with known BRCA1/BRCA2 mutations,²¹⁵ and 1 targeting the sisters of young women with breast cancer to promote appropriate risk assessment, increase knowledge about risk, and reduce worry related to breast cancer risk.²⁰⁹ All of these studies were individual (n=3)^{209,214,215} or cluster RCTs (n=4).²¹⁰⁻²¹³ The size of studies ranged from 100 to 1,012 participants. The most common age category was 40-49 years (n= 4)^{209,211,214,215} and 50-59 years (n=3).^{210,212,213} Most studies had a predominant racial group that was white (n = 6),²⁰⁹⁻²¹⁴ with 1 study that did not report racial composition²¹⁵ (Figure 10, panel I). All breast cancer risk studies were conducted exclusively among high-income countries. Most studies were set in the United States (n=6), while 1 was set in Australia.²¹⁵ Participants were recruited from a variety of settings including specialty care (n=3),^{211,214,215} primary care (n=1),²¹⁰ community-based settings (n=2),^{209,213} and a cancer registry²¹² (Figure 10, panel II).

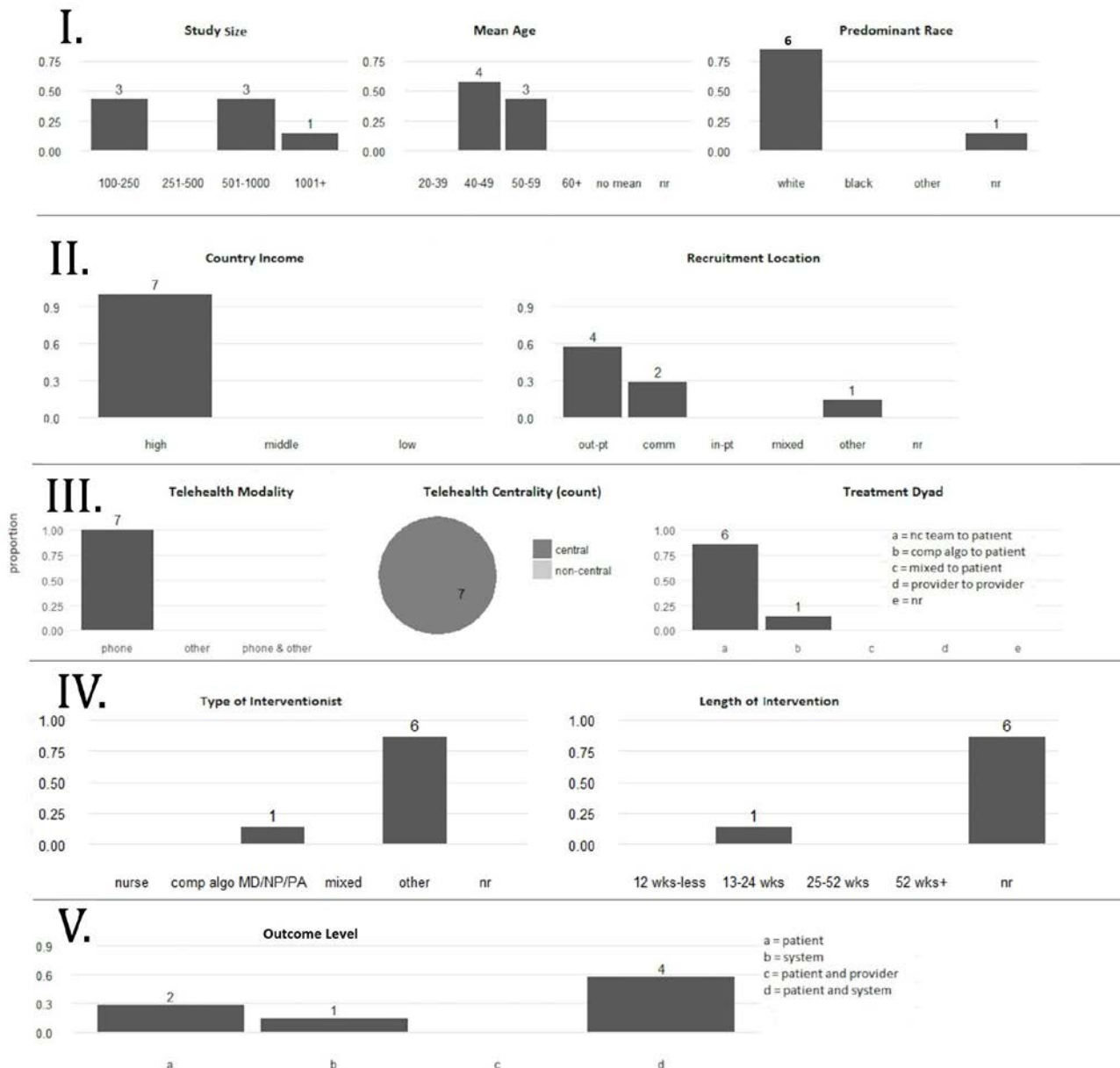
Intervention Details

All studies were synchronous, telephone-based, and featured telehealth as the central intervention modality. Most studies were designed for information flow from the health care team to a patient, and one study sent information from a computer algorithm to a patient²¹⁴ (Figure 10, panel III). The interventionist varied across studies. Providers were most frequently genetic counselors (n=4),^{210,212-214} followed by behavioral health specialists,²⁰⁹ peer or lay health workers,²¹⁵ and physician or advanced practice nurse.²¹¹ Only 1 study clearly described the length of the study, which was 13-24 weeks; this intervention provided social support to women with known BRCA1/BRCA2 mutation.²¹⁵ Four studies did not specify the length of the intervention but focused on the number of telephone counseling sessions (ranging 1-3 calls),^{210-212,214} and 2 studies did not report the number of calls^{209,213} (Figure 10, panel IV). Three of the 7 studies reported adherence to the intervention protocol.^{210,214,215} We also evaluated whether studies included information about a theoretical framework. Most breast cancer risk studies did not provide a theoretical rationale (n=6); however, 1 study²⁰⁹ referenced the Health Belief Model,²³³ Self-Regulation Theory,²³⁴ and Transtheoretical Model.²²⁹

Outcomes Evaluated

For this focus area, 4 studies had primary outcomes at the patient level including mental health symptom assessments^{209,211,215} and patient satisfaction,²¹⁴ while 3 studies had system-level primary outcomes including cost²¹⁰ and utilization.^{212,213} No breast cancer risk studies included provider-level outcomes (Appendix D). However, when accounting for both primary and secondary outcomes together, 2 studies included patient-level outcomes only, 2 had system-level outcomes only, and 4 reported patient- and system-level outcomes (Figure 10, Panel V).

