Research Topics

Implementation science to address health disparities and improve the equitable implementation of proven interventions

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Implementation science to address health disparities and improve the equitable implementation of proven interventions

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Editorial: Implementation science to address health disparities and improve the equitable implementation of proven interventions

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Editorial on the Research Topic
Implementation science to address health disparities and improve the equitable implementation of proven interventions

The constitution of the WHO states that "every human being should enjoy the highest attainable standard of health without distinction of race, religion, political belief, economic or social condition." Yet, this fundamental right is not fully enjoyed by all people, as decades of health disparities research have documented. Health disparities are fueled by social and structural determinants of health, including racism and discrimination (1), which shape access, implementation, and sustainability of health interventions or services. Implementation science offers perspectives and tools that can be harnessed to promote health equity (2–4), and several recommendations on how to achieve this have been published (5–10).

Experts state that the implementation science field has fallen short in terms of designing equitable implementation strategies, employing equity-focused metrics, integrating equity in frameworks, and working with organizations/sectors outside healthcare (2, 3). The studies published in this Research Topic tackle these shortcomings by employing meaningful engagement and partnerships with community members and organizations, identifying implementation determinants unique to underserved settings and strategies to address them, and introducing tools to co-producing health interventions and assessing bias in healthcare decision making. In addition, new ideas on how to address equity in sustainability efforts and how to re-shape the implementation science field are introduced which open research areas for implementation scientists to pursue. These studies are authored by a range of implementation scientists, including well-established leaders in the field and early career implementation scientists from under-represented groups.

Five studies in this Research Topic identified implementation determinants which are factors believed or empirically shown to influence implementation outcomes (11). González-Casanova et al. identified implementation determinants for mental health promotion practices among *promotores* serving immigrants in Mexican consulates in the

United States. Seth et al. identified organizational factors associated with the adoption of pre-exposure prophylaxis therapy among family planning clinics in the Southern United States. Singh et al. examined barriers and facilitators to providing, accessing, and receiving LGBTQ+ affirming care within the Veteran's Health Administration among clinicians and veterans. Fuster et al. examined the outcomes and implementation determinants of interventions co-developed using Human-Centered Design in two Latin American restaurants in New York. Finally, Itanyi et al. identified implementation determinants of cervical cancer control practices in the existing HIV care infrastructure in Nigeria and strategies to address them. To avoid inadvertently reinforcing health inequities (12), implementation strategies should address the context-specific determinants present in minority-serving settings. These studies identify several determinants that can be addressed through equity-promoting implementation strategies.

Three studies in this Research Topic focused on developing community partnerships to promote the equitable implementation of health interventions in the United States. Akintobi et al. described an evaluation of the Community Engaged Course and Action Network developed in the state of Georgia. Authors provide lessons to strengthen community-based participatory research principles and partnerships to improve health outcomes among communities of color. Blebu et al. described how cross-sector partnerships helped identify implementation factors related to racial disparities in adverse birth outcomes among marginalized populations in California. Finally, Steinman et al. described how partnerships with community-based organizations helped identify implementation strategies to improve access to depression care among underserved older adults in Washington and California. As previously recommended (12), these studies prioritize the needs of community partners and describe how implementation science can foster community resilience and active engagement.

Developing the science of adaptation has been recommended to advance health equity in implementation science (3) and two studies in this Research Topic address this area. Hess and Davis adapted the *Community Guide* recommendations for increasing physical activity in rural community settings and demonstrated adaptation and context relevance were critical to the dissemination of recommendations in rural communities. Woodard et al. adapted a suicide safety planning intervention using peer support in rural areas and provide a comprehensive assessment of barriers and facilitators to implementing an adapted version of the model. These studies provide useful examples of systematic processes for conducting planned adaptations; their findings highlight the importance of improving the fit and relevance of health interventions for rural communities.

Two other studies in this Research Topic introduced new research tools to promote health equity. Yardley et al. introduced the Agile Co-production and Evaluation framework for developing public health interventions, messaging, and guidance. The framework seeks to inform efforts to rapidly develop interventions and messaging by combining co-production methods with large-scale testing and real-world evaluation. Pool et al. introduced a tool to assess bias during team-based clinical decision-making. The tool can be used to promote a more equitable decision-making processes in healthcare by identifying the presence of team-based bias, promoting reflexivity, and informing implementation strategy design and testing. Future use of these tools will determine their utility and potential to promote health equity.

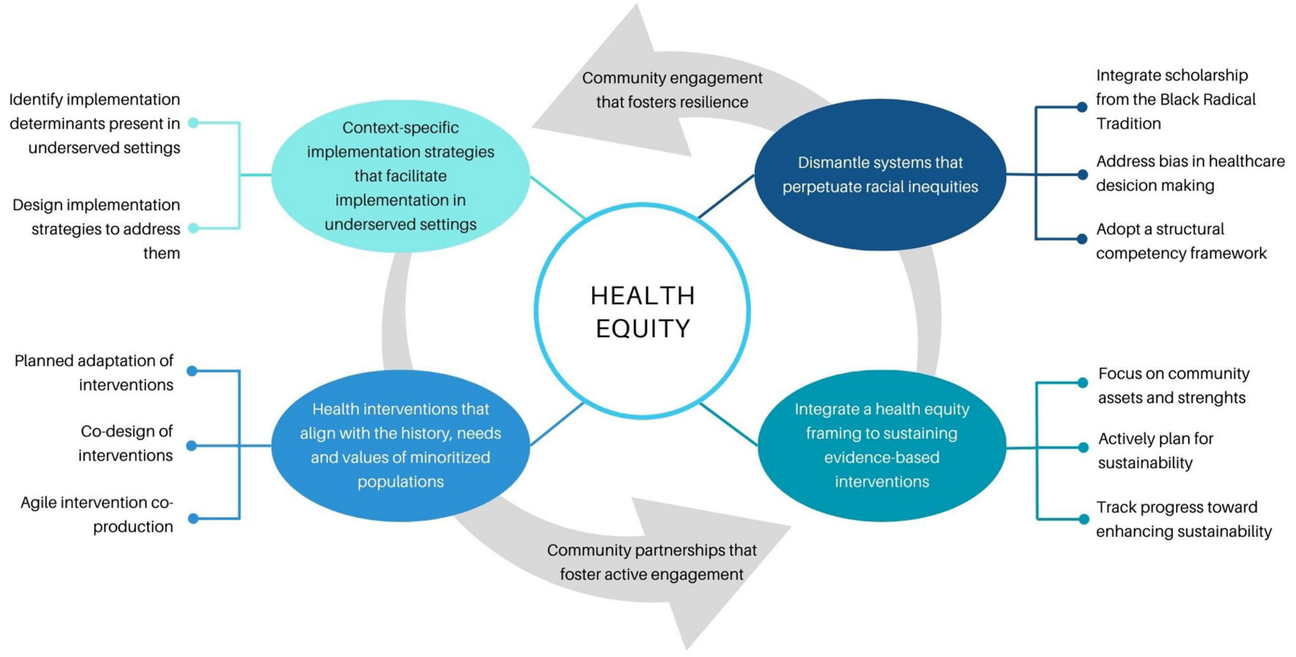

FIGURE 1
Contributions of the studies published in this Research Topic.

Finally, two perspectives in this Research Topic introduced new areas the implementation science field should pursue to promote health equity. The first perspective from Shelton et al. discussed how a health equity framing is essential to sustaining evidence-based interventions in under-resourced communities. This perspective focuses on identifying and nurturing existing assets within individuals and communities and provides recommendations to make progress toward sustainability. A perspective by Bradley et al. introduced a conceptual frame for integrating scholarship from the Black Radical Tradition in implementation science. Through a disciplinary self-critique of the field, authors call for a re-alignment of implementation science to focus on examining and dismantling systems that perpetuate racial inequalities. These perspectives open opportunities to explore novel equity-related issues in the implementation science field.

The studies published in this Research Topic offer several equity-focused lessons for the implementation science field and identify future directions to pursue (Figure 1). First, implementation science should be reframed from a "rubric of scarcity" to one that fosters the resilience of historically underserved communities who are engaged as active partners (13). Implementation research efforts should thus follow community-centered approaches that foster resilience among minoritized communities and promote active engagement through shared power and decision making. Second, to avoid inadvertently reinforcing health inequities (12), implementation science should prioritize the history of struggle among minoritized populations to gain access to health. Any efforts to reduce health disparities should be designed and implemented through the lens of this historical struggle. Finally, implementation science should focus on addressing the structural systems that perpetuate health inequities. A structural competency framework (14) could be adopted to dismantle the systems that lead to poor access to and implementation of evidence-based interventions.

In closing, substantial work is needed to ensure every person enjoys the highest attainable standard of health. This Research Topic offers ideas to capitalize on the potential the implementation science field has to promote good health for all.

Author contributions

KG: Conceptualization, Writing – original draft, Writing – review & editing. MS: Writing – review & editing. OG: Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Partnering with community-based organizations to improve equitable access to depression care for underserved older adults in the U.S.: Qualitative formative research

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Background: Embedding evidenced-based programs (EBPs) like PEARLS outside clinical settings can help reduce inequities in access to depression care. Trusted community-based organizations (CBOs) reach older adults who are underserved; however, PEARLS adoption has been limited. Implementation science has tried to close this know-do gap, however a more intentional focus on equity is needed to engage CBOs. We partnered with CBOs to better understand their resources and needs in order to design more equitable dissemination and implementation (D&I) strategies to support PEARLS adoption.

Methods: We conducted 39 interviews with 24 current and potential adopter organizations and other partners (February–September 2020). CBOs were purposively sampled for region, type, and priority older populations experiencing poverty (communities of color, linguistically diverse, rural). Using a social marketing framework, our guide explored barriers, benefits and process for PEARLS adoption; CBO capacities and needs; PEARLS acceptability and adaptations; and preferred communication channels. During COVID-19, interviews also addressed remote PEARLS delivery and changes in priorities. We conducted thematic analysis of transcripts using the rapid framework method to describe the needs and priorities of older adults who are underserved and the CBOs that engage them, and strategies, collaborations, and adaptations to integrate depression care in these contexts.

Results: During COVID-19, older adults relied on CBO support for basic needs such as food and housing. Isolation and depression were also urgent issues within communities, yet stigma remained for both late-life depression and depression care. CBOs wanted EBPs with cultural flexibility, stable funding, accessible training, staff investment, and fit with staff and community needs and priorities. Findings guided new dissemination strategies to better communicate how PEARLS is appropriate for organizations that engage older adults who are underserved, and what program components are core and what are adaptable to better align with organizations and communities. New implementation strategies will support organizational capacity-building through training and technical assistance, and matchmaking for funding and clinical support.

Discussion: Findings support CBOs as appropriate depression care providers for older adults who are underserved, and suggest changes to communications and resources to better fit EBPs with the resources and needs of organizations and older adults. We are currently partnering with organizations in California and Washington to evaluate whether and how these D&I strategies increase equitable access to PEARLS for older adults who are underserved.

KEYWORDS

older adults, equity, implementation, dissemination, depression, community-based organizations

1. Introduction

Depression is a major public health issue for older adults—a leading cause of disability, poor function, increased morbidity, suicide and other mortality, and reduced quality of life (1). Late-life depression often goes unrecognized or undertreated for older adults (2), and older adults facing inequitable access to care include communities of color (3–6), linguistically diverse (6, 7), experiencing poverty (8), or in rural areas (9, 10), recognizing that many older adults are multiply marginalized by intersecting identities (11). The burden of late-life depression was exacerbated during the COVID-19 pandemic due to isolation, distancing, fear, and reduced access to services and supports (12).

Community-based social service organizations (CBOs) offer an important avenue toward increasing access to depression care for older adults who are underserved (13). CBOs reach these older adults (14), who often prefer non-pharmacological treatment delivered by trusted providers in their community (15–17). These organizations address unmet social needs, thus reducing obstacles to health and health care and lowering preventable differences in depression burden among marginalized older adults (13, 18). Improving access to quality housing, food, environments, and health care is a key strategy for health equity—for everyone to have a fair and just opportunity to be as healthy as possible. Likewise, global mental health researchers and practitioners call for closing the mental health care gap by building capacity among CBO providers who are typically non-clinical workers. Although historically these organizations have not been mental health care providers, they are uniquely positioned to reduce inequities in access to depression care by providing services in resource-constrained settings (19).

One model for community-based depression care is the Program to Encourage Active and Rewarding Lives (PEARLS) (20, 21). Although PEARLS was created with community partners, uptake has been limited (22). This "know-do gap" (23, 24) has been well-defined by the implementation science field, which has recently called for centering equity as the key indicator of success (25) so that efforts to increase reach do not exacerbate inequities. To date, we have used a diffusion model (26) of disseminating PEARLS through trained providers and organizations, local, state and national conferences and meetings, and inclusion in program repositories. While intended to spread PEARLS through naturally occurring networks, this passive dissemination approach may in fact disenfranchise resource-constrained CBOs by favoring organizations that already have training, funding, and serve English-speaking clients in urban areas (27). Just as some older adults' face health inequities, many CBOs that engage older adults experience resource scarcity.

The intent of this study was to partner with organizations that engage older adults at higher risk for depression, experiencing poverty, and with limited access to care (communities of color, linguistically diverse, and/or living in rural areas), to learn how we can more equitably disseminate and implement PEARLS with, for, and in these settings. Proactive partnership- and capacity-building with these CBOs has the potential to increase access to PEARLS depression care in their communities. This formative research is the essential first step of our efforts to design new PEARLS dissemination and implementation strategies that will reach new CBOs and improve equity in access to care.

2. Methods

We are a CDC-funded prevention research center—a community-academic partnership based at a public university school of public health that collaborates with clinical and community partners to translate research into policy and practice to promote health equity. In late 2019, we received a 5-year grant to reduce inequities in access to depression care for older adults. This manuscript describes the first step in this study: conducting formative research with organizations that engage older adults who are underserved in order to develop equity-centered dissemination and implementation (D&I) strategies that align with CBO strengths and needs. This study is guided by a social marketing framework—an approach to promoting organizational and provider behavior change for social good (28). Social marketing can enhance pull factors like increasing organization's motivations to adopt PEARLS by understanding potential adopters through market or audience research, communicating how much potential adopting organizations can influence PEARLS through appropriate channels that target different populations, taking the social system into account (e.g., networks and norms), and ongoing engagement and evaluation with the target audience (29). This framework aligns with health equity and community engagement approaches like community-based participatory research (CBPR) and designing for dissemination (30, 31). These research strategies emphasize good communication between researchers and community partners, partnership exchange of knowledge, skills and resources guided by mutually understood values and through different means, community capacity building, and collaborations that benefit both researchers and community partners (32). This study was approved by the University of Washington Institutional Review Board in January 2020.

2.1. PEARLS intervention

The Program to Encourage Active and Rewarding Lives (PEARLS) is an evidence-based program for late-life depression care developed in partnership between our research center and CBOs. PEARLS reaches older adults traditionally underserved by clinical care by providing the program *via* CBOs that are already offering accessible services and supports. In six-to-eight 1-h visits over a 5-month period, trained CBO staff ("coaches") meet one-on-one with participants and help them build problem-solving skills using Problem Solving Treatment (PST) (33) to gain a sense of control over issues in their lives that are overwhelming. Participants also use Behavioral Activation (BA) (34) to plan meaningful activities that are physical, social, and pleasant, learn about depression to address stigma and understand symptoms, and link to health and social supports as needed. By training front-line social service staff in a structured intervention coupled with regular clinical supervision, PEARLS uses task shifting (35) from specialty or clinical mental health providers to expand access to depression care.

In 2004, our community-academic partnership co-developed and tested PEARLS *via* a randomized controlled trial (RCT) with CBOs and older adults who were underserved (42% persons of color, 58% annual income <$10,000, 72% lived alone, average of 4–5 chronic conditions) and lacked access to mental health care (9% receiving mental health care in last 6-months) (20). PEARLS participants were three times as likely to improve their depression outcomes as older adults in usual care. Since then, our research center has supported PEARLS delivery through training and technical assistance to foster our community of practice. The Guide to Community Preventive Services and the Administration on Community Living now recommend PEARLS to treat depression in older adults (21). As of 2021, PEARLS has reached over 9,400 older adults through 133 CBOs in 26 states.

2.2. Participants

Our participants are organizations in Washington and California that engage older adults who are underserved. For this project, we prioritized the following populations experiencing poverty who are underserved by depression care: older adults of color, who are linguistically diverse (speak languages other than English), and/or live in rural areas. While there are different national and local financial resources to support PEARLS delivery, we selected these two states because they have well-defined funding mechanisms to support PEARLS adoption-a key implementation strategy for feasibility and sustainability (36). We recruited three types of organizations that could fund, deliver, or support PEARLS implementation (funders, CBOs, other partners), sampling both organizations that have adopted and not adopted PEARLS (current adopters and potential adopters, respectively). Table 1 provides further detail about the different types of organizations in our sample. We used maximum variation purposive sampling (37) at the organization level to engage decision-makers (e.g., directors) and "do-ers" (e.g., community health workers) at these organizations. All participating organizations engaged our priority older populations.

2.3. Data collection

Qualitative research methods yield rich, contextual data about complex organizational and social phenomena (38). We conducted semi-structured interviews to describe in-depth processes, realities, and experiences from multiple perspectives (39). Our interview guide asked about the context for PEARLS adoption (e.g., words to talk about depression, whether depression is a priority for organization or community, perceived stigma around depression); barriers and benefits to PEARLS adoption (e.g., fit, cultural appropriateness, value); organizational capacity and needs (e.g., how services are provided before and during COVID-19, how our center can better support them); and potential collaborators and competitors for PEARLS adoption (e.g., collaborators for screening, referrals, funding, and support; other alternatives to PEARLS). For PEARLS adopters, we also asked about what adaptations they had made to the program or its delivery to better engage communities who are underserved. During COVID-19, we added questions to make sure tele-delivery and distance training were feasible and accessible.

Due to COVID-19 onset, in April 2020 we revised the interview guide to capture additional data on the altered community context and "telePEARLS" delivery *via* phone or video-conferencing and invited Winter 2020 interview participants to do a follow-up interview. Interviews were scheduled for 30 min, and participants were provided a $50 incentive for participation. Organizations could choose how many people to invite to the interview; we conducted both individual and group interviews. Following each interview, we sent a brief quantitative survey to systematically capture data on participant demographics and professional background.

2.4. Data analysis

Data were stored and managed in REDCap (40) and Excel. We used the rapid framework method (41) to thematically analyze (42) interview data. These analytic approaches are appropriate for answering our research questions, highlighting similarities and differences across participants and generating unanticipated insights during rapidly changing pandemic times. Interview recordings were transcribed for analysis. We (LS, AP, MK) reviewed a sample of transcripts to generate initial codes (both deductive from the interview guide and inductive from emerging themes) to categorize the data, refining the codebook as needed in subsequent transcripts. We systematically reduced the data from original accounts into a coding matrix of codes by interviews, with data including participants' words, framing and illustrative quotes. For the last step, interpretation, we reviewed the matrix to make connections within and between participants and codes, and moved beyond individual case description to develop themes that provide possible explanations for what is happening in the data. These interpretation memos served as our preliminary findings which were refined into our results section with our study team and community partners.

TABLE 1 Defining organizations for interview sampling.

Organization	Definition
Funders	Local government agencies with available funding for PEARLS • California: county mental health departments with state Mental Health Services Act funding • Washington: Area Agencies on Aging with access to state Medicaid waiver funding
Community-based organizations (CBOs)	Community-based social service organizations that can deliver PEARLS (e.g., culturally-specific organizations and senior centers)
Other partners	Organizations that make up care systems but would not directly fund or deliver PEARLS (e.g., faith-based organizations, community-based clinics, food safety-net organizations, and state social service agencies).
Current adopters	Funders or CBOs currently funding or delivering PEARLS
Potential adopters	Funders or CBOs working in communities who are underserved and not currently funding or delivering PEARLS

These methods align with well-established trustworthiness criteria (43) to ensure rigor in our analysis. For credibility, or goodness of fit between participants' perspectives and how we represented them, we used prolonged engagement with the data and research triangulation with multiple members of our team including PEARLS organization staff as co-authors. For transferability, we will provide descriptions of study participants, their organizations, and their perspectives through illustrative quotes so that readers can determine whether our findings would be applicable to their context. We documented decisions made throughout the study for dependability and confirmability.

2.5. Designing equity—centered dissemination and implementation strategies

Formative research findings will be used to create new PEARLS dissemination and implementation (D&I) strategies that center the strengths and needs of communities who are underserved. Dissemination strategies aim to change attitudes about and increase awareness, knowledge of, and intention to adopt EBPs like PEARLS through messaging and channels designed for organizations that engage these older communities. Implementation strategies aim to build capacity for selecting, adapting, and integrating PEARLS into these delivery settings and support systems (44). We shared study findings with our Community Advisory Board, Scientific Advisory Board, and internal and external communication experts to co-develop these new D&I strategies.

3. Results

We approached 45 organizations *via* email and phone through state and local networks and through snowball sampling; 24 agreed to participate. Reasons for not participating from the other 21 organizations included declined (e.g., too busy, not enough staff capacity to participate; $N = 7$) and were not able to be contacted ($N = 14$). While data saturation can be achieved at 12 interviews (45), we engaged additional participants for variation in geographic area, organization types, PEARLS adoption status, and populations served.

We conducted 39 in-depth interviews with 24 organizations in 2020. Sixteen interviews were conducted between February and March (before COVID-19 pandemic) and 23 interviews were conducted between July and September (during the COVID-19 pandemic). Fourteen (61%) of these were follow-up interviews with organizations interviewed pre-COVID-19. Interviews lasted mean (SD) 56 (16) min (range 27–85 min) and included 1–5 participants. Interview participant characteristics are provided in Table 2. Interviewees were middle-aged and older adults, 60% female, and 43% communities of color. Most participants had worked at their organization (81%) and had been in their role (68%) for five or more years.

Table 3 shows the attributes of the organizations that participated in the interviews, all of which served older adults experiencing poverty. Half (50%) were community-based social service organizations, 30% were potential funding organizations, and 10% were other partners. Organizations were split between current PEARLS adopters and potential PEARLS adopters (organizations not currently delivering PEARLS). Almost all (92%) were engaging older communities of color (70% Latino, 58% Asian, 21% Black, and 4% Indigenous), and older adults who spoke languages other than English (70% Spanish, 38% Chinese, and other languages including Korean, Vietnamese, Japanese, Hmong, Khmer, Tagalog, Arabic, Russian, Ukrainian, and Asian and Indigenous languages that were not specified). Fifty-eight percent of organizations served rural areas. Interviewees represented a mix of roles —83% of organizations interviewed had a decision-maker and 58% of organizations had a front-line staffer participate.

Our formative research focused on three central questions: (1) What are the needs and priorities of older adults in communities who are underserved by social and health resources? (2) What are the needs and priorities of organizations that engage these communities? and (3) What are the most important strategies, collaborations, and adaptations needed for adopting and delivering PEARLS in communities underserved by social and health resources?

3.1. Priorities and needs of older adults in communities who are underserved

3.1.1. Older adults living in poverty remain underserved by mental health and health care

Interviewees highlighted how older adults experiencing poverty remain underserved by mental health and health care. Despite being connected to home and community-based services, these supports were insufficient or inappropriate for meeting older adults' array of health needs. In addition to health care, older adults also required assistance with basic needs like food, housing, and heating their homes during extreme weather. Participants shared that ageism

TABLE 2 Characteristics of interview participants ($N = 37$)[a].

Respondents	*n*	%
Age		
<30	1	2.70
31–40	9	24.32
41–50	5	13.51
51–60	10	27.03
61–70	6	16.22
71–80	1	2.70
Missing	5	13.51
Gender		
Female	22	59.50
Male	14	37.83
Did not specify gender	1	2.70
Race		
American Indian/Alaskan Native	1	2.70
Asian American/Pacific Islander	11	29.73
Black or African American	2	5.41
White	21	56.76
Did not specify race	2	5.40
Ethnicity		
Latino	7	18.92
Not Latino	30	81.08
Profession*		
Social work	22	59.46
Gerontology/aging	14	37.84
Behavioral/mental health	10	27.03
Administration	7	18.92
Public health	3	8.11
Health care	2	5.41
Other professions[b]	8	21.62
Missing	1	2.70
Education		
Some college	3	8.11
College graduate	16	43.24
Post college/graduate school	17	45.95
Missing	1	2.70
Length at organization		
1–2 years	2	5.41
3–4 years	5	13.51
5+ years	30	81.08
Length in role		
1–2 years	7	20.00
3–4 years	5	13.51
5+ years	25	67.57

[a] Two of 39 interview participants did not report survey data.

[b] Other professions includes Communications, Sociology, College, and Student Services.

*Participants could check all that apply, so total sums to more than 100%.

TABLE 3 Participating organizations that reach older adults who are underserved in Washington and California ($N = 24$).

Organization	*n*	%
State		
California	13	54.17
Washington	11	45.83
Type of organization*		
Funder	7	29.17
CBO	15	62.50
Other partners	7	29.17
Food access	3	12.50
Community mental health	2	8.33
Faith-based organization	2	8.33
State	2	8.33
Population served by CBO*		
Communities of color	22	91.67
Black	5	20.83
American Indian/Alaskan Native	10	15.87
Asian	7	11.11
Latino	3	4.76
Non-English language preferred	2	3.17
Rural	8	12.70

*Participants could check all that apply, so total sums to more than 100%.

and social isolation due to poverty, mobility limitations, lack of transportation, loss of function, or caregiving duties, meant that older adults' needs remained unmet. As one potential adopting CBO in California put it, "*The number one thing is access to care.…they are simply not being seen, it's like they are invisible* (WA014)."

3.1.2. These older adults continue to experience isolation, depression, and barriers to care

Isolation and depression are ongoing issues for the older adults in communities served by the organizations we interviewed. Participants described how the older adults they engage have faced years of adversity and the many changes that come with aging. As one current CBO adopter in Washington stated: "*Because if you've lived on the planet for a long time, you have lost a life. Some clients are so depressed because they've had massive things that's changed* (WA003)." Cultural barriers and social stigma also make it challenging for older adults to openly discuss feelings of depression. Older adults with depression will often describe it *via* symptoms or feelings, such as feeling lonely, sad, worried, frustrated, stressed, anxious, down, experiencing chronic sorrow, too many problems, or needing social support. Given this challenging context of isolation, adversity and stigma, any strategy for community providers to address depression must start with building trust to engage older adults in care.

3.1.3. The pandemic has aggravated unmet health and mental health needs for older adults

The COVID-19 pandemic exacerbated these needs into a "*life or death situation*" (current PEARLS adopter in California, CA005), as social distancing and fears of contagion made it challenging for older adults to access services: "*…clients do not want people coming in [to their homes] even though they want to see somebody.*" (CA026, food access organization in California). For cultures for whom community is an essential value, the social isolation has been devastating: one Washington funder shared the impact on Indigenous communities: "*We don't know how to be apart from each other. We don't know how not to share everything we have with each other. We don't know how not to gather for our dances, for our ceremonies, for our language. We don't know how not to do those things, and it's really hurting people* (WA014)."

3.1.4. Help-seeking and tele-health care has shifted during the COVID-19 pandemic

While some organizations felt older adults have been even more cautious about seeking assistance during the pandemic, others felt the acuteness of need has made older adults more willing to ask for help. Organizations have pivoted to remote service delivery during COVID-19, though both providers and older adults prefer receiving services in-person when they can do so safely. There were mixed opinions about remote service delivery from both current and potential adopters—some organizations have seen increased access to services that no longer have to rely on transportation, and appreciate having a service to connect with older adults who are isolated and unable to access resources. Other interview participants called out the challenges in access and privacy with tele-care for both older adults and staff from priority communities who have been underserved: "*I mean, people may have those phones, but I know there's a lot of people who still aren't comfortable if they don't have a smartphone… in a lot of the rural areas, we have problems even with our own staff being able to get on VPN and get access and keep access* (WA013)."

3.2. Priorities and needs of organizations that engage older adults in communities who are underserved

3.2.1. The recent social context has made it harder for organizations to engage older adults who are underserved

In addition to providing social care and linkages to what health care is available and accessible to their communities, CBOs were providing some mental supports to older adults. Those who have not yet adopted PEARLS did not feel equipped to address the levels of depression in their communities. The pandemic and other social challenges beyond COVID-19—a combative presidential election, police violence and continued racial injustice against Black and Brown communities, and extreme weather—have made older adults even more difficult to reach with services: one rural California organization (CA021) shared the need for "*increasing communication and provision so that people access mental health and behavioral health services during this time where the needs seem to be going up and suicide rates are going up, addiction is going up, and mental health crisis is going up. So we're continuing to provide resources, but gearing it a little bit more toward what's happening. It's just so many. It's not just COVID-19, but here in California, we have wildfires, we've had extreme heat, and we've had in the cities and even in the small towns, we've had protests and civil unrest because of racial injustice.*"

3.2.2. Organizations require more training and capacity for staff to provide depression care

Staff at CBOs and funders that have not yet adopted PEARLS do not typically have mental health training and are cautious about addressing the topic with their clients particularly when they do not provide care or have appropriate services to refer them to. One California CBO serving older Latino and Chinese adults shared: *I know any staff that are non-licensed generally avoid using the term [depression]….My experience is that, I've often worked with frontline staff, degreed and non-degreed, that have this feeling that if they ask someone about depression, and they don't have a place to refer someone, then that's worse than if they didn't ask it at all* (CA026)." Organizations believe their staff need more and better training about the importance of addressing depression and how to recognize symptoms so that older adults can be connected with care. That said, most organizations shared that staff are beyond maximum capacity during the pandemic and struggling to do more with less.

3.2.3. Organizations identify new services based on community needs and networks

In terms of how organizations identify services to support their older communities, funders plan new programs based on community needs, and hear about new programs through professional networks. Community-based organizations and other partner organizations also learn about new programs through networks (e.g., peer networks such as local coalitions, partner organizations for referrals and funding, and health fairs) though this learning happens more organically than actively seeking out new services as "*every day changes…so all information is good information* (WA016)." Once organizations hear about a program, they may look up further details using the Internet or print materials, websites, or brochures, but much of program's credibility is established through recommendations from peers or word-of-mouth. As one California potential adopter from a faith-based, food access organization shared, "*I listen to the networks that we're involved in to see who might be doing that, …. and be able to get information from colleagues about who's done this program, who knows about this program, and is going to talk to me about their experience with the program* (CA027)." For interview participants who are front-line providers or managers at large organizations, they sometimes don't have a say in what new services they adopt but rather are told by leadership.

3.2.4. Organizations desire sustainable, accessible programs that align with cultural values

Organizations look for programs with cultural flexibility, stable funding, and accessible training that inspire commitment from their staff, and that fit with both their organizational culture and values and those of the communities they serve. Cultural flexibility means the program can adapt to accommodate different cultural norms, values and beliefs, and has a history with marginalized groups, which is not typically how evidence-based programs are perceived. There were mixed opinions about programs being "evidence-based"—funders tended to value this as an indicator of quality and access to funding, whereas CBOs were mixed. Some CBOs feel evidence-based program status is not important as it is meaningless to the community and what matters most is evidence created for the communities they serve. Other CBOs are actively interested in adopting evidence-based programs that have been shown to work for their communities because funders require this and they want some assurance the program will work if investing scarce resources. Given communities' limited access to services in resource-constrained environments in which organizations operate, there must be alignment between what communities' want and need, and the organization's ability to sustain services. As one potential adopter CBO in Washington shared: "*We want to make sure if we put something in place, a), we hear the voice of the community, and b) it's sustainable so it's not going to blow in the wind* (WA016)".

3.3. Strategies, collaborations, and adaptations for delivering PEARLS with CBOs that engage communities who are underserved

3.3.1. Train trusted staff from communities to improve access, delivery, and impact

Most interview participants strongly recommended that staff delivering PEARLS should be from the community being served, in order to best meet the needs of older adults. As one current PEARLS adopter described: "*We have a small team, three of them were born and raised in the community.…They know the community. They understand how to talk to people that may not talk like them, but they understand it. It's important to be able to serve so that they don't feel like you're talking down to them* (WA003)." This was amplified during the COVID-19 pandemic when older adults were further isolated and engagement had to be done remotely.

3.3.2. Programs must be culturally appropriate for both engagement and outcomes

Cultural appropriateness is also paramount given that many communities have experienced a long history of programs and services that are a cultural mismatch, potentially doing more harm than good. Some potential adopting organizations were cautious about whether PEARLS would be a good fit for their communities. One potential PEARLS adopter, a social service and food access organization in California, summed it up as follows: "*Oh, yes, we've heard of that [PEARLS]. I don't know if that really works for our clients. And I'll dig into that a little more. Some of our home-bound clients, that might be most isolated or most depressed, and very, very poor, extremely low income, just barely housed. I think there's a perception with some of my team, that programs like this aren't geared toward that population …. how effectively has it been offered and sustained in communities of color? (CA026).*"

3.3.3. Clarify that quality depression care can be provided by non-clinical staff with clinical support

Many participants also voiced the perception that PEARLS coaches must have advanced educational degrees and be clinically trained and licensed, when in fact the model was designed to train front-line staff without these credentials to deliver mental health services. Likewise, participants believed that the clinical supervisor required to support PEARLS coaches was hard to access given clinical workforce shortages. As one potential adopting community-based organization in California shared: "*I think I could count on both hands how many psychiatrists we have available... We have maybe 10, right? That's serving all of [a rural] county and probably beyond and only a handful of those… take Medicare. So we have a huge shortage. It's really hard to retain doctors and specialists in this area* (CA020)."

3.3.4. Funding plus other implementation supports remain key for equitable implementation

Funding was also seen as a challenge to PEARLS adoption, from both current and potential adopting organizations. Organizations use a variety of funding sources to support PEARLS, including redirecting organizational funding (rather than chasing new funding which can be a major time investment to secure). Funding is used not just for staff time and training to deliver care but also to do engage persons in care *via* outreach and referrals from internal and external partners, and evaluating impact and adapting as needed. While some CBOs are already connected with funding organizations, some funders desire help connecting and collaborating with CBOs who engage older adults living in underserved communities. CBOs want to partner with funders for financial support as well but find some of the pathways to funding too restrictive or complex: "*Department of Mental Health is huge. So, getting your foot in the door and getting connected is not an easy feat* (CA027; potential adopter CBO social service and food access organization in California)." While funding was important to launch the program, training and staffing were also key pieces of the adoption process. For example, having monthly group technical assistance calls with our center helped nurture a community of practice to support organizations to adapt, deliver, and sustain PEARLS.

3.3.5. Organizations that have adopted PEARLS highlight fit with existing staff and community

For organizations with PEARLS programs, the decision to adopt the program had often been made by organization leadership based on perceived fit with staff and community needs and priorities. Funders and CBOs view the program as aligning with their mission and communities, and appreciate being able to integrate PEARLS into what they are already doing to support older adults. Staff shared how PEARLS' focus on problem-solving could help older adults from diverse cultural backgrounds address concrete causes and symptoms of depression right away. As one California community health center noted: "*Most of my staff felt PST [Problem-Solving Therapy] is much easier, because our patient population are not that comfortable to talk about feelings… So we help them to come up with a solution. This is more culturally relevant, or more culturally acceptable to them* (CA015)." Some CBOs noted that older adults are more comfortable talking about depression after completing PEARLS and seeing that it is possible to recover.

3.3.6. PEARLS tools can also support self-care for front-line social service staff

Organizations currently doing PEARLS during COVID-19 highlighted how tools have helped support staff as well. One California funder who is a current PEARLS adopter shared: *We've talked a lot about self-care during this time. Aside from the COVID-19 aspect of everything and making sure you're washing your hands and all that stuff, really focusing and having them look at how are they taking care of themselves, which I know we already have to do in a helping profession, but now even more so our providers have gone from being a provider to being a provider while trying to be a teacher and do childcare and do... all of these multiple worlds are colliding at the same time, and that has been a struggle for a lot of folks. So making sure that they really are taking the time that they can to create that time, to carve that time out, to really make sure that they're just connecting, that they are finding good ways to take care of themselves. Just like they're walking their clients through doing those things, they need to be able to do that for themselves... I'm hoping it's been impactful and helpful for them. It's really hard to pour from an empty cup and it was really easy to get yourself drained during the last 3 months, if you didn't make a concerted effort to take care of yourself* (CA002).

3.3.7. Adaptations are an important implementation strategy for health equity

Table 4 summarizes current adaptations that organizations have made to support PEARLS delivery with older adults who have traditionally been underserved, and recommended adaptations to better fit their organizations or community. These modifications include changes to distance training and remote delivery with the onset of COVID-19. As an implementation strategy for promoting health equity (47), partnering with organizations, staff, and older adults to adapt what, how and where PEARLS is being delivered can facilitate program implementation in populations who have been historically underserved.

3.4. Equity-centered dissemination and implementation strategies

These findings were used to create new PEARLS dissemination and implementation strategies that prioritized the strengths and needs of underserved communities and the organizations that engage them (Figure 1). For the dissemination strategies, our internal and external communication experts created new messaging to emphasize the ways in which PEARLS can work in partnership with communities and organizations, and clarify misconceptions about program accessibility, appropriateness, and cost. Messages were actively disseminated and tailored to different audiences (funders, CBOs, or other partner organizations) and delivered both *via* our center and peer organizations that have done PEARLS with older adults in our priority populations. Since we cannot use word-of-mouth locally (we are delivering this strategy remotely across two states), we are using written and verbal channels such as website, phone, email, and webinars to build relationships.

For the equity-centered implementation strategies, we are holding virtual community conversations and provide one-to-one support to organizations to engage partners, assess capacity, need, and PEARLS fit, and discuss what adaptations are appropriate and desired. These supports focus on what organizations shared are important to their staff and to their communities, such as broadening "depression" beyond clinical diagnoses and stigma to addressing loneliness, isolation and what matters to older adults. Implementation strategies will also emphasize stories from staff and older adults about PEARLS' impact; clarify that ongoing training and technical assistance are available for capacity-building; and share examples of how resource-constrained organizations have partnered for funding and clinical supervision.

4. Discussion

Community-based organizations (CBO) have provided essential support to older adults who are underserved, including meal delivery and access to COVID-19 testing, vaccines, and other health care. Isolation and depression have emerged as urgent issues among older adults and the CBOs that engage them, due to the pandemic's disproportionate impact on older communities, increased anxiety and fear, and decreased social and physical connections. When looking for new services and supports for older communities who are underserved, CBOs want programs that fit organization, staff and community strengths and needs, are culturally appropriate and flexible, have stable funding, and provide accessible training and capacity building. These findings align with similar formative research to identify strengths and needs of trusted community-based organizations as partners in evidence-based health promotion that reach community members who are often marginalized or stigmatized (29, 49, 50).

Our findings align with implementation science and practice recommendations to improve health equity. While programs like PEARLS have traditionally highlighted their effectiveness on clinical outcomes or being "evidence-based" (51, 52), the literature bridging cultural adaptations and implementation science (53) to reduce racial and ethnic disparities in mental health care emphasizes the importance of communicating about an intervention's "social validity" (51). Social validity is the acceptability and usefulness of a program which is influenced by one's worldview (e.g., stigma about depression), practical realities (e.g., caregiving duties, work), and access (or lack thereof) to resources such as to transportation, mental health insurance, and culturally and linguistically appropriate care. Improving and communicating about PEARLS social validity is thus essential for reducing disparities in older adults' access to depression care Furthermore, current and recommended adaptations to PEARLS and how it is delivered are a key implementation strategy for health equity (47): they center the CBOs that reach older populations most at "risk of risks" (54) to deliver quality care that is socially valid and fits different contexts, thus improving engagement, delivery and outcomes (52).

Our learnings from interviews support recommendations from social marketing and communications to facilitate organizational behavior change—the adoption of depression care by social service organizations—by tailoring and targeting messages to front-line staff, managers, and funders using narratives that resonate with their values and context (55). For instance, finding suggest messaging to front-line staff about how PEARLS can meet both them and their older adult clients where they are in their communities to reduce depression and isolation in ways that are accessible and

TABLE 4 Current (C) and recommended (R) adaptations[a] to PEARLS to engage older adults who are underserved.

PEARLS	Adaptations
PEARLS content	
English-language written materials	• Use terms and vocabulary in English and other languages that are culturally appropriate (C) • Translate materials into other languages (currently available in Spanish, Chinese, Russian, and Somali) (C) • Have PEARLS materials translated into additional languages (mixed opinions on whether this should be done by our center or by organization) (R)
Psychoeducation, PST, BA, linkages to community-clinical	• Additional supports tailored to their community that complement PEARLS (e.g., case management, motivational interviewing, mindfulness and relaxation) (C)
Context (COVID-19) and PEARLS delivery	
In-person engagement	• Engagement *via* phone or video-conferencing (C) • Take additional time/calls to listen and hear their story; it may be necessary to assist a new client with urgent needs (food, heat), before the focus on PEARLS (C) • Drop off food and forms masked and distanced to build rapport (C)
In-person delivery	• PEARLS delivery *via* phone or video-conferencing (C) • Many older adults do not have access to or comfort using video-conferencing that requires reliable internet, data plans, hardware (smartphone, tablet, and computer) (C) • Can be hard to remotely teach older clients to use tech (C) • Guidance on how to adjust PEARLS for remote delivery (R)
In-person assessment	• Mailed forms or dropped off at older adults' home, and split assessment into multiple calls (C) • Review and update enrollment paperwork given pandemic reality many older adults are experiencing (R)
Master's level social workers and nurses	• Community health workers, interns, case managers (high school/GED, bachelor's, or graduate) (C)
6–8 sessions (3 weekly, 2 biweekly, and 3 monthly)	• Extend frequency to 10-15 sessions (still time-limited but allow additional support for older adults with complex lives (especially during COVID-19) and ease transition from biweekly to monthly sessions (R)
Individual intervention (one-on-one)	• Include group component to strengthen social and peer support during and after program (R)
Training and technical assistance (TA) strategies	
One-time in-person training (2 days)	• Training done *via* recorded video demonstrations, quizzes, live Zoom teaching, practice, and feedback (C) • Include case studies and role-plays about engaging communities who are underserved and delivering PEARLS in different community and cultural contexts (R) • Provide booster trainings for CBOs that engage communities who are underserved (R)
Ongoing TA (phone, email, and video-conferencing)	• Monthly TA calls for trained organizations to foster community of practice (C) • Include more content specific to engaging underserved communities. (R) • Offer case review and questions with clinical supervisor (R)
Implementation and funding	
Outreach done by research staff with grant funding.	• Outreach done by CBOs that already engage communities who are underserved. Can be time-intensive and often not covered as part of program funding. (C) • More direct outreach to populations at-risk (R)
Funding provided through research grant	• Provide letters of support for funding and share resources during TA calls (C) • Support organizations to identify and secure funding (R)
Clinical supervision provided through grant	• Support organizations to arrange clinical supervision (R) • Clarify clinical supervisor roles, responsibilities, options (not just a psychiatrist) (R)

PST, Problem-Solving Treatment; BA, Behavioral Activation.

[a] Organized using Framework for Reporting Adaptations and Modifications to Evidence-based interventions (FRAME) (46).

appropriate, and providing training to support engaging older adults in depression care given stigma and history of injustice. Managers who are often tasked with both decision-making and doing would benefit from messaging about PEARLS flexibility and adaptability to support both their staff and their older adult communities, such as supporting staff self-care *via* clinical supervision and extending the number of sessions to support older adults with complex health and social needs. For funders who are increasingly called upon to address health inequities but without additional resources to do so, we can better communicate about how to use existing funding to fill gaps in care for older adults (e.g., Older Americans Act Title III-B and D funding); Medicaid funding such as Tailored Supports for Older Adults (TSOA), Medicaid Alternative Care (MAC), and COPES Ancillary; and the Mental Health Services Act Prevention and Early Intervention funding) and connecting them with local CBOs to reach older adults who have been underserved by depression care. Engaging these organizations as partners in both dissemination and implementation research and practice further bridges research to practice (56), centering their wisdom about how to adopt, adapt, deliver, and sustain PEARLS for improving equitable access to depression care.