Figure 10. Evidence Map for High-Risk Breast Cancer Assessment Area of Research



MENTAL HEALTH

Key Points

- In addition to the 14 studies identified in the maternal health section that focused on postpartum depression and parenting anxiety, we identified 6 more studies that focused on mental health generally. All of these included synchronous telephone communication and addressed anxiety, posttraumatic stress disorder, and/or depression.
- One study examining treatment of posttraumatic stress disorder via telemedicine recruited both Veteran and civilian women through a VA and community setting.
- The frequency of telephone contact for mental health studies varied from weekly, to 1-2 calls, or more complex algorithms dictating frequency.

Synthesis of Findings

Study Characteristics and Demographics

Six studies focused telehealth interventions on women's mental health outside the postpartum period. All of these studies were 2-armed, individual RCTs. Four studies had between 100 and 250 participants^{217,219-221} and 2 had 251-500.^{216,218} Of those studies that reported age of participants, 2 studies had a mean age of 20-39 years,^{217,220} 1 study 40-49 years,²²¹ and 1 study 50-59 years.²¹⁸ Participants in 3 studies were predominately white,^{218,219,221} and 3 studies did not report participants' race^{216,217,220} (Figure 11, panel I). Most of the studies were conducted in countries categorized by the World Bank as high income (n=5),^{216-219,221} with most of these being in the United States.^{218,219,221} One study was conducted in a middle-income country.²²⁰ Further, most studies recruited women from specialty care settings (n=4),²¹⁶⁻²¹⁹ while 2 studies recruited from the community (Figure 11, panel II).^{220,221} One study compared the delivery of cognitive processing therapy via in-person versus video teleconferencing for posttraumatic stress disorder and recruited both Veteran and civilian women through VA and community settings.²²¹

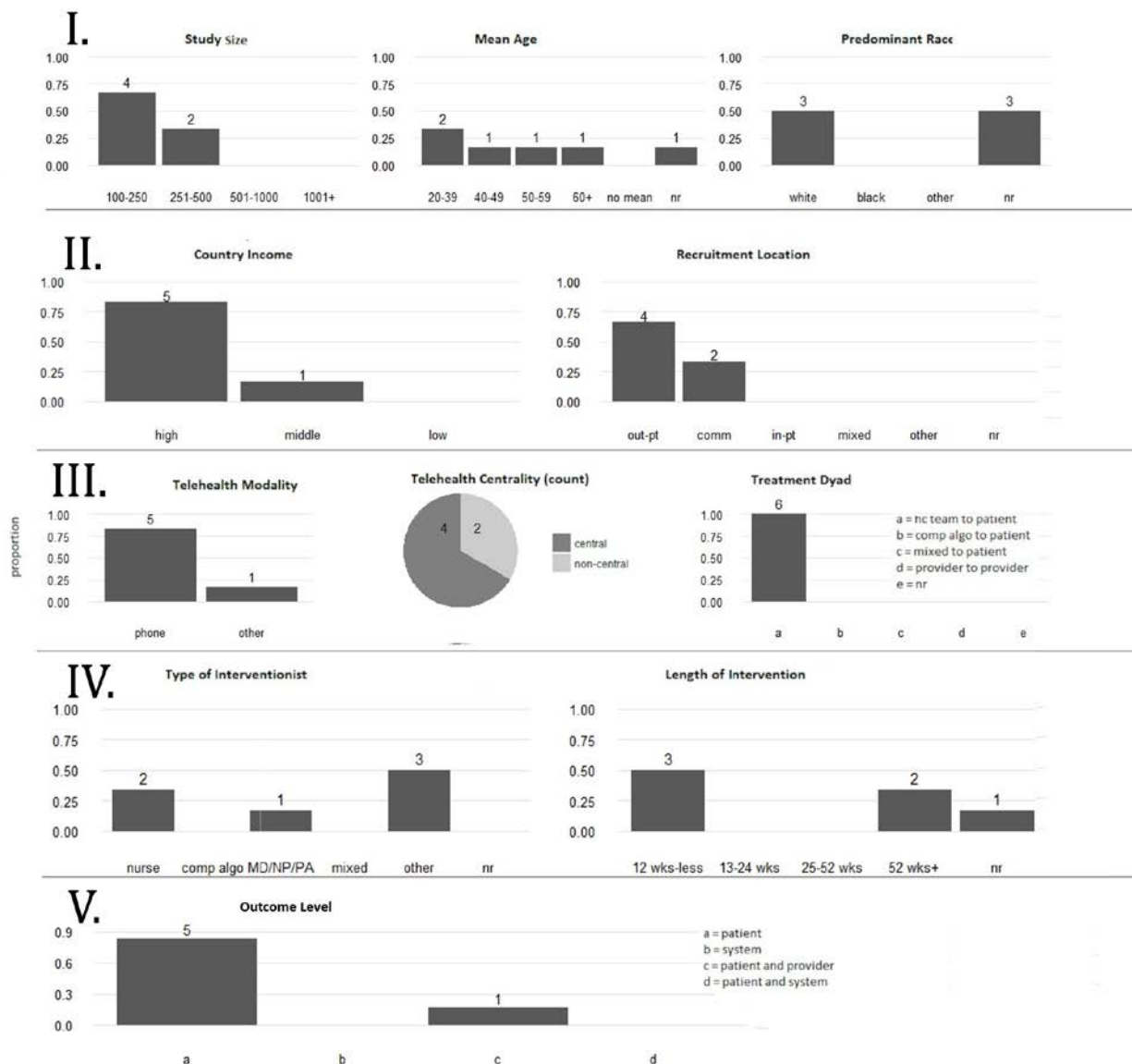
Intervention Details

Telehealth played a central role in 4 mental health studies.^{216-218,221} Further, all studies were synchronous; 5 used telephone as the primary telehealth modality, and 1 used videoconferencing²²¹ (Figure 11, panel III). For studies in this focus area, all centered on health care team-to-patient communication. For studies using telephone as the intervention modality, most involved repeated telephone calls (n=4), while a few studies reported only 1 or 2 calls (n=2).^{217,218} For the 1 study using video teleconferencing, it featured a total of twelve 90-minute sessions.²²¹ The health care team member who served as interventionist varied and included nurses (n=2),^{216,217} peer or lay health workers (n=1),²¹⁹ behavioral health specialists (n=1),²²¹ health educators (n=1),²¹⁸ and 1 study with multiple types of interventionists²²⁰ (Figure 11, panel IV). We also assessed whether studies address adherence to the intervention and 4 did.^{216,218,220} Intervention length ranged from 1 contact²¹⁷ to 2-5 years.²¹⁶ Only 1 mental health study²²⁰ described a theoretical framework, specifically Cohen's Social Support.²³⁵

Outcomes Evaluated

All primary outcomes were assessed at the patient level (Appendix D). The most common outcomes were depression and anxiety. No secondary outcomes reported were on the provider- or systems-level (Figure 11, panel V).

Figure 11. Evidence Map for Mental Health Area of Research



INTIMATE PARTNER VIOLENCE

Key Points

- Only 5 studies of telehealth interventions for women focused on IPV. One of these studies was also found in the SR relevant to this research area. Specifically, it was a trial of support provision to women who were recent survivors of rape to promote adherence to HIV post-exposure prophylaxis.
- All were telephone-based studies that targeted reproductive age women and were relatively short in length (all 24 weeks or less).
- All outcomes measured across these 5 studies were patient level with no measures of provider- or system-level outcomes.
- No studies about IPV were conducted within the VA.

Synthesis of Findings

Study Characteristics and Demographics

We identified 5 studies that focused on IPV.²²²⁻²²⁶ All but 1 were conducted among women with a previous history of IPV, with the goal of reducing the risk of future experience of violence through approaches such as promoting safety behaviors,²²² providing social support,^{224,225} problem-solving training^{224,225} and empowerment²²³ through motivational interviewing. The fifth study was a trial of providing support to women who were recent survivors of rape to promote adherence to HIV post-exposure prophylaxis.²²⁶ All studies were RCTs and involved 1189 patients, while individual study sample sizes ranged from 150-307. Studies in this focus area primarily included women of reproductive age, with 3 studies reporting a mean age of 20-39 years (2 studies did not report a measure of central tendency for age).^{223,226} The predominant race/ethnicity was white for 2 studies,^{223,224} Latina for 1 study,²²² and not reported in 2 studies.^{225,226} One study for which race/ethnicity was not reported was conducted in Hong Kong,²²⁵ and the other in South Africa²²⁶ (Figure 12, panel I). Of the 4 trials conducted in high-income countries, 3 were in the United States²²²⁻²²⁴ and 1 in Hong Kong.²²⁵ One study was conducted in a middle-income country (South Africa).²²⁶ Two studies recruited from the outpatient setting,^{223,226} 1 from a pediatric emergency department,²²⁴ 1 from the community,²²⁵ and 1 from a special family violence unit within a district attorney's office²²² (Figure 12, panel II). None recruited patients from VA settings.

Intervention Details

We also categorized studies based on the prominence of the role of telehealth in the study (central or non-central). Four studies used telehealth modalities as the central intervention strategy.^{222,224-226} All studies used telephone as the delivery modality (Figure 12, panel III), and all studies used synchronous communication. We also categorized studies based on the participants involved in the telehealth communication. The interventionist for these studies included 1 study with a nurse,²²⁴ mixed types of interventionists with nurses and a case worker,²²² 2 used unspecified nonprofessionals,^{223,226} and 1 did not clearly report the type of interventionist.²²⁵ For studies in this focus area, 4 were focused on health care team to patient communication,^{222-224,226} while the fifth study focused on communication from an unspecified individual to a patient.²²⁵ Three studies had an intervention length of 12 weeks or less,^{222,225,226} and 2 had interventions lasting 13-24 weeks^{223,224} (Figure 12, panel IV). We also assessed if studies provided data on adherence to the intervention, of which 3 of 5 did.^{223,224,226} Two studies noted using theoretical frameworks: 1 study²²⁵ named the Dutton Empowerment Model²³⁶ and Cohen's Social Support,²³⁷ and the other study²²² named Walker's 3-Phase Cycle of Violence²³⁸ and Curnow's Open Window Phase.²³⁹