The strengths of this study are using qualitative research methods and a social marketing approach to learn from CBOs with community wisdom to design an intervention to better support their adoption of quality depression care. This study aligns with recent calls to center equity in implementation science so that these strategies close rather than widen gaps for older communities who are underserved. These recommendations include focusing on

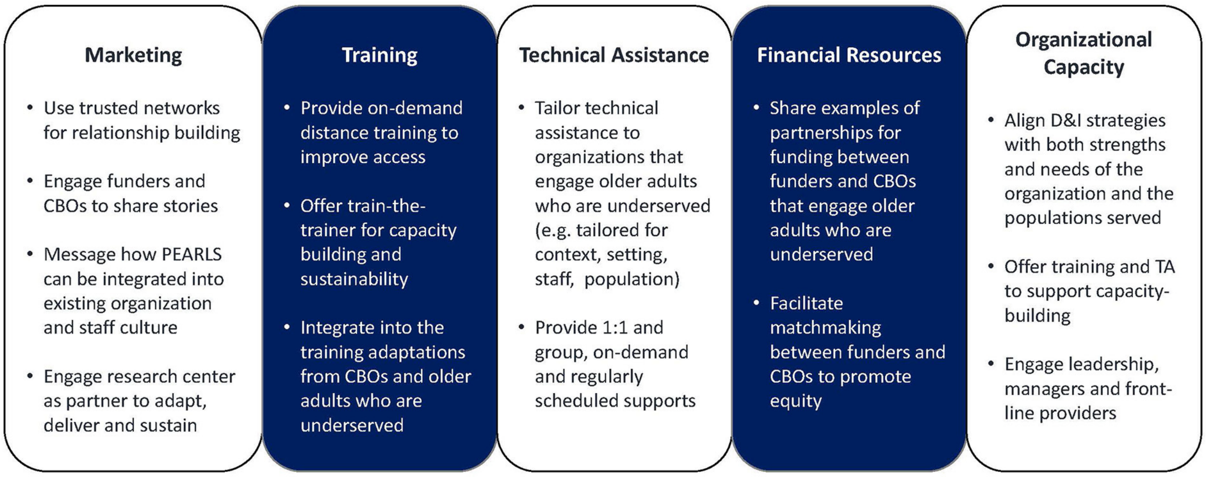

FIGURE 1
Adapted from knowledge to action (K2A) framework, translation supporting structuring, Wilson et al. (48).

reach from the very beginning, designing interventions for these populations and resource-constrained settings with implementation in mind, creating dissemination and implementation strategies that address inequities in access to care, understanding what can be adapted to better meet organizations' and communities' needs while maintaining program fidelity, and using an equity lens for evaluating how well and how much the intervention is working (47).

However, this research comes with several limitations. First, data were collected right as the pandemic was emerging and in its 1st year. Current partnerships with CBOs suggest that many organizations are still focusing on addressing basic needs of older adults and wanting to address inequities in access to care while they contend with economic challenges. Second, organizations who were willing and able to participate in this research may not reflect all organizations that reach older adults who are underserved, nor are all older adults who are underserved represented in this research. Third, most interview participants had a college education or more and had worked at their organization and in their role for 5 years or more. While being more educated and having a longer tenure at their organization may have provided advanced skills and deeper knowledge of both their organization and community, findings may not reflect the perspectives of front-line staff with less formal education or newer to their position or organization. Lastly, we recognize that our proposed organizational intervention and the one-one-one PEARLS program cannot fully eliminate the social determinants of health and the historical and contemporary injustices that have created older adult health disparities. Policy, systems and environmental changes and other structural interventions are needed to address these drivers of inequities in late-life depression burden (57).

In closing, this study describes formative research with organizations who are engaging older adults experiencing poverty and are underserved by depression care: older adults of color, who are linguistically diverse, and/or live in rural areas. Findings highlight how these older adults remain underserved by mental health, health and social care, which intensifies the burden of depression and isolation. The COVID-19 pandemic exacerbated these needs and also created opportunities with normalizing both help-seeking (through shared experiences, conversation and empathy about feeling depressed, anxious or traumatized) and remote care delivery (given in-person delivery was not a viable option). Organizations that engage older adults underserved by depression care see challenges given stigma, acute pandemic and environmental stressors, chronic injustices and resource scarcity, yet recognize their role to connect marginalized older adults to better care. Existing networks can be tapped to raise PEARLS awareness as one in-house solution for address inequities in access to depression care, aligning with organization's needs, preference, and values for programs that are person-centered and culturally appropriate, and have stable funding, accessible training, and flexibility to fit the culture of their organization and older adult communities. These findings guided new equity-centered dissemination and implementation strategies to better engage and support organizations who reach older adults who are underserved as depression care providers. We are currently partnering with organizations in California and Washington to evaluate whether and how these D&I strategies increase equitable access to PEARLS and plan to share findings in 2024.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by University of Washington IRB. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

Author contributions

LS conceived of the study, interviewed participants, co-led the analysis, and drafted the manuscript. AP made intellectual contributions to study development, interviewed participants, co-led the analysis, manuscript review and editing, and approved the final version. MK made intellectual contributions to study development, participated in the analysis, manuscript review and editing, and approved the final version. BB, PH, and MS made intellectual contributions to study development, manuscript review and editing, and approved the final version. KH-H and SW contributed to manuscript development, review and editing, and approved the final version. SI and LB participated in data collection, contributed to manuscript review and editing, and approved the final version. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2022.1079082/full#supplementary-material

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Planned adaptation and implementation of the *Community Guide* recommendations for increasing physical activity in rural community settings: A qualitative study

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Background: The purpose of this paper is to report on the implementation of an evidence-based model, VIVA, which was developed to translate physical activity (PA) recommendations to rural environments and was scaled-up to 12 rural communities across New Mexico. Our longitudinal qualitative research describes processes of planned adaptation in the rural context with an exploration of inner and outer context adaptations that consider important implementation constructs including leadership, partnership and collaboration.

Materials & methods: An enhanced version of the RE-AIM framework was used to formulate community-level engagement and process questions essential to implementation science. Qualitative methods, using a thematic approach that included both inductive and deductive coding with attention to processes, was used to explore adaptation at the community level. Data included semi-structured interviews with 17 community leaders at baseline and 10 at follow-up, fieldnotes, and technical assistance tracking forms. Analysis was conducted with NVivo qualitative data analysis software.

Results: Analysis demonstrated how planned adaptation of the implementation model was critical to dissemination in rural communities. Understanding and adapting to local context—including geography, culture, economics—is essential for implementation. Inner context constructs, recognized as important across implementation models, including leadership, partnerships and political engagement were found to be key to implementation success. Moreover, we provide concrete examples of the range and complexity of these issues in rural communities, and how these shaped implementation uptake and success.

Discussion: Studying processes of planned adaptation in rural contexts will further implementation science efforts to move evidence into practice. It is essential to incorporate planned adaptation to local, community contexts to create models which are simple to encourage adoption, are evidence-based, and are adaptable to local conditions without compromising the integrity of the evidence-based model.

KEYWORDS

rural, implementation research, adaptation, physical activity, community-engaged research

1. Introduction

Rural health disparities have grown in the last three decades (1). Disparities in death rates, life expectancy, heart disease, diabetes, and unintentional injuries have all increased. Physical activity was identified as a top-ten rural health priority by Rural Healthy People 2020, as was nutrition, weight status, diabetes, mental health, heart disease and stroke, all of which can be addressed by physical activity (2). That these health disparities exist across large swaths of the rural U.S. underscores the need for community-based solutions that go beyond individual risk factors. Community-based and community-wide approaches are needed to address these disparities. While there is solid evidence of the role of physical activity in preventing chronic disease (3), the *how* of implementing these recommendations *in practice* in rural communities remains a complex challenge (4). This research reports on the translation and adaptation of evidence-based recommendations for increasing physical activity and their dissemination and implementation in rural communities. Learning more about how to adapt and implement successful evidence-based research in community settings is crucially important to advance efforts to address rural disparities and build on community strengths and resources to improve health and wellbeing.

In this article, we report on a multi-phased longitudinal study. Phase I included a community-university partnership to develop an evidence-based model, or prototype, which translated, disseminated, and implemented recommendations for increasing physical activity (PA) to a rural community, Cuba, New Mexico (5). The recommendations for Phase I came from *The Guide to Community Preventive Services* (*The Guide*) (6). Phase II involved scaling-up of the Village Interventions and Venues for Activity (VIVA)-Step Into Cuba model developed in Phase I to rural communities across the state of New Mexico (7). The purpose of this article is to report on the adaptation and implementation of Phase II. Our goal is to address gaps in the literature related to underreporting of how evidence-based models are adapted during the implementation phase through attention to local context in community-engaged research. All of these communities share commonalities associated with context, however, they are situated within local, regional, socioeconomic, cultural, historical, and geographic contexts that differ in important ways.

2. Materials and methods

2.1. Implementation framework

RE-AIM, an established dissemination and implementation framework, was originally developed to guide research efforts in the early stages of dissemination and implementation science to increase the speed and improve the process for bridging the gap from research to practice (8). The VIVA research team used an enhanced version of this framework to align the implementation design, process, research questions, and data collection for a scaled-up model of VIVA-Step Into Cuba. For the scale-up and implementation phase of the research, VIVA Connects, we deployed a mixed method approach to collect and analyze data guided by RE-AIM, enhanced with additional cross-cutting constructs identified by Neta et al.'s framework (9), along with Milat and Redman's success factors and barriers in scaling-up (10). The cross-cutting themes identified by Neta and colleagues include how implementation crossed multiple socio-ecological levels; a deep look at local context that goes beyond demographics and emphasizes capacity for change, leadership and communication and feedback strategies; and reporting information from multiple stakeholder perspectives (9). Thus, the enhancements do not reflect new constructs, however, more granular attention to certain constructs and how they were operationalized.

Context has long been identified as an important variable of implementation frameworks (11), however, it has also been argued that it is one of the least reported elements in research (9). Moreover, it is often limited to understanding the context of health care services settings. Because implementation science has been recognized as essential to narrow the gap between research and practice, we argue it is important to use in community settings (12) with community-engaged participatory approaches, which are shown to result in robust and valid data (13) and produce outcomes related to community goals. In research where communities comprise the implementation setting, elaboration of context is extremely important. Demarcation of inner and outer context has deepened understanding of context in implementation research (14). In community settings, outer context constructs such as legislation, policy and funding may have many points of influence. In addition, recent research on adaptation argues that examination of adaptation processes should include considerations of when and how modifications occurred, whether they are planned/unplanned, their relationship to fidelity, and reasons and goals for modification (15).

Implementation researchers have provided insight into key elements of how adaptation to local contexts occur. First, active participation of community members in all phases of the implementation (planning, implementing and monitoring) is crucial for scale-up (10). Inner context constructs such as leadership, organizational characteristics, and staffing processes can be translated to community settings. Leadership has been identified as crucial to the success of implementation efforts and is incorporated into RE-AIM and most other frameworks. Strong leadership is critical (10), and we argue that leadership should be engaged on multiple levels, from community members not engaged in local governance but who have a passion for the issue at hand, to youth and elders and others who are leaders in local institutions (e.g., health care providers, school teachers and administrators), federal, state, and other land managers, as well as elected officials. Partnerships should be examined closely and specific partnership strategies used (9). Further, local context plays an important role in what is commonly understood as the socioecological model, as can be seen in Sallis and colleagues' adapted framework, which includes consideration of intrapersonal domains, perceived environment, behavior in the context of active living, neighborhoods, workplace and school environment, and policies (16). This pragmatic approach focuses on actual, real-world settings in their broadest context.

Building on all of these insights from the implementation science literature, the research we report on suggests that applying an implementation framework that incorporates planned adaptation to local context is viable to scale-up across similar, but unique, community settings. This view of adaptation means going beyond basic community attributes, such as demographics, considering other characteristics including geography and access to public lands. An overarching question of this research can be asked: what have we learned about implementation of *The Guide* recommendations in rural contexts that may apply to other implementation research that aims increase PA?

2.2. Translating guidelines to a rural community: VIVA-Step Into Cuba

In Phase I, *The Guide* recommendations for increasing PA were translated through a community-academic partnership, VIVA-Step Into Cuba (2009–2014) (5). Cuba, a rural community in New Mexico served as a "beta site", for subsequent scaling-up to similar rural communities. We therefore describe its features here as it constitutes the prototype for the adaptations in Phase II. The evidence base for VIVA comes from *The Guide*, which provides recommendations for increasing physical activity based on a review of the latest research with robust evidence of effectiveness. Much of this research, and thus many of the recommendations are grounded in urban or suburban settings (see Table 1).

Recommendations related to increasing access to places to be physically active, community-wide campaigns, individually adapted behavior change programs, social support, and the built environment were translated to the rural context simultaneously and on multiple levels of the socioecological model through the creation of a logic model which guided the project through its phases (5). Community-wide campaign guidance included involving many community sectors, including highly visible, broad-based, multicomponent strategies (e.g., social support, risk factor screening or health education). In Phase I, this recommendation was adapted to the creation of a website, the production of walking guides to promote places to be physically active, which eventually led to the creation of web-based and mobile phone application with trail maps and information. Walking was also promoted in the local newspaper, and through outdoor kiosks promoting specific trails and signs encouraging people to walk for health or convenience at the post office, clinic and credit union. Additional strategies included a walking champion who led walking groups for seniors, employees and students. For more on the results of this phase of the study see (17).

2.3. Widespread dissemination, scale-up and implementation across rural New Mexico: VIVA Connects

The second phase of research, 2014–2019, involved scale-up and implementation of the beta site prototype to other rural communities across New Mexico to see if it could be successful in communities with similar attributes such as being rural and under-resourced, but each with unique geography, political climate, natural resources, culture, and history. One hundred sixty-five communities with a population between 500 and 12,000 were originally identified using U.S. Census county-level data for New Mexico. We recruited participating communities from this list of eligible communities by distributing a form to those with which we had previous relations, often at conferences, through the health department and previous contacts, a website, videos, factsheets and a listserv. Of those 165 communities, a total of 31 communities chose to be included in the network by completing a VIVA Connects Action Community Intake form. Each of the 31 communities were invited to submit requests for technical assistance (TA) to implement activities to increase PA in their communities. Leaders from the community were able to request TA related to increasing PA in their communities. These TA requests were categorized using a form to indicate which *Community Guide* recommendation was represented to ensure they fit into the evidence base. The form used a "stoplight" format with green, yellow and red sections to categorize the TA requests, indicating whether or not the TA could be completed immediately (green), were achievable, but would take some time (yellow), or were not within our scope or were not considered evidence-based (red). Communities that (1) demonstrated active interest in implementing evidence-based recommendations to increase PA, (2) identified one or more community champions to assess needs and were involved in coalition-building around PA, and (3) requested TA on at least 2 occasions, were invited to be VIVA Connects Action Communities. Action Communities ($n = 12$) were then included in the qualitative arm of the research study.

Following *Diffusion of Innovations*, we wanted to highlight the importance of intermediary actors, or opinion leaders and change agents. Therefore, we refer to the leaders identified in these communities as "champions" in an effort to broaden the concept beyond political or other more traditional leaders (18). Thus, in this context, "champions" are people who took on a leadership role in a community directly related to increasing access or enhancing places to be physically active and who expressed interest in participating in the network of all 31 communities, VIVA Connects. The network was important as it allowed Action Communities and others who were interested, but not yet requesting TA, to share resources, ideas, and successes with each other, to share insights about successes overcoming challenges often particular to rural communities. Sharing was facilitated by participation in a listserv, learning modules accessed through a website, and the VIVA Connects website.

2.4. Data collection

The first author conducted semi-structured interviews with 17 champions from 12 Action Communities in a baseline interview after joining the study. She has a Ph.D. in cultural anthropology and served as the lead on the qualitative strand of this study and had over 20 years' experience conducting qualitative research. She had no relationship with study participants prior to the research being conducted. She conducted some interviews with individuals and others with groups of more than one champion. The interview

TABLE 1 Examples of how planned adaptation strategies were implemented for each *Community Guide* recommendation.

Evidence-based recommendations from *The Community Guide*	Original research focus in metropolitan settings	VIVA-Step Into Cuba: phase I translation for rural beta site	VIVA Connects: phase II adaptation for scale-up across rural areas of state
Community-wide campaign	• Involve many community sectors • Involve visible, broad-based, multi-component strategies	• Used variety of communication channels, including project website (www.stepintocuba.org), local media (newspaper, posters, signs radio) • Held and promoted Community events such as "Full Moon Hike", school class nature walks • Created kiosks and signs in community	• Developed and promoted walking groups led by community members, for example "Walk with a Doc", "Walk with a Birder", "Walk with a dog" (local shelter animals) • Local media: radio; flyers in utility bills; trail signs; newspaper
Create or enhance access to places for physical activity with informational outreach	• Focus on urban settings [e.g., green spaces, parks. exercise facilities (e.g., health clubs, YMCA)]	• Created, enhanced, and promoted 20 miles of trails in 7 locations • Enhanced local park: planted trees, wildflowers, shrubs, installed benches; produced walking guide and mobile app with trail information; engaged volunteers • Re-routed trail to enhance connectivity with Continental Divide Trail • Created maps and walking guide and mobile app with trail information • Created trail and town signage	• Promoted walking route with information on its cultural history in the community • Planned new trail to create connectivity between State Park and town • Equestrian, mountain biking and walking trails to contribute to economic development • Improved and promoted trail around DUI memorial park • Walkability workshop results adopted for city planning • Expanded mobile app to include VIVA Action Communities
Individually adapted programs	• Focus on behavior change through goal setting, skill building and self-monitoring of goals; building social support for new behavioral patterns	• Promoted walking through physical activity prescriptions from local health care providers. This was not effective.	• Evidence-base did not support this option; so de-emphasized
Social support for physical activity	• Individual enrollment in physical activity with social support component (in person or virtual check-ins; group component)	• Recruited walking champions who led walking groups for specific populations (e.g., seniors; employees; elementary and middle school students) • Developed and promoted community events (hikes, walks, runs) • Promoted benefits of walking as widely accessible and effective exercise	• Developed and promoted walking groups (see above) • Developed and promoted community events (hikes, walks, runs)
Street-scale design & land-use policies	• Combined efforts or urban planners, architects, engineers, developers and public health professionals to change physical environment in small geographic area. • Improved lighting, crossing safety, traffic calming, landscaping	• Conducted an HIA for highway improvements • Provided technical assistance with applications for creation and improvement of sidewalks • Provided recommendations for fairgrounds development • Completed memorandum of understanding with local school to allow community use of cross-country trail	• Completed walkability assessments for sidewalks, cross- walks and pedestrian safety • Park trail improvements • Connectivity between local and state parks
Other	• Not a *Community Guide* recommendation, but our concern with sustainability and community needs prompted us to address in our TA.	• Provided technical assistance to leverage funding for projects	• Provided technical assistance to leverage funding • Developed partnership with New Mexico Department of Health to provide mini-grants to Action Communities

guide remained consistent for interviews of individuals and groups. Because of the broad conceptualization of leadership from different sectors, champions represented stakeholders ranging from department of health employees, members of local health councils, state park rangers, city planners, and rural extension agents. Fifteen were female; we did not collect race/ethnicity, age or other demographic information. Champions were contacted *via* phone or email and invited to participate. Interview questions were open-ended and covered multiple domains related to community goals around physical activity, based on *The Guide's* evidence-based recommendations, and community adaptations or extensions of the VIVA model according to local context. We also asked about key factors included in the enhanced RE-AIM framework, specifically community readiness, coalition-building, partnerships, political leadership, and local context. Interview questions were pilot tested internally with members of the research team. Follow-up interviews were conducted with 10 participants from eight action communities after at least 1 year of participation in VIVA Connects. Many of the communities had experienced leadership changes and new people were included in the interview in addition to the initial interviewee ($n = 4$) or were interviewed in their stead ($n = 1$). Four action communities experienced change in leadership and the originally identified champions were not available for follow-up interviews, and no new champions could be identified and interviewed in their place. Topics included progress on goals, reflections on how previously explored domains (e.g., leadership and partnerships) affected progress in improving access to places for PA. Sustainability was also discussed. Interviews were conducted in person or *via* telephone with champions. Interviews, whether in person or over the telephone, were conducted in private offices or conference rooms and ranged from 30 min to 1.5 h, averaging 56 min. Interviews were not recorded, however, responses were transcribed by the interviewer during the course of the interview. These transcripts were very close to verbatim, omitting filler words and false starts, but attempting to capture participant speech as accurately as possible. Written consent was obtained and the research was approved by the university's institutional review board. Transcripts were sent to interviewees to allow for correction and/or additional elaboration. Data saturation was not a goal as our research design included interviews with all community champions.

In addition to interviews, VIVA Connects staff provided TA in person, by email, or by telephone, and through web-based learning modules available to the network of participating communities. Site visits included the coordination and leading of community-level assessments of places to be physically active. TA GO forms were completed by staff to track and describe TA provided, including which *Community Guide* recommendation was followed in each case. Fieldnotes of these site visits and each contact when staff interacted directly with the community were collected, imported into NVivo, and coded with the same coding tree and were thus included in our analytic memo writing process.

2.5. Data analysis

Data were analyzed using a thematic approach. We used a two-phased coding cycle approach that combined inductive and deductive analysis. Interview transcripts, fieldnotes and TA GO forms were anonymized, formatted and imported into NVivo 11 qualitative data analysis software (19). In the first coding cycle, interviews, observations, meeting notes and other text were coded using primarily descriptive codes, hewing closely to participant language. We also used process and values-coding techniques, resulting in a coding tree developed by the first author (20). Codes were created both deductively and inductively based on questions derived from the enhanced RE-AIM framework (e.g., adaptation, local context, partnerships, leadership and coalition building) and emerging themes. Others were related to the evidence-based intervention strategies found in *The Guide* (e.g., increasing access to places to be physically active, community-wide campaigns). The first author also trained two team members in qualitative coding (one medical student and one intern from the Centers for Disease Control) who conducted first cycle coding. The largely descriptive coding tree resulted in high levels of agreement (>0.75 Kappa co-efficient) when conducting inter-coder reliability checks. Data collected at these codes were then analyzed using second cycle, focused coding techniques (21). Memos were created on each of these thematic constructs (e.g., adaptation; partnerships) and evidence-based recommendation categories (e.g., increasing access to places). The process of memo writing includes reviewing all data associated with a code (or collection of codes) and organizing it in sub-categories, looking for patterns, anomalies, and suggesting other themes or coding intersections to explore. This is where the majority of interpretation and analysis occurred. In addition, queries were used to analyze facilitators and barriers related to the inner context constructs (e.g., coalitions, leadership, and partnerships) for each Action Community and how these changed over time (e.g., from the first to the second interview). Each Action Community became a "case", and we reviewed all associated data chronologically to assess change over time. Additional memos were created to track and analyze important phenomena that affected the research and community implementation, for example, frequent turnover in leadership made it difficult to re-interview champions from the baseline interview and in some communities, thus we created a memo "Turnover, Leadership Issue". We also created visual matrices based on these data to examine inner and outer constructs across communities, as well as "milestones" of implementation success (e.g., creation of maps, walkability assessments, creation of walking guides) to better understand facilitators and barriers regarding these constructs and milestones. These memos and matrices form the basis for the results presented in this article.

3. Results

Baseline interviews with community champions provided local context information that was used for the planned adaptation process that began as soon as possible after communities joined VIVA Connects. Adaptation of the Phase I prototype was led by community champions as they gained knowledge of the evidence base, shared local context elements with the research team, received TA, and participated in a network of other rural communities trying to achieve similar goals in their own communities.

3.1. Outer context adaptations

Collecting data about context and encouraging implementation in community settings with approaches that consider local geography, culture, and economics, underscores the planned adaptation features of our modified implementation model (15). For our purposes, these aspects—geography, culture, economics, and land use—consist of outer context elements (22) in community settings. Interview participants mentioned many strengths of rural contexts that communities can build upon to increase PA. In addition, identification of strengths confirmed important aspects of adaptation to rural context noted in Phase I of the project, the translation of evidence-based recommendations for a rural community in the beta site.

First, among common rural strengths is proximity and access to public lands. U.S. National Forest, Bureau of Land Management, National Park Service, state, county, tribal and other publicly funded and managed lands provide outdoor settings for physical activity. Places to be physically active in town, such as parks, if present, are also important, similar to urban settings.

In Phase II, local adaptations of this recommendation took on various forms, principally highlighting the way local, place-related historical and cultural information can be incorporated into efforts to increase access. For example, the VIVA Connects Action Community coalition in Tularosa had the goal of improving accessibility on a commonly used walking route that followed historic *acequias*, or Spanish colonial irrigation ditches that also served to link sacred cultural history to current practices. Ideas were to create signage that provided walkers information about the area's history, including QR codes to access more text, audio, and visual material related to the walking trail.

Another example is Moriarty, a rural community that had identified few places in which to be physically active and had no close proximity to public lands. In response to the prevalence of deaths caused by driving under the influence of alcohol, a state-wide memorial had been built in the community, consisting of a field of markers designed to look like gravestones to represent the last 5 years of state-wide fatalities related to driving while intoxicated. Members of the county-wide coalition recognized that this accessible, public space could serve as a place for a walking trail. Champions made plans to develop and grade a walking trail around the perimeter of the memorial. Walking the trail could serve as an act of remembrance and provide a safe space for community members who wish to walk on a regular basis. A city in the southern part of the state, Silver City, created a multi-group coalition and capitalized on proximity to the Continental Divide Trail (CDT) and being designated a CDT Gateway Community. The coalition also worked with local government to purchase inactive mining sites to create trails, which were promoted through a community-wide campaign and signage. In these ways, pre-existing land use can be enhanced to create safe, accessible walking trails for communities.

Large geographic areas typical of rural contexts made the focus on connectivity important. For example, Ramblin' Round Raton, a VIVA Connects Action coalition in Raton, created connectivity between a town park and Sugarite Canyon State Park approximately 6 miles away, through a trail to improve pedestrian access and usage of both sites. Another aspect of this recommendation includes a focus on walkability, which is important in rural and urban contexts alike. Improving sidewalks, creating crosswalks, and decreasing motorized traffic speeds are critical for improving walkability in rural areas, however, whereas in urban settings these projects make up a small percentage of municipal budgets, they are often cost prohibitive in rural communities without leveraging funding and expertise from multiple sources. Therefore, VIVA Connects became a source of technical assistance to access this funding to make these important improvements.

Working under a broad vision to improve the health of the community leaves room for various motivations, including economic development. Therefore, VIVA Connects adaptations focused not solely on walking, but on increasing other kinds of non-motorized traffic, for example, making trails accessible for equestrians as well as mountain bikers. Edgewood, population around 4,000, has worked to enhance multi-use trails for walkers, equestrians, and mountain bikers in conjunction with economic development initiatives supported by the Chamber of Commerce, the local parks and recreation department, and a hiking group. In addition, many of these communities were interested in connectivity—between trail systems, connecting trails to parks, and often increasing connectivity between schools, clinics, and other places to make it safer and easier to walk or bike through town. For example, in Taos, a champion stated "and if we can get agreement with town to connect to Fred Baca park. As a part of the town's planning process, she found some cool connections, and found a potential site for dog park on a town property a couple of parcels down. That would be great a connection site". In Silver City, the champion emphasized the importance of connecting the CDT to town: "CDT, having Silver City truly connected, a gateway community. Even though there is not a trail connecting, but that's what people want. Largely for economic development, to help thru-hikers have access that's not a highway, it's out of the way, off the trail". In Edgewood, the champion spoke of getting a trail connected to another trail near a concentrated population so they can get access to "this other set of trails. … Connectivity is key".

Implementation models that include planned adaptation strategies tied to evidence-based recommendations adapted to local conditions serve to highlight the ways technical assistance and networking between communities promote successful strategies to improve individual communities. Moreover, enacting the creation of a network of communities to share and build on evidence-based strategies adds to the overall success of each community and the implementation as a whole. Table 1 shows how evidence-based recommendations from *The Guide* were translated in the beta site in Phase I and then further adapted in the scale-up in Phase II.

3.2. Inner context adaptations

Inner context includes leadership, partnerships, and collaboration related to conducting implementation in the community setting (22). We identified commonalities related to the inner context across all the rural communities in this study.

3.2.1. Leadership

With respect to leadership at the community level, common barriers mentioned by champions included distrust of outsiders, "turf guarding" (defending one's area of influence and being resistant to working with others), programmatic silos, and lack of knowledge about how other rural communities addressed these issues. Some mentioned that community members and political leaders can be averse to change. Leaders said that highlighting the preventive aspect of PA in relation to community-wide health concerns is a hard sell given the tight funding environment. Leaders in rural communities endeavored to create coalitions of people with diverse roles and interests united by the common motivation to improve the health of their communities. In addition, the turnover of community champions themselves was indicative of unstable funding or other challenges that led champions to seek employment elsewhere. In rural contexts, adaptations include the necessity of including a variety of land managers from different agencies (e.g., Bureau of Land Management, U.S. Forest Service, and State Parks) as well as planners, health providers and others. However, we saw that if a coalition was not well-established, leadership changes or vacuums in leadership led to delays or perhaps even abandonment of previously set goals in the community around increasing access to places to be physically active.

3.2.2. Partnership and collaboration

Viewing leadership as broader than local political leaders is important in every context but is critical in rural communities where population is low, and leadership in multiple sectors must be cultivated. Building coalitions with a broad vision—improving community health—encourages bringing in and cultivating many different kinds of leaders with experience in the community.

Moreover, leaders spoke about including partners with specific areas of expertise, who have critical knowledge about how to maneuver within complex systems, but also have links to other experts in associated realms who can help accomplish goals. Thus, diverse coalitions made of partners with different areas of expertise, age, gender, and ethnicity all contribute to diversity. A community champion reported the benefits of a diverse coalition:

> Since I started attending, founders and elders were like, "Heck yeah, I am retired, let's build a trail."... In rural communities, you realize there are a lot of people you have to ask for permission. In the last meeting, we had US Forest Service, county commissioners, a county mapping and planning person, the National Park Service, [a local conservation organization], trying to help with wilderness area, and [mine company representatives]. They have mines all over the place.... It's not a matter of just asking permission, it's getting people at the table: DOT [Department of Transportation], council of governments. So when so-and-so says they are not going to let that happen, we can say, "Hey, so-and-so, how can we make that happen?" We can have more progressive dialogue. If people are investing time they are more committed [Participant 0043].

The champion is also demonstrating the kind of expertise and commitment needed to navigate the complexity of the local context, along with knowledge of how to best leverage leadership to achieve results.

Adaptations for the rural context included developing a community-wide vision built on wider goals than those related to physical activity (e.g., improving community health), forming a diverse coalition with leaders from different sectors, having people with local roots as leaders, and providing a context or mechanism for elders or people with seniority, to pass knowledge down to younger people.

Technical assistance requests were categorized according to *The Guide* recommendations. It was notable that many requests fell into the "other" category, specifically funding. Federal, state, and other governmental sources of funding to make places more walkable are tailored to the resources and capacity of larger communities, including full-time staff dedicated to grant writing and management was often mentioned as a challenge. In a group interview with several champions from one community, they discussed this issue. One community champion said,

> My frustration with the planning process, everyone is up here [motions with hands like a ceiling or line above his head], we are down here [motioning near the floor]. When you go to RTPO [Rural Transportation Planning Organization], DOT has grants available to communities, $75,000 is smallest one, with a 20% match, they want bigger things, that's not where we are. [Someone from the planning agency] asks, "Can't you come up with 10% of $500,000?" "No! We can't!" You want us to invest in walking, but we don't have this in our budget. It's a hard sell [Participant 029].

Economic challenges included PA being low on the list of priorities in communities affected by the opioid crisis, lack of jobs, and other urgent and systemic issues. Funding challenges underscore the interrelated inner and outer context dimensions and how they impact rural communities in common ways, revealing needed structural and policy changes to address rural disparities.

Our qualitative data led us to suggest that some Action Communities were not as successful in their efforts to increase physical activity through applying *The Guide* recommendations even with planned adaptation around outer context conditions. Using queries and matrices to compare qualitative data from our Action Communities, the interpretation of our research team was that inner context constructs were vitally important. Those who had more developed, diverse coalitions, local leadership, and diverse partnerships with expertise to address specific barriers created by context, were more successful in creating or enhancing places to be physically active in the community.

4. Discussion

Rural health disparities present an urgent public health problem that can be addressed at the community level. Research in urban contexts has provided strategies to increase access to places to be physically active, but these must be translated to rural contexts. Rather than using a deficit perspective for rural communities, which focuses on declining physical activity rates and the rise in chronic conditions, our research is focused on community strengths. Common strengths of rural communities include proximity to public lands, which considered together with socioeconomic and cultural contexts, can be built upon to increase physical activity and thus, decrease health disparities.

As implementation science has developed more consensus about common constructs, there are specific processes that occur within implementation that illustrate the need for a pragmatic approach. This is especially important in community-engaged research, where understanding and adapting to local context is an essential part of implementation. Interventions that have demonstrated viability can be scaled-up to similar settings, however, attention to local context is critical for success. Thus, adaptation is a critical feature of scaling-up evidence-based interventions. Researchers have noted that a lack of attention to adaptation may be a legacy of empirical models that have relied heavily on conducting science in controlled conditions, which is problematic in real world practice settings (23). The tension between adaptation and fidelity may have hampered the willingness to fully explore the need for adaptation and adaptation processes. In community-engaged research, adaptation to local context is not only important, but essential to implementation success. Further, its study should be included as part of the research activities.

Studying adaptation processes in community-based settings underscores the need for a broad understanding of context that not only goes beyond demographics, but considers geography, culture, politics and that these are constantly in flux. This complexity and changeability make it critical to include planned adaptation strategies as part of the implementation approach. Flexible models that include adaptation to local context as part of the implementation process and provide parameters for guiding adaptation are critical to improving chances of adoption and positive outcomes related to the intervention.

Conducting translation of evidence-based guidelines for increasing physical activity in a specific rural community (Cuba, New Mexico) did not provide the team with a one-size-fits-all model for scaling-up to other rural communities. It did, however, provide the team with an idea of how to incorporate planned adaptation strategies into the model for implementation in other communities with commonalities across geographic, cultural, political and economic configurations.

Planned adaptation in the VIVA model was directed at the outer context, or the geography, land use practices, economic and other context-specific features of the rural communities where the implementation occurred. However, our results showed the importance of inner context, which addresses leadership and other aspects of the organization or coalition doing the work. Future efforts will be sure to attend to adaptations of inner context, including, for example, how to build coalitions and partnerships critical to rural contexts. In addition, it is important for coalitions to enact these practices related inner context elements during the implementation itself, for example, participating in partnership networks to share ideas, successes, and brainstorm how to overcome obstacles to their efforts that are often common across settings.

In addition, although *The Guide* does not include providing technical assistance regarding leveraging funding as a recommendation, community needs made this a priority in VIVA Connects. Funding challenges underscore the interrelated inner and outer context dimensions and how they often impact rural communities, revealing needed structural and policy changes to address rural disparities.

This planned adaptation process necessarily combines both research and implementation efforts: namely, understanding and assessing local context including geography, cultural, political and economic landscape, historical patterns, and in-depth interviews with community champions to understand local manifestations of cross-cutting elements that have been identified as essential to successful implementation efforts: (e.g., geography, culture, land use patterns, leadership, partnerships, and political engagement). This process, while framed as data collection, also provides a guide for which factors local champions consider as potentially important to their efforts to create change around PA in their communities. Follow-up interviews can also aid in this purpose, as they can track change over time to evaluate the outcomes of intensive TA efforts, and help researchers, implementers and community members understand how local context is contributing to needed adaptations. The experience of the VIVA team, although conceptualized as research, holds important pragmatic lessons for communities interested in efforts to increase physical activity, including health care providers, policy makers and other implementers. We suggest that adaptation to context may contribute to sustainability of efforts over time, however, this is an area for future research.

4.1. Limitations and future directions

Although implementation costs have been identified as important to include in implementation science research, we had not planned on providing TA for communities around funding. However, this is clearly an issue for community leaders and the rural context indicates unique dimensions of the problem and thus, much of our TA, focus of content shared in the VIVA Connects network, and eventual successes were related to accessing and leveraging funding.

Qualitative methods are essential to study how processes unfold, especially in community settings with multiple contexts and levels. A deep focus on local context can limit generalizability, however, rich descriptions that show how adaptation is accomplished and its effects, can be widely applied. An implementation framework that attended to adaptation processes that relate to both outer (specifically focused on attributes of the research setting) and inner constructs, (in particular, leadership, partnerships, and collaborative processes) would provide an excellent foundation for future studies. Qualitative analysis pointed to some important relationships between the robustness of inner and outer context constructs and how successful communities were in reaching milestones, however, a more robust mixed method approach would be needed to provide more solid evidence of the association. Mixed methods could provide a robust quantitative component to analyze to what extent these constructs contributed to success. Adaptation measures that include inner and outer constructs are essential.

5. Conclusion

Implementation science has relevancy beyond institutional settings and has important applications in rural community settings. Implementation science has identified a core of common constructs that are important to address when implementing research and programs. These apply to community settings. Our research demonstrates the importance of implementation that is both built on evidence related to the desired outcomes (e.g., increasing physical activity) and implementation science (e.g., using established frameworks to guide research questions and implementation activities). It is essential to incorporate planned adaptation to local contexts and be mindful to how these processes encourage adoption, are evidence-based, and yet are adaptable to local conditions without compromising fidelity.

Data availability statement

The original contributions presented in the study are included in the article/supplementary files, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by University of New Mexico Health Sciences Human Research Protections Program. The patients/participants provided their written informed consent to participate in this study.

Author contributions

SD designed the study and contributed substantially to paper organization, content, and editing. JH integrated RE-AIM framework with qualitative questions, conducted the analysis, and drafted the paper. JH and SD read and approved the final manuscript. Both authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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A novel approach for assessing bias during team-based clinical decision-making

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Many clinical processes include multidisciplinary group decision-making, yet few methods exist to evaluate the presence of implicit bias during this collective process. Implicit bias negatively impacts the equitable delivery of evidence-based interventions and ultimately patient outcomes. Since implicit bias can be difficult to assess, novel approaches are required to detect and analyze this elusive phenomenon. In this paper, we describe how the de Groot Critically Reflective Diagnoses Protocol (DCRDP) can be used as a data analysis tool to evaluate group dynamics as an essential foundation for exploring how interactions can bias collective clinical decision-making. The DCRDP includes 6 distinct criteria: challenging groupthink, critical opinion sharing, research utilization, openness to mistakes, asking and giving feedback, and experimentation. Based on the strength and frequency of codes in the form of exemplar quotes, each criterion was given a numerical score of 1–4 with 1 representing teams that are interactive, reflective, higher functioning, and more equitable. When applied as a coding scheme to transcripts of recorded decision-making meetings, the DCRDP was revealed as a practical tool for examining group decision-making bias. It can be adapted to a variety of clinical, educational, and other professional settings as an impetus for recognizing the presence of team-based bias, engaging in reflexivity, informing the design and testing of implementation strategies, and monitoring long-term outcomes to promote more equitable decision-making processes in healthcare.

KEYWORDS

methodology, qualitative descriptive analysis, bias, mixed-methods analyses, decision-making, group decision

Introduction

Within healthcare, multidisciplinary teams make numerous consensus-based clinical decisions with life and death consequences for patients. For example, during the management of advanced heart failure, multidisciplinary teams make critical decisions about surgical and non- surgical treatments (1). Stereotype-based implicit and explicit bias exhibited by individual providers is negatively associated with the allocation of appropriate advanced heart failure therapies among women and African American patients (1, 2). Because many of the contraindications for approving therapies are subjective and linked to ambiguous social factors, there is a risk of introducing bias during this high-stake collective decision-making process.

Implicit biases among healthcare providers occur at the same level as the general public and include associations outside conscious awareness that may lead to negative evaluations of a person on the basis of characteristics such as race or gender (3). However, implicit biases among clinical teams are challenging to measure due to a plethora of interpersonal dynamics, power hierarchies, and structural factors (4). Thus, the motivation for conducting additional research was to enhance our detection and understanding of implicit bias during the planning and implementation of evidence-based heart failure interventions.

It is critical to examine group dynamics for bias prior to implementation of evidence-based interventions as a counterstrategy for the harmful effects of racism, sexism, hierarchy, and other negative social constructs that contribute to health inequity. Current frameworks for understanding the implementation or pre-implementation process among multidisciplinary healthcare teams largely rely on theoretical concepts about organizational culture that are not easily operationalized in real-world settings. For example, Normalization Process Theory (NPT) can assist in identifying structural and contextual factors inhibiting the adoption of new approaches or technologies in healthcare, but it relies on four constructs that are sometimes difficult for evaluators to measure (5). In the parent study described below, NPT served as a framework for conceptualizing how complex social processes influenced clinical thinking, behavior, and practices at the group level during team decision-making. In addition, NPT provided deeper insight into how implicit bias was embedded and normalized into group-based discussions about patients during team meetings. When combined with additional metrics, this insight may stimulate the design and testing of novel interventions to better address bias among clinical teams.

Although the negative impact of provider bias on patient outcomes is known, there is a need to better understand how interpersonal interactions within a healthcare team allow biases to influence critical decision-making processes and potentially hinder the provision of equitable care. Thus, a qualitative descriptive study was conducted as part of a larger mixed-methods investigation that sought to evaluate group dynamics as an essential foundation for exploring how types of interaction can bias collective clinical decision-making. In this paper, we provide researchers and clinicians with a practical application of the DCRDP protocol to assess team interactions for implicit bias, structural racism, and inequities that influence collective clinical decision-making.

Overview of the de Groot Critically Reflective Diagnoses Protocol

The de Groot Critically Reflective Diagnoses Protocol (DCRDP) is a mixed-methods research tool for evaluating verbal interactions among a team. The DCRDP was originally developed as a means of analyzing knowledge sharing, decision-making, and critical dialogues within professional communities (6). These behaviors can be challenging to assess and describe, yet more functional teams perform better and exhibit continual learning (6). The underlying premise of our application of the tool in this study was that more functional healthcare teams would exhibit less bias toward the patients they collaboratively cared for, although this had not explicitly been tested using the DCRDP until now. Reliability and validity of the DCRDP was previously established in studies examining reflective dialogue among veterinary and healthcare professionals (6, 7).

Rather than relying on team member self-report of team dynamics impacting decision- making, the DCRDP provides 6 criteria for researchers to evaluate recorded team dialogue more objectively: challenging groupthink (embracing different opinions that differ from the dominant view), critical opinion sharing (sharing opinions that can be discussed openly), research utilization (discussing research), openness to mistakes (openly taking responsibility for errors), asking and giving feedback, and experimentation (thought experiment). The presence and strength of each aspect is supported by verbatim textual excerpts (codes) and given a numerical score ranging from 1 to 4. Teams with lower scores represent more interactive, reflective, and equitable group functioning while those with higher scores exhibit restrictive communication patterns, more dysfunctional group dynamics, and potentially more biased decision-making. To illustrate how the DCRDP is applied, see the Figure 1 for team decision-making patterns reflecting best and worst scores.