Outcomes Evaluated

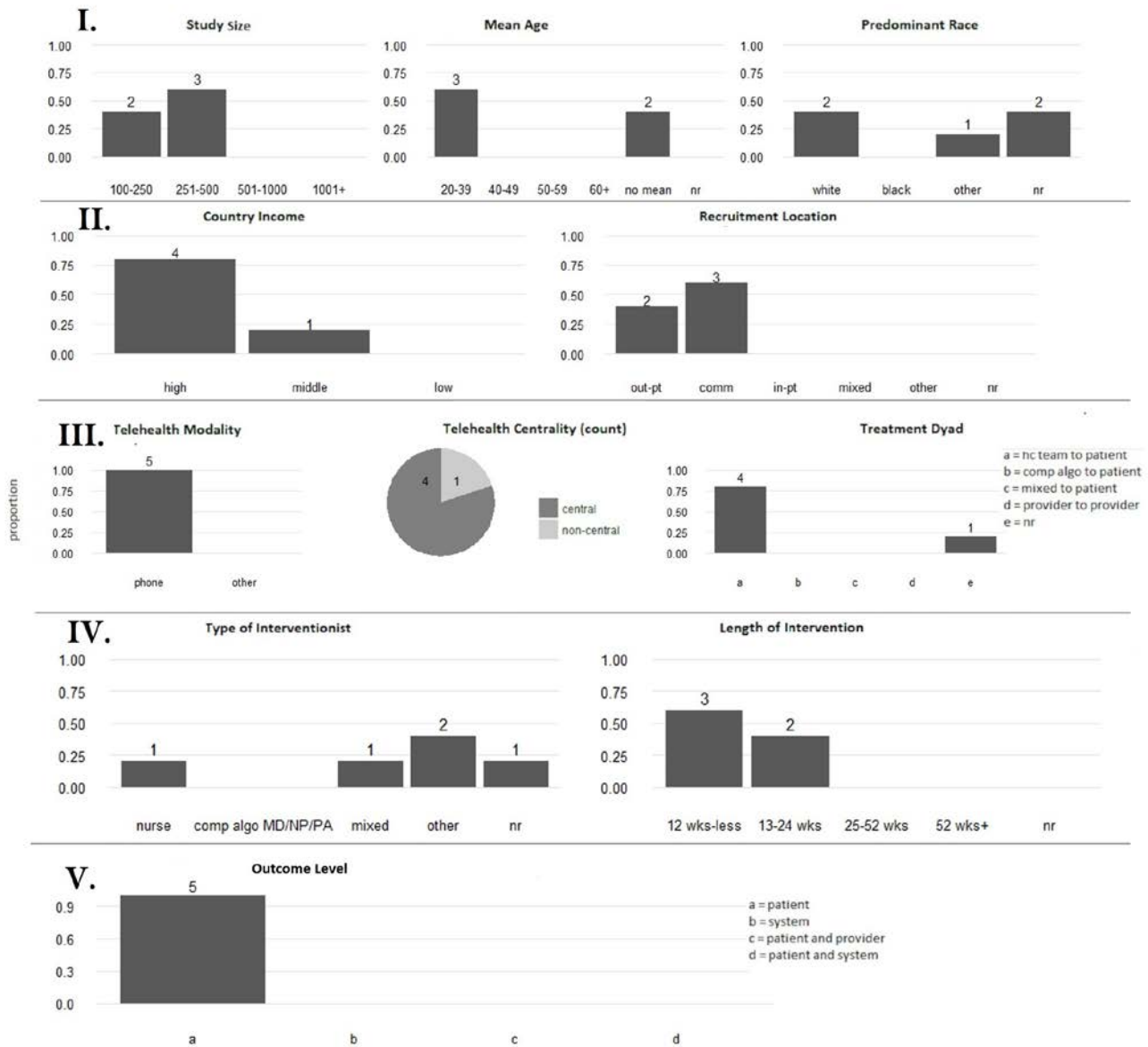
For these studies, all stated primary outcomes were at the patient level (Appendix D). The primary outcome of 2 studies was clinical assessment of mental health,^{223,225} 1 used experience of violence,²²⁴ 1 measured adherence to post-exposure prophylaxis,²²⁶ and 1 measured safety-promoting behaviors.²²² All reported outcome measures (including primary and secondary outcomes) across these 5 studies were at patient level. (Figure 12, panel V).

Systematic Review Findings

One trial was identified from an SR that was also found individually. The SR examined telephone interventions for preventing new HIV infection across care settings.²²⁷ The relevant

telehealth study meeting criteria for our evidence map was the RCT²²⁶ mentioned above that included 274 female rape victims who had presented to community clinics in South Africa. Enrolled women were randomized to usual care versus telephone support; support was delivered by a skilled counselor, and the primary outcome was patient level (medication adherence).

Figure 12. Evidence Map for Intimate Partner Violence Area of Research



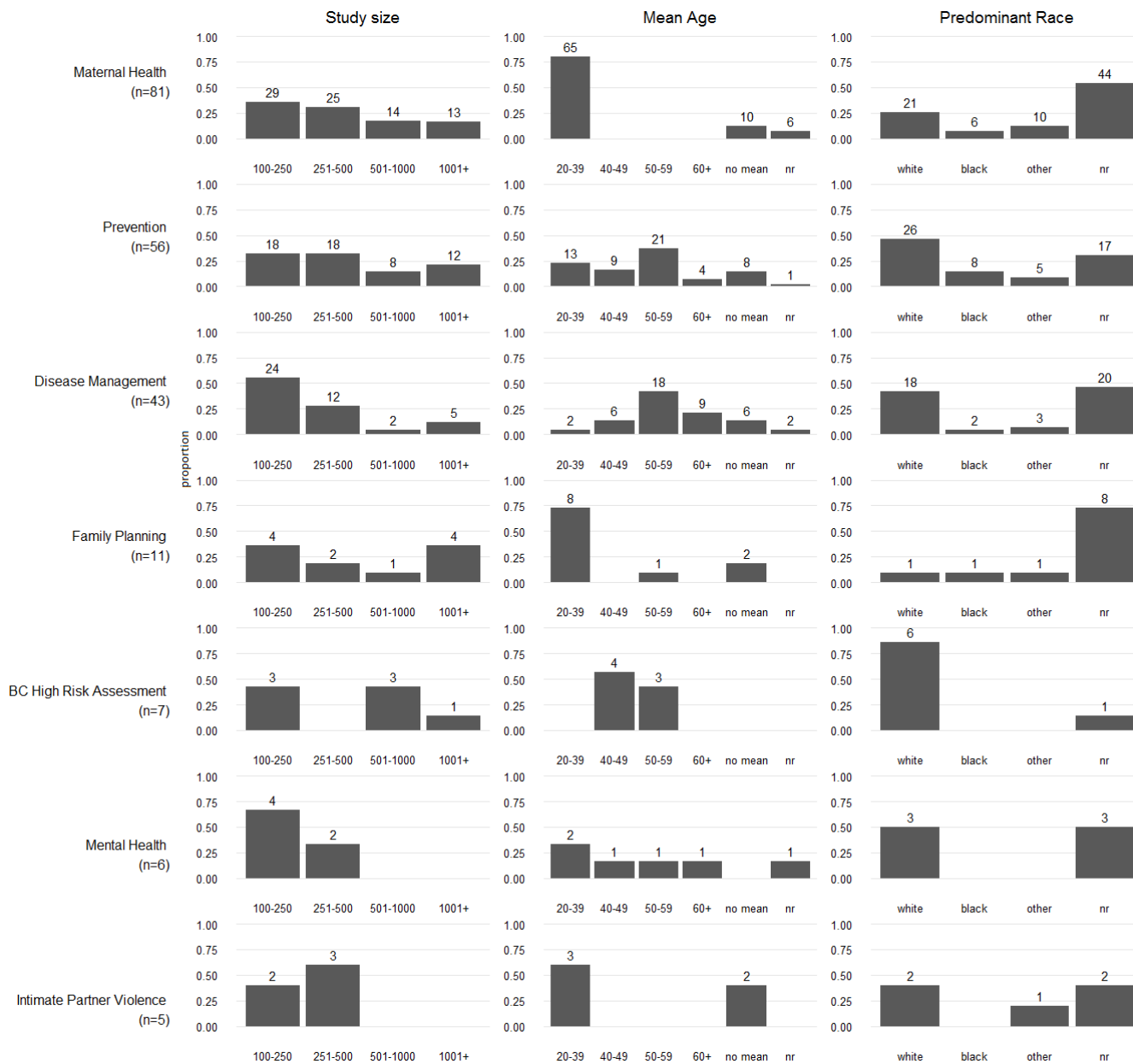
SUMMARY AND DISCUSSION

Telehealth can be an essential tool to deliver the right intervention to the right patient at the right time by improving access to care and facilitating the secure sharing of health information. VA has been on the forefront of implementing telehealth solutions as a way to extend care to key populations of interest or to overcome barriers to receiving timely and high-quality care.^{3,4} Women Veterans are one such key population that could benefit from the flexibility and access afforded by telehealth because they are geographically dispersed within the Veterans Health Administration (VHA) and have gender-specific care needs. Further, women Veterans may be particularly amenable to telehealth as an alternative form of health care because of more frequent interactions with providers compared to their male counterparts and an expressed preference for telephone contacts with their care providers.⁸ Given the multiple modalities of telehealth that could be targeted within the VHA to address the care needs of women Veterans, it is imperative to understand the existing literature supporting this approach to care delivery.

The goal of this report was to characterize the quantity, distribution, and characteristics of evidence for the use of telehealth services designed specifically for women. To our knowledge, this is the first attempt to map this literature base. We identified 209 reports of primary studies and 2 systematic reviews. These included 81 primary studies and 1 SR pertaining to maternal care, 56 to prevention, 43 to disease management, 11 to family planning, 7 to assessment of women at high-risk for breast cancer, 6 to mental health, and 5 primary studies and 1 SR to intimate partner violence (IPV). When looking across the 7 focused areas of research, the majority of studies identified recruited 250 or fewer participants (Figure 13 and Appendix C).

Age distributions in the identified literature tracked with population distributions of women potentially impacted with identified health conditions. For example, all studies of breast cancer high-risk management were among women with mean ages in the 40s and 50s, and maternal care studies were focused on women in their 20s and 30s. Yet, there was an overall trend of limited telehealth studies intervening on the health issues of women aged 60 years and older across the identified reports on prevention, disease management, mental health, and IPV. Further, when mapping the race and ethnic composition of included studies, we found that very few studies reported the race and ethnic distribution of women included in these studies. For the studies that did provide data on race distribution, most included populations that were predominantly white (Figure 13).