Methods

This was a mixed-methods study that required the coordinated integration of both qualitative and quantitative data to uncover intricacies within complex healthcare phenomena (8). A qualitative descriptive approach was deemed appropriate for the qualitative portion of the study as a means of examining the elusive phenomenon of implicit bias using minimal abstraction (9, 10). In essence, in this study we sought to examine when, how, and in what forms bias appears during team-based clinical discussions using an established schematic in the form of the DCRDP, which provided a coding framework for analyzing dialogue patterns (6). While use of an implementation framework such as NPT is recommended to increase the effectiveness and sustainability of new approaches in healthcare, quantifying high-risk processes (such as multidisciplinary decision-making in allocation of heart transplant) using a tool such as the DCRDP may further explicate this complicated process in implementation science (7).

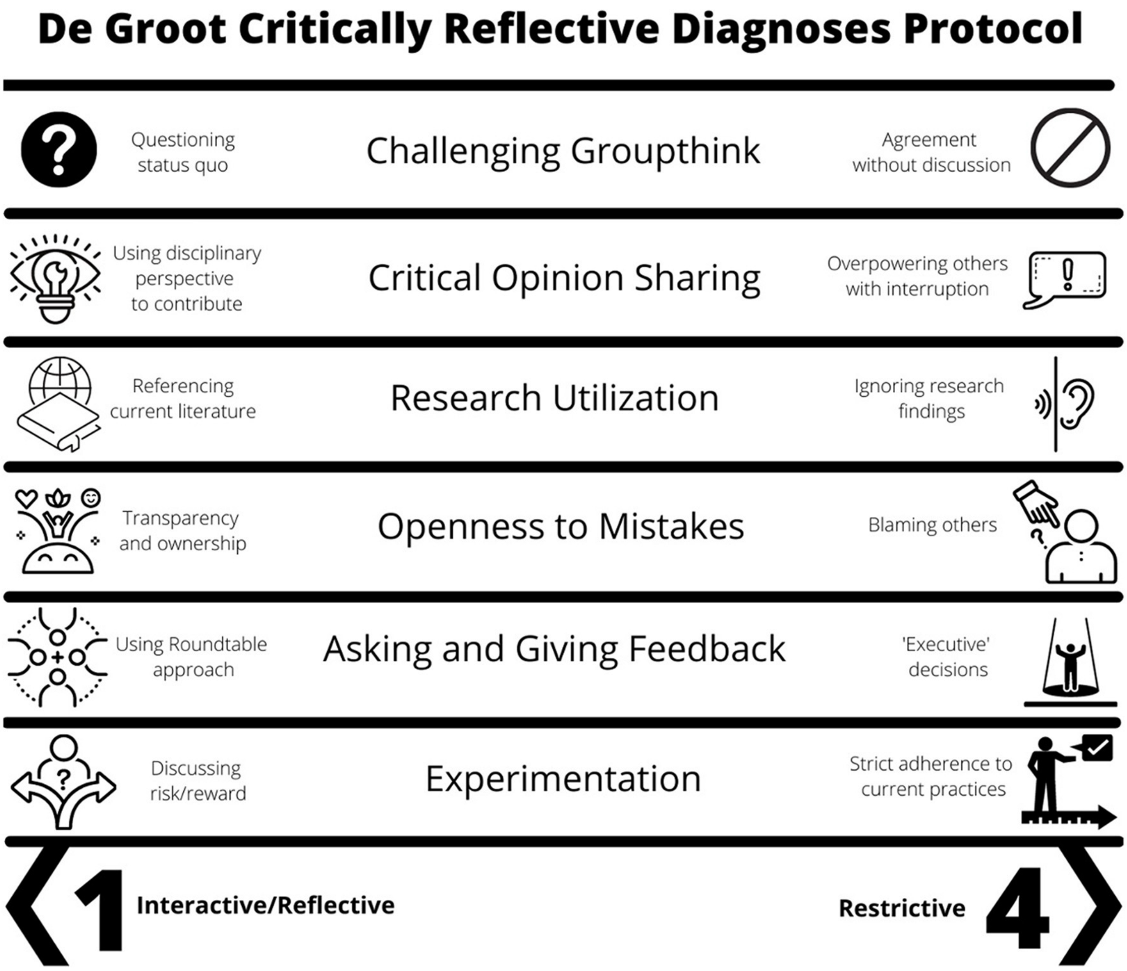

FIGURE 1
The de Groot Critically Reflective Diagnoses Protocol criteria. Scores from allocation meeting transcripts can range from 1 to 4 (best group dynamics to worst group dynamics).

Application of the de Groot Critically Reflective Diagnoses Protocol in a mixed-methods study

Although qualitative descriptive approaches are appropriate for evaluation of unguided group dialogue such as that occurring during therapy allocation meetings, analytic procedures in this method vary widely and may benefit from the use of additional tools to help codify and makes sense of the content (9, 10). Thus, the DCRDP aided this process by providing structure and increasing objectivity during qualitative data analysis through numerical quantification supported by textual codes. In this study, hierarchical logistic regression models were used which accounted for important individual factors (i.e., demographics and comorbidities) as well as accounting for DCRDP for a meeting and for variability among centers as well as among meetings within centers. The quantitative (scoring) portion of the DCRDP captured previously unexplored team dynamics and communication patterns in a numerical form, and these scores were added to regression models examining how group decision-making processes were associated with heart failure therapy allocation by race and gender.

Data collection procedures

To explore these complex team dynamics, we audio recorded heart failure therapy allocation meetings at multiple healthcare centers across the United States (U.S.) and transmitted the recordings to Health Insurance Portability and Accountability Act (HIPAA) approved transcriptionists. Institutional Review Board approval was received from the University of Arizona. Verbal consent was obtained from team members participating in the allocation meetings prior to the series of recordings being collected. All identifiers were removed from the transcripts. For example, transcripts were blinded to heart allocation center sites and race/ethnicity/gender of all team members and patients under review for therapy allocation. Individual team members were differentiated in the transcripts numerically (i.e., Speaker 1, Speaker 2, etc.) and no other identifying characteristics were revealed.

Data coding and analysis

Two data analysts with expert-level qualitative research experience separately coded the blinded transcripts in their entirety by using the DCRDP as a coding scheme. Exemplar phrases and excerpts illustrating repetitive ideas were categorized into each of the 6 criteria to support the given numerical score. Codes were selected both for frequency and for degree of alignment with each criterion. Consistent with a qualitative descriptive approach, the analysts performed content analysis using the DCRDP as a guide which controlled interpretation and facilitated the recognition of patterns based on the protocol (10). The Table 1 provides theoretical examples of exemplar quotes illustrating scores for each criterion.

After each transcript was independently scored and exemplar supporting quotes were selected, the two analysts came together with the principal investigator to compare results. The researchers found significant congruence (>75%) between the independently scored transcripts for each of the 6 DCRDP criteria. In many cases, the same textual codes were also selected by both analysts to support the numerical score. This finding reflected a high level of intercoder reliability, a key aspect of qualitative research for ensuring transparency, consistency, reflexivity, and trustworthiness (11). When the analysts' numerical scores differed by 1 point the researchers selected the mean as the final score. When the two scores differed by more than 1 point, the two analysts critically reexamined the supporting codes with the principal investigator serving as an arbitrator during negotiations for the final score. Consensus was achieved on each of the numerical scores for each transcript with the two analysts selecting the most illustrative codes based on their deep familiarity with the data. Following completion of all coding, separate research team members unblinded each patient's race, ethnicity, and sex using patient data and order of discussion submitted by participating centers, which was used by the statistician to complete analyses. The association of DCRDP scores with allocation decisions according to patient race, ethnicity, or sex uncover a standardized method for identifying bias.

Maintaining rigor

Study rigor was ensured through the following qualitative research procedures (9, 10). Credibility was promoted through researcher triangulation as the two qualitative analysts independently coded and scored each transcript with the principal investigator serving as an arbitrator when the numerical scores differed by more than 1 point. Having a minimum of two qualitative analysts separately code the data in its entirely followed by negotiated consensus with an arbitrator is a best practice in qualitative analysis to ensure reliability (11). Confirmability and reflexivity were achieved through regular debriefing between all three researchers during data analysis with notes documenting the decision-making processes and a clear audit trail located in an online data sharing platform (12). Reflexive notes and team debriefing was especially important considering that the two analysts and the principal investigator are all clinician-investigators with experience in team-based decision making; acknowledging these epistemological influences was essential during coding (12, 13). Transferability was encouraged through our demonstration of how the DCRDP can be used as a mixed-methods evaluation tool of team decision-making that can be adopted by others seeking to identify team functionality issues and design strategies to improve performance and reduce bias (10). Dependability was demonstrated by the easily traced verbatim quotes and their alignment with the codebook, which consisted of established DCRDP criteria.

While DCRDP scores and corresponding codes represent the etic, or outsider, viewpoint of allocation meetings, additional survey and interview analyses enacted in another phase of the study captured the emic, or insider, perspective of allocation team members as they engaged in group decision-making. Consideration of both perspectives strengthened the qualitative portion of this mixed-methods study and contributed to overall trustworthiness (8).

DCRDP findings, strengths, and limitations

Analysis of meeting transcripts using the DCRDP combined with hierarchical logistic regression indicated that as team function scores improved, the probability of women being allocated advanced heart failure therapies increased and was statistically significant ($p = 0.035$) (14). Some centers exhibited consistently higher functioning team dynamics, although no statistically significant effect was observed for race and ethnicity (14).

We found that the use of a previously substantiated data analysis tool was both effective and efficient during deductive coding of team dialogue transcripts. The DCRDP provided a more objective measure of the frequency and strength of various communication patterns among advanced heart failure therapy allocation teams, as succinctly illustrated in the Table. In conjunction with additional analyses, the DCRDP proved to be a useful tool for examining how team communication patterns were related to treatment decisions for a diverse set of heart failure patients across several allocation centers in the U.S.

There were some limitations with using the DCRDP. Although codes provided evidence for the 6 DCRDP criteria, not all were represented in each transcript. As a result, the research team imputed the mean numerical value of missing criteria. This also meant that for some transcripts, there was a dearth of exemplar phrases or excerpts to illustrate certain criteria. For example, many transcripts lacked any evidence of the DCRDP criteria "research utilization." While some allocation teams consistently failed to utilize research findings during their decision-making, we recognize that this aspect was potentially occurring outside of the recorded meetings in other cases. Another limitation was the inability to assess communication features such as body language or voice tone in the transcripts, both of which may factor into overall team dynamics and potentially biased decision-making. This limitation could be mitigated by including a research assistant acting as an observer during the meetings or through evaluation of video recordings of the meetings. However, either of these approaches would increase the risk for participant deidentification and could potentially lead to the Hawthorne effect influencing

TABLE 1 Codes illustrating scores for de Groot Critically Reflective Diagnoses Protocol criterion.

	1 interactive and reflective	2 individual with reflection	3 not reflective nor interactive	4 restrictive
Challenging groupthink	Before we make a final decision, what else should we consider about this patient?	As the transplant director, I feel strongly about this, but I would like to hear from the rest of the team before we move forward.	The surgical team will have the final say on this decision.	We think that this patient has too many unresolved social issues; we are not going to offer advanced therapies at this time.
Critical opinion sharing	The social work team are the best ones to answer that question. Can we hear from them first?	I have some concerns about this patient that I'd like to discuss with the group.	In my opinion, this therapy is rarely effective.	I'd like to interrupt and say that we've already heard this portion of the evaluation before.
Research utilization	We came across two newly published studies about this issue that we would like to present to the team.	I would like to consult the guidelines for insight about our next steps.	I don't know if there are any studies on this topic.	Regardless of what the research indicates, this patient is not a good candidate for transplant.
Openness to mistakes	Thank you for recognizing that the information in the patient's record is incorrect. I apologize for that and will correct it today.	The infectious disease team has been really overwhelmed lately, so I'll connect with them much earlier next time.	It's a complex situation and sometimes things get missed.	That team always drops the ball with our patients and it's very frustrating.
Asking and giving feedback	Does anyone have any additional insight into this patient?	I wasn't sure about initiating this medication, so I have some questions I'd like to ask the team.	If no one has any advice for how to improve this situation, let's move on with the discussion.	The patient's caregiver had some concerns, but we never spoke with them.
Experimentation	Would we be willing to try this therapy for the first time?	I'm not sure how that medication would impact the patient, but I'll look into it.	We should not be taking high risk patients like this at our center.	We have never tried that approach before, and I don't think we should now.

The examples provided for each code are theoretical examples. Exact quotes for the codebook have been previously published (14).

participant behavior during team meetings (15). A third limitation is that the DCRDP was originally developed with small professional groups of 5–7 people (7), and it is unclear how well DCRDP performs with larger number of active speakers. Although our application of the protocol was among larger meetings with over 20 speakers as is typical of transplant allocation teams, we demonstrated intercoder reliability using DCRDP.

Discussion

The DCRDP is a compelling tool for evaluating bias in clinical group decision-making by addressing key aspects of team behavior and communication including challenging groupthink, critical opinion sharing, research utilization, openness to mistakes, asking and giving feedback, and experimentation. Through the quantification of these 6 major criteria as supported by textual excerpts, researchers can assess different aspects of team dynamics and functionality that may contribute to biased performance. The DCRDP may enhance the design and testing of implementation strategies underpinned by frameworks such as NPT. The general compatibility of NPT with additional tools (such as the DCRDP) is supported in the literature as a mechanism for widening our contextual understanding of human behavior (5).

While there is sufficient research addressing individual healthcare provider biases (1–3), the ability of the DCRDP to aid in the detection of team-based bias toward patients with marginalized racial and gender identities is promising and unique. Findings from the DCRDP could contribute to the design of group-level implementation strategies aimed at improving multidisciplinary communication and performance during collective decision-making. Post-intervention re-assessment or integration of the DCRDP into a surveillance program should be implemented since longitudinal measurements are essential for improving health equity among marginalized populations (4). As with our study, scores from the DCRDP can be incorporated into statistical models that include other data to comprehensively explore how clinical group functionality is associated with patient level outcomes.

In conclusion, we successfully applied the DCRDP to assess racial and gender bias among clinical teams responsible for allocating advanced heart failure therapies. Findings from this study contribute to the limited body of literature on potentially effective methods for assessing and implementing strategies to mitigate implicit bias among multidisciplinary clinical teams. Considering the persistence and insidious nature of patient inequities that are influenced by team-based decision-making, new methodological approaches in health and social science research are warranted to detect and mitigate group bias. The DCRDP has a wide application in implementation research by demonstrating a standardized method to evaluate group dynamics and bias.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by the Institutional Review Board from the University of Arizona. Written consent was obtained from all team members participating in the allocation meetings prior to the series of recordings being collected.

Author contributions

Concept and supervision: KB. Manuscript draft: NP and MH. Critical review: All authors. All authors contributed to the article and approved the submitted version.

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Conflict of interest

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The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Evaluating the outcomes and implementation determinants of interventions co-developed using human-centered design to promote healthy eating in restaurants: an application of the consolidated framework for implementation research

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Background: Restaurants are an emerging yet underutilized setting to facilitate healthier eating, particularly among minoritized communities that disproportionately experience health inequities. The present study aimed to examine outcomes from interventions co-developed using Human-Centered Design (HCD) in two Latin American restaurants, including sales of healthier menu items (HMI) and the consumer nutrition environment. In addition, we aimed to assess implementation outcomes (acceptability, fidelity, and sustainability) and elucidate the determinants for implementation using the Consolidated Framework for Implementation Research.

Methods: This study used a mixed-methods, longitudinal design. Data were collected pre-, during, and post-intervention testing. Intervention outcomes were examined through daily sales data and the Nutrition Environment Measures Survey for Restaurants (NEMS-R). Changes in HMI sales were analyzed using interrupted time series. Implementation outcomes and determinants were assessed through site visits [observations, interviews with staff (n=19) and customers (n=31)], social media monitoring, and post-implementation key informant interviews with owners and staff. Qualitative data were analyzed iteratively by two independent researchers using codes developed *a priori* based on CFIR.

Results: The HCD-tailored interventions had different outcomes. In restaurant one (R1), where new HMI were introduced, we found an increase in HMI sales and improvements in NEMS-R scores. In restaurant two, where existing HMI were promoted, we found no significant changes in HMI sales and NEMS-R scores. Acceptance was high among customers and staff, but fidelity and sustainability differed by restaurant (high in R1, low in R2). Barriers and facilitators for implementation were found across all CFIR constructs, varying by restaurant and intervention. Most relevant constructs were found in the inner setting (restaurant structure, implementation climate), individual characteristics, and process (HCD application). The influence of outer setting constructs (policy, peer pressure) was limited due to lack of awareness.

Conclusion: Our findings provide insights for interventions developed in challenging and constantly changing settings, as in the case of restaurants. This research expands the application of CFIR to complex and dynamic community-based settings and interventions developed using HCD. This is a significant innovation for the field of public health nutrition and informs future interventions in similarly dynamic and understudied settings.

KEYWORDS

restaurant, nutrition, human-centered design, consolidated framework for implementation research, implementation science, Hispanic (demographic)

Introduction

Eating out is increasingly common today. The consumption of foods prepared away from home accounts for 50% of food spending among American households (1). This is important, as restaurant foods are associated with increased intakes of saturated fat and sodium, increasing risks for diet-related diseases, such as diabetes and cardiovascular disease (2–4). Cardiovascular disease is the leading cause of death in the United States (US), where about 7.2% of the population has been diagnosed with coronary heart disease (5). Diabetes is more prevalent, affecting 11.3%, plus 38% of US adults have pre-diabetes (6). At the same time, restaurants can serve as vehicles to spread culinary innovations by exposing consumers to new ingredients and preparations and changing social norms to motivate healthful eating practices, potentially affecting the foods cooked at home (7, 8). Public health initiatives and policies to improve food choices at restaurants have included efforts to restrict choice (e.g., trans-fat ban law) or guide choice through pricing schemes, point-of-sale promotion of healthy options, and nutrition information (9, 10). Research has also documented voluntary changes made by the industry to promote healthier choices (10, 11). However, most of these efforts have targeted and focused on chain-based, fast-food restaurants. While this focus is important, it fails to engage independently-owned, non-chain restaurants, which make up more than half (53%) of the industry in the United States (12). Emerging research in independently-owned restaurants demonstrates interventions can be successful at increasing the consumption of healthier options, through point-of-purchase promotion of healthy dishes and increasing the availability of healthier options (13). However, these efforts tend to exclude non-chain, minority-serving restaurants (9, 13). This is a missed opportunity to engage the sector for culinary innovations that may promote healthier diets and enhance equitable access to healthy foods among communities at greatest risk for diet-related conditions, as in the case of Latin American communities in the US (14–16). According to the National Restaurant Association, 80% of consumers eat at a restaurant serving ethnic cuisine at least once a month (17). Within these, there are over 120,000 Latin American restaurants in the US, most of which are independently owned. Mexican restaurants alone make up 8% of all US restaurants (18, 19). Yet, despite their importance, Latin American restaurants (along with other ethnic restaurants) remain an understudied and under-engaged sector. This research addresses this gap by applying implementation science to understand factors influencing restaurant engagement in community nutrition interventions. Restaurants are promising settings for interventions, but the lack of understanding of organizational context and determinants for implementation limit the capability of these programs and the dissemination for sectors in greatest need, as in the case of restaurants serving Latin communities.

Materials and methods

Study overview

This study examined the intervention and implementation outcomes of pilot initiatives developed using Human-Centered Design (HCD) approaches in two Latin American restaurants located in New York City (referred to as R1 and R2). HCD is an approach to developing solutions rooted in an experimental process and the needs and context of the end user to develop bottom-up solutions. The process has been increasingly used in public health interventions (20, 21) and is suitable for working with restaurants, given the unique circumstances and barriers affecting these establishments, particularly independently-owned restaurants. Given the importance of user-centeredness, it is expected that interventions co-developed with end users through this approach should result in greater acceptability, fidelity, and sustainability (20, 22). The present study aimed to (1) examine the effect of the resulting interventions on the sales of healthier menu items (HMI) and the consumer nutrition environment, (2) assess implementation outcomes (acceptability, fidelity, and sustainability) (23), and (3) elucidate the determinants for implementation using the Consolidated Framework for Implementation Research (24), a widely used determinant framework in implementation sciences to examine the intricacies of complex settings examining implementation as a social process that is interwoven with the context in which it takes place (25). The framework has been primarily applied in healthcare settings (26), with few community-based applications, even less in restaurants (27, 28).

Restaurant recruitment and overview

We worked with two Latin American restaurants located in New York City. The restaurants were identified through an ongoing community-engaged process, starting with listening sessions with Latin American restaurants beginning in October 2020 to examine barriers and facilitators for engaging in healthy eating promotion strategies (29). Restaurants were initially recruited through social media outreach and community networks, including a snowball approach. From the listening sessions, we identified an initial group of five restaurants that expressed interest in collaborating with the project. These restaurants were all located in New York City, given the team location at the time. They included three full-service and two counter-style restaurants. Three restaurants dropped out in response to issues related to the business, including loss of staff and temporary closures related to COVID-19. The two participating restaurants were a counter-style restaurant serving Puerto Rican food in a food hall (R1) and a full-service Mexican restaurant (R2). The participating restaurants received $300 as a stipend for participation, plus reimbursement for key intervention costs (i.e., new menu board in R1 and cost for photography in R2). Additional incentives included restaurant promotions on project social media and incentives ($50 gift card) provided to individuals (owners and staff) for participating in the data collection efforts.

Intervention description

We engaged owners and staff throughout the intervention design process, including problem definition, solution ideation, and the testing and refining of potential solutions, following the Stanford d. School HCD process (30, 31). Our iterative process is detailed in a separate publication (in process). Briefly, we engaged owners and chefs through one 3 h workshop where we defined the problem to be addressed and potential solutions. This was followed up by subsequent 1 h meetings where we refined potential solutions briefly tested (prototyped) by the partner restaurants. The workshops were co-facilitated by a designer and the study lead investigator. The process resulted in two tailored interventions to promote healthier choices, based on the needs identified by the restaurant stakeholders. In R1, our research and discussion with the restaurant stakeholders elucidated the need to increase healthier offerings in the menu that were also acceptable and profitable. The restaurant was offering a green salad that was underselling, resulting in food waste and lost profits. The chef developed a new offering, the *verduras*, a seasonal mix of non-starchy vegetables (cabbage, squash, peppers) seasoned with traditional spices. The verduras were added to multiple dishes in the menu, and the menu was re-designed accordingly. We also added avocado slices as a healthy side alternative. Our research in R2 led to a different identified problem and solution, where the menu was already offering innovative, healthier options, but these were not being promoted or seen as culturally authentic by some customers. We worked with the owner to develop social media messaging to promote these offerings by touting their sensorial characteristics (e.g., taste, texture) and connection with tradition and history, to dispel customer misconceptions of the cuisine being unhealthy and the healthy offerings not being part of the Latin American cuisine (i.e., lack of authenticity).

Data collection procedures and participants

This study used a mixed-method approach to examine and link intervention and implementation outcomes. The study combined data collected across the implementation process (pre, during, and post), incorporating sales data, ongoing rapid interviews with staff and customers, guided environmental observations, and in-depth key informant interviews conducted with owners and staff members at the conclusion of the study (Figure 1).

Intervention outcomes assessments

We assessed change in HMI sold using sales data collected *via* the partner restaurants' point of sales (POS) systems (Toast, Boston, MA; Breadcrumb, Providence, RI), which are computerized systems that allow restaurants to track and manage onsite and online orders (including from third-party sites), used as part of restaurant financial management. We first identified HMI in collaboration with a registered dietitian with expertise in Latin American diets. We considered three criteria: ingredients, preparation, and level of culinary innovation (Table 1). The criteria were not based on quantified nutritional benchmarks, allowing for some level of flexibility and taking into account if the offering was healthier in comparison with the usual alternatives found in similar restaurants. In R1, HMI were mainly those that incorporated the new vegetable component (verduras), which was considered an innovation. This included using verduras as a side, base for bowls (as opposed to rice) or in place of meat, but we also counted a leafy green side salad that was available before the start of the intervention. In R2, examples of existing HMI included a cabbage salad, fluke ceviche tostadas, roasted cauliflower tacos, and a vegetarian sandwich (torta), among others fitting the criteria (Table 1). Data were downloaded from the restaurant POS system as individual transactions covering our study periods (Figure 1). Individual transaction data were collapsed to the day level, including totals for item sales indicators. Given that the data are used for sales, data on individual customer consumption (including table size) are not tracked in a reliable manner. Therefore, we could not examine HMI as *per capita* daily sales.

We examined changes in consumer nutrition environments [ie. The environment experienced by consumers within restaurants (32)] using the Nutrition Environment Measures Survey for Restaurants (NEMS-R), a validated tool developed for this purpose, which examines food availability, and barriers and facilitators for healthier food choices in restaurants (33). The NEMS-R was applied at pre-, during and post-intervention, with a trained team member carrying out guided observations and menu assessments. We modified the protocol to assess the proportion of menu items classified as HMI. Following the NEMS-R protocol, we focused on main dishes (entrees), assessing side dishes separately for the availability on non-starchy, non-fried sides. We expanded the NEMS-R assessment

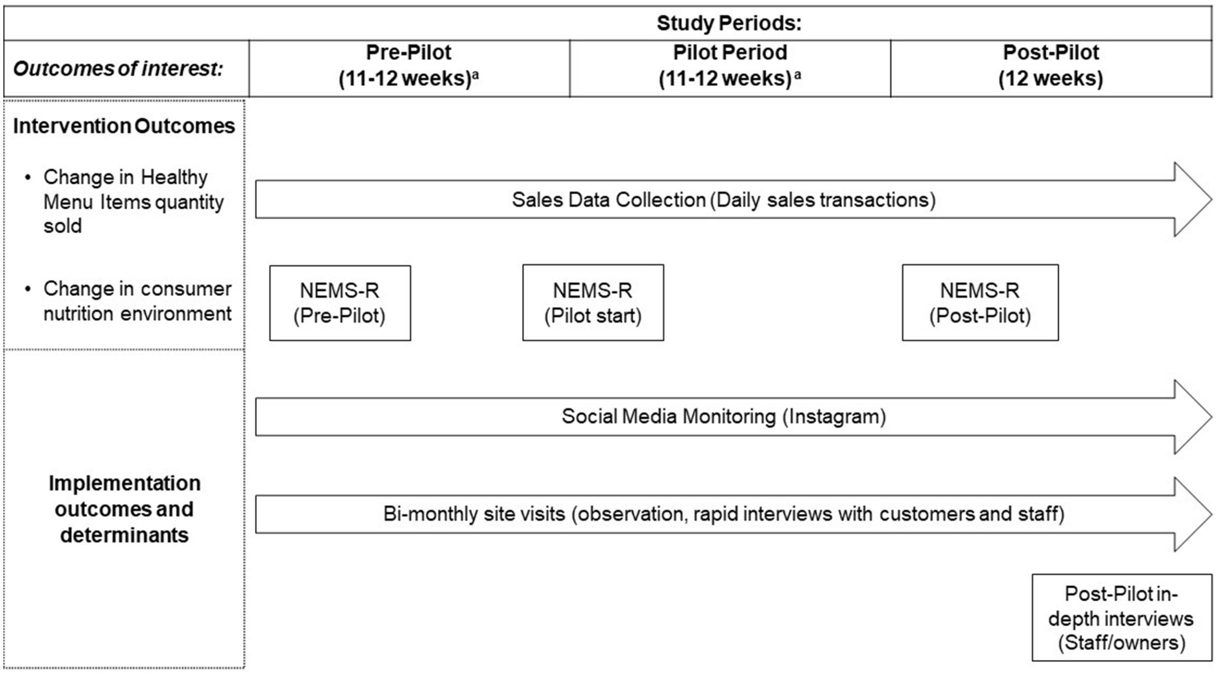

FIGURE 1
Data collection efforts by study period and outcome of interest. NEMS-R, Nutrition Environment Measures Survey for Restaurants. Social media monitoring also used to examine change in consumer nutrition environment. [a]Pre and implementation period for R1 was 11 weeks to accommodate owner's preferences related to new menu roll-out and revisions.

TABLE 1 Healthier menu item (HMI) criteria.

Criteria	Definition and examples
Ingredients	Item contains ingredients that are nutrient-rich with known health benefits, such as avocado, fish/seafood, fruits and vegetables, and item does not contain a high proportion of ingredients that are high in fat (e.g., cream, cheese) and simple carbohydrates (e.g., white rice[a]).
Preparation	Offerings are not fried or cooked with added fats, or fried component is not the main component of an offering containing otherwise healthier or innovative ingredients.
Innovativeness	Offering is an innovation from usual offerings in similar restaurants. Examples include plant-based substitutions for traditional meat-based dishes, seafood substitutions for traditional beef/pork-based dishes or vegetarian offerings.

[a]Exception made for items in R1 that contained verduras (the new vegetable-based offering), for example, shrimp over rice with a side of verduras.

of promotional efforts to examine those undertaken on social media. This was done given the emphasis on social media promotion in R2 and the increased use of social media for promotion efforts by restaurants. Our assessment focused on Instagram as the primary platform used by restaurants in general, as confirmed by our partner restaurants and in our formative data collection efforts (29). We collected social media posts in a database (AirTable), including the image(s) posted and captions throughout the study period (Figure 1).

Implementation outcomes and determinants assessment

Our examination of implementation outcomes and determinants was guided by Proctor et al.'s (23) implementation outcomes framework and the CFIR framework, using site visits and semi-structured interviews with owners and staff (Figure 1). Given that the intervention for R2 was focused on social media promotion, we used our social media monitoring effort to track fidelity and sustainability as well.

Site visits were carried out throughout the duration of the study (Figure 1), including one visit in the pre-test period, and planned bi-monthly visits in the testing and post-testing periods. We conducted a total of 14 site visits. R1 received three visits during the testing period and three during the post-testing period. R2 received four during the testing period and two during the post-test, with a third visit canceled due to the uptake in COVID-19 infections that coincided with the post testing period in January 2022. The site visits included a check-in with restaurant owners, short, structured interviews with staff and customers, and observations of the restaurant environment. Each site visit included a quick check-in with the owner and short structured interviews with 1–2 staff members, depending on availability during the day of the visit (total interviews = 19; 9 in R1 and 10 in R2). The staff included both front of the house (servers, cashiers) and back of the house (chef, cooks). The short interviews were on site (e.g., at the kitchen, by the cashier), based on interviewee preference and to be as unobtrusive as possible. The staff interviews included questions about intervention awareness (first encounter only), opinion of the intervention, perceived changes in customer ordering of healthier options, and whether partnering with the project changed their work. These conversations were short, lasting around 10–15 min, depending on staff availability and how busy the restaurant was on the day of the visit.

Customer perspectives were captured through short intercept interviews with customers present at the day of the site visit, a method commonly used in food retail intervention studies (34). A trained team member approached customers after ordering or while food was consumed for a short, structured interview to assess customer satisfaction with offerings and perceptions of the intervention-related outcomes, including opinions concerning healthy offerings at the restaurant and in Latin American restaurants in general. A standard set of questions was followed to ascertain how frequently the customer ate at the restaurant, what they ordered, if they tried any of the healthier options, and the reason behind their choice. After a brief explanation of the project, they were also asked if they thought the project was a good fit for the restaurant and what other health-focused initiatives they would like to see. We conducted an average of 3.5 customer interviews per site visit in R1 (21 total) and 2.2 interviews per site visit in R2 (10 total). The customers interviewed ranged in age from their 20s to 50s, with the majority being young adults in their 20s to early 30s. We had a close to even split by gender (male/female). The majority of these customers were Latin/Hispanic or Non-Hispanic White. The Latin background of most of the Hispanic customers coincided with the restaurant cuisine served.

The site visits also included non-participant observations to note overall patron volume, demographic characteristics, patron-patron interactions, patron-staff interactions, food orders, and factors facilitating/inhibiting healthy item ordering. Interactions were observed during orders to assess customer interactions with the menu, questions about offerings, and if HMIs were being discussed or promoted. The factors observed related to HMI orders were mostly environmental ones, including which products were showcased at the point of sale and potential promotions offered on site.

After the conclusion of the post-pilot period, we conducted in-depth interviews with restaurant owners and staff, including one front-of-the house staff (server, cashier) and one back-of-the-house staff (lead chef). Staff were made aware that their participation was voluntary and that neither their personal information nor information provided in the interview would be shared with their employer. Participants received $50 as compensation for their time. The interviews lasted, on average, 37.2 min. The interview guide was based on the CFIR interview guide (24), covering the framework domains: intervention characteristics, which encompass attributes of the intervention that influence the success of the implementation, including whether the intervention was perceived as internally or externally developed, complexity and required level of organizational reorientation, and costs; the outer setting, encompassing peer or competitive pressure to implement an intervention, the importance of client needs, connectedness with other organizations, and the influence of external policies and incentives; the inner setting, referring to the social architecture of the organization, available resources, culture, implementation climate, tension for change, and compatibility of the intervention and the organization, among other related factors; characteristics of individuals involved, including knowledge and beliefs about the intervention, individual belief in own capabilities, readiness of change, and other personal attributes (tolerance for ambiguity, innovativeness, etc.); and the process by which the intervention is implemented (25) (Table 2). The interviews were conducted *via* Zoom by two trained, bilingual interviewers -one lead interviewer and one co-facilitator/note-taker. The team debriefed after each interview, discussing insights gained, which were then shared during team study meetings in preparation for analysis.

The procedures involving human participants were reviewed and deemed as exempt by Tulane University School of Public Health and Tropical Medicine and the City University of New York. The participants provided their verbal informed consent to participate in this study. Written consent was not required as the research presented

TABLE 2 Interview sample questions by CFIR domain.

CIFR Domain	Selected question examples
Intervention characteristics	Do you think the changes were difficult to implement? Did the changes make your work very different from how it was done before? What were the costs to making the changes? How were the changes developed? Who developed the changes? Inclusion in process?
Inner setting	How did the characteristics or set-up of [Restaurant] affect the implementation of the changes? Why were the changes developed at [Restaurant]? Do you think there was a strong need for this change? How well do you think the changes and the collaboration fit with the values, mission or norms within [Restaurant]?
Outer setting	How well do you think the intervention met the needs and wants of [Restaurant's] clients? Are there barriers for clients to benefit from the changes promoted by the intervention? Can you tell me what you know about any restaurants similar to [Restaurant] that are doing similar innovations? Were there financial incentives or other incentives that influenced your decision to participate? Are you aware of regulations, policies or guidelines at the national, state, or local levels that may promote healthier eating in restaurants?
Process	Crosscutting domain, capturing reflections and evaluations across the different areas
Characteristics of individuals	How would you describe the changes or innovations implemented? (knowledge and attitudes of interviewees)

no more than minimal risks and the written consent would be the only record linking the subject and the research.

Data analysis

Changes in HMI items sold

The main intervention outcome was the number of HMI sold per day. Preliminary analyses of sales data were shared and discussed with owners to discuss emerging trends and to serve as part of our ongoing engagement with the partner restaurants, informing decisions concerning our analysis approach of focusing on HMI as quantity sold, as opposed to using dollar amount sold. Interrupted time series analysis was used to examine trends and breaks in trends in daily sales of HMI across the three study periods (Table 1). Analyses were conducted using the STATA BE 17 "itsa" command (35). Days when a restaurant was closed were treated as missing. Statistical significance was established at $p < 0.05$.

Changes in consumer nutrition environments

Changes in the consumer nutrition environments were done based on NEMS-R factors, including a mix of dichotomous indicators (Yes/No) and menu proportion calculations to examine the proportion of menu items classified as HMI across the three study periods. We adapted NEMS-R protocol to calculate the resulting NEMS-R scores (33), to assess differences by study period.

Analysis of social media posts

Social media posts (images and captions) were coded by two team members independently. After an initial pass, coders were reviewed by team members and during team meetings, where codes were clarified and reconciled, as necessary. The codes were simple and descriptive, noting if the post promoted a HMI (e.g., image of HMI included and/or caption promoted the item) or whether the post promoted unhealthy items or overeating (e.g., post featuring fried foods). Posts that did not feature food (e.g., event promotion, merchandize) or only featured alcohol were coded as non-food messaging.

Analysis of site visit data

Data from the site visits were entered into a database. Open responses from customers and staff interviews were summarized using descriptive, summative codes developed from responses (open coding) applied by the team member conducting the site visits, and subsequently revised and discussed with a second team member and the study PI. Notes from the site visit were also summarized, tracking time of visit, client volumes, and staff presence.

Qualitative analysis of post-test key informant interviews

The post-test semi-structured interviews were transcribed verbatim. Five interviews took place in English and one in Spanish, which was translated to English prior to analysis. The analysis used a directed content analysis approach (36), a deductive approach where codes were developed *a priori* using the CFIR framework interview development guide tool (24). The textual data were coded independently by two team members using NVIVO v.12 using an iterative approach that included ongoing coder debriefing and discussions, and larger meetings with the study PI to discuss emerging results. Excerpts were further organized according to the CFIR construct domain.

Data triangulation

Our work incorporated various data sources to understand the implementation of the tailored interventions. Data collected from the site visits were used to triangulate the information collected *via* the post-pilot key informant interviews. This validation was undertaken during debriefing meetings, where notes from the site visits were compared with findings emerging from the interviews. The site visits, key informant interviews, and social media analysis also helped contextualize the trends we observed in the HMI and NEMS-R analyses. These data were discussed during research team meeting, as well as during ongoing meetings with owners (during and post-testing), where we shared our emerging findings, including sharing detailed sales trends and our findings from the social media analysis.

Results

Intervention outcomes

Changes in sales

On average, overall the sales of HMI made up a small proportion of the value of food sales in dollars (3% of food sales in R1 and 22% of food sales in R2). On average, R1 sold 12.6 ± 14.3 HMI (8.7% of all food items sold, as individual items) and R2 sold 12.8 ± 17.4 HMI on a daily basis (21.8% of all food items sold, as individual items). In R1, the intervention resulted in an increase in HMI sales by 31 units, followed by a decrease in HMI sales of 0.22 unit per day. After the testing period ended, daily sales of HMI were not significantly different from baseline (Figure 2). In R2, the intervention did not have a significant influence on the quantity of HMI sold (Figure 2; see Supplementary Table S1 for regression results).

Changes in consumer nutrition environments

Table 3 presents an overview of key indicators in the restaurants' consumer nutrition environments across the three study periods. R1 showed a lower proportion of HMI in menus at baseline, increasing from 15 to 53% as a result of the menu changes. However, R1 also showed fewer facilitators for the promotion of healthier choices, including the promotion of unhealthy items (i.e., fried snacks) in social media and the overall encouragement for overeating through large portions (Table 3). R2 presented more facilitators for healthier choices, including the availability of main dish salads, half-portions, and the promotion of healthier items in social media, the latter, as part of the intervention. In concordance with the intervention, R2 showed an increase in social media promotion of HMI between baseline and the intervention period, but a decrease after the pilot period, denoting that the intervention was not sustained (Table 3).

Implementation outcomes

Acceptability

Acceptability was overall high in both restaurants among customers, owners, and most staff. The staff rapid and in-depth

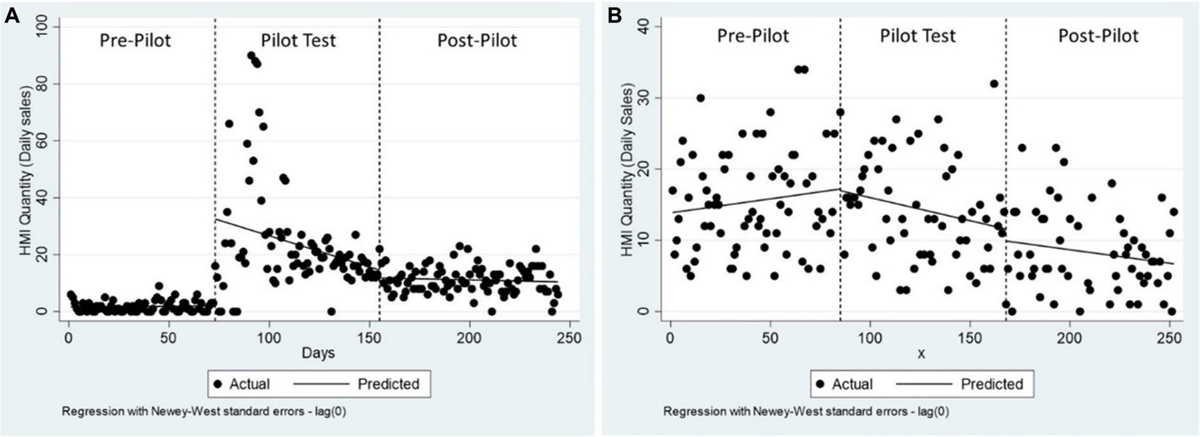

FIGURE 2
Changes in HMI daily items sold across study periods in R1 **(A)** and R2 **(B)**.

post-test interviews revealed that most staff at both restaurants had a positive attitude toward the intervention and recognized its benefits.

> They're always talking about having good quality healthy food for affordable price. I think that's the idea of them like having good stuff, good quality stuff, stay healthy, and then have lower prices, it's good. It's good for their Instagram as well. - R2 server

The staff in both restaurants also confirmed that the intervention did not increase workload nor had any unintended consequences regarding decreased tips or revenue in both restaurants. An exception to this was the chef in R1, who expressed ongoing resistance through the intervention development process, resulting in low initial acceptance of the change. The low acceptance was associated with the perception that the intervention was not a good fit for the restaurant brand – a finding is further elucidated in the next section, as part of the CFIR analysis.

The customer intercept interviews conducted during the site visits showed that most customers at both businesses saw a need to eat healthier at restaurants, with a higher proportion of interviews showing this in R1 versus R2 (71.4% vs. 50%, respectively). Only one client at R2 expressed that it was not the role of restaurants to facilitate healthier eating. In R1, most rapid customer interviews (15 out of 21, 71.4%) saw the need for healthier eating, and some expressed the desire for fewer fried items (2 out of 21), saw healthy options as good for the business (4 out of 21), and one client noted that they would recommend the restaurant based on the availability of healthy items. Customer acceptability was also noted by staff in regard to the new offerings in R1.

> I think they [customers] have taken to it, because customers now come and immediately order a side of vegetables or [the verdura] bowl. That's how we know customers have taken to it in a good way, that they have accepted the project. - R1 Cashier

Fidelity

The site visits and social media monitoring were used to examine implementation fidelity. In R1, the visits confirmed that the new menu items were being continually kept throughout the testing period. In R2, fidelity was assessed as social media engagement, monitored *via* Instagram, as presented in Table 3. In R2, social media postings increased from a total of 9 (on average, 0.75/week) in the pre-testing period to 27 (2.25/week) in the testing period, with an increase in posts that formally showcased an HMI during the testing period (Table 3).

Sustainability

The intervention was largely sustained in R1, where the main intervention addition –the verduras –was kept on the menu. As shown in Table 3, there was a slight decrease in HMI available after the testing period. This was due to the restaurants taking out the avocado side added along with the verduras as part of the intervention after the conclusion of the testing period. This change responded to the high cost of the item, lack of reliable sourcing and quality, and difficulties in the preparation logistics. In R2, the social media postings decreased after the testing period, denoting a lack of sustainment of the innovation implemented.

Determinants for implementation: application of the CFIR

Figure 3 summarizes our findings, illustrating relevant CFIR constructs within each domain as facilitators, barriers or factors with no perceived influence. This section is organized according to the type of influence, discussing the domains and constructs as interacting to either facilitate the changes or hinder intervention impact, ending with factors in the outer context that were perceived as having no influence.

Facilitators: what enabled the changes observed?

The use of HCD resulted in high owner buy-in for the resulting interventions (process and intervention characteristics).

Our use of HCD to engage restaurant owners and staff in the intervention development process yielded simple, restaurant-developed changes that were low in perceived costs and high in owner acceptance. The application of HCD resulted in changes that were

TABLE 3 Selected consumer nutrition environment indicators and total NEMS-R scores by restaurant and study period.