Figure 13. Study Characteristics by Focused Areas of Research

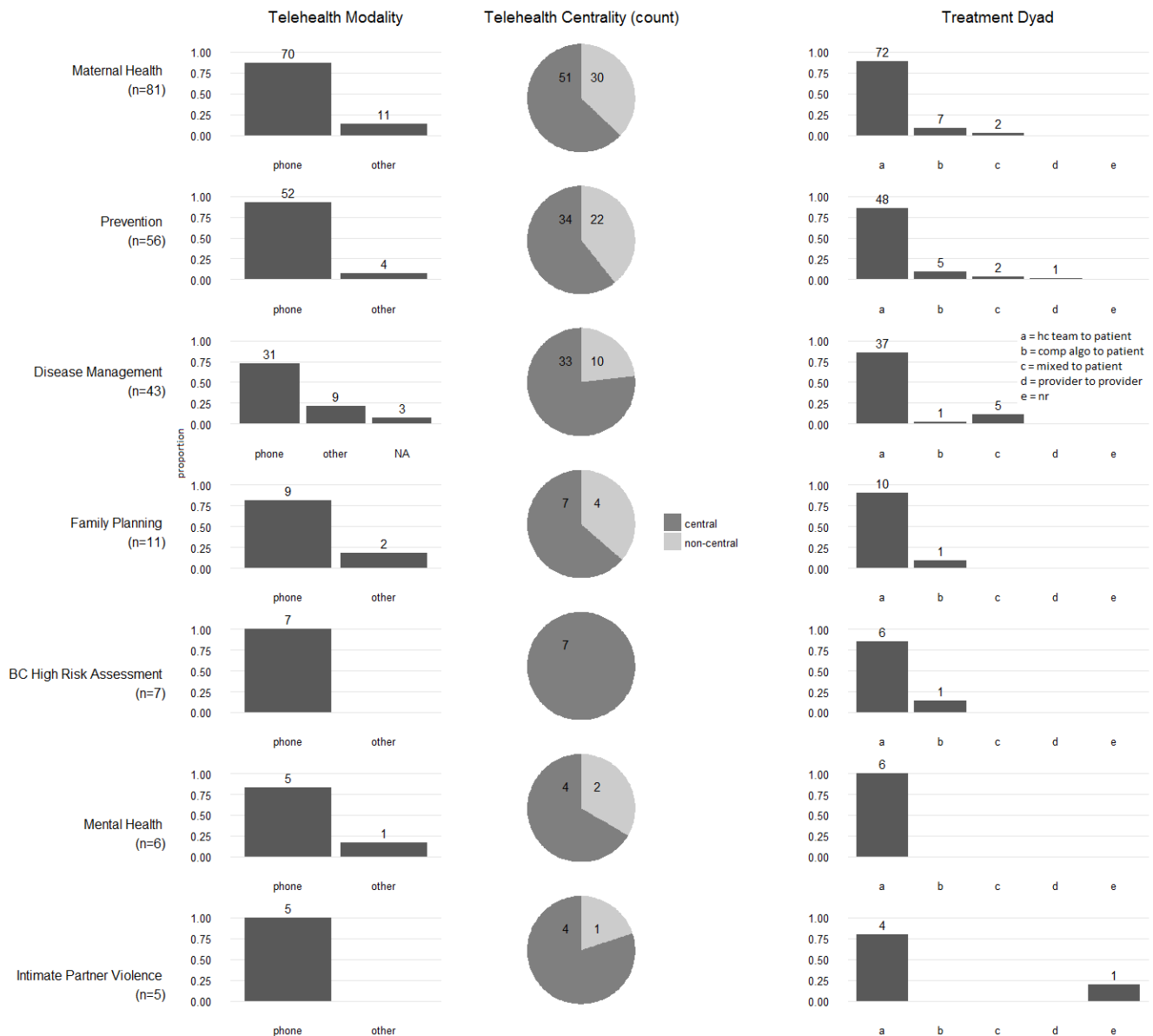


When mapping the evidence on the key characteristics of telehealth centrality, modality, and focus of the treatment dyad, clear patterns emerged (Figure 14). First, among the identified literature, telehealth technologies were rated to be the only or primary (*ie*, central) mode of intervention delivery across the majority of studies. Next, across all areas of research, telephone was the dominant modality to deliver intervention content. Notably, among the literature with the smallest footprint (*ie*, high-risk breast cancer assessment, mental health, IPV), we identified no studies that used telehealth technologies beyond the telephone. While the dominant use of the telephone likely reflects the longevity of experience with care delivery using this modality (*eg*, telephone counseling), there is a lack of evidence on alternative telehealth modalities such as mobile-based apps or SMS/texting. In developing these approaches, VA will be well-suited to contribute to the growing literature around this health care innovation. Last, most studies used telehealth technologies to facilitate communication between patients and health care team



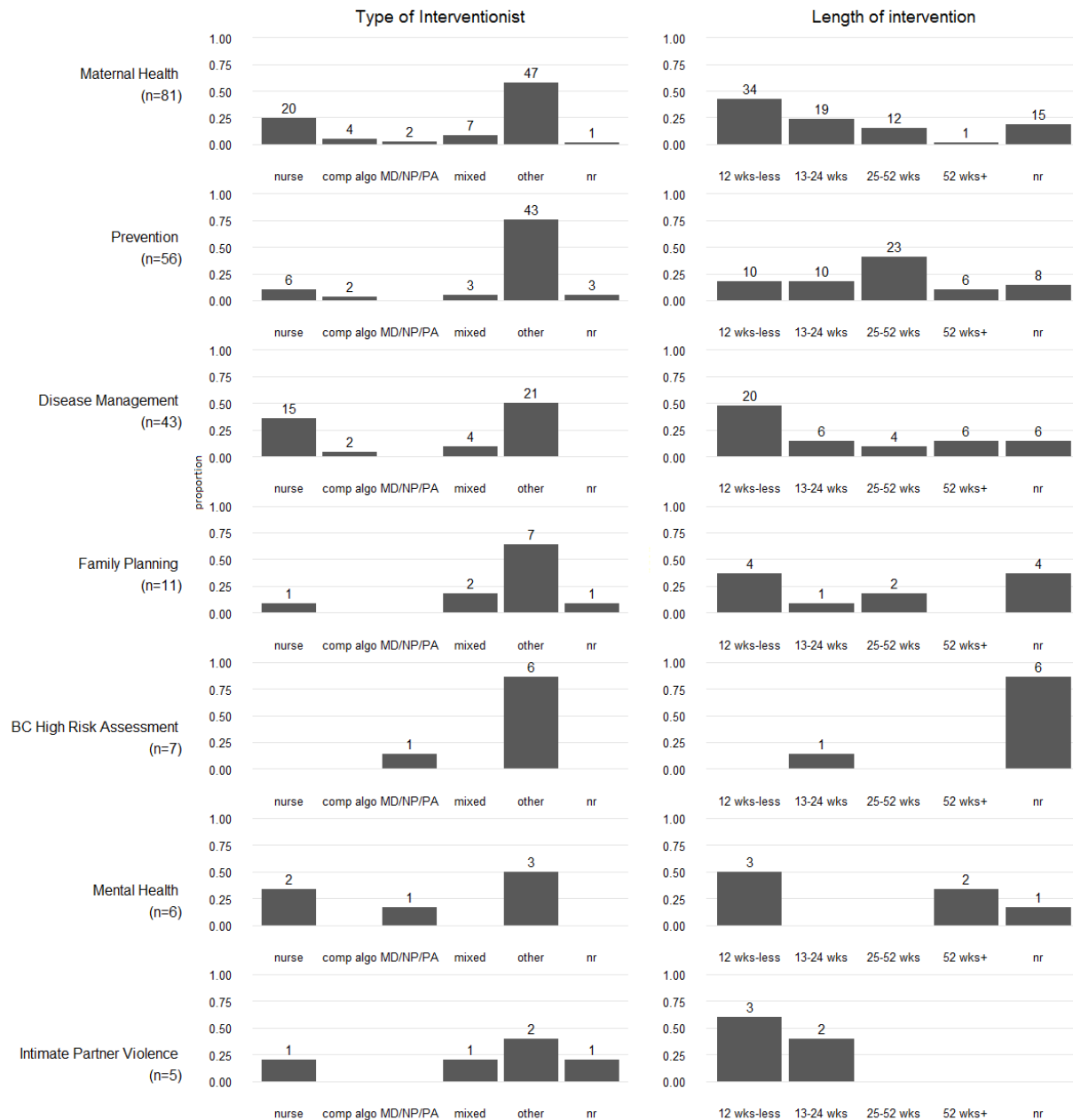
members. Only 1 prevention-focused study used telehealth to communicate from health care provider-to-provider.

Figure 14. Intervention Components by Focused Areas of Research



When mapping the type of interventionist used in telehealth approaches for women, very few were physicians or advanced practice providers (eg, nurse practitioners, physician assistants) (Figure 15). Instead, these interventions were mostly supported by a diverse variety of credentialed (eg, registered nurses, behavioral health specialists) and noncredentialed positions (eg, health educators, peer or lay health workers)—thus involving additional health care team members in the delivery of non-face-to-face care and expanding the resources of a traditional care team. The majority of the identified studies were limited in their duration and did not extend beyond 12 weeks. The only exception was among studies focused on prevention; the majority of these were 25 weeks or more.

Figure 15. Interventionist and Length of Intervention by Focused Areas of Research



When mapping the setting of telehealth interventions designed for women, the overwhelming majority of studies were conducted in countries categorized as high income by the World Bank. The only exception to this was in the area of family planning, where half the studies were conducted in middle- and low-income countries. When looking across the literature, most studies recruited from outpatient clinics (including specialty outpatient clinics), followed by community-based recruiting (Figure 16).

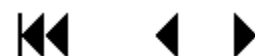
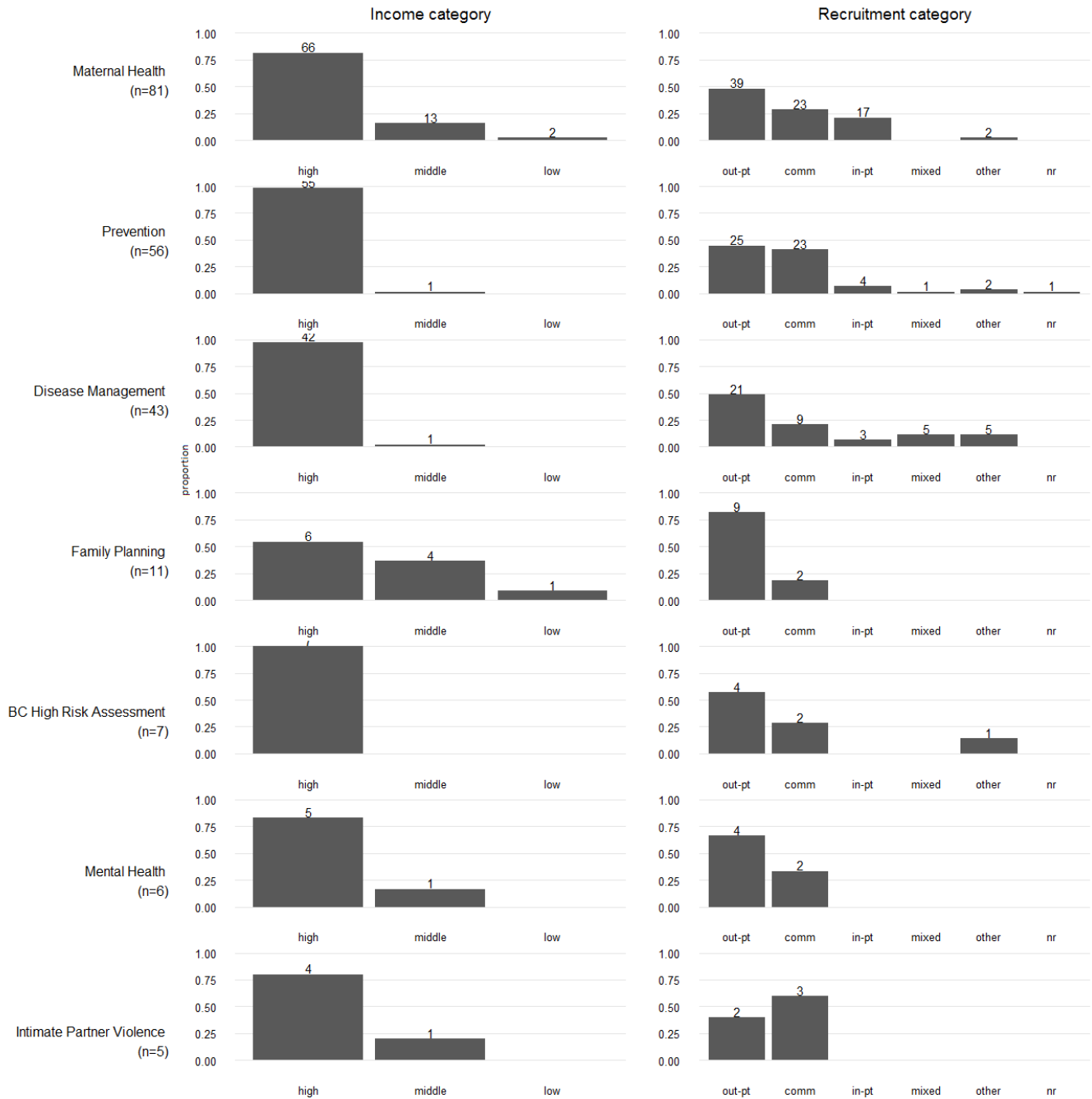


Figure 16. Study Setting by Focused Areas of Research



IMPLICATIONS OF FINDINGS

Women Veterans have multiple personal and structural barriers to seeking care within the VHA. First, women have multiple competing priorities that can make it difficult for them to seek and obtain the health care they need. Further, many VA sites have large catchment areas, and women Veterans may be dispersed across these catchment areas. For example, the growing number of pregnancies within the women Veteran population are geographically dispersed across the country with relatively small numbers at even larger VA sites. While the proportion of women using the VA for health care is growing, women Veterans still comprise a large minority of patients served compared with their male counterparts. Also, women Veterans have a need and preference for gender-specific care that is sensitized to their particular needs as Veterans.^{240,241} Recent studies of pregnant Veterans note challenges related to mental health comorbidities and increased risk of complication.^{13,242-246} Thus, there are pockets of women Veterans in need of specialized clinical care that lack the population density to support services at individual VA health care centers.

The expansion and optimization of telehealth directly aligns with VHA top priorities. Namely, the VHA is committed to improving the timeliness of health care delivery, and telehealth is seen as a key solution to advance this priority. Telehealth offers a potentially ideal approach to deliver targeted support to women Veterans in a manner that is convenient to the patient and does not require traveling long distances. From a provider and system level, telehealth provides additional tools to aid the facilitation of continuity of care and transitions of care (*eg*, post-acute care) and can be a powerful tool for population health management. In this evidence map, we illustrate the areas in which telehealth for women have been examined. There is a significant literature that has tested telehealth as a strategy to support maternal care, which may be of particular interest to VA as they seek to expand their maternal care coordination efforts¹³ due to the growing number of women of childbearing age who are dispersed throughout the VHA.