	R1: New HMI & Menu Redesign			R2: Social media promotion of HMI		
	Pre-Pilot	Pilot test	Post-Pilot	Pre-Pilot	Pilot test	Post-Pilot
NEMS-*R* Score	4	7	5	11	11	8
Food availability						
Whole grains	No	~	~	No	~	~
Fruit without added sugar	No	~	~	No	~	~
Nonfried, nonstarchy vegetable side	Yes	~	~	Yes	~	~
Main dish salad	No	~	~	Yes	~	~
Healthier menu items, *n* (%)	14 (15%)	73 (52.7%)	55 (47.8%)	7 (29.2%)	~	~
100% fruit juice	No	~	~	Yes	~	~
Facilitators to healthy eating						
Reduced/half portions of main dishes offered	No	~	~	Yes	~	~
Healthier options highlighted on site / menu	No	~	~	No	~	~
Healthier options promoted in social media (% of Instagram posts)*	2%	10%	15%	22%	48%	11%
Smaller portions cost less than regular ones	NA	~	~	Yes	~	~
Barriers to healthy eating						
Large portions encouraged	Yes	~	~	No	~	~
Unhealthy options highlighted on site / menu	Yes	~	~	No	~	~
Unhealthy food options promoted in social media (% of Instagram posts)*	56%	57%	48%	0%	~	~
Healthier items cost more than comparable, regular items	No	~	~	No	~	~

*Not part of NEMS-R Scoring; ~ denotes indicator was unchanged across periods.

internally developed, which served as a facilitator for implementation. The use of HCD increased the tension for change needed to facilitate intervention adoption, promoting changes within the inner context through interactions with the individuals involved (Figure 3). This was the case given the sharing of information and engagement of the restaurant stakeholders in the process, which provided an opportunity for reflection about potential business improvements,

> At restaurants, you fall into [a] way [of how] you do things. There's never time to stop and reflect for too long. […] When you have an outside entity that can come in and point out certain things and [make changes doable]. It's been very helpful. -R2 Owner

In both restaurants, the intervention was perceived as relatively simple, with low costs and requiring minimal reorientation. In R1, the owner said that the intervention was beneficial given the lower cost of the ingredients used in the new vegetable offering, which he perceived to be very popular.

> Money-wise, it has been a success because it cost me less for the kinds of vegetables that we're using and we're selling more of them because they became very popular. - R1 Owner

R2's owner found the content created for social media posts about the health benefits of specific ingredients, connections to the cuisine's origin, and the professional photographs beneficial for promotion, facilitating the implementation of the changes.

Owner's innovativeness and tolerance for ambiguity facilitated buy-in and implementation (characteristics of individuals).

Innovativeness and tolerance for ambiguity were key characteristics of the owners, facilitating their desire to be a part of the intervention, even though this was a new experience with unknown results, as shown in this excerpt:

> I guess the biggest challenge for anyone that's going to go through something like this is [to] give a chance [for the intervention] to work because if you're quick to judge, it's not going to work out. I'm not quick to judge and I let it go. -R1 Owner

When first approached, the owners were contemplating changes. This sentiment may be partly associated with the context in which the engagement began, in the midst of COVID-19, a period when restaurants were forced to adapt to an ongoing climate of uncertainty. Owners primarily expressed this tolerance of ambiguity, more so than chefs or front-of-house staff, who were

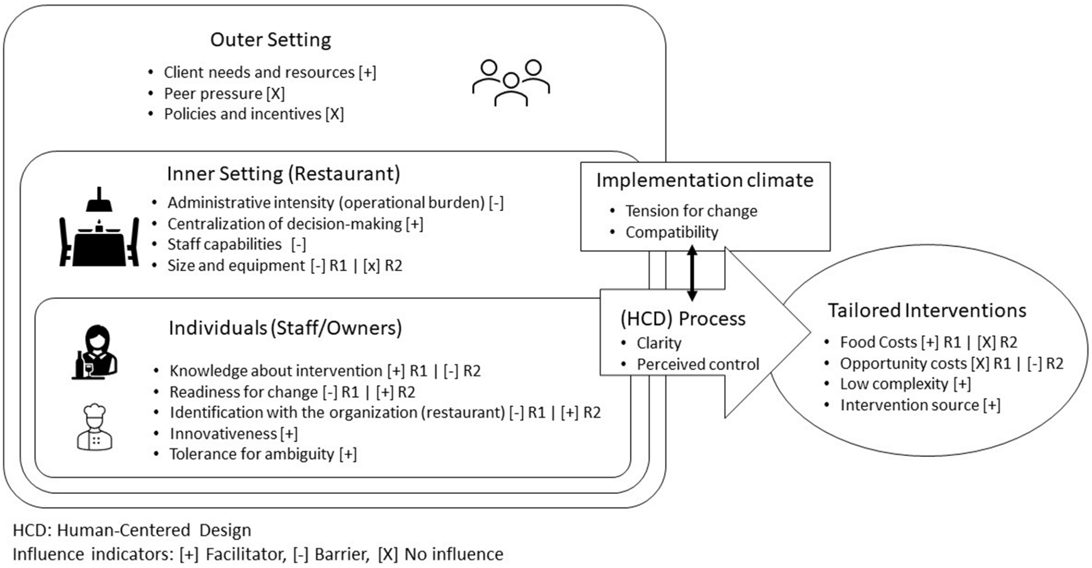

FIGURE 3
CIFR model for factors influencing the tailored intervention development and implementation.

constantly reorienting their work according to the changing climate during COVID-19.

Owners are the primary decision-makers in the restaurant and are responsible for future initiatives and the business's trajectory. These two traits facilitated the engagement of these restaurants with the use of HCD approaches, where the intervention emerged from the engagement process, as opposed to restaurants being prescribed specific changes. This increased the acceptance of the resulting intervention but required patience for the creation of tailored approaches. For instance, R1 owner noted the lack of clarity in the pre-intervention period, where the end product of the HCD process was not clearly specified –an ambiguity that is part of the process.

Owners perceived the intervention met client needs and presented an opportunity to expand the customer base (Outer Setting, individual characteristics).

The influence of client needs was an important facilitator for restaurant engagement and intervention adoption, influencing readiness for change and suggesting interactions between the outer setting and individual characteristics (Figure 3). Both owners recognized a growing demand for healthier offerings, including vegetarian offerings, among clients in general. In R1, the addition of new dishes that incorporated verduras was seen as a positive change to accommodate more customers. The owner of R2 thought that his restaurant's vegetable-focused offerings highlighted in the social media intervention would cater to the majority of the restaurant's current customer base, consisting of a young, white clientele interested in vegetarian and vegan offerings. However, he was also concerned with reaching more community members where the restaurant was located, many of whom were Hispanic, a need that was addressed *via* social media messaging, connecting the restaurant to the community and the contemporary cuisine in Mexico.

Centralized decision-making moved intervention forward, despite staff resistance (inner setting, individual characteristics).

The participating restaurants were independently owned and small in size, resulting in a centralized decision-making process. This was key in moving the intervention development and implementation process forward, especially in R1, where we found resistance and different perspectives coming from the chef.

> I was a little bit against a lot of the changes as you know. So I think that a lot of the seed was planted by you guys and then ultimately that was [the owner] over my head that did all the changes […] I didn't necessarily have a say in it at the time, but as far as I know, you guys were on the one side, pushing [the owner] into that idea of having those vegetables. That's something that we talked about, but sometimes you need to hear from a third party in order to light a fire under his a** if you want to do something. - R1 Chef

Several characteristics of individuals, including knowledge about the intervention and identification with the organization, relate to the centralized decision-making (inner setting, Figure 2). Knowledge was high among owners and chefs, who were part of the intervention development process and also had managerial positions within the restaurants. Individual identification refers to how individuals perceive the organization, and their relationship and degree of commitment with that organization. Respondents showed strong identification with the restaurants, with both owners and staff showing a high level of commitment the success of the restaurant. For owners, the identification was more personal, as the restaurants were essential to their livelihood and the result of their personal vision. Chefs and front-of-house staff, on the other hand, may change employment without losing a critical financial investment. Ultimately, this difference contributed to centralized decision-making by the owners regarding the intervention.

Partner restaurants had the resources to create and implement the intervention (inner setting, intervention characteristics).

Competence was important for creating and implementing the changes. Culinary skills were important for R1 chef to develop the verdura offerings, and then train the staff to sustain the dishes. The new dishes were internally developed, based on existing resources and capacities, which were aspects that supported implementation and sustainability. In R2, the owner had the skills and knowledge to engage in social media promotion for the restaurant. Our collaboration augmented the existing skills by providing additional resources for crafting the messages and supporting the cost of additional photography. However, the burden of implementation was minimized by the pre-existing resources, including the existing social media accounts and established presence, as well as the existing HMI that were promoted.

Barriers: What hindered intervention-related changes and outcomes?

Overall low tension for change limited the extent of the intervention (inner setting and process).

While the HCD process facilitated owner buy-in and ultimate implementation of positive changes, the resulting intervention was not enough to create large impacts in HMI sales, especially in R2. As discussed by R2 chef, the social media intervention might not be the most effective way to reach the Latin communities in the area (mostly Puerto Ricans and Dominicans), who might be less familiar with the contemporary Mexican cuisine served in R2. Our interviews also showed that, in general, front of the house staff had low knowledge about the intervention, which was explained by the owner as being due to other responsibilities and time constraints. We sought to address this by extending the intervention to include staff training for promotion of HMI in-house, but this idea was not realized due to the owner's time constraints and competing priorities.

Staff capacity, COVID-19, and structural factors hindered expansion and effectiveness (individual characteristics, intervention characteristics, inner setting, outer setting).

Restaurant staff capability and structural constraints were mentioned in both restaurants as limitations. In R1, both the owner and chef cited the small restaurant space as a barrier for change. R1's owner spoke of how it is difficult to keep up with growing business in a small space, making it difficult to make changes. R1 chef mentioned several specific limitations, including staff size, kitchen layout, and capacity to change the menu.

> It was just too many, I felt, limitations. Like I said, based on staff size, based on refrigeration, based on storage, based on everything. We're in a food hall. We can only do so much. We knew what we'd have to have on the menu already. We have to have this, we have to have this, these are the foundations of the restaurant, of the menu. There really wasn't a lot of room for wiggling around and adding a bunch of stuff. - R1 Chef

Both restaurants discussed facing issues with staff retention and turnover, requiring ongoing training and adding to the administrative burden. This was especially the case given the effect of COVID-19 and subsequent issues with hiring staff in general. In R2, staffing issues led to closures in the post-testing period, including short closures during the holidays and a reduction in the number of days the restaurant stayed open. This was also reflected in the diminished number of social media postings in the post-testing period. Another structural factor of importance for R2 was the layout, where the restaurant had a bar at the entrance, where part of the clientele came in mostly for drinks and not necessarily food, as noted by the chef,

> I think that [the] biggest struggle of trying to [promote heathier eating] and grab other people's attention and not just be this boozy hangout. Even, it is set up that way. When you walk into the restaurant, the first thing you see is a big a** bar, and maybe that doesn't necessarily- people just walking by with their families think like, "Oh, that's a place I would like to have dinner." There were subtle changes made that have improved that aspect of the restaurant, but I think that was probably one of the biggest hurdles in a way." - LL_Chef

Similar to R1's chef, R2's owner also mentioned restaurant size as a barrier to change because of staff size and kitchen layout.

While interventions were seen as simple, costs and operational burdens prevented implementation intensity (inner setting and intervention characteristics).

Administrative intensity, a construct from the inner setting domain and a structural characteristic, was particularly salient in both restaurants, especially given the small size of the staff, where owners had to take on multiple roles alongside running the restaurant. In R1, our engagement resulted in a simple intervention that required an initial level or reorientation, but then became "second nature." While the intervention added an item to the menu, the costs were perceived as low, except for one item – the avocado – which carried higher cost and less reliability, resulting in it being taken off the menu after the testing period.

In R2, the lack of changes to the menu or the restaurant environment made the intervention initially simpler, compared with R1. However, the reorientation process was a more ongoing process, given the constant need for social media posting, a task that fell under the owner's responsibilities, on top of the other tasks involved in running the restaurant. This resulted in a lower implementation intensity, given a low number of social media posts, as noted by the owner,

> It was difficult, sometimes, to keep up with my part of it, [to] post enough with the specific language. - R2 Owner

Policies, incentives, and peer pressure (outer setting)

Our CFIR examination included the role of peer pressure, policies, and incentives. These were perceived by our post-test interviewees as not influencing their decision to make the changes. Awareness of the influence from policies and incentives on healthy eating interventions was low overall. In general, respondents had a similar initial negative reaction to the government's role concerning restaurants. Most viewed government mandates as a burden on their workload and also viewed policies as restrictive and not beneficial for independently-owned restaurants. However, most respondents supported the idea of government incentives to promote healthy eating and support businesses, including, for example, wanting to see a collaborative relationship between government entities and restaurants to support the implementation of changes that could support healthier eating. For example, R2 owner mentioned that more recognition from government agencies toward independently-owned restaurants that support community health would be motivating.

Monetary incentives provided for their participation were seen as helpful, but the incentive was not seen as a key factor influencing the owner's decision to participate. Despite communication of these benefits as part of the recruitment process, one owner cited not being aware of these, and wanting to participate given the perceived benefit for the restaurant. However, incentives were seen as important for staff engagement in the research process, as in the case of the stipend for the post-testing period interviews.

Regarding peer pressure, the owner from R1 and chefs at both restaurants noted being generally unaware of what other Latin American restaurants were doing to incorporate or promote HMI because they were too focused on their own restaurant and work. However, R2 owner noted that he tried to be aware of what other restaurants were doing to be competitive but stressed the importance of having his own vision to be unique as a business.

> When you have a restaurant, you are aware of what other people are doing, and you want to be careful to be competitive, but also you want to be careful that you're not just following what others are doing because you're supposed to convey your own vision. - R2 Owner

Discussion

This study examined the outcomes and determinants of tailored, restaurant-based interventions co-developed using HCD. The use of HCD was important in securing the buy in from key stakeholders, motivating changes that, while yielding mixed results, showcase the potential of this approach to create innovations in these complex settings that are often difficult to engage in public health interventions (37–39). This potential has been increasingly recognized in public health, including applications in global health and for chronic disease prevention (21). In the present study, the tailored interventions resulted in high acceptability, but were limited in influencing the sales of HMIs. While previous intervention research show the greater potential of combining increase in HMI with promotional efforts in community (non-chain) restaurants (13), these were not implemented jointly in the partner restaurants as the intensity and extent of the changes were limited to what the restaurant stakeholders were interested in and capable of achieving. The increase in HMI sales after the introduction of new, healthier items in R1 coincides with past research (40, 41), but arguably changes may have been larger if the intervention had incorporated increased promotion efforts, including those over social media. At the same time, the lack of significant changes in HMI in R2 coincide with mixed results found in past research examining the influence of promotional activities and healthier food sales alone (42, 43). While this part work has been mostly examining on-site promotional efforts, more research is needed to understand the influence and potential of social media for changing social norms and consumption patterns for restaurant choices. Social media research has documented the influence of this medium on children and adolescent food choices (44), but its use for the promotion of healthier foods is yet to be fully explored especially in restaurant settings.

This study contributes to such emerging area of work by applying implementation science to examine these interventions through a nuanced, theory-informed understanding of these results, demonstrating the benefits of expanding theoretical frameworks, as in the case of CFIR, to these complex, community-based contexts, with the potential for addressing persisting diet-related inequities.

The application of CFIR highlighted key influences within the interaction of the inner setting, individual characteristics, and the process used to develop the interventions. Our examination shows the importance of owner buy-in given the centralized decision making in the two participating independently-owned restaurants. The centralization is related to the relatively small size of the partner restaurants, with a small number of staff and the potential for high turn-over, where owners have to take on multiple roles, adding to the already high operational burden. This burden is compounded by perceived lack of staff capabilities to take on key roles (e.g., social media promotion, expansion of HMI), limiting the change intensity of the tailored interventions. This points to the need of addressing these structural issues as part of the intervention development process, to find ways to address time constraints and resource needs – aspects that tend to fall beyond the usual scope of public health interventions to promote healthier eating in restaurants.

Our findings concerning contextual or outer setting factors also merit further discussion. While our participants lacked awareness of policies or peer activities, these factors still have the potential to influence the restaurants. Their reactions to the questions about policies revealed that the majority of the owners and staff perceived existing regulations and interactions with public health entities (e.g., sanitation, city health department) as punitive, rather than supportive in connecting small business owners to resources and benefits. Both owners mentioned fines from the health department for lack of compliance with policies as their reason for mistrust in their relationship with government agencies. In the New York City context, where the partner restaurants are located, restaurants are subject to periodic, unannounced health inspections, potentially resulting in fines and a public downgrade in category (based on a letter system), further straining their relationship with the regulatory sector. Fines for lack of compliance with the health code, coupled with the cost of permits to run their businesses bring a financial burden for independently-owned restaurants. All of these findings demonstrate the need for government support for independently-owned Latin American restaurants and the need to assess ways to improve the relationship between restaurants and health-promoting agencies.

Study strengths and limitations

We used objective measures to assess intervention outcomes, *via* sales data and the NEMS-R assessment. The use of CFIR provided a systematic way to examine the intervention determinants, guiding the design and analysis of the post-intervention interviews with restaurant stakeholders. Further, our interviews incorporated the perspective of multiple roles within the restaurants, by including front-of- the-house (e.g., servers) and back-of-the-house (e.g., chefs) staff in this exercise, an improvement from past research that tend to only examine owner and manager perspectives. Our use of a mixed-methods approach and multiple data sources allowed for data triangulation through different sources. For example, restaurant staff confirmed that the intervention did not increase their workload in both the staff rapid interviews conducted during site visits and from the post-testing in-depth interviews. Lastly, our joint examination of intervention outcomes and the implementation determinants provided a more in-depth analysis of the intervention. However, our study has limitations. We provided an in-depth analysis of two restaurants, with unique circumstances and tailored interventions that limit the generalizability of our findings to other restaurants. A second consideration is our approach to defining HMI, which was not based on a quantitative, nutrient-based analysis. We defined HMI through collaboration with experts, contextualizing the dishes within the restaurant menus and the potential for innovativeness, making the definition harder to replicate. We were unable to examine HMI on a *per capita* basis, as we could not capture individual consumption through the use of sales data. Our analysis of sales trends might have been influenced by sales fluctuations in response to COVID-19, which was a factor we were unable to capture in our analysis. Lastly, our examination of customer acceptance and satisfaction with the resulting intervention was limited to short intercept interviews during site visits, which did not capture a representative sample of customers and might be subject to social and selection bias.

Conclusion and implications

The engagement of restaurants in healthy eating promotion interventions requires innovative ways to engage the sector and systematic approaches to examining the implementation of such interventions. The sector is difficult to reach and complex. Our emphasis was on Latin American restaurants, with insights that increase our understanding for working with other non-chain, independently-owned restaurants. While this study yielded mixed results in terms of HMI sales, the approach showed potential for augmenting owner buy-in and staff acceptance. More work is needed to facilitate innovative engagements and the application of implementation science to better understand the barriers and facilitators for intervention development, implementation, and sustainability in this sector. Future research should continue to engage the different levels of staff in these establishments to develop palatable changes that can sustain revenue while promoting healthier choices. More work is also needed beyond intervention development, expanding research to examine policy and regulatory level innovations to facilitate health promoting changes, especially within community, independently-owned restaurants, where the stakeholders engaged are typically within the communities these intervention aim to positively influence. Such work should also incorporate other aspects of the food systems influencing restaurant offerings, including ingredient costs and quality. The application of theoretical approaches from implementation science needs to be a part of these future efforts to both expand the current state of knowledge in food environment research while also expanding the application of theoretical models, as in the case of the CFIR, to new, more complex settings, continuing to build the field. The systematic and theory-driven approaches provided by implementation science can provide more focused approaches and learnings to develop interventions to best address persisting health inequities through community settings, as in the case of this work, engaging restaurants to address diet-related inequities among Latin American communities.

Data availability statement

The datasets presented in this article are not readily available because given the nature of the data and in consideration to our partner restaurants, we are unable to share sales and qualitative data. The authors will consider reasonable data requests, but sharing will be limited to raw, anonymized data. Requests to access the datasets should be directed to MF, mfuster@tulane.edu.

Ethics statement

The studies involving human participants were reviewed and approved by Tulane University Institutional Review Board. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

Author contributions

MF, ED, MH, DR, CS, MK, BE, and TH contributed to the writing and editing of the manuscript. MF is the principal investigator and primary author, secured project funding, supervised data collection and analysis, and led the writing of the manuscript. ED co-led the interview efforts, contributed to the data analysis, and assisted in the writing and revision process. CC co-led the interview efforts, carried out the site visits, led the collection of sales data and social media monitoring, and contributed to the analysis. CS advised and contributed to the analysis of the sales data. MK assisted in the qualitative analysis write-up and revisions of the manuscript. DR, BE, MH, and TH advised on all aspects of the manuscript, study conceptualization, and contributed to the write-up and revisions of the manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

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Implementation of cross-sector partnerships: a description of implementation factors related to addressing social determinants to reduce racial disparities in adverse birth outcomes

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Introduction: Traditional perinatal care alone cannot address the social and structural determinants that drive disparities in adverse birth outcomes. Despite the wide acceptance of partnerships between healthcare systems and social service agencies to address this challenge, there needs to be more research on the implementation factors that facilitate (or hinder) cross-sector partnerships, particularly from the perspective of community-based organizations. This study aimed to integrate the views of healthcare staff and community-based partner organizations to describe the implementation of a cross-sector partnership designed to address social and structural determinants in pregnancy.

Methods: We used a mixed methods design (in-depth interviews and social network analysis) to integrate the perspectives of healthcare clinicians and staff with those of community-based partner organizations to identify implementation factors related to cross-sector partnerships.

Results: We identified seven implementation factors related to three overarching themes: relationship-centered care, barriers and facilitators of cross-sector partnerships, and strengths of a network approach to cross-sector collaboration. Findings emphasized establishing relationships between healthcare staff, patients, and community-based partner organizations.

Conclusion: This study provides practical insights for healthcare organizations, policymakers, and community organizations that aim to improve access to social services among historically marginalized perinatal populations.

KEYWORDS

implementation, health disparities, prenatal care, social detereminants, cross-sector partnership

1. Introduction

Perinatal care alone is insufficient to address the unmet social needs, such as food insecurity and housing instability that contribute to disparities in adverse birth outcomes (e.g., preterm birth, infant mortality) among vulnerable populations. Because social determinants of health (SDOH) continue to drive health disparities, collaborations between healthcare and social service sectors are becoming increasingly common in healthcare organizations to mitigate health-related social stressors and achieve equity (1–3). These cross-sector partnerships aim to bridge fragmented care systems and contend with unmet social needs by forging partnerships between often siloed sectors (4). For instance, medical-financial partnerships that establish collaborations between healthcare and financial service organizations to address financial stressors more broadly (and not limited to healthcare expenses) can reduce financial stress, particularly during critical periods such as pregnancy (5). Other studies demonstrate that connecting older adults to social services in health systems may reduce hospitalizations and emergency room visits (6).

As the adoption of cross-sector partnerships continues to increase, many studies have documented their core components (7–13). For example, Liu et al. (9) describe specific foundational structures, such as linked data and communication platforms, and a shared theory of change (i.e., a clear pathway through which a cross-sector partnership will improve outcomes) that can support the functionality of cross-sector partnerships. Some studies describe the importance of policies to support collaboration and the quality of relationships within a partnership and financial investments to incentivize and facilitate partnerships (12, 13). Others note the importance of buy-in and demonstrated commitment from a broad network of agencies (10). However, cross-sector partnerships remain challenging to implement despite identifying these core components.

Structural challenges related to organizational culture, funding, and different approaches to service delivery make cross-sector partnership implementation complex and threaten sustainability (14). Some studies have shown that the extent healthcare organizations engage in cross-sector partnerships can vary depending on hospital characteristics. For instance, Noh et al. (15) found that among hospitals in United States counties with the highest socioeconomic disadvantage, larger hospitals, teaching hospitals, and hospitals in health systems were significantly more likely to partner with non-health sector organizations to address unmet social needs. Similarly, Nelson (16) found that health department participation in cross-sector partnerships was more likely if resource sharing (e.g., shared personnel) was already taking place and written agreements were established. These findings have important implications for equitable access to cross-sector partnerships among patients.

Understanding the perspectives and experiences of community-based organizations and other partner agencies can also unpack factors associated with the implementation and sustainability of cross-sector partnerships. Agonafer et al. (17) found that while community-based organizations valued partnerships with health systems, they desired more equitable collaborations that included bi-directional exchanges of information and shared-decision making related to the design and implementation of the partnerships. Other studies have documented perceived challenges related to cross-sector partnerships among community-based organizations associated with losing autonomy and distinct approaches to care through partnerships with healthcare systems (18, 19). These findings speak to the relational and technical challenges of building and sustaining equitable cross-sector partnerships, potentially limiting their impact on upstream drivers and health outcomes.

Additional research is needed to describe cross-sector partnership implementation and to shed light on implementation strategies that support cross-sector partnerships, particularly in serving perinatal populations with unmet social needs. This study aims to examine the implementation of an enhanced prenatal care program called MAMA'S Neighborhood that incorporates cross-sector partnerships to address social determinants associated with adverse birth outcomes among Medicaid-eligible perinatal clients. To achieve this objective, we describe relevant implementation factors (i.e., processes, barriers, and facilitators) related to cross-sector partnerships. We use a mixed methods (in-depth interviews and social network analysis) design (20, 21) to integrate the perspectives of healthcare clinicians and staff with those of community-based partner organizations to provide a comprehensive exploration of cross-sector partnership implementation from the perspective of key implementors.

2. Methods

2.1. Study setting

Medicaid covers over 95% of births in the Los Angeles County Department of Health Services, one of the largest safety net systems in the United States. Preterm birth rates are twice as high among Los Angeles County Department of Health Services clients (18.5%) compared to births to women with Medicaid coverage in Los Angeles County (9%) (22, 23). Similar inequities between these two populations exist with social stressors such as housing instability, intimate partner violence, and food insecurity. Comprehensive interventions to address social, medical, and behavioral determinants known to impact birth outcomes in this health system are critical.

Within the Los Angeles County Department of Health Services, Maternity Assessment Management Access and Service synergy throughout the Neighborhood (MAMA'S Neighborhood) is an innovative, multi-sector initiative that seeks to address social determinants of health known to contribute to the risk of adverse birth outcomes. The program includes linkage to services, including housing, food assistance, health education, mental health treatment, and substance use disorder treatment. To address the siloed service landscape in Los Angeles County, MAMA'S Neighborhood also aims to foster cross-sector collaboration and strengthen the integration of health and social service systems by bringing together three key service sectors: public health, health care, and social services, beyond the clinic and in community settings. The MAMA'S Neighborhood approach includes team-based care that integrates traditional perinatal care providers with a MAMA'S Neighborhood Care team (hereafter MAMA'S Neighborhood staff), which includes social workers, community health workers (called Care Coordinators), mental health providers, and health educators. MAMA'S Neighborhood staff support care coordination and continuity with a global risk screening for social stressors and individual care planning (Care Coordinators), mental and behavioral health (social workers, mental health providers), and pregnancy/nutrition education (health educators). Lastly, MAMA'S Neighborhood also includes a network of partner organizations (public health, social services, and health care agencies) that support the referral process to address unmet social needs. Currently, MAMA'S Neighborhood is the standard of care for all perinatal clients. Early evidence on MAMA'S Neighborhood impact suggests significant pre/post reductions in preterm birth rates following the implementation of cross-sector partnerships and collaborative care (14.9 vs. 15.7%), particularly for Black women (18.2 vs. 9.1%) (24).

2.2. Data

Data sources for this study include in-depth interviews with MAMA'S Neighborhood clinicians and staff ($N = 18$) and social network survey data collected from MAMA'S Neighborhood partner organizations ($N = 19$). All data were collected between May 2019 and May 2021. This study received human subject's research approval from the Los Angeles County Department of Public Health institutional review board (IRB # 2013-08-451).

2.2.1. In-depth interviews

A local non-profit research and evaluation organization conducted in-depth interviews with MAMA'S Neighborhood staff. The overall goal of the interviews was to understand the context of MAMA'S Neighborhood program implementation among staff. Guiding questions for the interviews included the following:

- What does the intake process entail? To what extent does it serve its intended purpose?
- Where does the collaboration among MAMA'S Neighborhood staff occur? How does collaboration contribute to engaging the patient and the overall success of the patient's health, pregnancy, delivery, and motherhood experience, if at all?
- What contributes to a successful referral to resources and programs among the MAMA'S Neighborhood partner organizations?
- What strategies effectively maintain a patient's engagement with the MAMA'S Neighborhood?

The interviews were conducted virtually and audio recorded. Transcripts were developed verbatim and deidentified before analysis.

2.2.2. MAMA'S neighborhood network analysis

We collected network data among MAMA'S Neighborhood partner organizations using the Visual Network Labs PARTNER Community Partner Relationship Management Software (CPRM) platform (25). The PARTNER CPRM platform is an online tool that uses social network analysis to facilitate the collection, analysis, and interpretation of collaboration data in community-based networks. PARTNER generates data to identify partners, quantify relationships, and compute social network metrics related to the quality of relationships (e.g., trust and value) within a network. The MAMA'S Neighborhood network analysis included survey questions related to perceptions of MAMA'S Neighborhood success with facilitating referrals through cross-sector partnership and overall experiences collaborating within the MAMA'S Neighborhood partner organizations network. Participants were invited via email to participate in the network surveys. Each participant received follow-up emails to increase the response rates.

2.3. Analysis

We aimed to triangulate the perspectives of MAMA'S Neighborhood clinicians and staff (in-depth interview data) and MAMA'S Neighborhood partner organizations (network analysis data) to better understand the implementation of cross-sector partnerships. We coded data thematically using inductive codes that emerged from the interviews and the network data to generate themes about factors related to cross-sector partnership implementation (e.g., referral processes logistics, communication among partner agencies, and information sharing between care coordinators and partner agencies). All coding was conducted using Atlas.ti 9.

After coding each data source, we followed triangulation methodology of Farmer et al. (26) to develop a triangulation protocol that would guide the synthesis of codes from each source. The triangulation protocol consisted of a five-step process. We first sorted the codes identified in each data source into similar themes around implementing cross-sector partnerships (Step 1: sorting). Next, we coded deductively to evaluate the level of convergence between both data sources within each of the themes, using the following coding scheme: "full agreement," "partial agreement," "disagreement," and "silence." (Step 2: convergence coding).

We evaluated convergence based on (1) descriptions of implementation factors (e.g., factors that hindered implementation, factors that improved implementation) and (2) mechanistic descriptions of how each factor shaped cross-sector partnership implementation. We used the "full agreement" code for implementation factors with complete convergence on substantive and mechanistic descriptions and "partial agreement" for convergence of either the substantive or mechanistic description. For instance, if MAMA'S Neighborhood staff and partner organizations described heavy client caseloads as a barrier to implementing cross-sector partnerships and specifically described heavy caseloads as hindering their ability to engage more than one partner organization in the network, we would code this factor as "full agreement." Alternatively, if MAMA'S Neighborhood staff reported that heavy client caseloads hindered their ability to address all clients' social needs while partner agencies shared that they could not engage with more than one agency due to heavy caseloads, we would code this as "partial agreement." We used the "disagreement" code for instances of divergence when neither substantive nor mechanistic descriptions converge. Lastly, we used the "silence" code when we identified a factor in one data set but not the other. Two authors then reviewed the convergence findings, clarified interpretations, and finalized the coding (Steps 3–5).

3. Results

Overall, we identified seven implementation factors to address social determinants of health in perinatal care through cross-sector partnerships. These factors were related to three broader themes: relationship-based care, cross-sector partnership implementation barriers and facilitators, and strengths of a network approach to cross-sector partnership. Most implementation factors were in full agreement, except for the three factors that were silent ($n = 2$) or in partial agreement ($n = 1$). Beyond the implementation factors, we identified broader themes that showed high fidelity to the MAMA's Neighborhood approach to team-based perinatal care for addressing unmet social needs. The network analysis yielded a network of 51 organizations (nodes) identified by MAMA'S Neighborhood staff, which corresponded to 80 unique relationships (arrows) among the partner organizations (Figure 1). Larger nodes depict organizations with a more significant number of relationships. Of the 51 organizations, 40 were invited to participate in the survey (11 organizations did not have updated contact information), and 19 responded (48% response rate, Table 1). Survey respondents included social service organizations (53%), healthcare organizations (31%), and public health organizations (16%). The distribution of survey respondents was similar to the broader network (68% social service, 21% healthcare, and 10% public health). We present the implementation factors as they relate to overall themes.

3.1. Relationship-centered perinatal care

3.1.1. MAMA'S neighborhood care coordinators embody a person-centered and place-based approach to perinatal care

The in-depth interviews revealed that MAMA'S Neighborhood staff, and specifically Care Coordinators, are central to the referral process, have a clear sense of the importance of addressing unmet social needs for improving maternal health outcomes, and view the care coordination process as an opportunity to mitigate social stressors to improve the overall circumstances of clients and their families:

> We may think that we're just linking people to resources but if you add that empowering too, I feel like that goes a much longer way than, 'Hey, I'll just connect you to a resource. You didn't follow through with it. That's on you.' There's more to it than that. It's building that rapport with the patient to say, 'Hey, you can trust me enough and maybe nobody else recognized all the hard work that you're doing in your life, but I want to be the first to say, 'Hey, I recognize you, I see you. I see the work that you're doing. I see how hard that you're fighting for your daughter or for your son or just to bring your family unit back together.'

Additionally, interview participants shared how the Care Coordinators' extensive experience with and knowledge of community resources improve MAMA'S Neighborhood capacity to provide quality care. When asked what drives the selection of an organization for referral, this staff member describes how the quality of the service is their focus:

> Yeah, it's definitely the quality of the services. I like to get feedback from the patients. I also like to call these places on my own and kind of talk to somebody because I hate giving out resources that I don't really know much about. I don't want to be confused about what services exactly they offer because if I'm feeling confused, my patient is not going to know what's going on. Just working the field for so long I've built some relationships with some of these places. So, I feel comfortable calling and saying, 'Hey, I have somebody. Can I please send them?' Or 'Can we come together?' So, it kind of works nicely that way. Yeah.

Similarly, 24% of network survey respondents recognized the role of MAMA'S Neighborhood staff in providing a person-centered approach to addressing unmet social needs (Table 1). One partner

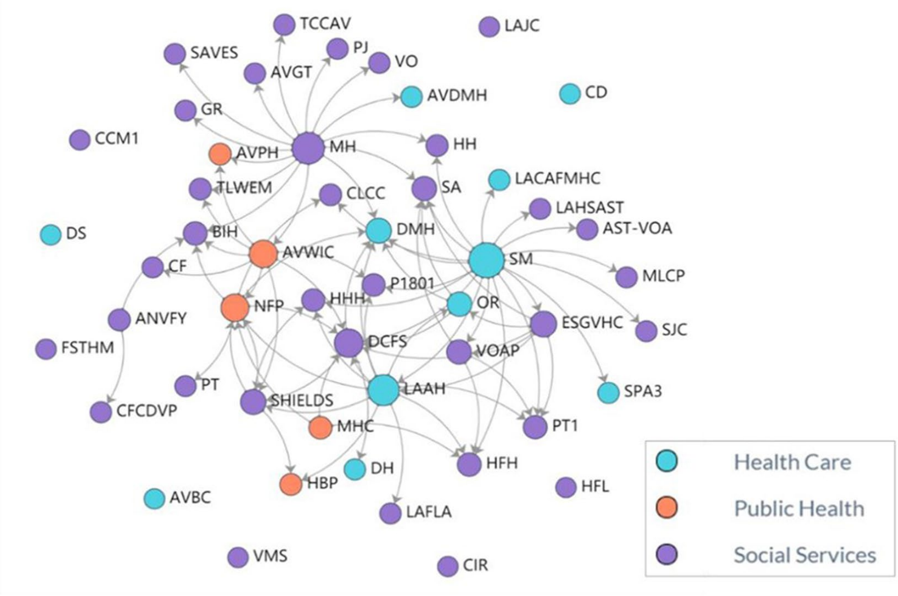

FIGURE 1
MAMA'S neighborhood partnerships (*N*=80 unique partnerships). MAMA'S staff identified 51 organizations (nodes) as part of the network. These organizations identified 80 unique partnerships (arrows). Larger nodes indicate organizations with a greater number of relationships. The network includes 11 (22%) healthcare organizations, 35 (68%) social services organizations, and 5 (10%) public health organizations throughout Los Angeles County. A list MAMA'S Neighborhood partner organization names is included in Appendix 1.

TABLE 1 Network analysis survey results, *N*=19.

Facilitators of engagement among partners[1] (*n*=19)	%	Common partnership activities[2] (*n*=10)	%	Successful aspects of MAMA'S referral process[3] (*n*=17)	%
Sharing resources among network members	60	Client referrals	90	Access to a point-person on the MAMA'S team	65
Network is responsive to needs of members	50	Case coordination and case conferencing	50	Coordinating and/or sharing patient information	59
Diverse and multidisciplinary network membership	40	Information exchange	50	Follow-up between MAMA'S staff and your agency	47
History of collaboration/sharing among network members	40	Advocacy/policy	40	Meetings to discuss service delivery/ referral process	35
In-person meetings	40	Client assessments	40	Partnership with DHS hospitals and clinics	29
Regular meetings	40	Data sharing	40	Partnerships with other CBOs	29
Strong sense of trust among network members	20	Service delivery	40	Patient/client screening	29
Funding	0	Sharing resources	30	Patient care navigation with MAMA'S care coordinators	24
Technical assistance	0	Meetings/events/trainings	20		
Peer learning/sharing among networks partners	0	Technical Assistance	10		
Strong network leadership	0	Developing standards/procedures, tools or technologies, funding, and joint programming	0		

[1] Respondents were asked to select the factors that improved their engagement in the MAMA'S Neighborhood Partnership.

[2] Respondents were asked to indicate what their partnerships with other organizations entailed.

[3] Respondents were asked to indicate which aspects of the MAMA'S Neighborhood referral process were working well.

Sample sizes varied because responses to these questions were optional.

organization shared that the MAMA'S Neighborhood was most effective at improving their "cultural [and] holistic wrap-around services provision."

3.1.2. MAMA'S neighborhood care coordinator/ client relationship as a resource for MAMA'S neighborhood partner organizations

MAMA'S Neighborhood staff described the relationships cultivated between Care Coordinators and clients as central to the referral process because Care Coordinators maintain "constant communication" with clients throughout the perinatal period. Forty-seven percent of respondents from MAMA'S Neighborhood partners shared that follow-up with MAMA'S staff (e.g., Care Coordinators) was a successful component of the referral process (Table 1). Further, as one survey respondent reflected: "MAMA'S [Neighborhood] has been successful in referring patients to programs as well as following up to find out status of that client's referral. If additional information is needed or additional contact with client to obtain the information needed MAMA'S is good about assisting in communication." However, a MAMA'S Neighborhood staff member shared that some partner organizations may not be proactively engaging MAMA'S staff enough:

> Most of the time the partnering agencies are not reaching out to us, which really surprises me because we do spend a lot of time with our patients… at some point we're seeing our patients every week. So, that is a huge disconnect that these agencies are not reaching out to MAMA'S for information or just for extra support. I find that I'm the one calling these places.

3.2. Barriers and facilitators of referrals through cross-sector partnerships

3.2.1. Facilitator: designated point of contact for referrals

MAMA'S Neighborhood staff and partner organizations indicated that having a direct point of contact improved their ability to establish and complete referrals within the partnership. For instance, in the network survey, 65% of partner organizations reported that having access to a designated point person was a successful part of the referral process (Table 1). A staff member shared how having an established point of contact at a partner organization streamlined the referral completion process:

> I would send it [referral] to the person that we're designated to send it to, and I have never had a problem tracking a referral because they've been so helpful. I could just give her a call and "I can say oh, may I ask the status of this patient?" Or, I can just e-mail her and ask, "can I get the status of this patient? Is this patient receiving Nurse-Family Partnership?"

Additionally, some respondents described having onsite MAMA'S Neighborhood staff at their locations, staff responses to referral follow-up, and regular calls with staff to discuss client information and treatment planning improved communication throughout the referral process.

3.2.2. Barrier: lack of shared referral tracking among MAMA'S neighborhood staff and partner organizations

Partner organizations described different approaches to internal referral tracking systems, such as tracking clients via phone calls and verbal check-ins or data-driven tracking platforms and varying degrees of integration with MAMA'S Neighborhood staff. For example, one partner organization reported that their counselors and case managers "work very closely with MAMA'S to meet all the patient needs in a collaboration of services." While another described a sophisticated platform that was shared with MAMA'S staff:

> Every referral that comes in gets entered into our database, and providers (like MAMA'S Neighborhood) get recorded. Our database allows us to run reports by provider which would give us the total amount of referrals received by MAMA'S Neighborhood. Each service is recorded into the database. Whether it is forms, notes, telephone calls, etc. The services received are documented either directly into the database or via forms which the nurse has documented the service/s received.

Alternatively, some partner organizations reported not having a structured process for tracking referrals among MAMA'S Neighborhood clients specifically: "We do not keep track of what agency the client is from unless it requires further assistance with the agency." Further, partner organizations reported that 23% of partnerships entailed information sharing, while 18% entailed data sharing, suggesting that activity related to tracking between organizations is also limited (Table 1).

3.2.3. Barrier: referral process tracking centered with MAMA'S care coordinators

Because Care Coordinators are broadly responsible for tracking referrals to partner organizations, they maintain much of the referral documentation, which may introduce communication challenges among MAMA'S staff. However, collaborative care meetings to address client needs among MAMA'S staff do ease some of these challenges. For instance, one clinician described how they "basically rely on either a social worker or the Care Coordinators to report back. Or at the collaborative care meeting to give an update on if the patient could connect with what we had discussed. Or, at the next time I see them for their appointment, we check in about that." Care Coordinators often use informal verbal client check-ins to glean information on referral experiences or completion, which limits shared knowledge among MAMA'S Neighborhood staff about the quality of referral services: "I sometimes will just check in with the patient, see if they found it helpful."

3.3. Strengths of a network approach to cross-sector partnership

3.3.1. Bi-directional referrals among MAMA'S neighborhood partner organizations

For both Neighborhood staff and partner organizations, the network structure and partner collaboration facilitated a bi-directional referral process where MAMA'S Neighborhood staff are not the sole drivers of referrals to address unmet social needs within the partnership. For instance, 90% of partner organizations reported that client referrals are one of the most common activities among MAMA'S Neighborhood partner organizations, followed by case coordination and conferencing (50%, Table 1). Further, 29% of partner organizations indicated that their relationships with other organizations in the network were successful components of the MAMA'S Neighborhood referral process. Some partner organizations refer to each other when a referral is beyond their capacity to complete. As a MAMA'S Neighborhood staff member shared, "it's not just the team within MAMA'S, but it's even the collaborating agencies who we work with to help house our patients or to help put them in programs and things of that sort…We're all working together as one."

3.3.2. Networking, training, and informational meetings

Among partner organization respondents, 35% agreed that meetings to discuss MAMA'S Neighborhood referral processes were a successful program component (Table 1). Additionally, 40% of respondents agreed that meetings among partner agencies were successful at facilitating their engagement in the Neighborhood partnership. MAMA'S Neighborhood staff shared several instances where attending training and informational meetings hosted by partner organizations facilitated their capacity to complete referrals by making more referral options available and creating greater transparency around referral steps for specific agencies and a direct point of contact:

> We'll get a Housing for Health training. And we are talking to and asking questions to the liaison, the person who we're supposed to be in contact with when we want to refer a patient. That person is supposed to be able to address any issues we have, answer any questions, let us know if the applications that we're putting in are complete, what other documentation we need so that application can go through successfully.

Opportunities to network and learn about new community resources also facilitated MAMA'S Neighborhood staff members' abilities to expand the Neighborhood Partnership network:

> We're always looking for collaborative programs to help. We would email the different staff to say that there is going to be maybe a training or group session where the staff gets together and learns more about these different agencies. Anytime they would send an email, or it's put on our calendar, or we learn about it, we would go. That's your time to network, to know about the different agencies or the different programs that are out there.

4. Discussion

This study aimed to examine the implementation of cross-sector partnerships for integrating social determinants in pregnancy care. Our analysis highlighted several implementation processes, facilitators, barriers, and outcomes that exemplify the success and opportunities of addressing unmet social needs through cross-sector partnerships. Our findings underscore the importance of cultivating and sustaining authentic human-centered relationships between patients, healthcare systems, and partner organizations.

Our study found that the relationships between MAMA'S Neighborhood Care Coordinators and clients facilitated the care coordination process by centering client needs and the relatability of MAMA'S Neighborhood Care Coordinators. Further, the longitudinal relationships that Care Coordinators established with clients throughout the perinatal period improved referral completion and communication among partner organizations, other staff, and clinicians in MAMA'S Neighborhood. These findings are similar to those of other studies on community health workers' roles in improving patient navigation of social services systems, linkage to resources, and health outcomes (27–30). For instance, Kim et al. (27) found that community health worker interventions were effective among historically marginalized communities in improving access to preventive care. Additionally, Boyd and colleagues found that trust-based relationships between community health workers and perinatal women with chronic conditions improved engagement with the health system reduced stress, and improved health behaviors (28).

Beyond the process-related and intermediate improvements to referrals in cross-sector partnerships, the centrality of the Care Coordinator and client relationship in MAMA'S Neighborhood also speaks to the significance of relationship-based care as a mechanism to mitigate the impacts of structural racism, experiences of discrimination and implicit bias in the United States health care system and maternal health care (31–36). As Hardeman et al. (37) demonstrated, relationship-based clinical care provides opportunities for providers to be emotionally present, practice cultural humility, and facilitate reciprocal relationships with patients as experts on their health and well-being. For MAMA'S Neighborhood, many of these practices are inherent to Care Coordinators, given their positionality as members of clients' communities and knowledge of community resources that align with clients' needs.

The challenges related to shared tracking and siloed referral documentation among MAMA'S Neighborhood partner organizations and staff may reflect integration and partnership limits stemming from differences in organizational culture, resources, and capabilities (18, 38). Among MAMA'S Neighborhood staff, we found that documentation of referral outcomes and client experiences is informal, distinct from MAMA's Neighborhood partner organizations, who use a variety of referral documentation processes. This ultimately presents challenges for shared outcome measurement (7). While opportunities to improve data sharing through digital platforms are essential for impact evaluation and process metrics (9), they may hinder aspects of relational communication that proved foundational to the MAMA'S Neighborhood program (e.g., having a direct point of contact at partner organizations, Care Coordinator relationships with clients). Thus, additional strategies may be needed to bridge gaps in shared tracking while upholding the autonomy and approaches to tracking that work best among partner organizations.

An important strength that emerged in MAMA'S Neighborhood is the network-based approach to integrating partner organizations alongside perinatal care through cross-sector partnerships. The network structure of the MAMA'S Neighborhood enables partner organizations to collaborate on referrals and for MAMA'S Neighborhood staff to network and learn about partner organizations' referral processes, which increases transparency across organizations that might ordinarily be siloed. These types of relational structures in cross-sector partnerships are important for improving trust and learning within the partnership (9). Byhoff and Taylor (19) found that opportunities to facilitate shared learning and understanding within cross-sector partnerships are critical for continued buy-in among community-based organizations. Similar to other cross-sector partnerships, MAMA'S Neighborhood is initiated by a health system. However, the findings presented here show that the network approach also supports activities and referrals among partner organizations not created by the health system. Further, opportunities to engage with and learn from other partner agencies facilitate capacity building among partner organizations and MAMA'S Neighborhood staff, improving relationships' depth and quality.

This study contributes to research on implementing cross-sector partnerships; however, it has important limitations. First, this study did not include data on the experiences and preferences of MAMA'S clients. This has important implications for defining the equitable, person-centered implementation of cross-sector partnerships in the MAMA'S Neighborhood network. For instance, it remains unclear whether participants shared the same views on MAMA'S relationship-centered approach or whether the quality of care received varied among partner organizations. We intend to elucidate client experiences in future research. Next, the study was conducted during the COVID-19 pandemic. Thus the themes that emerged may be related to the contextual impacts of the pandemic (e.g., limited in-person meetings or referrals within the partnership). While examining the impacts of COVID-19 was beyond the scope of this study, future research should describe how the pandemic shaped cross-sector partnerships, particularly as it relates to community resources and client needs. Second, this study did not consider variations in the relationships cultivated between MAMA'S Neighborhood staff and partner organizations, which may have depended on partner organizations' characteristics (e.g., staff size, the scope of services, and proximity to services MAMA'S Neighborhood sites, etc.).

Lastly, the findings presented may be unique to California's social and political environment, specifically Los Angeles County (a large region that covers diverse landscapes of available community resources), which may uniquely enable or hinder cross-sector partnerships, and thus results may not be generalizable to other settings. Despite these limitations, this study offers key evidence of the implementation successes and challenges of a robust cross-sector partnership serving historically marginalized communities during the perinatal period.

Data availability statement

The data analyzed in this study is subject to the following licenses/restrictions: this data contain PHI. Requests to access these datasets should be directed to bridgette.blebu@lundquist.org.

Ethics statement

The studies involving human participants were reviewed and approved by Los Angeles County Department of Public Health institutional review board (IRB # 2013-08-451). The participants provided their written informed consent to participate in this study.

Author contributions

BB led the analysis and writing of this manuscript. PL supported the analysis and writing for this manuscript. WN, MH, AJ, and ES supported the writing and review for this manuscript and generated the original concepts for the overall project. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

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The community engagement course and action network: strengthening community and academic research partnerships to advance health equity

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Background: Historically Black Colleges and Universities and Minority Serving Institutions are uniquely positioned to implement community-campus research partnerships based on a history of service, the pursuit of community trustworthiness and student demographics often similar to surrounding marginalized communities. The Morehouse School of Medicine Prevention Research Center collaborates with members of Historically Black Colleges and Universities, Minority Serving Institutes, and community organizations on the Community Engaged Course and Action Network. This network is the first of its kind and aims to strengthen members' ability to implement Community-Based Participatory Research (CBPR) principles and partnerships. Projects address public health priorities including mental health among communities of color, zoonotic disease prevention, and urban food deserts.

Materials and methods: To assess the effectiveness of the network, a Participatory Evaluation framework was implemented to conduct process evaluation which included review of partnership structures, operations, project implementation processes, and preliminary outcomes of the research collaborations. A focus group of Community Engagement Course and Action Network members (community and academic) was also conducted to identify benefits and challenges of the network with emphasis on key areas for improvement to further enhance the relationships between partners and to facilitate their subsequent community-campus research.

Results: Network improvements were tied to themes strengthening community-academic partnerships including sharing and fellowship, coalition building and collaboration, and greater connections and awareness of community needs through their current community-academic partnerships. The need to conduct ongoing evaluation during and after implementation, for determining the early adoption of CBPR approaches was also identified.

Conclusion: Evaluation of the network's processes, infrastructure, and operation provides early lessons learned to strengthen the network. Ongoing assessment is also essential for ensuring continuous quality improvement across partnerships such as determining CBPR fidelity, assessing partnership synergy, and dynamics, and for quality improvement of research protocol. The implications and potential for advancing implementation science through this and similar networks are great towards advancing leadership in modeling how foundations in community service can advance to CBPR partnership formation and ultimately, health equity approaches, that are local defined and assessed.

KEYWORDS

Community-based participatory research, community engaged research networks, collaboration, community-academic partnerships, marginalized populations, participatory evaluation

Introduction

Community engaged research is defined as the process of working collaboratively with and through groups of people affiliated by geographic proximity, special interest, or similar situations to address issues affecting the wellbeing of those people (1, p. 7). It is focused on building and sustaining strong community-academic partnerships and operates along a continuum of increasing community involvement in research activities. Community-based participatory research (CBPR) is a type of community engaged research, emphasizing equitable community engagement in research. Historically Black Colleges or Universities and Minority Serving Institutions are uniquely positioned to implement effective CBPR based on a history of service and the pursuit of community trustworthiness central to their missions.

The Community Engaged Course and Action Network was designed to establish a capacity building, CBPR infrastructure for and by Historically Black Colleges and Universities and Minority Serving Institutions adapting an established CBPR model led by Morehouse School of Medicine. Most of these schools are entirely integrated into their surrounding communities (e.g., most students are commuters especially at the public institutions) often with shared social, cultural values, behaviors and demographics of surrounding marginalized communities. It is no coincidence that rural areas and the portions of the Micropolitan Statistical Areas containing historically black colleges or universities are also some of the most underserved areas in terms of healthcare accessibility and inversely these areas experience high rates of poverty and income inequality. Thus, there is a great need and potential to educate faculty at these institutions to learn and model CBPR partnerships to address local health priorities for the future public health leaders at these institutions.

Partnership and administrative factors are assessed through a Participatory Evaluation framework. This approach has been previously employed by the Morehouse School of Medicine Prevention Research Center to equitably and strategically, engage project implementation partners and stakeholders due to the welcome complexities of CBPR and historical power inequities detailed earlier. We seek to facilitate a supportive network towards advancing related partnerships in response to local health priorities for a network of newly partnered collaborators. Participatory Evaluation approaches are designed to address needs mutually identified by partners to assure that initiatives are: (1) audience-driven; (2) foster sustained ownership of evaluation processes; and (3) are central to program decision-making and sustainability (2). This also provides accountabilities to sponsors towards ensuring that recommendations, concerns, and preferences are heard towards sustaining program strengths and making quality improvements of identified challenges or weaknesses. Hence, the purpose of this study is to evaluate the community-academic partnership and research administration using process evaluation techniques.

Background

Morehouse School of Medicine is one of ten Historically Black Colleges and Universities in Georgia and one of only four Historically Black Medical Colleges in the United States. Morehouse School of Medicine holds over four decades in globally recognized implementation of a cross-cutting (clinical, research education and service) community-centered vision - *to lead the creation and advancement of health equity* (3). The Morehouse School of Medicine Prevention Research Center is the designated center for CBPR within the institution. For over two decades, through collaborative relationships with community members and organizations, Morehouse School of Medicine Prevention Research Center has been competitively funded to conduct applied to HIV/AIDS, substance abuse, cardiovascular, diabetes, oral health, behavioral, clinical and translational research as well as lead related research infrastructure and capacity building efforts (4–17). The Morehouse School of Medicine Prevention Resource Center has collaborated with its Community Coalition Board to build trusting and mutually beneficial relationships with communities. The Center is governed by the Board, which was established in 1999 to articulate community priorities and advance health equity (10, 18–21).

The Community Engagement Course and Action Network, established in 2019, is an extension of the Morehouse School of Medicine Prevention Research Center mission to strengthen community engagement, research, leadership and partnership models designed to innovatively, advance health equity through strategically identified potential partner communities. The network was established to strengthen the capacity of minority serving institutions to develop locally responsive community-campus CBPR partnerships. The goal of the network is to strengthen the ability of Historically Black Colleges and Universities, Minority Serving Institutions, public health agencies, medical practitioners, students, and multi-sector partners in CBPR and community engaged research.

Materials and methods

Community engagement course and action network

Structure

The network began with 10 Georgia Historically Black Colleges and Universities and Minority Serving Institutions when the network was launched in May 2020. Due to the global COVID-19 pandemic and other factors, four Georgia academic institutions remained committed to working with MSM. These included: Dalton State College, Fort Valley State University, Georgia State University, and Savannah State University. Table 1 details the health conditions in communities in the counties surrounding each school supporting the rationale to offer intensive outreach, education and capacity building to Historically Black Colleges and Universities, Minority Serving Institutions, and partnering communities towards applied public health prevention research and implementation strategies. The Center launched a mini-grant program to support community-university research partnerships, facilitate community input into university research, and to increase health research in community settings that is both responsive and relevant to the health needs of the community. Projects, partners and focus areas are detailed in Tables 2,3.

Operations

To support community leadership, the network is led by the chair of the Morehouse School of Medicine Prevention Research Center Community Coalition Board. Essential to the Center's mission, the Board chair has been community and research identified as a community developer, civic engagement practitioner, and health advocate. His work ensures community-centered, led and translated health equity leadership and governance to support network members. He is a community economic development practitioner and long-time Morehouse School of Medicine community partner. His leadership with and for diverse groups of community advocates, academic partners, and agencies in strategies to achieve equity and enhance the built and natural environment that reduce health disparities and promote community-campus partnerships using the CBPR makes him a valued leader of the network. He is supported by staff of the Center's to facilitate meetings, convening, communication, and evaluation processes.

A qualitative assessment of the community-academic partnership was conducted by reviewing the Community Engagement Course and Action Network establishment, structure, partnership dynamics, and outcomes of partnerships based on the alignment with the CBPR principles. A review of partnership formulation documents, funding structures, and reports from meetings, webinars, technical assistance and support, and workshops provided additional contextual data for assessment of the network partnership dynamics. In addition, a focus group ($N = 12$) of Community Engagement Course and Action Network members (both community and academic partners) was conducted face-to-face and supported by Mentimeter, a survey polling tool (22). The focus group was designed to identify benefits and challenges of the network with emphasis on key areas for improvements to further enhance the relationships between partners and to grow the network. The group, together, identified areas of success and areas for improvements in creating synergy and cohesiveness within the network. This PE framework was essential to ensuring that *all* community-campus partners involved in the network share and hear the similar and disparate issues central to their participation and perceived network success. This was critical given

TABLE 1 Socioeconomic characteristics of CECAN research partner counties.

CECAN partner counties and sites	Population living below federal poverty level (%)*	Minority population (%)*	Proportion of population with less than HS diploma*	Number of primary care physicians per population**	Population with low access to store (%)***
Chatham County (Savannah State University)	17.9	46.7	8.8	1:1,130	22.1
Fulton County (Georgia State University)	16.9	54.8	6.0	1:573	23.5
Peach County (Fort Valley State University)	21.0	51.9	13.2	1:1,820	19.4
Whitfield County (Dalton State University)	15.0	39.0	20.3	1:3,424	NA
Georgia	17.8	40.2	10.7	1:1,30	NA

*Data source: National Historical Geographic Information System. American Community Survey Summary Files (2020). Retrieved from: https://www.nhgis.org/.

**Data source: Primary Care Practitioners Workforce Projections. Health Resources and Services Administration (December 2020).

***Data Source: United States Department of Agriculture. Food Atlas (2019). Retrieved from: https://www.ers.usda.gov/topics/food-choices-health/food-access/.

Low access to store: people in a county living more than 1 mile from a supermarket or large grocery store if in an urban area, or more than 10 miles from a supermarket or large grocery store if in a rural area.

TABLE 2 CECAN research partners and projects.

Developing Culturally Appropriate Mental Health Network for Latinx Community – Dalton State College (DSC), the first college in the University System of Georgia designated as Hispanic Serving Institution, partners with the Coalicion de Lideres Latinos (The Coalition of Latin Leaders), an all-volunteer local organization to reach the Hispanic residents in Dalton County, to address mental health concerns. The partnership is still being developed as the academic role has been redefined and the community-based organization role has been amplified
Mental Health Outreach through Black Barbers (The Confess Project - TCP) – Georgia State University, the largest in the University System of Georgia and designated as a Minority Serving Institution, is examining the impact that participating in TCP has on barbers' knowledge, attitudes/beliefs, skills, and behaviors related to mental health. TCP is "America's First Mental Health Barbershop Movement," which began in 2016 to address the need for programming that can equip African American men with knowledge, strategies, and coping skills to help them recognize and address mental health challenges. The data collected provides a better understanding of barbers' views, perceptions, and attitudes about mental health since these can influence their capacity and willingness to be mental health advocates for their clients and communities. Further, baseline and follow-up data on the barbers is being collected for the first time. Therefore, the evaluation will generate useful information that will help identify areas of the training/model that should be modified to improve the curriculum based on the data collected and to achieve the project's anticipated outcomes. Specifically, the pilot study aims to answer an important question about TCP: can TCP-trained barbers help reduce mental health stigma among black men/boys and positively impact their mental health?
Prevention of Zoonotic Disease Transmission – Fort Valley State University (FVSU), the only university in the world that is concurrently a University System of Georgia Institution, a Historically Black College or University (HCBU) and a land grant institution, partners with the Department of Natural Resources (DNR) within Burke County, Georgia to provide training to technicians of licensed Doctor of Veterinary Medicine (DVM) and Veterinary Technicians on proper field necropsy techniques to determine zoonotic disease potential in wildlife species. Zoonotic diseases that interface between wildlife and outdoors enthusiasts (hunters, taxidermists, game processors) remain an under-addressed topic in mainstream public health and yet the threat is real. Natural resource technicians are often called upon when wildlife carcasses present either in general population environments (yards, farms, etc.) or on state/federal lands (WMA's, parks, etc.) to provide answers and assistance in both removal and protection of human populations sharing these areas. With the prevalence of such zoonotic diseases as rabies, salmonella, or presence of certain parasite vectors capable of spreading disease between carcass and humans, the DNR technician is the first line of defense in monitoring the status of indigenous wildlife populations. Training of Department of Natural Resources technicians their knowledge of zoonotic disease transmission and safe necropsy procedures and provide printed necropsy guide for technicians that may be shared throughout the agency to ensure all technicians education on safe handling of wildlife carcasses during field work
Addressing the Challenges of Urban Food Deserts – Savanah State University (SSU), the oldest public historically black college or university, partners with a Community-based organization the Harambee House in Savanah, GA to implement community engagement at Harambee House will be focused on community education and outreach that leverage on building capacity and community support networks, that will help potential urban farmers and urban community residents to assess and better understand the existing urban land use practices and innovative entrepreneurial agriculture opportunities, discover connections, and establish shared vision among practitioners. The participating community was educated on the unhealthy impact of their limited local food resources, and the various ways they can augment their dietary choices and improve the availability of food and groceries in their neighborhood.

TABLE 3 CECAN prioritized populations/communities.

Prioritized populations/ communities	History of population inequality	Sample health disparities	Root cause of vulnerability
Latina/o and Hispanic	Immigrant status Mass incarceration Language barriers	Brown versus white life expectancy Mental health stigma	Historical mistrust Wage/wealth gaps
African American men	Slavery Mass incarceration police brutality	Black versus white life expectancy Access to appropriate mental health service	Structural racism Discrimination Medical mistrust Wage/wealth gaps Mental health stigma
Department of Natural Resources Technicians and Wildlife Hunters	Under-resourced workers	Covid-19 healthcare workers and use of PPEs	Essential workers' health and safety
Underserved Rural Communities	Barriers and health and healthcare services	Higher prevalence of risk factors for Chronic diseases	Poverty Food insecurity Inadequate transportation Lack of medical providers

the CBPR network being facilitated and the well understood power differentials address through CBPR that the network is designed to dismantle and collaboratively support towards responsive, partners community response.

Process evaluation involved review of partnership documents aforementioned. Focus group data analysis was manual and involved two coders that developed an initial codebook informed by questions guiding the focus groups discussion. Summary points were transferred into.

a matrix to systematically code responses. Emerging codes were noted and included in the final coding guide (23). Themes associated with codes were reviewed by the Center's Community Coalition Board Chair (network facilitator) and Center staff and identified detailed in the section that follows.

Results

Key themes

The findings of the qualitative assessment of Community Engagement Course and Action Network research partnership were subdivided into sections, in relation to commonly identified themes, to summarize the outcomes of the collaboration between partners based on the CBPR framework.

Building and strengthening partnership

Despite the well-documented benefits of CBPR [(24, 25); Jagosh, et al., 2012], there are challenges in building and maintaining community-academic research partnerships to improve community health outcomes. It is critical before establishing community-academic partnerships for CBPR to first find out the issues that are affecting the community and understand the interest of the community. Georgia State University CECAN research project is a testament of academic partners working collaboratively with the community to overcome challenges in conducting research in barbershops and barber schools across metro Atlanta. After listening to these community partners and valuing their contributions, the university designed a pilot study aimed at appropriately evaluating and improving a novel program that trains barbers and barber students to be mental health advocates. Considerable formative work went into establishing and strengthening a community-academic partnership well before the research began, and these efforts continue throughout project (i.e., “cradle to grave”) to ensure that the community’s voice, ideas, and concerns are foundational to this collective work. Through focus group discussions with this community of interest (i.e., barbers, barber students, and shop owners) – as well as participant surveys and barber advisory board input – the partners were able to collect process and outcome data that will be used to enhance the training program. Ultimately, the program will better meet the needs and interests of barbers trained to serve as mental health advocates in their communities. Researchers should approach partnership within communities with honest intentions and humility, recognizing that building such relationships takes time and unwavering efforts over the long-term.

Establishing authentic partner engagement

Effective evaluation of partnership efforts requires a clear conceptual framework that links group dynamic characteristics of equitable partnerships (e.g., shared leadership, meaningful participation, and power sharing) with the effectiveness of partnership efforts to intervene and reduce health inequities more broadly (26). For example, for the networks research project, *Developing Culturally Appropriate Mental Health Network for Latino/a Community*, Dalton State College worked with Coalicion de Lideres Latinos a Latino/a grassroot community advocate group, to assess and identify the need for mental health services within the Latino/a community. Coalicion de Lideres Latino/a assumed the role of cultural broker to continue building trust and rapport with community members. Researchers should collaborate with community partners to ensure that that they are recognized and valued within the community as a trusted agent of change. Being present in the community helps to build trust and commitment to engagement and ultimately establish co-leadership for research.

Network synergy and expansion

A critical dimension in many CBPR frameworks is the concept of partnership synergy, or synergy that arises from collaboration among members of diverse knowledge, perspectives, cultures, and social positions (27). Synergy is the concept of gainfully accomplishing more collaboratively, opposed to separately which is critical to partnership effectiveness and expansion. For example, Savannah State University collaborated with their community partner, Harambee House to address the challenges of urban food desserts in underserved rural communities, while embracing the idea of a community-led project approach. Harambee House is well-known for promoting civic engagement, environmental justice, and social change but needed further guidance on how to properly execute CBPR. The partnership was initially hampered because the responsibilities of both partners were not clearly defined or based on the expertise of each partner. For the second round of funding, the community partner, instead of the academic institution, became the lead, which resulted in a delay in implementation of the research project causing both partners to reevaluate their roles and responsibilities. In CBPR, addressing the structural, social, and cultural differences between community and academic is critical for successful implementation of research projects. Sharing knowledge, expertise, decision-making, capacity building of community partners, and other resources would help in breaking down silos and strengthening unity for the success of such partnerships.

Institutional and leadership support

Researchers invested in community– academic partnership requires institutional and leadership support to be successful (28). This level of partnership investment requires commitment in creating an environment of co-leading, co-learning, and capacity building that is beneficial for all members of the partnership (29). While the Community Engagement Course and Action Network research projects were well supported by academic researchers, there is limited knowledge of whether the community-academic partnership was supported by each university/college academic leadership. Morehouse School of Medicine Prevention Research Center’s leadership fully embraced the use of CBPR model and expressed its commitment to the establishment of community-academic partnerships for the Community Engagement Course and Action Network research projects by contracting with its Community Coalition Board chair, a non-academic leader, to serve as a coordinator and facilitator for community engagement. The Community Coalition Board chair has 15 years of experience working with diverse groups of community advocates, academic partners, and agencies to develop strategies aimed at reducing health disparities and promoting community-academic research partnerships using the CBPR framework and a reflection of the leadership model with the Morehouse School of Medicine Prevention Research Center. This leadership structure allows for power-sharing between community and academia by building on existing trusting relationships as promoted by the Morehouse Model for Community Engagement. The Morehouse School of Medicine Prevention Research Center leadership team also offers technical assistance to the network research partners in areas of project administration, community partnership engagement, evaluation, and research translation and dissemination.

Partnership and network engagement

One benefit of community engagement in research is gathering valid and credible evidence of diseases and designing meaningful and impactful culturally appropriate interventions based on the lived experiences of affected community members. The Fort Valley State University researchers admitted that their research on zoonotic diseases was strengthened by directly involving Department of Natural Resources technicians who were at increased risk for exposure to pathogens of the diseases and who had practical solutions for disease prevention and control. Upon conducting a 2022 focus group discussion among Community Engagement Course and Action Network research partners, we learned the expectations and benefits from both the academic and community-based organizations of participating in the network. Expectations and benefits coincided to include "*sharing and fellowship, coalition building and collaboration, and greater connections and awareness of community needs*," (see Table 4). Community Engagement Course and Action Network research partners also expressed some of the successes (wins) they achieved through the network and recommendations for improving their project plans to strengthen the community-engaged approach. One of the most salient wins was "*bringing national attention to the concept of community engaged research at undergraduate level*," (see Table 5). Recommendations for Community Engagement Course and Action Network improvements were tied to lessons learned from their current community-academic partnerships.

Discussion

Evaluation of the Community Engagement Course and Action Network research partnership facilitated an assessment of fidelity in application of the CBPR principles. By conducting a qualitative review of partnership structure, project implementation processes, and outcomes of the research collaboration, it was clear that consistent monitoring and technical assistance is essential for success of community-academic partnerships. There was evidence to support the claim that breakdown in communication between partners can result in undefined expectations and delay in the execution of research processes. Focus group discussions among the network's partners did reveal some positive results regarding the benefits of the network with key areas for improvements to further enhance the relationships between partners and to grow the network. Noteworthy in informing other initiatives is that CBPR capacity building and partnership development support towards community-driven intervention, is the goal of the network. The focus of this manuscript was process evaluation of the network function and CBPR partnership formation to date. As the network and funded projects evolve (projects and processes are still underway) CBPR principles, in practice, will be comprehensively assessed.

The qualitative data provided great insights into the challenges that were experienced by the Community Engagement Course and Action Network research partners from which to learn and grow the network for the next phase of project implementation. One of the

TABLE 4 CECAN partner reasons for joining and benefits of the network.

Questions	Responses
Why did you choose to join the CECAN Network?	• Application of community – based research and applied research • Sharing and fellowship • Partnership engagement - community engagement • Coalition building and collaboration • Opportunities to learn, work collectively, and have impact • Accessing extramural funding for research • Establishing credibility in research and gain exposure for work • Assurance of information credibility and data collection in research from a trusted academic institution
What do you believe are among the biggest benefits of participation in the network?	• Opportunities to see value in the community – campus partnerships and to partner with community • Opportunities to partner with community - actualized public health intervention by working in partnership with those who are adversely affected • Access to expertise and information of Morehouse School of Medicine • New opportunities and crowdsourcing of ideas • Collaborations with organizations from different regions of Georgia • Greater connections and awareness of community needs, greater influence on community through enhanced ability to conduct community-based research in an efficient way • Sustainable relationship between academia and community in research • Addressing community needs through collaborative engaged research • Opportunity to have evidence to make informed decisions • Being able to discuss challenges and having other organizations being able to provide relatable suggestions • Gaining new perspectives in research

most important lessons learned is the need to conduct ongoing evaluation of networks collaboration efforts to improve synergy among community-academic partners and for effective project functioning. Establishing clear roles and responsibilities to ensure accountability for governance of the research project processes, including invoicing and reporting. Engaging community partners during the selection of pertinent issues prior to project developing and planning phase is critical to ensure that community needs are being prioritized in research. Building relationships with community partners prior to the research also allows for equal distribution of power between the community and academia, consistent with the co-leadership principle of CBPR. From the focus group discussion, academic partners are aware of the importance of engaging community partners and that their level of contributions will determine the success of the research project. However, the timeline for engagement should be clearly defined and the process of engagement needs to be better streamlined (Table 6).

To our knowledge, this is the first is the first network of Historically Black Colleges and Universities and Minority Serving centered on increasing CBPR capacities and conjointly providing funding to support skills and partnership acquired. Second a nationally recognized community leader, rather than Morehouse School of Medicine Prevention Research Center facilitating this network and partners were led by the chair of the Community Coalition Board at Morehouse School of Medicine Prevention Research Center collaborated with underserved communities and academic leaders representing unique priority population groups within the urban and rural areas of Georgia. We conducted a formative, participatory process evaluation study amongst network partners, both community and campus-based, who served as equitable experts on relevant community and partnership priorities and challenges.

A more comprehensive assessment of the community-academic partnership is warranted. Baseline data at the initiation of the Community Engagement Course and Action Network regarding the partnership structure, application of the CBPR principles in partnership, research design, and implementation, coupled with ongoing partnership evaluation would reveal areas of growth and areas for improvement over

TABLE 5 CECAN partnership successes and opportunity for project improvement.

Questions	Responses
If you have experienced any early wins, what have they been?	• Existing and potential partners • Cementing or firming up my partnerships through gathering regularly • Having access to this network • Opportunity to project expansion • Bringing national attention to the concept of community engaged research at undergraduate level • Continued engagement in the network • Opportunities for increased involvement of institution in community
In what ways have you had to adjust your project plans and why?	• Reevaluate partners contributions to accommodate valuable community engagement • Focus is a new endeavor rather than continuation of round one-but that's a positive pivot • Adjust how projects are being implemented and in turn how to move forward and tailor research/evaluation

TABLE 6 Recommendations for CECAN project and network enhancements.

Questions	Responses
What are the changes you recommend as we continue our work together?	• Longer lead times-turning around contracts/invoices/etc. • Everything works very well and cannot think of changes that need to be made • Visiting the various sites to see the work in-person – was not possible during Covid-19 • Getting to know our partners beyond the project; being creative and adjustable to changes; respect and trust building • Opportunities to hear what is going on with other projects on a regular basis • Mentor some community organizations on a deeper level to be more efficient
What are some recommendations for things you believe we can do as a network?	• Seek funding as a group to support our collaborative work • Developing student ambassadors to continue efforts • Use the power of the network to help various projects find more funding to grow and expand on the CECAN projects • Sharing knowledge and skills gained, building capacity - next generation of community-academic partnerships • Have a dedicated website (do we already have this?) that showcases each project and drives interested readers to the project and health promotion of interest • Representation at the Georgia Public Health Association to present projects • Participate in Strategic Management classes for local organizations in their communities • Engage with policy makers for project sustainability

time. Conducting a partnership assessment after the mid-term implementation of the network's research projects provided only a snapshot of the successes and challenges that were achieved over the two funding cycles. Nonetheless, the qualitative data collected on partnership dynamics can be used to enhance collaboration and strengthen cohesiveness between members of the network as it continues to progress.

The Morehouse CBPR Model with the complementary tools promotes collective reflection that, among other constructs, leads to our central theory of change—collective empowerment (30). Reflecting on the partnerships and the projects that Community Engagement Course and Action Network partners implemented, the research partners were asked about changes they would make to their projects and the network based on lessons learned and to develop next steps for enhancement of the partnership and network, (see Table 5). Recommendations were aimed at building/strengthening community-academic partnerships and increasing the legitimacy of the network's research projects among researchers, communities (local, regional, and statewide), funders, policymakers, and other stakeholders.

Conclusion

It is essential to assess community-academic partnership at initiation, during, and after research project implementation to determine its alignment with CBPR principles and to ensure continuous quality improvement across partnerships in a myriad of contexts. The results of such ongoing evaluation can be used to develop strategies to enhance partnership functions and to strengthen the cohesiveness of the partners within the network. The unique history and position of Historically Black Colleges and Universities and Minority Serving Institutions present opportunities to understand the conditions through with CBPR partnership development despite cross-cutting dedication to community trust, take place. The heterogeneity of institutions require attention to the contexts in which community-campus partnerships are successful, given differences in identity (private/public, teaching/academic health center, geography, and track record of relationship and power sharing among community-campus partners). The implications and potential for advancing implementation science through this and similar networks are great towards advancing leadership in modeling how foundations in community service can advance to CBPR partnership formation and ultimately, health equity approaches, that are local defined and assessed. Collaboration amongst Community Engagement Course and Action Network partners will expand the influence of Historically Black Colleges and Universities and Minority Serving Institutions which is vital for sharing ideas, knowledge, expertise, and other resources that advance their collective impact as strategic public health change agents.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

THA, RB, and LH: conceptualization. THA, RB, LH, and SS: writing—original draft development. THA, RB, LH, and TJ: designed research questions, and analysis tools. THA, RB, LH, and SS: conducted data analysis. THA, RB, LH, SS, NDB, MF, RF, AG, PO, QP, TR, OS, and TT: prepared original manuscript, and revised draft of manuscript. THA, RB, LH, SS, KD, TJ, NDB, NF, RF, AG, JH, RM, CO, PO, QP, OS, and TT: contributed to data collection, reviewing, and editing of revised manuscript drafts. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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The Agile Co-production and Evaluation framework for developing public health interventions, messaging and guidance

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A lesson identified from the COVID-19 pandemic is that we need to extend existing best practice for intervention development. In particular, we need to integrate (a) state-of-the-art methods of rapidly coproducing public health interventions and messaging to support all population groups to protect themselves and their communities with (b) methods of rapidly evaluating co-produced interventions to determine which are acceptable and effective. This paper describes the Agile Co-production and Evaluation (ACE) framework, which is intended to provide a focus for investigating new ways of rapidly developing effective interventions and messaging by combining co-production methods with large-scale testing and/or real-world evaluation. We briefly review some of the participatory, qualitative and quantitative methods that could potentially be combined and propose a research agenda to further develop, refine and validate packages of methods in a variety of public health contexts to determine which combinations are feasible, cost-effective and achieve the goal of improving health and reducing health inequalities.

KEYWORDS

public health, interventions, co-production, evaluation, emergency response

Introduction

We have learned from the COVID-19 pandemic that health protection would benefit from improved methods of rapidly co-producing, optimising and evaluating public health interventions, guidance and messaging (1, 2). This could ensure that all population groups receive practical and accessible interventions and messaging that help people protect themselves and their communities (3–5). Particular attention to how best to include and support people from diverse contexts and underserved communities is required (6, 7). Evidence for the effectiveness of specific interventions and public health advice aimed at facilitating behaviour change during the COVID-19 pandemic was limited (3, 8), highlighting the need for methods of rapid evaluation in order to determine what interventions do or do not successfully change behaviour and reduce infections, in which contexts, and why.

In this paper, we propose the Agile Co-production and Evaluation (ACE) framework for developing public health interventions and messaging. ACE combines three key ingredients necessary for effective and efficient public health intervention and message development: (i) speed, (ii) co-production with target communities and (iii) evaluation.

Whilst good progress has been made in successfully deploying many elements of the required methodologies in isolation, there is currently no comprehensive, cost-effective, validated framework for combining them. Guidance documents for developing interventions (9) and applying behavioural science to national policies do exist (10). However, existing evaluation frameworks do not combine all three of the components that comprise ACE. For example, excellent intervention development frameworks exist, but these have not addressed the needs of rapid development of public health interventions for emergencies (9, 11). Existing evaluation guides may lack detail about efficient co-design (10), and while there are established methods for inclusive co-design [e.g., (12)], these often depend on much longer timescales than are available when responding to public health emergencies. A review of the literature by members of the team revealed no comprehensive framework that combines rapid co-production with rapid evaluation currently exists (13). The need for such a framework is further supported by qualitative work conducted with behavioural scientists and public health practitioners during the COVID-19 pandemic. That work revealed that whilst frameworks for supporting the application of behavioural science into public health policy are useful, existing frameworks were considered insufficient for pandemic situations, and it was felt that a co-produced strategy would be helpful (14).

We suggest the ACE framework can provide a unifying focus and flexible agenda for a programme of methodological innovation to supplement existing best practice in intervention development by ensuring that rapidly co-produced interventions and messaging are appropriate for all target users and effective when implemented.

Below, we describe ACE and how it was developed. Drawing on our experience during the COVID-19 pandemic, we outline some examples of methods that could be integrated within the framework.

Conception and development of the ACE framework

The ACE framework was conceived by a team of behavioural and social scientists, public health professionals and members of the public. Our collective struggles with rapidly developing and evaluating interventions during the COVID-19 pandemic convinced us that better approaches were urgently required. In particular, the speed at which interventions had to be developed and deployed meant that it had not always been possible to engage with those who required support the most, to rapidly evaluate co-produced interventions in terms of the impact on attitudes, acceptability and behaviour, or to rapidly evaluate the implementation of interventions in the real world.

During a series of meetings, we characterised the core challenges we had faced and discussed research agendas and strategies that could be developed ahead of future emergency situations to support effective intervention development and evaluation. The ACE framework was proposed by the lead author and discussed and refined through consultation with the core team. Following this, the team conducted a scoping review that aimed to map available behavioural science resources that could be used to develop and evaluate public health guidance, messaging, and interventions in emergency contexts onto components of ACE. Of the 17 studies that were included in the review, three discussed co-production with the target audience and consideration of diverse populations, four focused on rapid testing, evaluation, or validation methods, and six were designed to support rapid implementation. None included all components of ACE. This confirmed the need for such a framework, and a paper in which a prototype framework was described was co-developed and circulated among the team for an interactive discussion.

As an initial test of our original framework, which focused primarily on the co-production of public health messaging, we applied it to the development of messages to support members of the public to protect themselves from mpox (formerly monkeypox) (15). Mpox almost exclusively affected sexual networks of gay, bisexual or other men who have sex with men (GBMSM) and people living with HIV and was declared a public health emergency of international concern by the World Health Organization (WHO) on July 23rd 2022. In efforts to control transmission, multiple public health measures were introduced, including vaccination, contact tracing and isolation. There was a need for rapid research exploring facilitators for and barriers to the uptake of public health measures among GBMSM to inform optimizations of the intervention measures. This first application of the framework quickly revealed the need for substantial modifications to the framework. In particular, we became aware of the need to focus not just on public health messaging, but on complex interventions to support behavior change.

At this point, we approached public contributors and invited them to share their perspectives. These contributors comprised 3 women and 2 men (1 Black British, 1 Mixed Black Caribbean and White, 2 British Pakistani, 1 White) who worked in community, health, or public health settings during the COVID-19 pandemic. They reviewed a draft of this paper and gave their views on how compatible the ACE framework is with real-world experiences, and opportunities and challenges for this approach. Verbal (MS Teams, telephone) and written feedback was obtained in English and Urdu between 12th and 21st September 2022. The feedback was very positive about the recommended approach and methods but suggested some changes to the text and advised that a Figure was needed to summarise the key elements of the ACE approach to aid understanding and implementation in practice. Numerous recommendations were also given for methods of co-production, and these were added to Table 1 or the text. The revised text and Figure were recirculated to the public contributors to check that their suggestions had been well represented in the paper.

Overview of the ACE framework

The ACE framework is an intervention development and evaluation framework and describes the process by which

TABLE 1 Potential methods for applying the ACE framework – to be expanded, refined and validated through use and practice.

• PPI and stakeholder involvement at all stages of intervention and messaging co-production, implementation and evaluation as full members of the research team, including: members of the public, especially a range of people from seldom-heard groups and communities; healthcare professionals and providers, including people from diverse backgrounds; community leaders; behaviour change experts and relevant others. • Involvement in co-production teams of people with cultural sensitivity and competency, a deep understanding of inequalities, and good listening and communication skills, including in languages used by the target communities.
• Capacity building and consultation with local communities to support engagement with co-production while avoiding community members being over-burdened or feeling excessively targeted. This should involve working with trusted community influencers but also listening to a wide range of people with different views. • Real-time analysis of linked data to identify the sectors of the population that are underserved and/or have high need. • Co-production of interventions and messages that reflect the priorities of the target groups and communities as well as public health priorities, taking a holistic approach to wellbeing. • Co-production of interventions and messaging tailored and targeted appropriately for specific (e.g., population or geographic) context, using suitable language, messengers, imagery and delivery formats (e.g., social media, flyers, radio). • Rapid iterative adaptation and optimisation of interventions and messages based on evaluation findings to ensure that they are accessible, feasible and evidence-based and are easily understood and seen as appropriate, relevant and useful by target members of the population.
• Rapid online surveys to determine knowledge and perceptions of disease/infection control behaviours among the general population. • Rapid surveys administered in person at appropriate locations (e.g., school, work, hospital, community centre) to include members of the population less likely to engage with online surveys (e.g., who do not have digital access or prefer in person communication with known and trusted people). • Large-scale in person consultations (with facilitators from diverse groups that have in-depth knowledge of cultural competency) using pre-established national and local networks to include people who are less likely to engage with online consultations.
• Large online experiments to test effects of co-produced public health messages/interventions on intentions to engage in infection control behaviour(s).
• Semi-automated analysis of large free text data-sets: use of artificial intelligence methods to assist qualitative researchers to analyse responses to open-ended survey questions from large population samples.
• Qualitative and quantitative analysis of comments, posts and features shared *via* social media, including audio messages, to understand views and attitudes of members of the public who do not wish to take part in surveys or interviews.
• Rapid participatory ethnographic research, with appropriately skilled community members carrying out observation, interviews and surveys.
• Audit of feasibility and implementation of interventions to determine if specific, measurable, timely actions have been undertaken by those involved in implementing them. • Rapid evaluations using routine data to assess outcomes in a range of real-world implementation settings using observation, experimental or quasi-experimental methods.
• Mixed methods process evaluations: rapid qualitative and quantitative research aiming to understand system effects and impacts on objective measures of behaviour and health.

interventions may be rapidly co-produced and evaluated so that they reach all the target users, and meet the priorities of the public, particularly those from seldom-heard communities. The framework combines the three key ingredients (i) an agile approach to intervention development, (ii) co-production with target communities and (iii) evaluation (Figure 1) which we define below.

Agile: Agile intervention development is a concept that originated in the field of software development but can be applied to healthcare intervention development (16). Agile development typically involves a rapid cycle of user-centred development in which evaluation of the user experience informs rapid optimisation. Public health interventions frequently need to be developed, evaluated, and implemented very quickly. Thus agile methods are required to speed up the co-production and evaluation cycle. For example, this may include making use of pre-established or existing systems and relationships to facilitate the conduct of rapid recruitment, engagement, and/or data collection, together with rapid analysis methods.

Co-production: Co-production involves researchers, practitioners and members of the public working together to achieve a shared outcome (17). The term co-production often means different things to different people, in part due to the wide range of disciplines from which co-production originates (18). We use the term inclusively to reflect the range of definitions and ways of working; in recognition of the need for flexibility in how co-production is used and achieved, depending on the context, situation and target audience.

Evaluation: Finally, we use the term "evaluation" to include efforts to assess the acceptability and feasibility of the intervention, factors influencing effective implementation, the process by which the intervention leads to impact, and/or impact of interventions through rapid testing, evaluation or other validation methods (such as online testing or implementation evaluation using routine data).

ACE is intended to be used flexibly to suit the needs of the specific context in which the intervention is being developed. Figure one depicts the cyclical nature of the framework, indicating that the framework should not be considered a linear process but may be applied at any point in the cycle of developing, adapting, optimising or implementing an intervention.

Below we suggest some methods and recommendations that may be usefully employed during each of the components.

Agile co-production and optimisation of appropriately targeted and tailored interventions and messaging

Co-production is vital to ensure that both population-level and targeted interventions and messaging are appropriate for and trusted by the people and communities that they must engage (10, 19, 20).