We also identified significant bodies of literature related to prevention and disease management using telehealth interventions designed specifically for women. Integrating telehealth in these areas, as the VA is currently implementing, can allow for a realignment of health care resources. We identified a wide range of interventionists who delivered care. Thus, telehealth may also be a strategy that allows the integration of additional, nontraditional personnel resources to the health care team. Providing patient access to other health care team members frees up physicians and advanced practice providers to spend more time on high-risk, complex patients. Yet the dearth of provider- and system-level outcomes measured by existing literature limits our ability to explore the feasibility and sustainability of telehealth interventions for women. For interventions that involve providers (*eg*, provider-to-patient or provider-to-provider), it is important to understand how strategies are received by the providers, if providers perceive these strategies as beneficial to optimize the efficiency and quality of clinical decision-making, and if it improves system-level outcomes like access to high-quality care and retention of personnel. Last, as technology evolves and becomes further integrated into clinical practice, it will be important to understand provider perspectives in order to customize strategies to meet the needs of providers and to optimize stakeholder buy-in during future implementation efforts.

LIMITATIONS

Evidence mapping is an evolving methodology, without well-defined best practices. While we conducted this review with high scientific rigor, our evidence map has limitations. First, identifying and mapping the body of literature on telehealth strategies for women was

challenging. There are multiple definitions of telehealth and each one has implications for searching and identifying the literature base. In collaboration with our stakeholders, we developed an operational definition that was most relevant to the VA care context. Thus, other ways of operationalizing telehealth may produce different results. Similarly, we could have included studies of telehealth that included mixed-gender populations but which conducted sex- or gender-based analysis. While we made this choice intentionally, we acknowledge that we may have missed some relevant findings. Further, in collaboration with our stakeholders and panel of technical experts, we only included study designs set forth by the Cochrane Effective Practice and Organization of Care (EPOC) Group¹⁶—criteria developed to capture both randomized and nonrandomized study designs best suited to assess the effects of health system interventions like telehealth. Thus, we may have excluded other relevant studies that used observational designs. We chose EPOC designs because our research focus was on mapping the literature that assessed the effectiveness of telehealth strategies for women. In order to focus on studies large enough to provide meaningful findings, we limited our inclusion criteria to those studies that included at least 100 patients. While this would have allowed trials for which the unit of randomization was providers or systems, requiring a minimum number of patients may have excluded studies with relevant findings. Due to the size and scope of this review, we did not conduct dual review or abstraction of all studies. However, we conducted targeted dual review and over-reading and monitored those targeted reviews for acceptable levels of agreement. Further, we classified studies into broad, focused areas of research, potentially limiting interpretation of results. However, we further classified the largest identified literature, maternal health, by subcategories to aid the interpretation of this key body of literature. Also, because this study was an evidence map and the purpose of the study was to characterize and visualize a broad literature base, we did not provide summary estimates of effects. We also did not assess the quality of the literature base. To mitigate this limitation, we only included randomized and nonrandomized study designs of higher methodological rigor as outlined by the EPOC criteria.¹⁶ It is possible that this decision excluded some provider- and system-focused studies that may be more likely to use other designs.

RESEARCH GAPS/FUTURE RESEARCH

A key use of these maps is to inform decisions about where more primary research is needed. The evidence maps in this report serve as a broad visualization of the field of telehealth interventions for women and a foundation for future research in this area (Appendix C). Beyond maternal health care, we identified a relatively small number of telehealth studies that addressed other gender-specific needs of women Veterans and underscore areas that warrant further exploration such as family planning, IPV, homelessness, pain management, and high-risk breast cancer assessment. Further, beyond postpartum depression, few studies used telehealth interventions to address the mental health needs of women. For example, many pregnant women Veterans have comorbid mental health conditions and may disconnect from their mental health provider during pregnancy as they transition to a community obstetric provider.²⁴⁷ Assessing telehealth strategies designed for this population may provide an important tool to enhance continuity of care. The wealth of existing literature about telehealth for maternity care could inform the development of future telehealth interventions for this population within VA.

We also found relatively few studies among older women, or studies conducted with racially or ethnically diverse populations. So, there is a need to test telehealth strategies in more diverse patient populations and contexts. We also identified a dearth of studies focused on strategies to enhance provider-to-provider communication for women's health conditions. Such studies are essential to assess the impact of telehealth interventions focused on gender-specific care. Further,

telephone was by far the most commonly studied telehealth modality and newer approaches such as mobile health technologies were underrepresented. This gap underscores the need to study how best to use evolving technology that can address the needs of women. As noted, we identified a relatively small literature base that assesses provider and system outcomes. There is a need for research on the extent to which telehealth improves provider and system outcomes related to provider satisfaction and retention and patient access to care.

The brief duration of many interventions included in this review is a notable limitation of the current state of the evidence on telehealth interventions for women. One of the most promising aspects of telehealth for making large improvements in public health is the potential for such interventions to extend treatment over time by using interventions that have relatively low cost for the health care system. Chronic medical and mental health conditions often require frequent, long-term follow up to address symptom exacerbations and maintain treatment gains. This could be accomplished by utilizing telehealth interventions to increase the durability of treatment over time and reduce the frequency of high-cost clinic visits. There is a need for more research using telehealth to improve long-term health outcomes.

While we found very few telehealth studies based within VA, the nature of VA as a large and diverse health care system that has been a national leader in developing and implementing telehealth modalities creates many opportunities to pursue multisite trials to address some of the gaps in the body of literature described in this report. Of relevance, there have been many multisite VA studies that demonstrate the capacity for this type of research.^{248,249} In particular, the VA Women's Health Practice-Based Research Network is an active research and quality improvement infrastructure designed to support multisite studies that seek to recruit sufficient numbers of women to support adequately powered trials.^{250,251}

CONCLUSIONS

Telehealth can be a powerful tool to enhance access, quality, and satisfaction with health care. Due to geographic spread and gender-specific needs, women Veterans are a key population that could benefit from expanding care via telehealth modalities. This review mapped the current landscape of the published literature on telehealth strategies designed to address women and their health care needs. We identified 209 primary reports and 2 systematic reviews addressing telehealth interventions for women. Our findings highlight some notable gaps in the literature, including the need for more exploration in the areas of mental health, pain management, IPV, and family planning. We note the need to explore the testing of alternative telehealth modalities such as texting and videoconferencing and the need to test these strategies in more diverse populations of women. Key to VA, we also note the need to implement studies that assess the impact of telehealth on provider- and system-level outcomes. Only after such studies have been conducted can we assess the full promise of telehealth strategies to optimize the care and well-being of women Veterans across the VA health care system.

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