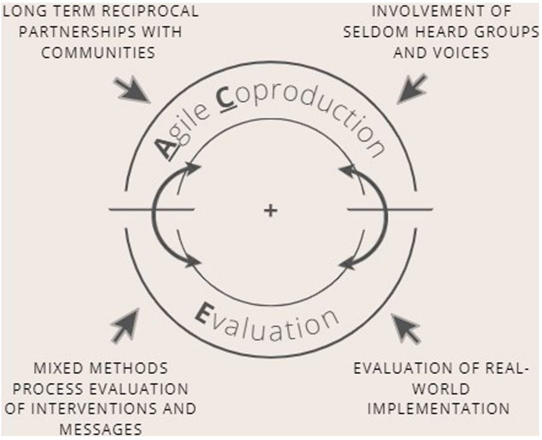

FIGURE 1
Overview of the Agile Co-production and Evaluation (ACE) Framework.

It is crucial that co-production involves communities or groups whose voices are seldom heard from during emergency public health campaigns and who may face additional barriers, such as those from lower socio-economic groups and ethnically diverse communities (21). This may require innovative approaches to engage with members of these groups, including offering a wider variety of ways in which members of the public can contribute and establishing new forms of long-term partnerships (22). Long-term reciprocal relationships established prior to emergencies can not only build trust and help to break down 'them/us' barriers but can then facilitate rapid co-production in emergencies. Offering a wide range of digital and non-digital methods (written, oral/aural, visual and in-person) for involving and communicating with members of the public is necessary to meet the needs and preferences of seldom heard members of the population, including people of all ages and with disabilities.

Many public health teams have excellent ongoing partnership links with their diverse communities and the skills to co-produce interventions and messaging in consultation with different groups (6, 7). The UK Community Champion schemes are an example of a successful innovative and responsive approach to increasing engagement with diverse communities during the COVID-19 pandemic. The schemes provided a supportive framework for building capacity in seldom-heard communities to generate rapid insights and co-create interventions and messages that reflected the needs and attitudes of specific groups (23).

Targeting and tailoring of interventions and messages will benefit from being informed by the best available evidence wherever possible. For example, during the COVID-19 pandemic target user groups were identified using real-time analysis of linked data to detect and include the sectors of the population that were underserved and had high need for targeted interventions such as vaccination outreach (19). Other examples include use of community-led researchers and local resilience forums to provide real-time qualitative data to inform the development of targeted interventions (24).

Once interventions and messages have been co-produced, evaluation of their effectiveness in achieving intended outcomes is required. However, to date, public health and research teams have not usually combined their co-production efforts with experimental testing or objective validation. The aim of the ACE framework is to combine rapid intervention and messaging co-production with immediate evaluation and further optimisation. This could include some of the approaches outlined below.

Rapid mixed methods evaluation of interventions and messages

In the COVID-19 pandemic, rapid large-scale online surveys were used to establish attitudes and intentions towards planned or ongoing interventions, such as testing, self-isolation and vaccination (25, 26). Experimental online evaluation (such as A:B testing) of the likely impact of messages on attitudes and intentions was used to test their relative effectiveness and to modify the messages accordingly (27–29). For example, an online experiment found that adding a single sentence informing participants that there was still a chance that they could be infectious significantly improved participant understanding of the risk of transmitting COVID-19 following a negative test result (30). Online studies evaluating perceived importance of mitigation measures among individuals attending cultural events informed implementation of infection control polices at mass events (31).

Online message testing has significant limitations – it can only tap into self-reported hypothetical intentions among people able and willing to take part in online studies, which will exclude important sectors of the population even when representative sampling is employed. However, as part of an evaluation package this method can provide useful evidence concerning the relative effects of different messages on attitudes and intentions (usually a necessary albeit not sufficient precursor of behaviour) in a large population sample. This method could be used to screen out messages with less potential for positive impact, compare the effects of different messages and identify messages that may have differential impact on different sectors of the population. In future, it may be possible to conduct rapid large-scale evaluations that are not online by creating the required infrastructure of well networked national, local and grassroots community groups that can be called on as required.

The value of large-scale testing is likely to be substantially enhanced if it is combined with the co-production element of the ACE package, which should ensure that the messages that are tested online have the greatest potential to be acceptable, credible and effective in different communities. Rapid analysis of large-scale qualitative datasets, such as social media, can also usefully supplement large-scale surveys. For example, semi-automated methods of qualitative analysis could permit use of open-ended questions about the reasoning behind survey responses (32).

An essential element of evaluating interventions and messaging is to measure their real-world impact on behaviour and health outcomes. In an emergency this will need to be carried out immediately after the intervention is implemented, to inform ongoing management of the emergency. For example, rapid studies were carried out during the COVID-19 pandemic to evaluate interventions and messaging to try to reduce transmission in large venues (33–35). It is vital to develop methods of objectively measuring outcomes, since the pandemic demonstrated that real world effects are often different from those predicted or anticipated, and reported attitudes, intentions and behaviour did not always statistically correlate highly with observed behaviour (36).

Rapid, pragmatic, low-cost methods of evaluation need to be developed in order to test and optimise interventions in a timely and cost-effective manner (37). Making use of existing or routinely collected behavioural and health data where possible could provide a feasible and pragmatic solution. Evolving learning health and care systems (38), should be able to provide the required infrastructure to carry out experimental or quasi-experimental efficient design implementation trials, using routine data to evaluate impacts on objective measures of behaviour and health, plus mixed methods process evaluations to understand system effects. As with all methods included in ACE, co-production of the evaluation with stakeholders will play a crucial role in identifying populations with the potential to benefit, appropriate methods of implementation and suitable outcome measures, and informing interpretation of process analyses of system effects (39).

Framework refinement

The ACE framework has the potential to support the systematic development of effective, inclusive, and timely public health interventions. However, our discussion of potentially useful methods is far from exhaustive, and different methods will be appropriate in different intervention development contexts. The ACE research agenda now needs to further develop, refine and validate packages of methods in a variety of applications. Planned future work will involve validating the framework by applying it to a range of different health challenges, interventions and populations. In addition to this, we invite researchers to engage in discussion with us to collaboratively refine and optimise the framework so that it addresses the needs and challenges faced by others tasked with developing interventions in a time-pressured environment.

Conclusion

In the COVID-19 pandemic there were some good examples of approaches to intervention and message development and evaluation that used co-production, large-scale experimental testing or were evaluated using objective measures (26) – but these methods were rarely combined and were not applied systematically. The ACE framework is intended to provide a focus for exploring a range of new ways of rapidly developing effective interventions and messaging by integrating co-production methods with experimental, quasi-experimental and real-world evaluation to secure better health outcomes. The ACE research agenda needs to further develop, refine and validate packages of methods in a variety of applications to determine which combinations of methods are feasible and cost-effective. If the ACE framework proves useful it could be applied for efficiently developing effective and timely public health interventions and messaging to facilitate adoption, maximise health benefit and reduce health inequalities in a range of contexts, including, importantly, the next public health emergency.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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State-level clustering in PrEP implementation factors among family planning clinics in the Southern United States

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Background: Availability of PrEP-providing clinics is low in the Southern U.S., a region at the center of the U.S. HIV epidemic with significant HIV disparities among minoritized populations, but little is known about state-level differences in PrEP implementation in the region. We explored state-level clustering of organizational constructs relevant to PrEP implementation in family planning (FP) clinics in the Southern U.S.

Methods: We surveyed providers and administrators of FP clinics not providing PrEP in 18 Southern states (Feb-Jun 2018, $N = 414$ respondents from 224 clinics) on these constructs: readiness to implement PrEP, PrEP knowledge/attitudes, implementation climate, leadership engagement, and available resources. We analyzed each construct using linear mixed models. A principal component analysis identified six principal components, which were inputted into a K-means clustering analysis to examine state-level clustering.

Results: Three clusters (C1–3) were identified with five, three, and four states, respectively. Canonical variable 1 separated C1 and C2 from C3 and was primarily driven by PrEP readiness, HIV-specific implementation climate, PrEP-specific leadership engagement, PrEP attitudes, PrEP knowledge, and general resource availability. Canonical variable 2 distinguished C2 from C1 and was primarily driven by PrEP-specific resource availability, PrEP attitudes, and general implementation climate. All C3 states had expanded Medicaid, compared to 1 C1 state (none in C2).

Conclusion: Constructs relevant for PrEP implementation exhibited state-level clustering, suggesting that tailored strategies could be used by clustered states to improve PrEP provision in FP clinics. Medicaid expansion was a common feature of states within C3, which could explain the similarity of their implementation constructs. The role of Medicaid expansion and state-level policies on PrEP implementation warrants further exploration.

KEYWORDS

Southern U.S., women, PrEP, family planning, implementation

Introduction

Despite advances in HIV treatment and prevention technologies, HIV continues to be a persistent public health issue in the United States (U.S.) that particularly affects minoritized and marginalized communities resulting in significant HIV health disparities. Black Americans comprise only 13% of the U.S. population, yet account for roughly 40% of new HIV diagnoses (1). In 2020, the ten states with the largest non-Hispanic black population (Alabama, Arkansas, Delaware, Georgia, Louisiana, Maryland, Mississippi, North Carolina, South Carolina, and Virginia) were all located in the U.S. Department of Health and Human Services (DHHS) Regions III, IV and VI, which collectively encompass the U.S. (2) South. Racialized HIV disparities are pronounced in Southern states where the current HIV epidemic is highly concentrated, with nearly 60% of new HIV diagnoses occurring among Black individuals. Though the highest HIV infection rates in the U.S. continue to occur in Black men who have sex with men, in 2021, cis-gender women accounted for 18% of all new HIV infections nationally, among which 54% are Black cis-gender women (3).

In 2019, the U.S. Department of Health and Human Services', *Ending the HIV Epidemic (EHE): A Plan for America*, identified 4 key pillars (Diagnosis, Prevent, Treat, and Respond) to achieve an end to the HIV epidemic in the U.S. by 2030 (4). Since then, U.S. federal agencies have been working in a coordinated manner, with their initial focus on vulnerable populations (e.g., Black women) and geographic hotspots (e.g., Southern states/jurisdictions). The primary emphasis of the Prevent pillar includes prioritization of biomedical prevention tools like HIV pre-exposure prophylaxis (PrEP) that reduce HIV transmission up to 99% with consistent use (5). However, in 2021, cis-gender women represented only 8% of PrEP users in the U.S. despite comprising 18% of new HIV diagnoses (6). PrEP use has increased among men, but remains flat in women (7), with disproportionately low use among women in the Southern U.S. and Black and Hispanic women specifically (8). Two prominently reported reasons for low PrEP uptake among women in the US, and particularly in the Southern U.S., have been women's lack of knowledge about PrEP and lack of PrEP provision in settings where women seek sexual health care (9–18).

According to dissemination and implementation science, first steps to improve PrEP uptake among vulnerable populations include ensuring that those who can benefit from PrEP are aware of it, and ensuring PrEP is accessible in settings where they seek health care (19). The federally-funded Title X National Family Planning Program supports a nationwide network of ~4,000 family planning sites with over 3 million clients annually, 87% of whom are women (20). The program is designed to ensure contraception access, particularly for low-income youth and adults, but also funds preventive services including HIV testing and prevention. While most Title X clients are cis-gender women, clinics also serve men, transgender/gender nonconforming individuals, and youth, and therefore are poised to play an essential role in expanding PrEP access for multiple marginalized populations. For most clients, Title X clinics serve as their usual source of medical care, particularly in Southern states that have not expanded Medicaid (21, 22).

Despite being ideal sites for PrEP delivery, several studies have revealed that Title X clinics do not offer PrEP (9, 10, 23, 24), despite clinical guidelines having incorporated PrEP (25). Specific to clinics in the Southern U.S., Sales et al. surveyed nearly 600 providers/staff working in 286 Title X clinics across the South in 2018; only 22% of clinics provided any PrEP services, and the Southeastern region (including Alabama, Florida, Georgia, Kentucky, Mississippi, North Caroline, South Carolina, and Tennessee) had the fewest clinics offering PrEP (9, 26). Slow adoption of new evidence-based interventions, like PrEP, is a widespread concern in healthcare (27, 28). Organizations have difficulty implementing new interventions, often due to challenges coordinating change across a practice setting, rather than lack of recognizing the new intervention as relevant and desirable (27, 29). In line with the implementation science literature, Sales et al. also found that inner-setting factors from the Consolidated Framework for Implementation Research (CFIR) (30), such as having a climate supportive of HIV prevention interventions, supportive leadership, availability of resources, and individual attitudes about PrEP's suitability for family planning were the salient factors associated with readiness to provide PrEP among clinics not doing so (31).

However, Title X clinics are part of a diverse network, with clinics operating within different social and policy environments (e.g., states with Medicaid expansion and/or PrEP Drug Assistance Programs); factors captured as part of the outer setting of CFIR. Although it is commonly acknowledged that outer setting factors such as state-level policies can impact clinic-level implementation, the outer setting is rarely considered in analyses of clinic-level implementation, and to our knowledge has not been explored explicitly in the context of PrEP implementation in the Southern U.S., a region with fewer PrEP-providing clinics relative to other regions nationally. The goal of this secondary analysis was to explore state-level clustering of organizational constructs relevant to PrEP implementation in Title X clinics in the Southern U.S.

Methods

Study design

From February–June 2018, we conducted a web-based, geographically-targeted quantitative survey of clinicians, staff, and administrators of publicly-funded family planning clinics not providing PrEP located in 18 U.S. states. Specifically, the survey was sent to Title X family planning clinics in DHHS regions III (Washington D.C., Delaware, Maryland, Pennsylvania, Virginia, and West Virginia), IV (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee), and VI (Arkansas, Louisiana, New Mexico, Oklahoma, and Texas). The National Clinical Training Center for Family Planning (NCTCFP) supported our online recruitment of participants via listserv emails and advertisement on their website. Additional recruitment efforts included engagement with state Title X grantees and in-person recruitment at an NCTCFP national meeting.

Among 742 respondents from an eligible Title X DHHS region who agreed to participate in the survey, 519 (69.9%) completed the survey. Region IV (Southeast) had more respondents compared to III (Mid-Atlantic) and VI (Southwest) (329 (63.4%) vs. 126 (24.3%) and 64 (12.3%), respectively). Most respondents were clinic providers or support staff (436 (84.0%) vs. 83 (16.0%) administrators). Survey respondents represented 283 unique clinics across the three regions (30.7% in Region III, 54.4% in Region IV, and 14.8% in Region VI), with 76 (26.9%) of those clinics rurally-located. Only 59 (20.9%) clinics provided PrEP (33.3% of clinics from Region III provide PrEP, 14.3% of clinics from Region IV, and 19.0% of clinics from Region VI); only four PrEP providing clinics were rurally-located. Our secondary analyses presented here included 414 respondents from 224 clinics not providing PrEP. A comprehensive overview of the study's protocol, data collection instruments, and primary statistical analysis methods has been published elsewhere (9, 26).

Measures

The CFIR (30) informed construct selection, including Readiness to Implement PrEP and additional constructs previously associated with Readiness to Implement PrEP in the primary analysis of this survey (9, 26). These additional constructs included Inner Setting Constructs (Implementation Climate – General and HIV-related; Leadership Engagement – General and PrEP-specific, Available Resources – General and PrEP-specific) and Characteristics of Individuals (PrEP Knowledge; PrEP Attitudes – General, Positive, and Negative). All CFIR construct measures were scored as semi-continuous composite scores based on collections of related survey items. Each outcome, except for PrEP Knowledge, was derived as the mean of one or more Likert scale survey items that were identified as having high internal consistency based on Cronbach's Alpha (8). PrEP Knowledge was derived as the number of correct responses identified by the respondent from a set of 5 questions. The survey and all items for each construct are fully available and reported elsewhere (9, 26).

Analysis

Relevant constructs of interest were derived as composite scores. We analyzed each construct individually using linear mixed models (LMMs) with fixed effects for state, provider and clinic-level covariates, and a random effect for clinic to account for correlation among respondents from the same clinic. A principal component analysis (PCA) of the resulting construct-specific, state-level fixed effects was performed as a dimension reduction technique to address limitations based on the number of states for which we had sufficient data to estimate state-level effects ($N = 12$; excluded 6 states due to insufficient data, defined as less than 10 respondents). Principal components (PCs) were inputted into a K-means clustering analysis, with K specified to 3 clusters, to examine the extent of state-level clustering after adjusting for state, provider, and clinic-level covariates.

To assess which constructs were important drivers of the clustering observed, we examined each construct's contribution to a given canonical variable (CV) by summing the absolute value of the product of the construct weight in each of the six PCs and the weight of the corresponding PC in the cluster analysis. The constructs were then ranked separately for each of the two CVs from largest to least total weight. The five constructs contributing the largest total weight to each CV were then selected for further examination. Figures for each CV plot the standardized effect estimate of the mean state-level fixed effects for the five largest contributing constructs by state (Figures 1A,B). We grouped the resulting standardized effect estimates by cluster to assess directionality such that larger standardized effect estimates indicate larger values of the estimated state-level fixed effects for the construct of interest.

Results

Using the resulting estimates from the 12 LMM outcome models, the PCA identified six PCs that explained 96 percent of the variability in the estimated state-level construct effects. The K-means clustering analyses identified clusters of states with similar inner setting implementation constructs (Figure 2). The three clusters were characterized by five (Cluster 1: Alabama, New Mexico, North Carolina, South Carolina, and Virginia), three (Cluster 2: Florida, Georgia, and Mississippi), and four (Cluster 3: Kentucky, Maryland, Pennsylvania, and West Virginia) states, respectively. The first CV (CV1; x-axis) distinguished Cluster 3 from Cluster 1 and Cluster 2. Cluster 3 states were generally characterized by higher perceived PrEP implementation readiness, higher PrEP-specific leadership engagement, more favorable PrEP attitudes, and higher PrEP knowledge when compared to states from Cluster 1 and Cluster 2 (Figure 1A). All Cluster 3 states had expanded Medicaid by the time of the survey, compared to only one state in Cluster 1 and no states in Cluster 2.

The second CV (CV2; y-axis), distinguished Cluster 2 from Cluster 1. Cluster 2 states were characterized by higher perceived PrEP-specific resource availability, more favorable PrEP attitudes, and lower perceived general implementation climate when compared to Cluster 1 (Figure 1B).

Discussion

Our study demonstrates that among Title X clinics in the Southern U.S. which were not providing PrEP, inner setting constructs identified as salient for PrEP implementation exhibited state-level clustering, thus suggesting outer setting factors' potential impact on inner-setting PrEP implementation determinants. This secondary analysis spanned 12 states in DHHS regions III (Maryland, Pennsylvania, Virginia, West Virginia), IV (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina), and VI (New Mexico). We observed noticeable clustering across the South, but state-level clustering of the 224 unique non-PrEP providing clinics in this sample was not observed within DHHS regions. Although states within DHHS regions may have similar geographical, social and policy environments, we observed that two of our clusters comprised states from different regions suggesting similar outer setting contextual factors among these states and that they may benefit from tailored strategies which could be used by clustered states to improve PrEP provision in Title X clinics. Improving PrEP access in places women seek sexual health care remains a critical priority in the South and will likely require attention to both outer and inner setting factors effecting PrEP implementation.

When considering salient outer setting features that differentiate our clusters from each other, Medicaid expansion was a common feature in Cluster 3 states, which were characterized by higher perceived readiness for PrEP implementation and other factors associated with PrEP implementation readiness/implementation (24). Successful adoption of new evidence-based interventions into healthcare settings has been characterized by several organizational factors, including provider/staff and administrators' readiness to provide the new intervention (to what degree is it possible), their

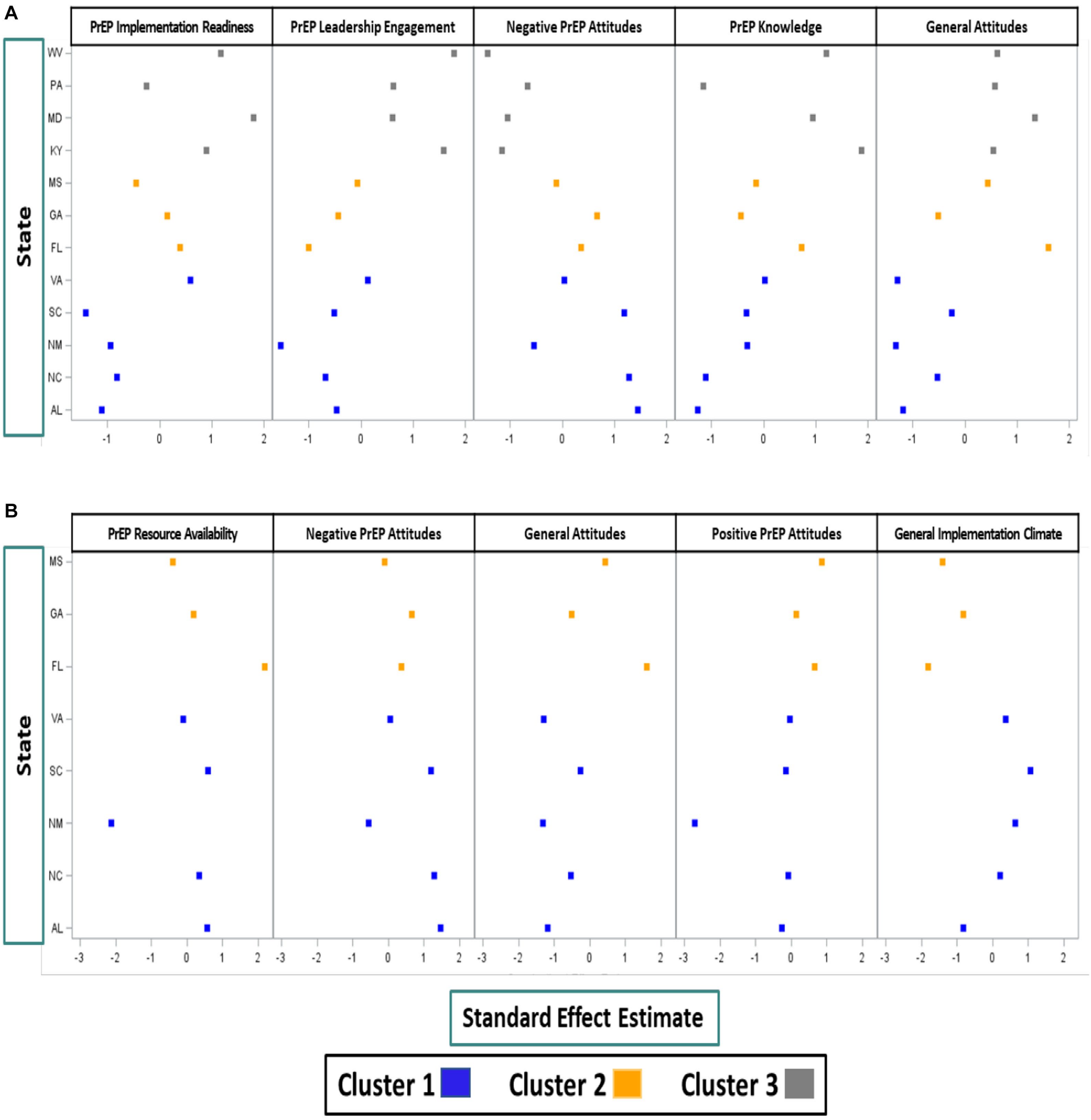

FIGURE 1
(A) Constructs most predictive of CV1 (distinguishing Cluster 3 from Cluster 1 and Cluster 2). **(B)** Constructs most predictive of CV2 (distinguishing Cluster 2 from Cluster 1).

attitudes about the new intervention individually (is it desirable) as well as collectively (climate supportive of new intervention), leadership support (making the change a priority), and adequacy of resources (training, staffing, and financial) (32). When these factors are present before the adoption of a new intervention, they may indicate an organization's readiness to adopt/implement the new intervention, and when collectively present, these factors have predicted successful implementation (32–34). Thus, Title X clinics in Cluster 3, with higher levels of readiness for PrEP implementation, higher PrEP supportive attitudes and greater PrEP knowledge compared to Clusters 1 and 2, may require relatively few implementations strategies to move them to PrEP implementation. However, Title X clinics in Clusters 1 and 2 with lower PrEP readiness may require more robust, time-intensive interventions to address challenges with organizational climate, leadership engagement, and more substantial resource constraints (e.g., staffing) identified as important for PrEP implementation in other studies (9, 24).

Commonly cited barriers to PrEP implementation included cost and lack of resources including training, staffing and time for providing PrEP (24, 35–40). Title X funding is allocated at the state-level (16). The state-level Title X grantee(s) distributes Title X funds to clinical service sites to support provision of family planning and preventive services, as well as provide training and technical assistance to clinical sites as they provide covered services. Several federal agencies have been working in a coordinated manner as part of the EHE initiative which has prioritized certain counties or states for receipt of additional funding to address HIV based on epidemiologically determined need in these communities (4), In states

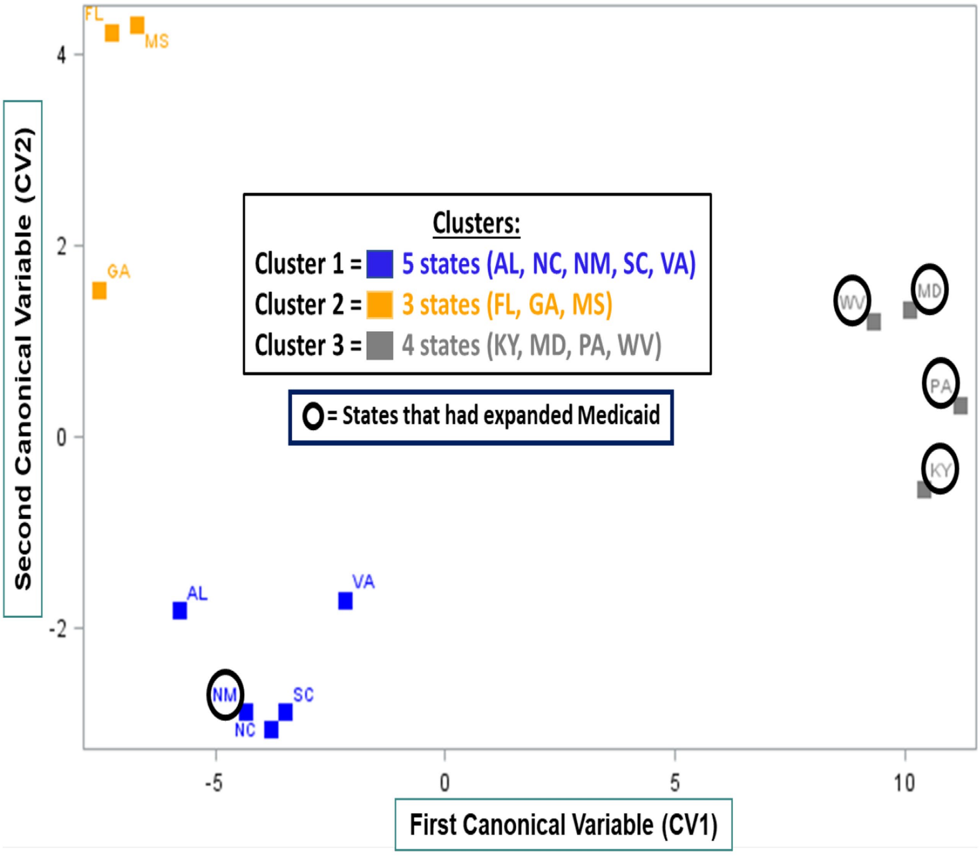

FIGURE 2
Clusters of 12 Southern US states stratified by first (CV1, x-axis) and second (CV2, y-axis) canonical variables derived from CFIR construct-specific, state-level fixed effect estimates.

like those in Cluster 2, none of which have expanded Medicaid and all have been geographically prioritized by EHE, the provision of additional funds dedicated for PrEP delivery to the Title X programs of these states could improve PrEP delivery and ultimately PrEP reach to the low income, mostly minority women served by the Title X clinical sites in these states. Given that PrEP attitudes among providers and staff in these clinical sites were high, state grantee(se) could use these earmarked funds to incentivize clinical sites to provide PrEP and help them overcome any education and cost/resource barriers likely driving low climate for adopting new interventions.

The parent study was not designed to systematically assess outer setting factors pertaining to the geographic, social or policy environments of each state. However, the state-level clustering we observed for PrEP implementation in safety-net family planning clinics across a region of the country where some of the starkest racial HIV disparities exist for both men and women warrants further examination of the role of Medicaid expansion and other state-level policies (e.g., HIV criminalization, abortion bans, anti-LGBTQ laws) on PrEP provision.

Limitations

Our study has several limitations. Ours was a convenience sample of clinic providers and administrators, thus may be subject to selection bias. Clinic characteristics were provided by self-report rather than direct observations. Finally, the study was conducted among staff of Title X funded-family planning clinics, and therefore findings may not be generalizable across other women's health settings. Nonetheless, a key strength of this study was the large sample size, along with the diversity of geographic location and clinic characteristics among the clinics represented by study participants.

Conclusion

The Title X family planning program is a vital safety-net clinical network providing sexual health care for millions of low-income individuals across the U.S., including many minoritized and marginalized populations (i.e., Black women and LGBTQ individuals). For many women, especially in states that did not expand Medicaid, Title X clinics serve as their sole source of health care. Despite this, there has been limited discussion of the role of this vital safety net in achieving the ambitious targets set forth by the EHE initiative. Given persistent health disparities in the U.S., the EHE initiative should leverage and expand on the important role that this network of family planning clinics continues to play in providing HIV testing and preventive services to the 3 million people they annually serve. Our study indicates that clinic-level barriers and facilitators to providing PrEP cluster across states, suggesting that salient social and policy-related outer setting factors may be associated with clinic-level inner setting determinants to providing PrEP in these otherwise ideal PrEP-delivery sites for women. Greater attention is needed to focus implementation strategies at multiple levels of the social ecology, including policy drivers of heath inequities, to improve PrEP access and ultimately PrEP reach among Black women in the Southern U.S.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by Emory University Institutional Review Board. The patients/participants provided their written informed consent to participate in this study.

Author contributions

JS and AS conceptualized this study, drafted and edited the manuscript. MM, KE, and MP conducted statistical analysis and contributed to the drafting of the manuscript. AR contributed to the drafting and editing of the manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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Rapid implementation mapping to identify implementation determinants and strategies for cervical cancer control in Nigeria

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Background: Cervical cancer constitutes a huge burden among women in Nigeria, particularly HIV-infected women. However, the provision and uptake of cervical cancer screening and treatment is limited in Nigeria. Understanding implementation determinants is essential for the effective translation of such evidence-based interventions into practice, particularly in low-resource settings. COVID-19 pandemic necessitated online collaboration making implementation mapping challenging in some ways, while providing streamlining opportunities. In this study, we describe the use of a virtual online approach for implementation mapping (steps 1–3) to identify implementation determinants, mechanisms, and strategies to implement evidence-based cervical cancer screening and treatment in existing HIV infrastructure in Nigeria.

Methods: This study used a mixed methods study design with a virtual modified nominal group technique (NGT) process aligning with Implementation Mapping steps 1–3. Eleven stakeholders (six program staff and five healthcare providers and administrators) participated in a virtual NGT process which occurred in two phases. The first phase utilized online surveys, and the second phase utilized an NGT and implementation mapping process. The Exploration, Preparation, Implementation and Sustainment (EPIS) framework was used to elicit discussion around determinants and strategies from the outer context (i.e., country and regions), inner organizational context of existing HIV infrastructure, bridging factors that relate to bi-directional influences, and the health innovation to be implemented (in this case cervical cancer screening and treatment). During the NGT, the group ranked implementation barriers and voted on implementation strategies using Mentimeter.

Results: Eighteen determinants to integrating cervical cancer screening and treatment into existing comprehensive HIV programs were related to human resources capacity, access to cervical cancer services, logistics management, clinic, and client-related factors. The top 3 determinants included gaps in human resources capacity, poor access to cervical cancer services, and lack of demand for services resulting from lack of awareness about the disease and servicesA set of six core implementation strategies and two enhanced implementation strategies were identified.

Conclusions: Rapid Implementation Mapping is a feasible and acceptable approach for identifying and articulating implementation determinants, mechanisms, and strategies for complex healthcare interventions in LMICs.

KEYWORDS

implementation mapping, determinants, implementation strategies, cervical cancer, Nigeria, EPIS framework

Introduction

Cervical cancer is a challenging chronic disease affecting millions of women in sub-Saharan Africa. Cervical cancer is the second most common cancer affecting women in Nigeria, accounts for the highest number of deaths from cancers, and is more prevalent in HIV-infected women and occurs at a younger median age than in HIV-negative women (1, 2). The provision and uptake of cervical cancer screening and treatment is limited in Nigeria (3, 4). There are key gaps in understanding implementation determinants that impact implementation of cervical cancer screening and treatment in HIV clinics across Nigeria.

Core to dissemination and implementation science is the identification of implementation determinants and mechanisms (i.e., impediments or facilitators to successful implementation of evidence-based innovations) along with the articulation and testing of strategies to tackle identified determinants (5). Determinants and mechanisms are not always obvious, and their identification requires partnership and engagement with community members, practitioners, and on-the-ground implementers to harvest the practical wisdom and knowledge to uncover and contextualize them. For the purposes of this project, we use the term determinants to represent determinants and mechanisms while understanding that some determinants may act as mechanisms. Implementation determinants are myriad and exist at any level of the socio-ecological spectrum, from the outer context (e.g., policies, social determinants of health) to the inner context (e.g., provider organizations), and it is essential to delineate determinants and address them to ensure the successful implementation, adoption and sustainment of evidence-based interventions (6).

Implementation mapping is a method aimed at helping to identify determinants, mechanisms, and strategies relevant for implementing evidence-based interventions in specific contexts. A key limitation of implementation mapping is that it can be time and resource intensive and fairly onerous to participants, requiring multiple focus group meetings spanning weeks or months, multiple iterations to the protocol with built-in time for discussion, and rounds of testing and debriefing (7–9). While engaging community partners and collaborators, it is important to be respectful of time and minimize burden (10, 11). Furthermore, the COVID-19 pandemic has accelerated the need for research and implementation science such that it is important to adapt methods to improve the efficiency of implementation methods and innovation across healthcare settings. The pandemic has also required teams to rapidly shift to virtual spaces and often rely fully on virtual collaboration, even in low- and middle-income countries (LMICs). Although online platforms allow multiple users to synchronously connect with built-in mechanisms for chatting, facilitated group conversations online are sometimes impeded by technical difficulties, voice interruptions, and predictable environmental distractions (12–14).

Due to the necessity of virtual collaboration since March 2020, and the potential benefits of implementation mapping for large-scale geographically dispersed project, implementation mapping has needed to be modified for virtual platforms and for different service settings (15). In fact, there is nothing inherent in implementation mapping that requires face-to-face interaction. In this study, we utilized an online format of nominal group technique (NGT) combined with Rapid Implementation Mapping process (i.e., steps 1–3) to identify determinants, mechanisms, and strategies to implement and sustain cervical cancer screening and treatment uptake in HIV clinical settings in all six regions of Nigeria (16) for a National Cancer Institute grant application, now funded. In this paper, we describe the use of an adapted protocol of implementation mapping to rapidly identify and contextualize determinants to cervical cancer screening and treatment, map determinants to implementation strategies, and define a set of core and enhanced strategies for cervical cancer control implementation in Nigeria.

Materials and methods

Study context

This study was designed and conducted by a core team of researchers from the University of Nigeria Nsukka (UNN), Northeastern University, Johns Hopkins University, and the University of California San Diego. This study is part of a research collaboration among the universities and six major HIV implementing partners in Nigeria, who are also members of the Nigeria Implementation Science Alliance. In 2021, the Nigeria Implementation Science Alliance established 21 Model Innovation and Research Centers for multi-center clinical trials and implementation research. The process of establishment of these model centers has been reported elsewhere

(17). The HIV prevention leads from the six implementing partners collaborated with the research team to conduct a needs assessment for integrating cervical cancer screening and treatment into the existing comprehensive HIV program in Nigeria.

Study design, participants, and data collection

This was a modified version of NGT with group brainstorming and ranking. We utilized the Exploration, Preparation, Implementation, Sustainment framework to guide and contextualize our activities and goals (18, 19). EPIS is both a process and determinant framework (i.e., dynamic framework) that is useful for collaborators in considering determinants and mechanisms across the four phases—Exploration, Preparation, Implementation and Sustainment. EPIS is useful in study design and execution in order to identify determinants and mechanisms, and related measures and activities that may occur during all four EPIS phases (20). The main EPIS determinants constructs included outer system context, inner organizational context, bridging factors that represent bi-directional linkages and relationships between outer and inner contexts, innovation characteristics including engagement of intervention developers, and interconnections and linkages within and across contexts and constructs. We describe our activities in the Exploration phase of EPIS to identify the determinants and select implementation strategies for cervical cancer control in Nigeria.

We invited eleven participants (nine program staff and two healthcare providers) to participate in an implementation mapping process that occurred in two phases. The first phase utilized an online survey, while the second phase utilized a virtual NGT. Participants for the online survey included the HIV prevention leads who were the program leads for Prevention of Mother-to-Child transmission of HIV program and comprised lead of each of the six major implementing partners in Nigeria. Participants for the NGT were five of the six HIV prevention leads described above and five health facility staff (two healthcare providers and three program staff). The health facility staff were purposively selected from health facilities supported by these major implementing partners based on their engagement and responsiveness with the NISA-MIRCs team.

Description of implementation mapping

Implementation mapping is a systematic process for developing strategies to improve the adoption, implementation, and sustainment of evidence-based interventions in real-world settings. Implementation mapping involves five activities: (i) conduct an implementation needs assessment and identify implementers; (ii) identify implementation outcomes, determinants, and create matrices of change objectives; (iii) choose theoretical methods (mechanisms of change) and select or design implementation strategies; (iv) produce implementation protocols and materials; and (v) evaluate implementation outcomes (16).

Rapid implementation mapping process

This rapid implementation mapping process occurred in two phases. Figure 1 summarizes the process.

Phase 1: online survey

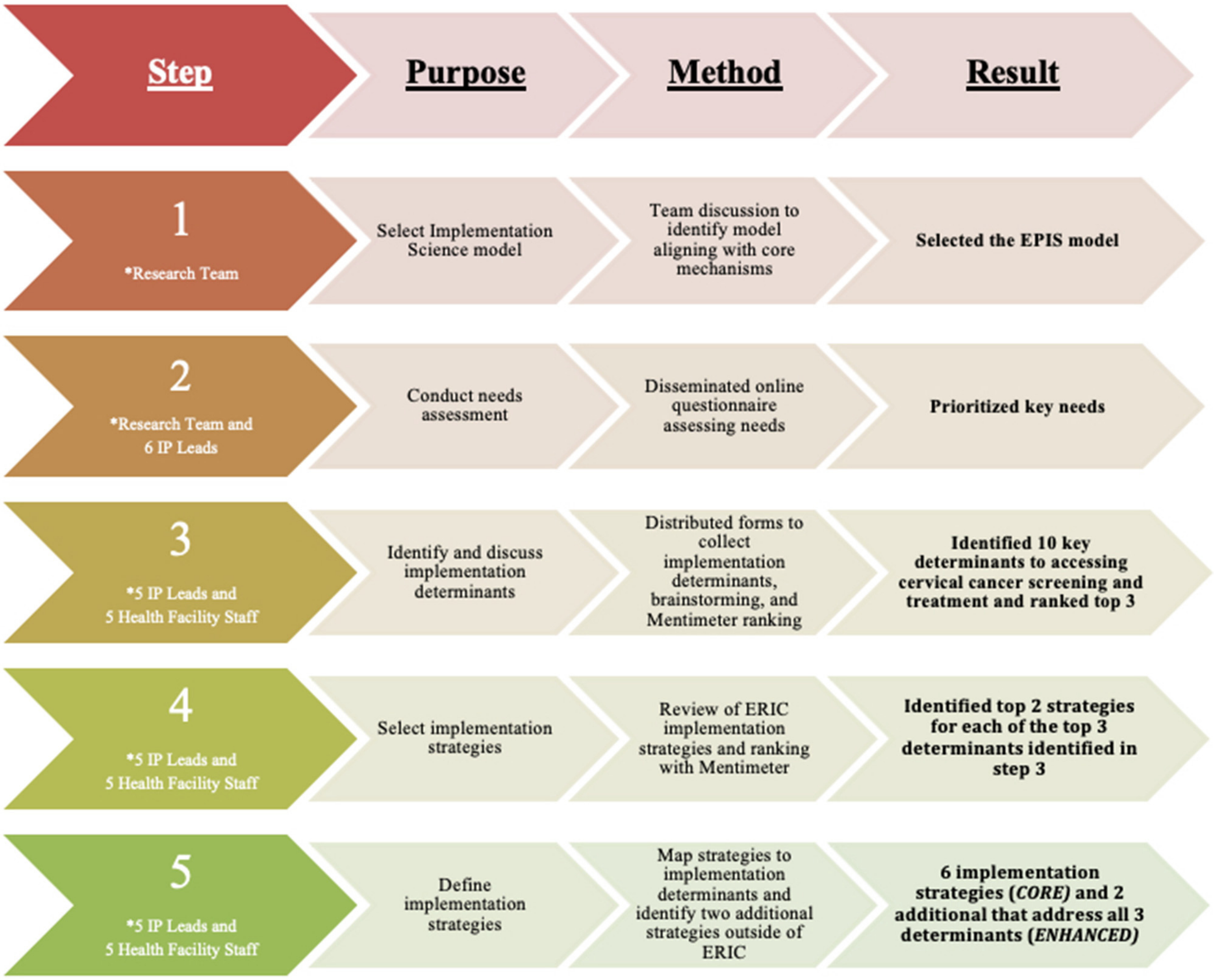
The research team approached the six HIV prevention leads by email and invited them to participate in an online survey. The team introduced the goal of the survey (to identify determinants, mechanisms, and potential implementation strategies for integrating cervical cancer screening and treatment into existing comprehensive HIV treatment programs), and shared the refined compilation of implementation strategies of the Expert Recommendations of Implementing Change (ERIC) project journal article (21) with them. These partners were asked to identify three anticipated critical determinants (barriers) to integrating cervical cancer screening and treatment into existing comprehensive HIV treatment programs, and select five potential implementation strategies from the ERIC taxonomy to address their three most critical identified determinants (21). The survey included the following two questions: “(1) What are three critical anticipated barriers to integrating cervical cancer screening into the existing HIV program;” and “(2) List five potential implementation strategies for addressing your three identified determinants in Question 1 above (Please choose from the attached journal article).” They completed and submitted the survey after 1 week.

Phase 2: NGT

In the second phase, the six HIV prevention leads and five health facility staff, one from each of five implementing partner-supported clinics (total of 11 partners) were invited for a brainstorming session and virtual NGT on Zoom. One of the HIV prevention leads could not attend the Zoom session, so we had 10 participants. The health facility staff received phone credits to access internet data for the Zoom meeting. In preparation for the NGT, the research team met to develop and refine a seven-step process for the virtual NGT. Ten partners participated in the Zoom session which followed a seven-step process building on the results of the determinants and implementation strategies survey. The virtual NGT was led by three members of the research team who have facilitated NGT in the past (22) with IUI leading Steps 1 to 5, and BOO and EEE leading Steps 6 and 7.

Step 1: The research team collated all the 18 identified determinants and selected implementation strategies from each HIV prevention lead (n=6). The research team then grouped these 18 determinants into 10 based on repetitions and their similarities in preparation for a rapid version of NGT.

Step 2: The participants first reviewed and agreed on the initial grouping of the 18 determinants into 10 determinants by the research team. Each of the 10 participants was then asked to define and explain his/her identified implementation determinant using the “name it, define it, and operationalize it” approach (23). Consistent with NGT,



Step	Purpose	Method	Result
1 *Research Team	Select Implementation Science model	Team discussion to identify model aligning with core mechanisms	Selected the EPIS model
2 *Research Team and 6 IP Leads	Conduct needs assessment	Disseminated online questionnaire assessing needs	Prioritized key needs
3 *5 IP Leads and 5 Health Facility Staff	Identify and discuss implementation determinants	Distributed forms to collect implementation determinants, brainstorming, and Mentimeter ranking	Identified 10 key determinants to accessing cervical cancer screening and treatment and ranked top 3
4 *5 IP Leads and 5 Health Facility Staff	Select implementation strategies	Review of ERIC implementation strategies and ranking with Mentimeter	Identified top 2 strategies for each of the top 3 determinants identified in step 3
5 *5 IP Leads and 5 Health Facility Staff	Define implementation strategies	Map strategies to implementation determinants and identify two additional strategies outside of ERIC	6 implementation strategies (*CORE*) and 2 additional that address all 3 determinants (*ENHANCED*)

FIGURE 1
The rapid implementation mapping protocol. *Participants in each step of the protocol.

this step used a focus group discussion approach where all 10 participants were given the opportunity to define the 10 identified determinants. During these discussions, two additional determinants emerged. After all the 10 initial and two additional determinants were defined, the participants grouped similar determinants together and reached a consensus on a final grouping and naming of 10 determinants.

Step 3: The participants were asked to select their top implementation determinants based on importance (if addressed, will help overcome the gaps in cervical cancer prevention and control—screening, onsite treatment and referral among HIV-infected women) and feasibility of addressing them. We used Mentimeter, an online polling tool, to allow the group members to confidentially rank each determinant. The aggregated group-level data were then used to identify the collective three most important and feasible implementation determinants.

Step 4: For each of the top three implementation determinants, each participant was asked to match and rank the top potential implementation strategy from the initially selected ERIC implementation strategies during the survey. The instructions for this activity were to use perceived importance and feasibility as criteria for ranking the top implementation strategies. Mentimeter was used for the ranking and selection of the top two implementation strategies to address each of the top three determinants identified in Step 3. When there was a tie in the ranking, a tie breaker was applied by having participants again make ratings in Mentimeter. There were ties in the ranking of the top two implementation strategies for the second and third implementation determinants, and these were resolved with tie breakers.

Step 5: The group (participants and research team) defined the six selected implementation strategies in Step 4 as the Core implementation strategies selected from the ERIC set of strategies to address the group's top three determinants to integrating cervical cancer screening and treatment into existing comprehensive HIV programs.

Step 6: The group proposed and discussed additional implementation strategies outside the ERIC project's compilation of implementation strategies, relevant to Nigeria and other LMICs and can be culturally tailored to the country and region. This step was important because not all potential strategies are represented in existing listings. The criteria for proposing these additional implementation strategies were based on: (1) importance; (2) feasibility; (3) can address >1 implementation determinant in the three main stages of the cervical cancer identification and treatment cascade (screening, onsite treatment, and referral); and (4) can be implemented across all the 12 implementation sites. During the discussion, all participants were encouraged to contribute and the team agreed on a set of six additional implementation strategies.

Step 7: The participants ranked their top additional implementation strategy based on the four criteria defined in Step 6, using Mentimeter. There was a tie between the top second and third additional implementation strategies and by consensus, the group agreed to use a blended strategy for this tie. At the end of this step, the group defined the top three ranked additional implementation strategies as the enhanced set of implementation strategies to address the group's top three determinants to integrating cervical cancer screening and treatment into existing comprehensive HIV programs. This was consistent with the goal to identify a core multifaceted implementation strategy and a core+ multifaceted strategy that could be tested in a randomized comparative effectiveness implementation study.

Results

Characteristics of participants

The HIV prevention leads included four physicians and two nurses. All but one had a terminal degree (MD or PhD), and all had at least 14 years' experience working in the health sector. The health facility staff included one physician gynecologist, one registered nurse, and three monitoring and evaluation officers. Two of the monitoring and evaluation officers had a master's degree while the third has a bachelor's degree. All but one had at least 5 years' experience working in the health sector.

Phase 1

The six HIV prevention leads identified 18 determinants (Supplementary Table 1) to integrating cervical cancer screening and treatment into existing comprehensive HIV programs. These determinants were related to human resources capacity, access to cervical cancer services, logistics management, clinic, and client-related factors. These determinants were grouped into 10 determinants by the research team based on repetition and similarities as described in the methods (Supplementary Table 2). Each HIV prevention lead also identified three to five implementation strategies from the ERIC strategies for each identified determinant resulting in a total of 9–15 implementation strategies for each HIV prevention lead.

Phase 2

At the end of Step 2, the five HIV prevention leads and five healthcare providers (10 participants in total) named, defined, and operationalized a final set of 10 determinants to integrating cervical cancer screening and treatment into existing HIV programs (Supplementary Table 3). During this step, the participants merged initial determinants 3 (i.e., lack of demand for services) and 9 (i.e., education about disease and services). Similarly, determinant 10 (i.e., access to patients) was merged with determinant 2 (i.e., poor access to cervical cancer services with insufficient treatment sites). The two additional determinants which emerged were stigma, and lack of adoption of guidelines at implementation sites/clinics. After ranking, the top three determinants selected by the participants included 1) gap in human resources capacity, 2) poor access to cervical cancer services with insufficient treatment sites/access to patients, and 3) lack of demand for services resulting from lack of awareness about the disease and services.

Three implementation strategies were ranked for the determinant "gaps in human resources capacity" and there were no ties. For the determinant of "poor access to cervical cancer services with insufficient treatment sites/access to patients," five implementation strategies were ranked and there was a tie between prepare patients/consumers to be active participants and alter patient/consumer fees. After breaking the tie, prepare patients/consumers to be active participants ranked second with seven votes. Four implementation strategies were ranked for "lack of demand for services resulting from lack of awareness about the disease and services." There was a tie between identify and prepare champions and conduct local consensus discussions. The latter received five votes while the former received four votes during the tie breaker voting. One of the participants (an HIV prevention lead) could not vote for the tie breaker because of poor internet connectivity. Following the inconclusive outcome of the votes, the group agreed to select conduct local consensus discussions (blended with identify and prepare champions) as the second implementation strategy for "poor access to cervical cancer services with insufficient treatment sites/access to patients." At the end of Step 5, the participants had selected and defined a set of six core implementation strategies to address the top three potential determinants to cervical cancer integration (Figure 2).

Six additional implementation strategies, not originating from the ERIC set of strategies were proposed. The research team had suggested the Healthy Beginning Initiative, popularly known as "Baby Shower" (24) and the use of mobile health smartcard technology (both locally developed, tested, and implemented strategies in prior work focused on increasing access to the delivery of health interventions and follow up) (25). The participants proposed the remaining four implementation strategies. During ranking, the Healthy Beginning Initiative/Baby Shower and

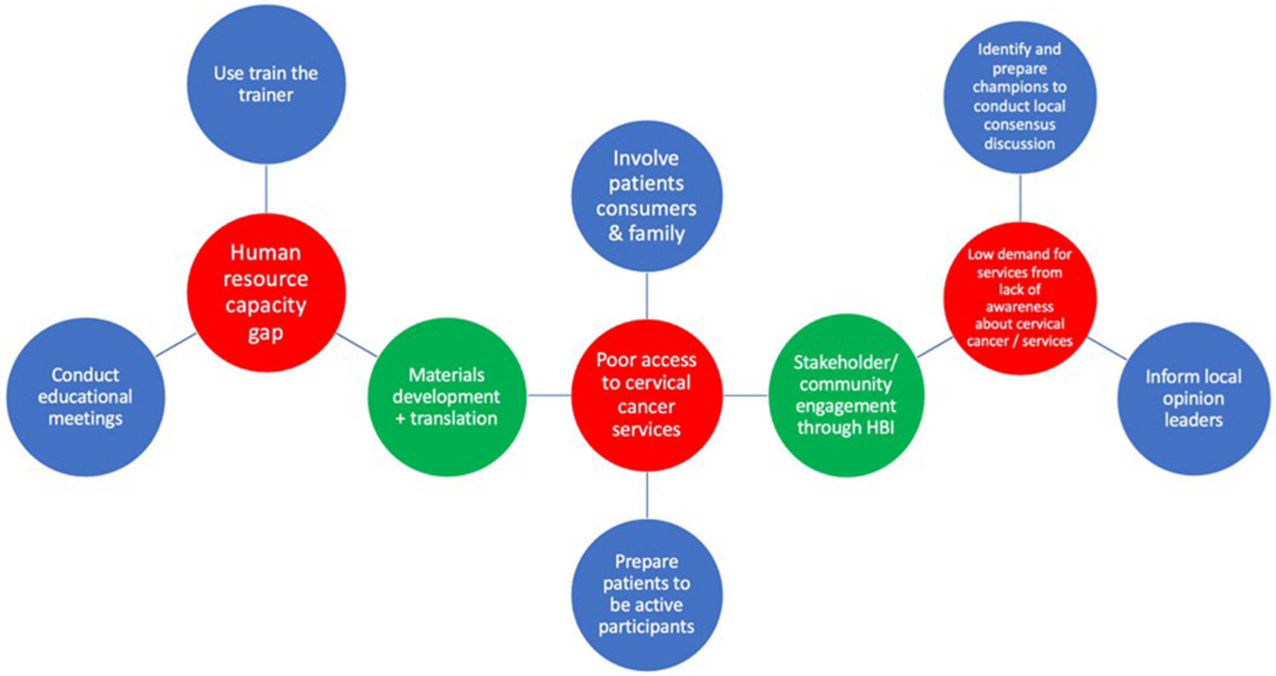


FIGURE 2
Matching core and enhanced implementation strategies to implementation determinants. Key: determinants (red), core implementation strategies (blue), enhanced implementation strategies (green).

stakeholder engagement tied for the second place and there was a consensus by the group to use both strategies as a blended implementation strategy (Stakeholder [community] engagement through the Healthy Beginning Initiative). Figure 2 shows the final set of enhanced implementation strategies defined by the group.

Discussion

We outline a rapid implementation mapping (steps 1–3) protocol to identify implementation determinants, and strategies to implement evidence-based cervical cancer screening and treatment in the existing HIV programs in Nigeria. We demonstrate the feasibility and acceptability of implementation mapping with modified NGT to uncover determinants to, and strategies for implementation of, cervical cancer screening in Nigerian clinics. Our experiences underscore that implementation mapping can be an efficient and pragmatic overarching framework when combined with NGT for consensus building to select determinants and strategies.

Implementation Mapping, and the Intervention Mapping protocol from which Implementation Mapping was derived, are traditionally time and resource intensive requiring multiple meetings across weeks or months to articulate implementation plans (9). For engaging clinicians and community partners, it is critical to respect time, support meeting access, and minimize burden (10, 11). Other consensus-building techniques and approaches including user-centered design protocols, Delphi techniques, or concept mapping which can be time-consuming potentially causing protracted research delays and slowing public health impact (26). Moreover, the pandemic has accelerated the pace of research and highlighted the need to quickly optimize interventions for implementation and scale from the outset. In this rapid version of implementation mapping (steps 1–3), consisting of an electronic survey (20 mins) and a facilitated Zoom meeting (165 mins), it took ∼3 h and 5 mins in total to identify a set of Core and Enhanced Implementation Strategies within 5 days. This is contrasted with the aforementioned consensus building approaches like concept mapping which can be more time-consuming and not as agile and engaging when done remotely (27). The virtual platform and Mentimeter voting tool were instrumental to accelerate the process of implementation mapping and NGT. Specifically, Mentimeter voting happened synchronously within seconds through a password-protected website shared in the Zoom chat which was accessible on any web-enabled device (e.g., smart phone, tablet, or computer). The availability of internet network facilitated this virtual implementation mapping process. Also, the provision of data to the health facility staff helped overcome the limitation of inadequate data for the 2 h 45 mins Zoom meeting. However, poor network in some locations resulted in interruptions for some participants who were disconnected from the Zoom meeting occasionally and they had to rejoin the meeting.

EPIS served as a helpful framework to stimulate discussions around potential determinants and strategies from the outer system (i.e., country and regions) context, inner organizational context of existing HIV infrastructure, bridging factors that relate to bi-directional influences, and the health innovation to be implemented (in this case cervical cancer screening and treatment).

The NGT participants engaged in discussions of how EPIS applied to the proposed project and need to consider all of the EPIS phases and factors. Of the 10 determinants of cervical cancer screening for HIV-infected women in Nigeria, NGT participants selected determinants spanning different levels of EPIS 1) lack of human resources (outer system), 2) poor access to cervical cancer screening (bridging factor), and 3) low awareness/low demand for services (inner context, individual level).

A possible criticism of rapid implementation mapping may include the minimization of group discussion in favor of rapid consensus building using ranking and voting. However, despite using a tightly structured agenda with rounds of voting, there were also several opportunities for open conversation using a "round robin" focus group discussion style, allowing participants to articulate and contextualize determinants to better understand which determinants and strategies might be most impactful. Words like "meaningful," "feasible," "appropriate," and "important" were used by participants to discuss strategies which naturally encouraged the group to clarify priorities and think through the potential impact of selecting specific determinants. Although consensus was solidified quickly through voting, one could argue that through the rapid implementation mapping and NGT, all voices are elevated, and hierarchies are flattened. In fact, NGT has been described as a technique for effective group process in community-based participatory research partnerships because it allows equitable participation and open communication (28).

Strengths of this rapid implementation mapping protocol include the multi-step and systematic process for pre-meeting data collection, anonymous in-person voting, and facilitated discussion. Additionally, the use of multiple methods to triangulate data collection through survey, focus group discussion, and voting is an important strength. Lastly, this rapid implementation mapping protocol has the potential to promote health equity by involving communities in identifying implementation determinants that cause health disparities and selecting context-specific implementation strategies that can lead to successful implementation of evidence-based interventions and improved health outcomes. Limitations include the single case study which may limit application and generalizability to other research teams and settings. In the current context, research team members spanned Nigeria and the United States, and most team members and stakeholders had previously worked together. Inclusion of global colleagues can be challenging when there is poor team dynamics and may be more time consuming and costly in a non-virtual environment.

Conclusion

We outline the feasible and efficient use of a virtual protocol of Rapid Implementation Mapping to identify implementation determinants and strategies to implement evidence-based cervical cancer screening and treatment in existing HIV treatment programs in Nigeria. As COVID-19 has necessitated online collaborations and approaches in dissemination and implementation science, modified virtual implementation mapping can help keep up with equitable implementation efforts in low-income settings.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

This was a quality improvement project involving members of the Nigeria Implementation Science Alliance hence ethics approval was not required according to the national ethics guidelines. The study was conducted in accordance with the local legislation and institutional requirements. According to national ethics guidelines for quality improvement projects, written informed consent was not required. However, we obtained verbal and implied consent through participants' responses to emails and acceptance of invitations to the nominal group technique. No potentially identifiable images or data are presented in this study.

Author contributions

IUI, CV, JOO, BOO, EEE, and GAA conducted the implementation mapping process. IUI and CV wrote the first draft of the manuscript while all authors revised the manuscript for important intellectual content. All authors read and approved the final draft.

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Conflict of interest

AFR is currently employed by Hologic but this work was done while she was a faculty member at Johns Hopkins University, where she maintains an adjunct appointment, as part of her independent research program. EEE was employed by HealthySunrise Foundation.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2023.1228434/full#supplementary-material

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Making the connection between health equity and sustainability

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Sustainability and health inequities are key challenges in public health and healthcare. Research suggests that only about half of evidence-based interventions (EBIs) are sustained over time, and settings and populations experiencing systemic and structural barriers to health (e.g., poverty, racism, stigma, and discrimination) experience even greater challenges to sustainability. In this article, we argue that an enhanced focus on sustainability in the field of implementation science is critical in order to maximize the long-term health benefits and broader societal impacts of EBIs for all populations and settings. From an equity perspective, a focus on sustainability is particularly critical to prioritize among population sub-groups that have not historically received the benefits of health-related EBIs. We discuss how a health equity framing is essential to sustaining EBIs in under-resourced communities, and requires moving away from a deficit mindset that focuses on why EBIs are challenging to sustain, to one that focuses more on identifying and nurturing existing assets within individuals and communities to increase the likelihood that EBIs are sustained. We conclude with a discussion of future directions as well as recommendations and resources (e.g., frameworks, tools) to advance and make progress toward sustainability from a health equity mindset, including: (1) Actively planning early for sustainability alongside key partners; (2) Tracking progress toward enhancing sustainability and being accountable in doing so equitably for all settings and populations; and (3) Focusing on both equity and engagement early and often throughout the research process and all implementation phases.

KEYWORDS

health equity, health inequities, sustainability, implementation science, sustainment, maintenance

Introduction

Sustainability and health inequities are significant challenges faced in public health and healthcare. Reducing and ultimately eliminating avoidable health inequities will require sustained delivery of programs, practices, policies, products, and treatments that are effective in improving health and reducing health inequities, referred to here as evidence-base interventions or EBIs (1, 2). There have been significant advancements and investments in the development, evaluation, and initial implementation of EBIs that seek to promote health. Yet, what happens to EBIs after initial implementation, especially once implementation support or resources have been removed, has been understudied to date, particularly among lower-resource settings (3). Relatively little is known about the extent to which there is widespread and sustained implementation of EBIs, whether the benefits of EBIs are maintained, and whether there is sufficient capacity built to continue carrying out the EBI as intended (4–8). Thus, despite the promise of EBIs in improving population health (9), many hurdles remain in understanding how to translate these programs to have widespread and long-term impact and benefits outside of well-resourced and controlled settings (1, 10, 11). There are also pressing needs to better understand the return on investment after millions of dollars are spent on initial development and implementation of EBIs, often in settings with limited resources (3).

Despite gaps in understanding, it is well-documented that sustainability is a critical challenge, and that sustainability may be particularly difficult in settings and communities under-represented in research, that face numerous barriers to health, and that have limited access to resources (3, 6, 12). Research suggests that only about half of EBIs are sustained over time (3, 12), and settings and populations experiencing historical and ongoing systemic and structural barriers to health (e.g., poverty, racism, discrimination, and stigma) likely face even greater challenges to sustainability that may be compounded over time (7,13, 14). Lack of sustainability exacerbates health inequities, especially if the discontinuation of EBIs occurs in settings and communities with fewer health-promoting resources (15–18). Thus, failure to sustain EBIs contributes to the maintenance, recurrence, and reinforcement of health inequities. This can result in diminished support and lack of trust of researchers or public health/healthcare systems among communities that have experienced the discontinuation of EBIs following initial implementation (3, 15). Meaningful engagement and amplification of the lived experiences and voices of individuals and communities experiencing inequities is essential to understanding and ultimately overcoming these challenges, and has the potential to enhance both health equity and sustainability (19).

In this paper, as researchers with experience and training in the fields of both health equity and implementation science, we seek to make more explicit the connection between sustainability and health equity. Our definition of health equity here is centered on social justice, where everyone has a fair and just opportunity to be healthy (20); a focus on equity recognizes the injustice of inequities and the underlying root causes that shape them, as well as the community assets and resources needed to address them (11). Additionally, we define sustainability as the extent to which there is continued delivery and ongoing health benefits of EBIs over time, recognizing that EBIs may need to evolve in response to changing contexts to maximize benefits (21, 22). We argue that an enhanced focus on sustainability in implementation science is critical to maximizing the health and societal impact and benefits of EBIs for all populations and settings, particularly among those that have not historically received the benefits of EBIs. Additionally, we highlight future gaps and opportunities, as well as recommendations and resources (e.g., frameworks and tools) to advance and make progress toward sustainability from a health equity perspective.

Why sustainability matters for health equity

There are many reasons why sustaining EBIs matters for health equity and why researchers and funders must prioritize sustainability in order to be more accountable in making progress toward eliminating inequities. *First*, because health equity research is under-resourced and has not historically been valued as a priority for all researchers or funders, most EBIs were not developed, evaluated or implemented in populations or settings under-represented in research (2). Under-represented populations experience persistent health and social inequities that limit efforts to improve health for all groups. Thus, there has been a major disconnect between the EBIs that researchers are typically seeking to implement and ultimately sustain and their long-term fit in addressing the real-world needs and priorities of underserved communities. Prioritizing the sustainability of equity-focused programs and policies will help prevent avoidable suffering and care for those who are unwell, while creating lasting conditions that promote health from the beginning, in which all can truly thrive. *Second*, of the EBIs implemented, there is often a delay or latency period for many health-related interventions, where the impact or benefits to the community or at the population level may not be seen until many years after initial implementation (3, 6). Therefore, discontinuing programs results in suboptimal public health benefits, particularly among the populations and settings that would benefit from them the most. These include organizational settings, communities, and populations that have fewer social and economic resources or face structural barriers to health. Additionally, discontinuing programs prematurely will mean not only failing to achieve the health impacts, but also not seeing the gains of investments in health in other broader economic, social, and policy changes that are typically only observable over time [e.g., across many years (23)].

Third, discontinued programs can reflect a substantial loss of investment in valuable time and resources for initial implementation on the part of funders, organizations, leadership, practitioners, and administrators. This may result in frustration and wariness about future implementation efforts, constituting a major challenge particularly among settings with limited resources and many competing demands (e.g., low-income communities, neighborhoods, and groups experiencing the harrms of structural racism) (7, 13). *Finally*, abandoning, abruptly stopping, or failing to continue delivery of EBIs may also bring disillusionment to service users and community members, and reinforce negative perceptions and distrust or mistrust of research and health services among community partners and the broader public, with subsequent implications for future engagement of communities (7, 24).

Challenges and considerations in promoting sustainability and health equity

Sustainability is intricately linked with health equity, as unsustainable or discontinued EBIs can lead to disparate health outcomes across settings and population sub-groups (5, 13). There is a need to go beyond traditional definitions of sustainability, to expand the construct to include more diverse voices and perspectives to advance understanding of what is needed to maximize the long-term delivery and benefits of EBIs among under-resourced communities. For any implementation effort, including but not limited to sustainability, a focus on health equity should center and uplift community values (25–27). Efforts to sustain EBIs should take into consideration the transformative nature of community engagement and its strong potential to lead toward social justice, particularly when involving the redistribution of power, resources, and decision-making (28, 29). Such an approach is particularly relevant for low-resource and historically marginalized communities where health and economic inequities are evident along the lines of race and socioeconomic position. As has long been recognized (26, 28), meaningful community engagement and partnership are central and foundational to sustainability efforts and have the potential to reduce clinical and public health inequities and improve population health (26).

At the heart of any effort to sustain EBIs from an equity mindset are the key partners who are engaged in or impacted by interventions and implementation efforts. Such partners are critical to engage to understand the long-term use, needed resources, and ongoing improvements and adaptations of EBIs over time (27). Successfully sustaining EBIs focused on reducing health inequities requires engaging a range of key partners throughout the planning, implementation, and adaptation process to increase the fit between EBIs and local context/resources, while also addressing dynamic and emerging issues that might impede sustainability (14, 16, 22). Establishing processes to facilitate ongoing and meaningful engagement with key partners in the setting where EBIs are deployed is essential to managing and supporting the sustainability of an EBI within a changing context. This was the case in a study on sustaining community based participatory research (CBPR) efforts in three urban research centers in Detroit, New York, and Seattle. Israel et al. (30) found that lack of time and resources, alongside maintaining the commitment of partners over time, were key challenges identified that impacted participation in EBIs. However, having the "right people at the table" (including program champions and local partners) while ensuring and communicating clear program benefits to all partners, were essential to overcoming these challenges and sustaining community engagement efforts over time. *Key partnerships and establishing processes to facilitate ongoing, meaningful engagement can support the coordinated actions needed to improve health equity and sustainability*.

Nonetheless, many EBIs were not developed or evaluated with equity in mind (2). In most cases, meaningful involvement of communities experiencing inequities as partners in the design and implementation process is also limited, further diminishing the potential to center community values with the goal of social justice and representation of racially and socioeconomically diverse communities and settings (1, 2). Many EBIs and implementation efforts have also not considered the extent to which structural determinants like systemic racism shape not only health inequities but also intensify inequities in implementation reach, uptake, delivery, and long-term sustainability (29, 31). Additionally, many of the EBIs prioritized for delivery do not typically focus on creating changes at the policy or systems level that might have more sustainable impact (32). Given this disconnect in the nature of the evidence base, implementation science as a field is not always well poised to maximize progress toward health equity or sustainability. In many cases, the EBI being delivered is not a good fit from the start (e.g., was not developed with/for the community, is not culturally or contextually appropriate, is complex and costly, is not acceptable or feasible in light of limited resources and time, or does not align with existing organizational context or readiness), which will have critical implications for its long-term delivery and health impact (13). The appropriateness of an EBI in any setting will require not only an understanding of readiness for change, but also knowledge of the presence of competing initiatives, acute human resource challenges, and organizational support and alignment for the EBI (6). A deeper understanding of the fit between the EBIs and the context in which it is implemented is crucial for reducing health inequities and informing strategies to enhance sustainability. Lack of attention to fit and organizational readiness may result in programs and strategies that are not sustained or offer minimal benefits to address inequities. Tools like the Hexagon Tool (33) and the Organizational Readiness for Implementing Change (34) assessment may be useful to understand both fit and organizational readiness to deliver an EBI in a specific context. *To prioritize equity as an essential component of sustainability, it is important to assess the fit between context and the intervention, and consider making adaptations to the context or the intervention to align with key priorities and existing resources in the setting.*

More research on fit and the context in which EBIs are implemented is necessary for understanding how EBIs and strategies should evolve and adapt to promote sustainability. Practitioners and implementers may find that sustaining the core components of EBIs with high fidelity is challenging, particularly in settings that have limited resources. It is increasingly recognized that some adaptations to EBIs may actually be helpful and necessary in delivering and ultimately sustaining EBIs (35). Such adaptations may be useful in order to enhance fit within specific settings and organizational contexts or to reflect the sociocultural characteristics of communities that differ from the original setting or population in which the EBI was developed (36). Not making such adaptations may exacerbate health inequities, particularly if EBIs are not adapted to address social determinants of health (e.g., lack of transportation) and align with new sociocultural contexts (35). Inattention to adaptation may result in lower reach and engagement of the EBI for communities that face structural barriers to health (e.g., if an EBI is not adapted to reflect patient literacy levels, financial barriers, and language in a rural clinic that serves predominately Spanish-speaking Latino populations) (1). *To make progress toward equity, it is critical to track and empirically evaluate the types of adaptations that matter for enhancing sustainability of EBIs, including in low-resource settings and populations experiencing inequities, while still identifying and maintaining those core components that are essential for achieving health outcomes.*

Additionally, research suggests that specific contextual factors may be important to consider when seeking to sustain interventions in settings experiencing resource and health inequities; for example, empirical research suggests that partnerships, organizational capacity, resources, program burden, fit with context, and staff attrition are key determinants of sustainability in low-resource communities (13, 14). Additional factors may be relevant in global settings; for example, Iwelunmor et al. (7) reviewed 41 studies across 26 countries in sub-Saharan Africa and found that community mobilization, engagement, and resources were essential to consider, as well as working with existing resources, providing adaptable interventions that are flexible to local context, and considering the broader societal and political context and upheavals. There may also be different learning needs, literacy and educational levels, and language preferences of the populations being served, varying perceptions of EBI burdens and benefits, as well as trauma, harm, and distrust of public health/medicine based on experiences of racism in communities (13, 14). Thus, in lower-resource settings, as EBIs and strategies are selected, it is important to understand key contextual determinants in those settings that may impact sustainability, including differences in patient populations as well as organizational infrastructure and resources available. Existing sustainability frameworks can provide a useful starting place for conducting such contextual assessments [e.g., (15, 37)], but may require refinements to address specific contexts and health equity considerations.

It may also be useful to specifically understand equity considerations and map assets within communities and settings early on to help facilitate local ownership and enhance sustainability. Such efforts may help ensure that delivery of and refinements to EBIs reflect local cultural norms, system realities, and challenges (e.g., healthcare worker shortages), and the broader socio-political context. Frameworks like the PEN-3 cultural model (38–40) with its focus not only on barriers, but also on factors within settings that are positive and existential, may help to uncover and amplify assets critical for sustaining EBIs and advancing health equity in communities under-represented in research. *Contextual assessments can be useful in planning for and promoting sustainability with a focus on health equity* (40, 41)*; this will require that we not only approach barriers to sustainability from a deficit perspective only* (i.e., *limited resources or what society is doing poorly*)*, but also from an asset mindset, including existing resources that can be tapped to foster sustainability among systemically marginalized groups and settings, and opportunities to further enhance existing capacity in a more sustainable way.*

Discussion

Here, to help chart a path forward for the field of implementation science to synergize, enhance impact, and advance the science, we highlight key recommendations and additional considerations to advance sustainability from a health equity mindset.

Recommendations to advance a focus on equity and sustainability in implementation science

Actively prioritize and plan early for sustainability alongside key partners

To effectively apply implementation science to promote health equity and build trust with community partners, it is essential to actively plan for the sustained and equitable delivery and impact of EBIs in a dynamic way over time. This will help researchers be more accountable in tracking the extent to which continued EBI delivery and implementation over time reduces or exacerbates health inequities. This requires that we explicitly monitor and track the extent to which program activities are delivered and sustained equitably across all settings and population sub-groups. Planning and tracking progress allows the possibility of intervening early to identify and address challenges to implementation and sustainability as they arise across implementation phases. An extension of the RE-AIM framework (Reach; Effectiveness; Adoption; Implementation; Maintenance) was introduced to enhance and promote sustainability, with a focus on dynamic context and health equity over time (42). This may be a useful tool to guide tracking of where and when inequities are reduced or exacerbated across implementation phases and what needs to be adapted or refined to promote long-term sustainability equitably. Specifically, this extension recommends: (1) consideration of dynamic, longer-term sustainability across the life cycle of EBIs (at least 1 year post-implementation and on an ongoing basis); (2) iterative or periodic application of RE-AIM assessments to guide possible adaptations needed to plan for and enhance long-term sustainability; and (3) explicit consideration of equity and cost as cross-cutting issues that have implications for sustainability and should be assessed and ideally addressed across all RE-AIM dimensions (42).

Additionally, developed in the context of ongoing research among young people in Nigeria, Iwelunmor et al. (19) introduced PLAN (or how People Learn, Adapt and Nurture the core values of an intervention), which may enable the engagement of partners, as well as the planning and development of more practical and realistic strategies that foster sustainability. Practitioners, end users, and policymakers typically do not engage with or learn about the science of sustainability or how to enhance sustainability efforts through the peer-reviewed literature (19). To help ensure that lived experiences connect with and informs scientific research and that research findings are translated and reach local practitioners, it may be useful to incorporate and apply PLAN to help understand and communicate when, where, how, and why sustainability matters for a particular EBI from the perspective of local community members and what dissemination channels are appropriate to reach a range of key audiences (19). Such planning may help to identify the right people who matter early for sustaining EBIs equitably and foster learning across the life-cycle of EBIs (including strategies to improve the fit of EBIs in practice). Additionally, initiating planning processes may nurture existing assets within settings that may facilitate ownership and long-term support of and capacity to deliver EBIs after initial implementation.

Monitor progress of efforts to enhance sustainability and track the extent to which sustainability is equitable across a range of settings and population sub-groups

As researchers are building the empirical evidence base around the impact of implementation and sustainability strategies (43), it is critical to also track and build an evidence base around the extent to which whether such strategies are equitably feasible, acceptable, and impactful across a diverse range of settings and sub-groups (e.g., with varying levels of resources and structural impediments to health). This includes prioritizing collection of data on sustainment as an outcome using validated measures when possible (44), and assessing which strategies are particularly impactful in enhancing not just initial implementation efforts but long-term sustainability of EBIs (43). Existing tools like The *Acceptability, Practicability, Effectiveness, Affordability, Side-effects, and Equity* (APEASE) criteria developed by Michie et al. (45) may be useful for considering factors that impact the appropriateness of a strategy for a specific setting or context, and can inform the selection or co-design of strategies. Additionally, there is value in moving away from "one-time" implementation strategies implemented by external facilitators and toward greater focus on advancing understanding of strategies that are well-aligned with existing resources and expertise in practice settings, led by internal staff/practitioners, and that have the potential to build more durable community and organizational capacity (46, 47).

Tools like the Program Sustainability Assessment Tool and the Clinical Sustainability Assessment Tool may be useful in identifying key areas that partners perceive as critical for building more long-term capacity for sustainability and in informing the development and testing of sustainability strategies (43, 48, 49). Additionally, attention to more equity or context-specific frameworks that seek to understand sustainability determinants may be important in settings and populations experiencing inequities. Sustainability-specific frameworks like The Integrated Sustainability Framework can be refined or adapted for specific settings to attend to equity issues (6), informed by existing qualitative research guides that can inform this process (15). As one example, the Lay Health Advisor (LHA) Sustainability Framework was specifically developed in the context of LHA programs in African American communities and considers factors like mistrust and discrimination in shaping sustainability (14, 50). Health equity tools, including frameworks such as the PEN-3 cultural model that help build capacity for sustainability are complementary and can also be incorporated in contextual assessments to understand sustainability (38–41). As noted, such frameworks would allow a framing that moves away from a deficit mindset to one that is asset-driven about what communities can do to achieve the sustained use of EBIs to reduce health inequities. Frameworks like the PEN-3 cultural model offer potential to shepherd in new pathways of knowing, including increasing understanding of the complexity of factors that shape health inequities that continue to persist, but from a lens that is positive yet transparent about challenges and resources that matter in efforts to sustain the EBI (51).

Focus on equity and engagement in the context of both research and practice efforts

Prioritizing a focus on equity and engagement early and often along the translational continuum is essential, as it is the foundation of later sustainability. This requires fundamental shifts in how we approach, prioritize, and fund community-engaged implementation science research and the extent to which community-aligned and practice-based evidence is valued in our scientific paradigm (2, 52, 53). Community-engaged approaches have the potential to enhance and build capacity for sustainability and health equity by shifting more power, funding, and resources to value and support community partner time, evidence, and expertise (54). Making progress will also require that researchers consider developing more flexible and agile EBIs from the start that recognize the evolving nature of community and population needs over time, as well as the changing sociopolitical landscapes that can thwart sustainability efforts. While there has been progress on requiring a focus on equity and community engagement in recent grant announcements [e.g., (55)], there is a need for more grants and funding mechanisms that support community-led initiatives, facilitate resource sharing, and require more equitable decision-making/leadership between academic and community partners.

The foundation of sustained intervention delivery and impact is long-term partnership, which is essential to building the trustworthiness of researchers and institutions. This will necessitate more equitable decision-making and resources with community partners in the context of research, as well as institutional commitment and accountability to community partners beyond research grants from universities and healthcare systems. There is value in building and supporting infrastructure and processes at institutions to meaningfully engage and empower communities beyond short-term and unstable funding and grant cycles (56). A focus on sustainability and health equity requires transparency and bi-directional communication in identifying and achieving short and long-term benefits for both partners (e.g., identifying priority areas for long-term capacity-building that is valued by partners). Finally, it necessitates accountability of researchers and institutions to committing to action (regardless of grant outcomes and timelines) and collecting and returning data that is timely, accessible, meaningful, aligned with partner priorities, and is actionable in creating change (29). Such shifts in how research is conducted will require that institutions and funders place greater prioritization and resources toward supporting impactful partner-engaged research and dissemination of findings, and that there is greater value and recognition in academic promotion for community-engaged and equity-focused research.

In conclusion, as we have argued here, maximizing the population health impact of EBIs and addressing the research-to-practice gap requires prioritizing, investing, and proactively planning for the sustainability of EBIs (37), particularly in settings and populations experiencing health inequities. We have highlighted key gaps in the field and recommendations for future implementation science researchers and practitioners to advance the science and impact of work at the intersection of sustainability and health equity. We believe that implementation science is at an important crossroads with respect to how it can be applied and advanced to make progress toward health equity. We also note it is important to address health equity with efforts to sustain EBIs, keeping in mind the distribution of resources, power, and structural determinants of health equity over time within and across populations under-represented in research. Going forward, a resolute focus on fairness and justice with investments made in settings with limited resources requires additional insight into the long-term return of investment of research, including who benefits and who does not, the role of power, and the shared frustration that researchers and communities experience when EBIs end, despite promising findings (3, 57–59). Understanding the toll of health inequities and progress toward their eradication will be futile, unless equal efforts are made to sustain and continually improve EBIs that address these inequities. Only then will the promise of creating lasting conditions from the beginning, in which all can truly thrive, be realized.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

RS, MH, and JI made substantial contributions to the conception and design of the work and to the acquisition, analysis, or interpretation of data/literature for the work as well as substantial contributions to drafting the work and revising it critically for important intellectual content and provided approval for publication of the content and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Barriers and facilitators to mental health promotion for Mexican immigrants in the U.S. through the Ventanillas de Salud program

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Introduction: Mental health promotion and screenings are recommended as part of standard preventive care. Mexican immigrants in the U.S. are at high risk for mental health illness especially after the COVID-19 pandemic, however access to mental health prevention for this population has been limited, which results in important implementation and equity gaps. The Ventanilla de Salud (VDS) program provides preventive services through Mexican consulates in the U.S.

Objective: The objective of this study was to assess capability, opportunity, and motivation for promotores to implement mental health programming through the VDS, leveraging early experiences of ongoing mental health prevention efforts.

Methods: This was a qualitative study using the Capability, Opportunity, and Motivation for Behavior Change model (COM-B). We conducted 9 focus groups with 40 VDS *promotores* and 6 semi-structured interviews with program stakeholders. Data were analyzed using inductive and deductive coding.

Results: We found high levels of interest from the leadership, partners, and *promotores* to provide mental health services through the VDS. Early implementation of a mental health strategy that included training sessions for *promotores* and mental health promotion, screenings and referrals for VDS users was ongoing. We identified facilitators and barriers that could affect capability, opportunity, and *motivation* to provide mental health services. Facilitators included promotores' extensive knowledge about the importance of mental health, *promotores* service mindset and commitment to provide services to VDS users, and general support from the VDS network and partners. Barriers included *promotores*' turnover, need for additional economic compensation, burnout, competing priorities, and lack of mental health professionals to provide clinical services or supervision. Additional investments are recommended to support *promotores*' well-being.

Conclusion: The main lesson learned from this study was that investing in VDS *promotores*' training, resources, and well-being is key to their capability, opportunity and motivation to provide mental health services for Mexican immigrants in the US. Results from this study can be applied to improve the ongoing VDS mental health strategy and increase its impact on the mental health of Mexican immigrants.

KEYWORDS

mental health promotion, mexican immigrants, Latino mental health, depression screening, implementation science, health disparties, COM-B, Theoretical Domains Framework

Introduction

Mental illness is the leading cause of disability worldwide (1). Mexican immigrants, the largest foreign-born group in the United States, are at higher risk of developing depressive and anxiety disorders compared to non-migrant Mexicans and to their US-born counterparts (2). It is estimated that almost 40% suffer from anxiety disorders and almost 15% have been diagnosed with depressive disorders, which is probably an underestimation due to the high prevalence of undiagnosed mental illness in this population (3). Hence, it is essential to implement evidence-based interventions to prevent mental disorders among Mexican immigrants.

The World Health Organization has identified mental health promotion and screening for mental disorders as essential for the prevention of mental illness (4). However, Mexican immigrants in the US face barriers in access to mental health preventive services and care (3). For instance, Mexican immigrants are less likely to receive health screenings for mental disorders or seek mental health treatment compared to other Hispanics in the US (5). National US data show Mexican immigrants have, on average, fewer years of education, lower income, and are less likely to have health insurance than US-born individuals, other Hispanics and immigrants from other countries (6–8). Language and structural barriers also complicate access to preventive care in this population (9). To address these many barriers, a promising approach is to incorporate mental health promotion and screening into existing health prevention initiatives that already reach this at-risk population (10, 11).

The Ventanilla de Salud (VDS), implemented through the network of Mexican consulates, is an initiative that already reaches a large number of Mexican immigrants throughout the US. The VDS plays a critical role in the preventive care of recent immigrants, providing health education, cardiometabolic risk screenings, and referrals to community resources or healthcare to millions of Mexican and other Latino immigrants that would otherwise not have ready access to these services (12). According to the latest evaluation of the program in 2020, the VDS provided screenings for cardiometabolic risk factors (hypertension, hyperglycemia, dyslipidemia, and overweight) to more than 500,000 Latino immigrants in 2019 (13). While the specific impact of the VDS screening program on health outcomes has not been evaluated, screening for cardiometabolic risk factors in combination with appropriate referrals is an evidence-based intervention has been shown to increase preventive behaviors, improve quality of life, and linkage to care (14). Taken together, this evidence supports an important contribution of the VDS to the cardiometabolic health of Latino immigrants in the US.

Since 2018, the VDS began implementing a strategy to integrate mental health promotion into their existing services through basic training for *promotores*. More recently, during the COVID pandemic, this effort was expanded to include screenings and referrals (3). We conducted this study to evaluate existing efforts to provide mental health prevention services through the VDS network and to identify barriers and opportunities for additional mental health programming (screening and services) through the VDS.

Methods

Study design

This was a qualitative study aimed at assessing the implementation of mental health strategies through the VDS program. It followed the capability, opportunity, and motivation to affect behavior (COM-B) model and the Theoretical Domains Framework (TDF) (See a more detailed description of COM-B and TDF below). A description of the study following the consolidated criteria for reporting qualitative studies (COREQ) (15) is presented next.

The VDS program

The VDS is a program funded by the government of Mexico and implemented in the US to facilitate access to primary and preventive health services to Mexican immigrants. There are currently 49 VDS and two mobile units operating in the Mexican consular network in the US (13). According to information from the Mexican Ministry of Health, between 2013 and 2018, the VDS program served over 9 million people, providing more than 25 million individual services (8). More recently, in the period from January 2019 to June 2021, 14 million services were provided to 5 million people (13).

The VDS program is implemented through a health *promotores* model, where each Ventanilla has a team of one to four *promotores* and a coordinator, as well as a local non-for-profit partner responsible for managing each site. This team works together at a VDS to provide high quality health information, health education, advice, and referrals in a safe environment, with the goal of improving the health and quality of life of Mexican immigrants (16). *Promotores* background and education varies but some of the qualifications for the job include college education preferably in a health related field, or training as community health worker, community outreach worker, or health promotor; experience working with Latino families; basic knowledge about the health care system and social services; experience conducting outreach in diverse settings; and experience providing community education. There is also a national coordination center based in San Diego that is responsible for establishing partnerships in the US and for overall program management and evaluation. The coordination center works closely with the Mexican Ministry of Health and the Mexican Institute for Mexicans in the Exterior, which are the two governmental organizations responsible for the program in Mexico.

Existing mental health services implemented through the VDS

A VDS mental health strategy is already underway where training sessions in the WHO mental health Gap Action Programme (mhGAP) intervention guide, which is an integrated package of mental health interventions, the development and implementation of a COVID-mental health screening questionnaire, and a telephone line to provide psychological services in Spanish to people who completed the screening questionnaire and were deemed at risk. In addition, VDS *promotores* developed a database to generate a network of local partners in mental health.

Training in the WHO mental health Gap Action Programme was conducted in collaboration with the Mexican section of the United States-Mexico Border Health Commission (CSFMEU) and the Pan American Health Organization (PAHO) and targeted VDS health personnel and community *promotores*. This was done to strengthen technical capacities in mental health through basic training for detecting and referring patients with mental health problems. Forty-two health *promotores* were initially trained in 2018, and some updates were made available as new *promotores* joined the VDS.

In 2020, as a response to the COVID-19 pandemic, the screening questionnaire and the psychological services phone line were implemented through a collaboration between the Mexican Ministry of Foreign Affairs, the Mexican Ministry of Health, the Mexican Section of the CSFMEU, the Migrant Clinicians Network (MCN), and the National Autonomous University of Mexico (UNAM) with the objective of providing remote mental health services in Spanish. At the time of this qualitative study, sixty-one Mexican immigrants had been given a questionnaire to determine if they had mental health needs. Among those, forty-two people consented to be contacted by professionals from the Faculty of Psychology of UNAM. The problems identified mainly were anxiety and depression, followed by substance abuse and stress (3).

Theoretical framework

This study was guided by the Capability, Opportunity, and Motivation behavioral change model (COM-B), that recognizes behavior as a part of an interacting system involving all these components (8, 17). The target behavior in this case was for promotores to conduct mental health screening, education, and/or referrals during VDS visits. We also used the Theoretical Domains Framework (TDF) (18) to operationalize the COM-B model. The TDF is an implementation framework developed by behavioral and implementation scientists. It operationalizes behavior into 14 theoretical constructs that can be mapped to capability, opportunity, and motivation (see Table 1). The use of COM-B and TDF has been recommended to collect information about barriers and opportunities that then can lead to the development and implementation of individual behavioral change interventions (17). In this study, we used the COM-B and TDF to develop the data collection instruments following the process recommended by Michie et al.. Similarly, deductive codes were based on the TDF framework (Table 1).

Data collection

The qualitative data collection was conducted between July and December of 2021 through interviews with key actors and focus groups with health *promotores*. The semi-structured interview and focus group guides were developed based on the COM-B model and the TDF framework (Table 1) and pilot-tested with former and current VDS employees ($n = 3$). All data collection activities were conducted in Spanish by native Spanish speakers.

The field psychologist (DLMR) conducted six semi-structured interviews with key actors from the VDS program including the national VDS coordinator, other program administrators, and collaborators from the National Autonomous University of Mexico (UNAM) who had been responsible for implementing mental health strategies through the VDS. Information obtained from key actor interviews was complemented with bibliographic research and available publications (often suggested by the stakeholders) to better understand the context and previous efforts to provide mental health services through the VDS program.

In addition, nine focus groups were conducted (led by DLMR, with IGC or JOB present for support and note-taking) with *promotores* who worked in VDS throughout the United States. Focus groups were divided by the following regions: East [2], West [2], Center [1] and Border [2]. Additionally, two groups with *promotores* from any region who could not attend the scheduled groups were conducted. The number of participants in each group varied between 3 and 6.

Study participants

We used intentional selection to choose the key actors who were interviewed (VDS strategy coordinators and administrators and UNAM collaborators). For the focus groups, an e-mail was sent to all VDS health *promotores* and site coordinators inviting them to participate in the study. Calendly was used to allow *promotores* to sign up to their preferred groups. Participants were compensated for their participation with a 25 US dollar gift card. The criteria used were being 18 or older, working as *promotores* or coordinators in a VDS, and giving their verbal consent to participate in the study.

Data analysis

We performed content analysis with inductive and deductive coding. Audio recordings of the interviews and focus groups were transcribed by JOB. The coding guide was developed by IGC based on TDF domains and refined through several discussions with DMLR, and JOB. We used inductive coding by looking at emerging patterns, and deductive coding guided by COM-B and the TDF framework. An initial subset of an interview and a focus group was coded for reliability purposes and the coding guide was refined until a kappa of 0.82 was reached. NVivo 14 qualitative data analysis software was used. Analyses were conducted in Spanish by native speakers and then the results and quotes were translated into English while writing this manuscript. Quote translations were reviewed for meaning by bilingual (Spanish and English) speakers.

Results

In total six VDS key actors participated in the semi-structured interviews and 40 *promotores* participated in the focus groups. *Promotores* were on average 46 years, had been working in the VDS for almost 5 years, and were primarily women (Table 2).

TABLE 1 **TDF domain definitions*, questions, and testimonies from VDS promotores and key actors.**

COM-B	TDF domain	TDF domain questions (interview guide)	Testimonies
Capability	Knowledge: An awareness of the existence of something. Including knowledge of condition/ scientific rationale; procedural knowledge; knowledge of task environment. Cognitive and interpersonal skills: An ability or proficiency acquired through practice. Memory, attention, and decision processes: The ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives. Behavioral regulation: Anything aimed at managing or changing objectively observed or measured actions.	What are the most important mental health problems to address in the VDS? What knowledge do you think could be important for VDS promotores to identify mental health problems in users? What skills related to mental health do promotores have? Do they need additional skills or training? What tools, questionnaires or tests are available in the VDS to for promotores to screen and identify mental health problems in users? What do the VDS promotores usually do if they identify a mental health problem in users? How can the mental health strategy be incorporated into the work routines of the VDS promoters? How can we take advantage of the existing work routines in the VDS to facilitate new tasks related to mental health screening?	*"Yes, we also went through the mhGAP guide and we had the full training and then feedback with case studies. And well, it is a practical guide, maybe not all cases apply to us, but it is always good to know and learn. By the time we have the opportunity, we are already trained" (promotor, focus group)* *"Sometimes, the emotional health course at UNAM stressed me more because I did not have the time and had many activities to do. So, I had to talk to the psychologists from UNAM, and they told me that I was fine, not to worry" (health promoter, focus group)* *"At the beginning of the year, when we had to close the Ventanilla [because of the COVID-19 pandemic], we interacted with people through telephone calls. I felt a little helpless and guilty that I could not be there with people. To improve that aspect, we began to do surveys where people could express a need, and I talked to them and made their referral, but it was frustrating that I could not be there because they had several needs, including mental health. […] and now I feel perfect that I can interact with people, obviously with the preventive measures, but there was a difficult moment, I was doing my best for them when there were limitations" (promotor, focus group)* *"For us it is very important to know how to listen to them and simply listen to the person, when they tell you -I am not interested that my glucose level is at 250, 300. I am not interested that my family is going through this-. But you know that this person has a problem and it's important to refer them. If the person is not taking control of their emotional health, this is going to get worse and worse" (promotor, focus group)*
Opportunity	Environmental context: Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence, and adaptive behavior. Resources: Material resources, barriers and facilitators. Social influences (norms): Those interpersonal processes that can cause individuals to change their thoughts, feelings, or behaviors.	Are there competitive tasks that complicate implementing the mental health strategy in the VDS? If yes, which ones? To what extent do physical or resource factors facilitate or hinder the ability of VDS promotores to carry out a mental health strategy and referrals? To what extent could work teams be created among the VDS to implement the mental health strategy? Is there any social support for promotores to implement the mental health strategy? If yes, please describe.	*"Lack of time, that is the first concern, excessive workloads, excessive demands from the consulates, that you have to deliver numbers and you leave mental health aside." (key actor, semi-structured interview)* *"[Promotores]go out of their way to help the person if they see that they need something. So, if they see that a person arrives very badly … the first thing they do is be empathetic. [Our role] is trying to support them, give them resources, skills" (key actor, semi-structured interview)* *"… We have allies who come to our VDS to provide free counseling with through the "Healthy mind, healthy life" program. Then we can not only measure blood pressure, glucose, but also integrate mental health" (health promotor, focus group)* *"Stigma, discrimination, and social exclusion are definitely the worst enemies. We have people with a severe risk of mental health who do not receive specialized services and are discriminated against in the educational, social, and health fields. So, stigma is the biggest enemy of mental health that we need to defeat." (key actor, semi-structured interview)*
Motivation	Social/Professional role and identity: A coherent set of behaviors and displayed personal qualities of an individual in a social or work setting. Beliefs about own capabilities (Self-efficacy): Acceptance of the truth, reality, or validity about an ability, talent, or facility that person can put to constructive use. Belief about consequences: Acceptance of the truth, reality, or validity about outcomes of a behavior in a given situation. Goals and motivation: Mental representations of outcomes or end states that an individual wants to achieve. Emotion: A complex reaction pattern, involving experiential, behavioral, and physiological elements, by which the individual attempts to deal with a personally significant matter or event. Nature of the behaviors: Routine / automatic habit, breaking habit, direct experience, and representation of tasks	How could your job position contribute to the design and implementation of a strategy to address mental health issues in the VDS? How difficult or easy would it be for you to direct or coordinate mental health promotion and services with the VDS promotores? Why? Do you think that implementing a mental health strategy through the VDS would help people improve their health? Why or why not? Do the benefits of carrying out a mental health strategy in the VDS outweigh the consequences? How much do you want to promote mental health care in VDS users? What would serve as an incentive for promoters to overcome these competing factors? Have the VDS promoters been made aware of mental health issues? Have you identified any emotional responses from promotores as they implement the mental health strategy?	*"The Ventanillas' promotores have always been very empathetic to the needs of the people; that is, I believe that if you want to be a promotor, you have to have a big and golden heart to be able to help." (actor key, semi-structured interview)* *"It is important to take care of the mental health of the promoters since providing mental health depends on them; that's where we start." (key actor, semi-structured interview)* *"…Improve economic compensation, I think they will appreciate that and tools to be able to do their job better. Other incentive that they are always looking for is a type of certificate, for example, when we give them a webinar, they love that it has some kind of certificate" (key actor, semi-structured interview)* *"I think that we are going to feel bad with the cases that come to the Ventanilla, but I believe that feeling bad, feeling sad, or wanting to cry with them is part of the empathy that we must have with them" (promotor, focus group).* "(Speaking about the COVID and mental health screening questionnaire) *The only thing I would also say is that many of the questions are about COVID, and not all cases are going to be depression or anxiety due to COVID; that is, people have many other problems, and COVID is not a priority. So, it's confusing, but it does help, because as I told you, it helps us to see more of the symptoms that they are experiencing and, obviously, that also allows us to make the referral" (promotor, focus group)*

*Definitions obtained from Atkins et al. (18) and Michie et al..

TABLE 2 Sociodemographic characteristics of Ventanilla de Salud promotores who participated in focus groups ($n = 40$).

Characteristics [mean ± SD or %(*n*)]	*N* = 40
Age (years)	46.2 ± 10.6
20–30	5.0 (2)
31–40	22.5 (9)
41–50	37.5 (15)
51–60	22.5 (9)
61–70	10.0 (4)
Did not answer	2.5 (1)
Time working at VDS	4.4 ± 5.8
Less than a year	15.0 (6)
1 to 5 years	35.0 (14)
More than 5 years	50.0 (20)
Sex	
Female	85.0 (34)
Male	15.0 (6)
VDS region	
Border	25.0 (10)
Central	35.0 (14)
West	7.5 (3)
East	32.5 (13)
Ethnicity	
Hispanic/Mexican/Latino/Chicano/Mestizo	95.0 (38)
Did not answer	5.0 (2)

Capability, opportunity and motivation to provide mental health services through the VDS

The main findings for the capability opportunity and motivation domains are summarized in Figure 1. The detailed explanation by TDF domains, sample interview questions, and quotes are included in Table 1.

Psychological capability

For psychological capability, *promotores* expressed basic knowledge about mental health and its importance, especially for VDS users. The *promotores* repeatedly expressed their goal of providing mental healthcare to VDS users from a holistic perspective.

> "To me, mental health is an integral part of our health. Many times, we focus on physical [health] and leave mental health behind because we see it as a taboo. Then, what we talk with the community is that mental health is part of our wholesome health." (Promotor, focus group).

This was potentially due to the ongoing training opportunities provided by the VDS leadership team, as well as to their interactions with VDS users in need of these services.

> "Yes, we also went through the mhGAP guide and had the whole training and then feedback with practical cases. And well, is a practical guide, maybe not all the cases are applicable for us, but it is always good to know and learn. For whenever we get an opportunity, we are already trained." (Promotora, focus group).

However, despite these training sessions, there was a general perception that skills needed to conduct mental health screenings and referrals remained limited due to the high turnover in *promotores*.

Ongoing supervision and feedback were potential factors that can improve the implementation of mental health screenings and referrals through providing behavioral regulation.

In terms of attention and decision processes, many *promotores* mentioned that they were able to listen attentively to users and to pay attention to small details, however, some *promotores* said that they felt overwhelmed due to competing priorities, and sometimes were not able to provide these services.

Social opportunity

For social opportunity, *promotores* expressed mixed feelings related to the question if providing mental health services was part of their professional role. Some saw themselves as highly empathetic, with great commitment to and interest in providing these services that they see as a priority for VDS users. However, others felt that the training sessions went beyond their role of *promotores* because they included information about the diagnosis and treatment of mental health illnesses and most *promotores* do not have formal training or credentials in mental health.

> "My concern when I heard what they were doing was exactly what (person 1) was talking about. I do not think it is adequate that the promoters of the Ventanillas, who do not have professional training in mental health, are the ones who lead this type of situation." (promotora, focus group).

Similarly, the *promotores* identified several sources of social support for them including the network of external organizations and partners to the VDS, as well as the collaboration with the National Autonomous University of Mexico, their fellow *promotores*, and the national managers of the VDS program.

Stigma and discrimination associated with mental illness were identified as social norms that need to be addressed, and *promotores* already started to work on some initiatives. Similarly, gender roles were also identified as an important consideration, including the problem of machismo.

Physical opportunity

Regarding opportunity, the *promotores* expressed that resources are generally adequate to provide mental health services. However, they also identified various environmental stressors including excessive workload, lack of time, high turnover of *promotores*, increased workload without increased compensation, time consuming data entry requirements into a monitoring system, lack of support from mental health professionals, and the need to shift activities online during the COVID-19 pandemic.

> "Lack of time, that is the first issue, excessive workloads, excessive demands, that you have to report numbers, and you leave mental health aside. … that could mean that they do not have time to do this" (key actor, semi-structured interview).

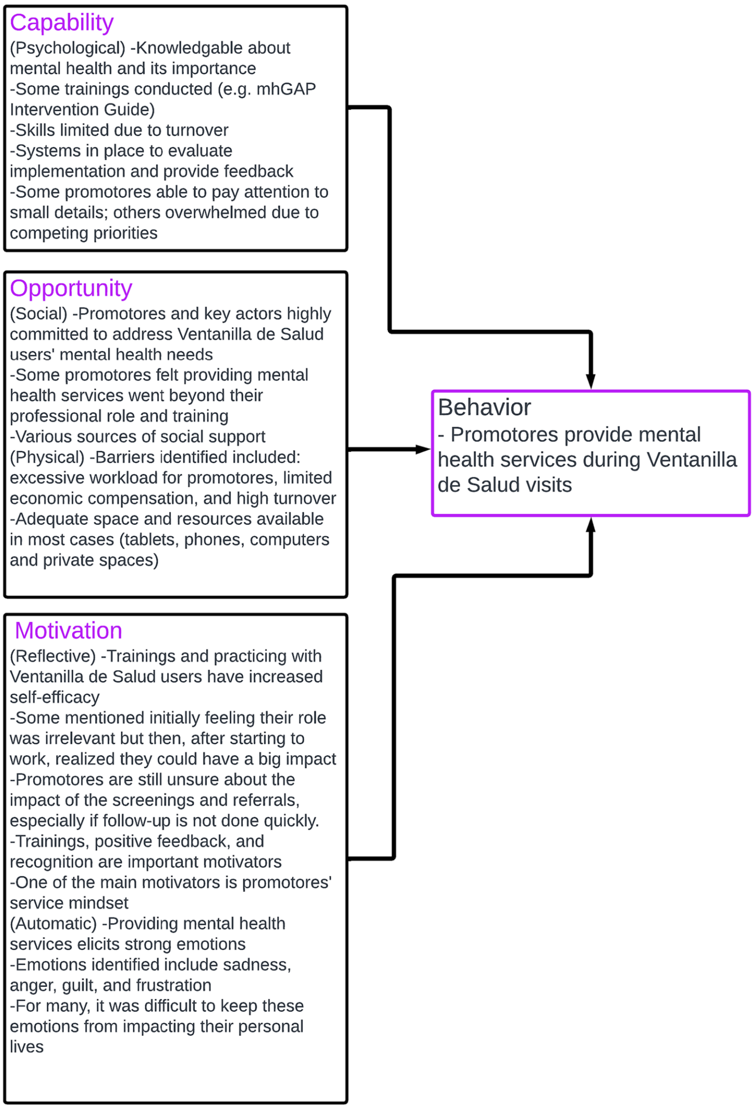

FIGURE 1
Summary of main results for capability, opportunity, and motivation of Ventanillas de Salud *promotores* to provide mental health services.

Reflective motivation

For reflective motivation, we found that most *promotores* felt increasingly capable of listening to mental health concerns, providing general information and referring VDS users as needed. They explained that this increase of self-efficacy has been built through the training sessions and the practice of these skills with users.

In general, *promotores* and stakeholders feel that the actions they take providing mental health services through the VDS will positively impact the well-being of the VDS users. However, a challenge they have found witnessing the impact of their actions is that often VDS users do not return to the VDS for years and *promotores* never know if they are adequately linked to mental health services. Even when *promotores* referred users to VDS programs, such as the phone line staffed with psychologists from the National University of Mexico, they never know if the users received the call backs as planned or if the connection was lost. Some *promotores* expressed concern that maybe the psychologists are not being able to connect with the users, and they never received the mental health care they needed. This concern sometimes affected their motivation to conduct the screenings.

Both stakeholders and *promotores* identified the latter's attitude towards service as the most important motivation for incorporating mental health services. However, stakeholders also highlighted the importance of improving economic incentives, giving recognition to the *promotores*' work and providing constant feedback as motivators for *promotores* to continue providing the services.

> "We need to provide economic motivation[to the promotores], I think they will appreciate that and tools to be able to do their job better, they are always looking for that and that these tools have a type of certificate, for example, when we give them a webinar, they love that it has some kind of certificate that they took an hour to practice this and this" (key actor, semi-structured interview).

Automatic motivation

Regarding automatic motivation, a theme that was constantly highlighted by *promotores* was the strong emotional response that they experience when providing mental health services. They identified sadness, anger, guilt, and frustration as the main emotions felt when providing mental health services through the VDS. They mentioned feeling afraid of the magnitude of the responsibility that helping users with their mental health problems represents. In some instances, the stress related to providing these services started during the training. Others described how the COVID-19 pandemic also generated a mental health emergency in the VDS users, and *promotores* were left to address it with limited tools. In some cases, this led to compassion fatigue in the *promotores*, where they started to take on the users' emotions. To address this, VDS leadership and mental health partners implemented some self-care workshops that the *promotores* described as very helpful. In terms of habits done automatically and routinely, *promotores* identified that there was a setback during the COVID-19 pandemic because all the normal procedures had to be adapted to fit the new reality. They were able to adjust some of the procedures to continue to provide mental health information, screenings, and referrals to some users.

"I think that we are going to feel bad with the cases that come to the Ventanilla, but I believe that feeling bad, feeling sad, or wanting to cry with them is part of the empathy that we must have with them" (health promoter, focus group).

Emerging codes

The following sections describe codes that were identified inductively during the data analysis phase.

Mental health activities independently designed and implemented by *promotores*

Besides the strategies designed by the VDS in partnership with the Mexican National Autonomous University (UNAM) psychology team, *promotores* designed, adapted and implemented diverse approaches to provide mental health services, in response to the specific needs of the VDS users in their consulates. Some of these approaches included: providing mental health education through videos, WhatsApp messenger, Facebook lives, virtual and face to face talks; following up with users through text messaging or phone calls to see if they had received the care that they needed; agreements with local organizations or with volunteer mental health professionals; virtual Zumba dance, yoga or other fitness classes; and having a box with different stress balls, plush toys and other trinkets to release anxiety or stress. Some VDS relied on psychology students doing their internships to provide mental health preventive services.

> "It would take all the publicity in the world. Right now, we have a poster that says mental health support; come to your Ventanilla. This, I think, could be educational videos. I think that what works the most are social networks so that videos can be handy, and posts on social networks, on Facebook Live, on the Facebook of the Mexican consulate, of the Ventanilla de Salud." (promotor, focus group).

Self-care strategies employed by health *promotores*

Self-care was a recurring topic that was mentioned by both key actors and *promotores* as essential to sustaining the mental health strategy and supporting *promotores*. Key actors introduced the context of self-care through formal training and virtual sessions during the COVID-19 pandemic. The *promotores* quickly adopted these strategies and used them to deal with the emotional load of providing mental health services to the VDS users. Self-care strategies mentioned by the *promotores* included using oils, aromatherapy, lime and chamomile tea, Himalayan salts, music, yoga classes, mindfulness, psychotherapy, relaxation exercises, and activities such as going out for coffee and walking around. They mentioned the need to create an emotional support group for them.

> "I went to therapy after so many deaths with COVID, dead and dead and dead, and obviously, you were referring people with families to support groups or psychologists back then, but it was too much. So, I said 'I needed to look for a professional', and I was in therapy to take away the emotional pressure of having to provide solutions all the time, all the time, 24 h, because people were left alone, women without families, cases of children where all the older relatives died. So, there were extreme cases. And yes, I did raise my hand and looked for a therapist because I said, 'it's too much, I cannot'. And yes, it works! It really is something good and recommendable" (promotora, focus group).

Specific characteristics of the training sessions that could help support *promotores*

Key actors and *promotores* provided suggestions and requests to improve the ongoing mental health training sessions. Topics suggested by key actors included communication skills, active listening, interviewing techniques, developing new partnerships, and identifying mental health risks of users, as well as training sessions that included clinical practice opportunities.

"I was just telling you about these skills that are priorities that have to do with awareness, and later essential skills, communication and listening, establishing this environment of trust, so that the person feels heard, and shares with us what is happening" (key actor, semi-structured interview).

Promotores suggested crisis response, suicide prevention, schizophrenia, child rearing styles, and gender violence.

> "Maybe schizophrenia or suicide. These two, because we almost always focus on what is very common: anxiety, depression, bipolar disorder. I have been at the Ventanilla de Salud for 8 years, and I have taken all the courses that UNAM has offered. So it's been excellent. I mean, I congratulate them; they have been terrific, but

> it seems to me that suicide and schizophrenia have been left a little to the side. Personally, I have not had many of these cases, but yes, it's not like none have ever appeared, and I would like to be a little more prepared to deal with them in case I need to help someone" (health promoter, group focal).

They requested additional training in self-care and additional support tools for themselves as providers. They mentioned that activities such as group and individual self-care guided sessions provided by psychologists, counselors, or other mental health professionals for *promotores* would be very beneficial for their mental health. The most frequently suggested training session frequency for these activities was every 15 days, although others mentioned that, because their time is limited, once a month or every 2 months would be better. Also, they highlighted that sessions should be preferably online during VDS working hours (because many *promotores* have other jobs) or as lunch and learns. However, some *promotores* expressed concerns that the high flow of people in their VDS would not allow them to attend the sessions.

Discussion

In this study, we explored capability, opportunity, and motivation for *promotores* to provide mental health services during the ongoing health promotion and prevention programming that they routinely conduct through the network of Mexican Consulates in the US. We found that the leadership of the VDS had already implemented some mental health programming, had established partnerships in Mexico with the psychology school of UNAM, and provided training and support for *promotores*. Through the interviews with key actors and the focus groups with *promotores*, we identified strengths of the ongoing program and opportunities to improve it and to fully integrate mental health promotion and prevention into the current services provided through the VDS.

The main strengths found in terms of capability were that *promotores* have at least basic knowledge of the importance of mental health as part of overall health and well-being, and that there are systems in place to monitor the implementation of the mental health strategy and provide feedback. Conversely, there is high staff turnover, which has resulted in many *promotores* without all the skills that have been taught through the training sessions. Also, some *promotores* feel overwhelmed with all the tasks required of them and are not able to pay attention to detail when providing mental health services. Interventions that can help improve capability in this context include additional training, role modeling from more experienced *promotores*, and adding prompts or cues to remind the *promotores* to conduct the mental health questionnaires (19).

Social opportunity was identified as an important area to strengthen the implementation of the intervention. *Promotores* identified different sources of social support including other *promotores*, the VDS leadership, and psychologist form UNAM; however, they also expressed the importance of channeling that support through official and structured channels. They requested periodic support groups where they can talk to each other, express their feelings, and exchange ideas and approaches. This is in line with recommendations from a recent review of health provider mental health during the COVID-19 pandemic that found that healthcare workers relied on social support and contact to address mental health problems (20).

Another important aspect of social opportunity was the big sense of commitment among *promotores* to provide mental health services. They have witnessed firsthand the difficulties faced by VDS users and have a service mindset that compels them to provide these mental health services. However, some participants questioned if the proposed activities go beyond the professional role and training of the *promotores* who are not licensed mental health professionals. Recommendations to address this issue include increasing the partnerships with trained mental health professionals who can provide treatment, and delineating very clearly what is expected from the *promotores* during the VDS work, which is primarily health promotion, screenings, and referrals.

Under certain circumstances, being able to provide support has been deemed positive for providers' mental health and well-being (21, 22). Inagaki and Orehek identified two conditions that need to be met for providing support to be beneficial for the provider: that support is given by choice and that the individual giving support believes the support is effective (23). In the case of VDS *promotores*, the first condition is met. However, a challenge identified for reflective motivation was that, even though providers feel that their work can have a big impact, they often do not know what happens to the VDS users they refer: whether they are ever contacted by the psychologists and receive the attention they need. This not only could decrease the benefits that they get as providers of support, but also dampens their motivation to conduct screenings and referrals.

Perhaps the most important challenge identified for automatic motivation was the emotional burden that *promotores* experienced while providing mental health services, especially during the COVID-19 pandemic when the mental health vulnerable Latino groups was particularly impacted (24). *Promotores* described experiencing strong emotions while providing mental health services to VDS users, including anxiety, sadness, and frustration, and that sometimes, these emotions and concerns persisted at home and affected their personal lives. Self-care training was implemented by the VDS leadership and the UNAM psychology team as a response to this situation. Self-care was described as extremely helpful by *promotores*, which is consistent with other studies that have improved emotional burnout of community health workers with self-care interventions (25, 26).

High turnover was identified as an important challenge for capability, opportunity, and motivation to implement the mental health services in the VDS. This challenge is potentially related to the emotional burnout associated with proving services to a highly minoritized population, (27, 28) as well as to the limited economic compensation and high demands the VDS *promotores* face. Recommendations are to continue supporting and addressing the mental health needs of the *promotores*, to find additional economic resources and improve economic compensation as much as possible, and to innovate to try to reduce competing tasks and demands. In this sense, most recommendations identified through this study relate to the importance of investing in the well-being of VDS *promotores*. The VDS is a unique program reaching and addressing the preventive needs of thousands of Mexican immigrants in the US and, within this program, *promotores* are a unique workforce that is essential to achieving the goals of the program.

Limitations of this study include that some key actors and *promotores* were not able to participate in the study due to the demanding nature of their jobs, and that all data collection was conducted online which can affect the way people interact, especially in focus groups. However, we were able to collect qualitative data from a diverse group of key actors and *promotores* describing different aspects of the VDS mental health strategy. The use of the COM-B model to explore barriers and opportunities is also a strength of this study, which will allow us to translate the results into actionable solutions that improve the implementation of the VDS mental health strategy and improve mental health prevention for Mexican immigrants.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by Indiana University Bloomington Institutional Review Board (2009002576). The studies were conducted in accordance with the local legislation and institutional requirements. The ethics committee/institutional review board waived the requirement of written informed consent for participation from the participants or the participants' legal guardians/next of kin because Research was considered exempt as part of a program evaluation. Verbal assent was provided by participants.

Author contributions

IG: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Project administration, Supervision, Writing – original draft. DM: Data curation, Formal analysis, Investigation, Writing – original draft. JO: Data curation, Formal analysis, Investigation, Writing – original draft. MR: Conceptualization, Resources, Supervision, Writing – review & editing. MG: Investigation, Supervision, Writing – review & editing. AF: Conceptualization, Funding acquisition, Supervision, Writing – review & editing.

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Conflict of interest

At the time of the study MR worked at the Border Health Commission and was responsible for overseeing the Ventanilla de Salud program.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The author(s) declared that they were an editorial board member of Frontiers, at the time of submission. This had no impact on the peer review process and the final decision.

Publisher's note

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Pre-implementation adaptation of suicide safety planning intervention using peer support in rural areas

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Introduction: Currently, seventeen veterans die by suicide daily in the United States (U.S.). There are disparities in suicide behavior and access to preventative treatment. One disparity is the suicide rate in rural areas, including the state of Arkansas—suicide deaths among rural veterans increased 48% in the last 2 decades, double that of urban veterans. One major challenge for veterans in rural areas is the lack of healthcare providers to provide Safety Planning Intervention, which is an effective intervention to reduce suicide attempts in the general adult population and among veterans. One solution is more broadly implementing Safety Planning Intervention, by using peers to deliver the intervention in rural communities. Before implementation, the intervention needs to be adapted for peer-to-peer delivery, and barriers and facilitators identified.

Methods: Since January 2021, using community-based participatory research, we collaboratively developed and executed a 1 year study to adapt Safety Planning Intervention for peer-to-peer delivery in rural communities and identified implementation barriers and facilitators prior to spread. From July 2022 to February 2023, we conducted group interviews with 12 participants: rural veterans with prior suicidal thoughts or attempts in one U.S. state, their support persons, and healthcare professionals with expertise in veteran suicide prevention, Safety Planning Intervention, and/or peer delivery. We collected qualitative data through interviews during nine, 2 h meetings, and quantitative data from one anonymous survey and real-time anonymous voting—all on the topic of core and adaptable components of Safety Planning Intervention and implementation barriers and facilitators for peer delivery in rural communities. Questions about adaptation were designed according to processes in the ENGAGED for CHANGE community-engaged intervention framework and questions about facilitators and barriers were designed according to the Health Equity Implementation Framework. Participants categorized which Safety Planning Intervention components were core or adaptable, and how freely they could be adapted, using the metaphor of a traffic light in red (do not change), yellow (change with caution), and green (change freely) categories.

Results: Participants made few actual adaptations (categorized according to the FRAME modification system), but strongly recommended robust training for peers. Participants identified 27 implementation facilitators and 47 barriers, organized using the Health Equity Implementation Framework. Two example facilitators were (1) peer-to-peer safety planning intervention was highly acceptable to rural veterans; and (2) some state counties already had veteran crisis programs that could

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embed this intervention for spread. Two example barriers were (1) some community organizations that might spread the intervention have been motivated initially, wanting to help right away, yet not able to sustain interventions; and (2) uncertainty about how to reach veterans at moderate suicide risk, as many crisis programs identified them when suicide risk was higher.

Discussion: Our results provide one of the more comprehensive pre-implementation assessments to date for Safety Planning Intervention in any setting, especially for peer delivery (also referred to as task shifting) outside healthcare or clinical settings. One important next step will be mapping these barriers and facilitators to implementation strategies for peer-to-peer delivery. One finding surprised our research team—despite worse societal context in rural communities leading to disproportionate suicide deaths—participants identified several positive facilitators specifically about rural communities that can be leveraged during implementation.

KEYWORDS

patient and public involvement, community engagement, community-based participatory research, implementation science, suicide prevention, adaptation

1. Introduction

Currently, 17 veterans die by suicide daily in the United States (U.S.) (1). There are disparities in suicide behavior and access to preventative treatment. One disparity is the suicide rate in rural areas, including the state of Arkansas—suicide deaths among rural veterans increased 48% the last 2 decades (2), double that of urban veterans (1). The disparity between rural and urban veterans' suicide rates may be associated with factors related to contextual societal hardships veterans face in rural areas, such as more chronic poverty, fewer economic investments (3, 4), not enough healthcare services (5, 6), and long distances to travel for healthcare (7). Another reason for delayed care are cultural beliefs about relying on one's self to handle mental health problems (8, 9).

Although there are evidence-based interventions to prevent suicides, such as Safety Planning Intervention (which includes lethal means safety counseling, they are primarily delivered in healthcare settings that can be hard to access for rural veterans due to long drives or limited internet access to use telehealth (10). Safety Planning Intervention is an evidence-based intervention, a one-time interaction in which a healthcare provider collaborates to complete a "safety plan" with a veteran who is experiencing suicidal thoughts but does not require inpatient psychiatric hospitalization (11). In Safety Planning Intervention, the provider learns the patient's most recent suicidal crisis, explains safety planning is a collaborative effort between them, and together, they complete a 6 step safety plan with the veteran to cope with suicidal thoughts until they pass, or clarifying how veteran can seek emergency assistance (12). Among veterans in five emergency departments, Safety Planning Intervention was associated up to 45% reductions in suicidal behavior (13). The last step in a safety plan involves lethal means safety counseling, during which providers and patients discuss ways to restrict access temporarily to means in the patient's environment they may use to attempt suicide (e.g., disassembling firearms, placing pain medicine in a locked box) (12). Lethal means safety counseling is key for veterans (14) as 68.2% of veteran suicides occur by firearm (1). Risk of firearm suicides for rural veterans is even higher than in urban areas, because firearm ownership and availability is greater (15, 16). However, one major challenge for veterans in rural areas is lack of healthcare providers to provide Safety Planning Intervention (6). This is especially true in Arkansas where every county is "medically underserved" without enough providers (17). As part of a public health approach, community engagement in veteran suicide prevention is essential to promote health equity by addressing suicide risk in rural communities (18, 19). One solution is implementing peer-to-peer delivery in rural communities (also referred to as task shifting).

Veterans' preference is to first have discussion about securing lethal means—items a veteran might use to harm themselves, such as firearms or pain medication—with family members or peers (20). Having peers deliver mental health care in some situations has been as effective as when professionals deliver this care (21). In one study, veteran peers were trained to deliver a brief suicide intervention to other veterans who had been in a psychiatric hospital due to suicide risk (22). Results indicated peers were able to deliver the intervention very close to how it was intended to be delivered, and veterans receiving the intervention reported highly positive experiences discussing suicide prevention with peers (22). Peer support for veteran suicide prevention is so promising that the Veterans Health Administration (VA) has embedded veteran peers in some healthcare clinics and services nationwide (23). Given this, plus the dearth of healthcare coverage in rural areas like Arkansas, our community-academic research partnership between the Arkansas Freedom Fund (veteran community organization), Center for Mental Healthcare and Outcomes Research at the Central Arkansas Veterans Healthcare System, and the University of Arkansas for Medical Sciences decided to culturally adapt and prepare Safety Planning Intervention to be delivered by peers outside healthcare settings, i.e., community members living in rural areas.

2. Materials and methods

In the current study, we used scientific methods for community engaged adaptations of interventions, community based participatory research (CBPR), and implementation science, relying on data generated by veterans with lived experience with suicidal thoughts or attempts (community) and healthcare professionals with expertise in suicide prevention. Since January 2021, our community-academic research team has met every 2 weeks to collaboratively develop research questions, study design, and execute the study. From January to September 2021, we collectively participated in a local university course on community-based participatory research designed for community-academic research teams. This course included online modules, live video courses, textbook readings, and team mentoring with an experienced community engagement researcher to assist us in preparing a grant application for this study. To ensure every team member provided input, accommodations were made for amputee veterans, limited internet services, and team members who were not comfortable speaking in a group. By making accommodations to receive input from every team member, we were able to thoroughly understand others' needs for our research and what study modifications were needed after the study commenced. This study was co-led by an academic principal investigator and a community principal investigator. Our first aim was to determine core and adaptable components of Safety Planning Intervention that could be used in implementation of the intervention peer-to-peer in community organizations. Our second aim was to identify anticipated implementation barriers and facilitators if deploying this in real world settings, to prepare for spread and scale through community organizations.

2.1. Design

To guide adaptation, we use the ENGAGED for CHANGE framework (24). This framework presents 13 steps for how to develop an intervention with community members. ENGAGED for CHANGE is an acronym signifying each step using community needs, priorities, and assets; existing data; and relevant theory (24). We aimed to complete the following 8 steps because this was most feasible in our 1 year timeframe and aligned with our aims: (1) Expand the partnership, (2) Intervention team established, (3) Gather existing literature, (4) Assess community needs, priorities, and assets, (5) Generate and refine intervention priorities, (6) Evaluate and incorporate meaningful theory, (7) Design an intervention logic model, and (8) Create objectives, activities, and materials. Because Safety Planning Intervention already existed, we modified steps of the framework slightly to culturally adapt (instead of develop) Safety Planning Intervention from being delivered by healthcare professionals to being delivered by peers in rural communities.

We used mixed methods research, QUAL + QUAN design, in which qualitative and quantitative data were collected concurrently throughout the study and priority was equally shared between both data types (more detail in Analysis section) (25). Qualitative data were collected each workgroup meeting by asking participants open-ended or "fill in the blank, then elaborate" questions. Quantitative data were collected first through a one-time anonymous survey to participants about their ratings on whether each Safety Planning Intervention step should be retained or change, and if changes, their preferences on how. These data were used to narrow the qualitative questions for the group to steps in which there was not quantitative consensus in the survey, and to make decisions about adaptation about steps in which there was quantitative consensus in the survey. After using qualitative questions and data during workgroup meetings, we then refined specific a quantitative question about each proposed adaptation, asking participants to rank their agreement with the adaptation in real-time voting during workgroup meetings.

2.2. Participants and recruitment

We convened research study participants known as the "Arkansas Safety Planning Intervention Workgroup" at nine monthly meetings. Participants included: rural Arkansas veterans with prior experience with suicidal thoughts and/or attempts, support persons of those veterans, rural Arkansas veterans who worked in community organizations to prevent veteran suicide but did not necessarily experience suicide thoughts or attempts themselves, mental health and internal medicine professionals with expertise in suicide prevention and/or peer support interventions (some working in VA). The goal of the participant workgroup was to decide on core and adaptable components of Safety Planning Intervention, determine adaptations to Safety Planning Intervention for peer-to-peer delivery, and identify preliminary implementation barriers and facilitators. The Arkansas Safety Planning Intervention Workgroup followed the ENGAGED for CHANGE steps, digesting data from different sources of knowledge, including veterans' lived experience, government reports, existing training manuals and tools for Safety Planning Intervention, and published peer-reviewed research. This group was distinct from our research team, the latter of which oversaw and coordinated the study with community partners embedded as a co-principal investigator and significant contributors. Both groups had members from the community with lived experience.

Regarding eligibility criteria, we recruited veterans from rural communities to become participants and members of our Arkansas Safety Planning Intervention Workgroup. To be eligible to participate, veterans had to meet these inclusion criteria: they must have formerly served in the U.S. military, had suicidal thoughts or attempts before but not within 6 months, and live in a rural community with a Rural Urban Commuting Area code of four or higher (higher codes equal more rural places) (26). We also allowed people who were identified by these veterans as close family, friends, or peers, who were support persons to the veteran participant through a suicidal crisis. For recruiting healthcare professionals, our inclusion criteria were centered around their expertise in relevant topics: either suicide prevention, veteran mental health, and/or peer support.

To recruit veterans and their support persons participants, each community-academic research team member sent an initial outreach to potential participants via text message, e-mail, and social media pages of their own and of the community organization partner using scripted text with a flyer about the purpose of the study, roles for participants, risks, benefits, compensation, and contact information. Forty-one people were interested. From this initial pool, 19 people were not responsive to follow-up for screening, and 22 potential participants agreed to complete eligibility screening questions by any member of the community-academic research team. During eligibility calls, two individuals' phone numbers were not working, 5 were not eligible due to not living in a rural area, three declined to participate [did not want to commit to monthly meetings ($n = 2$), was not interested ($n = 1$)], one person was hospitalized and later died, and two were leaders of other community groups that agreed to forward study information. We recruited 12 total participants: 6 veterans, 3 support persons, and 3 healthcare professionals. All participants completed at least two meetings and 91.7% completed the anonymous survey. One support person only attended two of the workgroup meetings and completed the survey and one of the healthcare professionals only attended one meeting (reasons unknown), and the remaining ten participants engaged in majority of meetings. See Table 1 for description of the initial sample.

2.3. Procedures, data collection, and analysis

2.3.1. Procedures

We assembled the Arkansas Safety Planning Intervention Workgroup for nine, 2 h meetings from July 2022 to February 2023, approximately every 3–4 weeks. The first and last meeting were hosted in-person in the public library, rather than our hospital clinics, in a convenient central city agreed upon by all participants. The purpose of in-person meetings was relationship building and had a hybrid video conference option for those who could not attend in person. The remaining seven meetings were hosted via video/telephone conference as this was preferred by participants and the research team due to participants being geographically dispersed and ongoing COVID-19 infection concerns.

To enhance equitable participation and minimize power imbalances, we started with only community member participants at the first three meetings and met with the healthcare professional participants in one meeting separately, so all could become oriented to the topic and process with people more like themselves (Table 2). We incorporated the healthcare professional participants into combined meetings with community participants after all community participants reported they were ready for that shift. We allowed participants to make decisions about whether they wanted their video camera on or off, and to respond verbally or type in the chat text box. We ensured each participant's name on the video conference reflected what they wished to be called. We alternated the meeting time each month from during daytime to evening hours to accommodate different schedules.

TABLE 1 Demographic characteristics of veteran and support person participants.

Demographic characteristic	*N* (%)
Age	Mean = 49.78 years, Range = 33–62 years
Veteran status	
Veteran	6 (66.67%)
Not a veteran (support person)	3 (33.33%)
Gender identity	
Man	4 (44.44%)
Woman	5 (55.56%)
Racial identity	
American Indian or Alaska Native	1 (11.11%)
White	7 (77.78%)
Declined to report	1 (11.11%)
Ethnicity	
Hispanic or Latino	1 (11.11%)
Not Hispanic or Latino	8 (88.89%)
Sexual identity	
Straight or heterosexual	7 (77.78%)
Lesbian, gay, or queer	2 (22.22%)

2.3.1.1. Positionality of qualitative interviewers

One academic member *and* one community member from the research team co-facilitated workgroup meetings (functioning as qualitative interviewers in the group setting). The academic member (blinded for peer review) was a PhD clinical psychologist and lead researcher for the study. She identified as a white cisgender woman who had not served in the U.S. military, and had provided mental healthcare to veterans for 11 years through VA. She made connections with the 3 healthcare professional participants through professional networks. She met 2 participants from the veteran community and one support person participant prior to the study during community volunteering. This was this interviewer's first experience leading community engaged research, and her prior training on the topic included one doctoral-level course, monthly mentoring for 2 years, and the community-based participatory research course with the community organization partner mentioned in the introduction. She believed community engaged research and Safety Planning Intervention were valuable, although not sufficient, to reduce veteran suicides. She grew up in a rural community and understood many socioeconomic challenges reported by participants. The community member (blinded for peer review) was a veteran. He identified as a white male that grew up in urban and rural settings. He received his Master of Organizational Leadership degree in 2021 and retired as a Senior Master Sergeant (paygrade E-8) in 2022. He served 25 years in the Air Force with 12 years as a Senior Noncommissioned Officer and 6 years as a First Sergeant. This position is responsible for quality of life for all service members and their families, which gave him innumerable experiences with mental health and suicide situations. He responded to and guided people through their own suicidal ideation and was himself diagnosed with depression in 2021 when he noticed himself developing his own plan for attempting suicide. He was motivated for the study because he saw first-hand the impact a single person can have on another person's life just by responding to them in their time of need. He knew some of the research participants before the study from a veteran community organization. To assist the research participants, he shared his personal story and conducted role plays during meetings with the research lead to show examples of Safety Planning Intervention. Another research team member (blinded for peer review) was present at all meetings to take

TABLE 2 Meeting numbers, topics, and participants aligned to ENGAGED for CHANGE framework steps to adapt an existing intervention and identify preliminary implementation barriers and facilitators.

Meeting topic and data collection by ENGAGED for CHANGE step	# of meetings on topic and participants
Expand the partnership	Prior to study
i**N**tervention team established	Prior to study
Bonus: created community agreements about ground rules for discussion **G**ather existing literature • Community: review written summaries of safety planning intervention and data on suicide risk factors for rural veterans; bring their expertise from other sources to blend with research expertise (interview) • Professionals: review safety planning intervention steps and determine what they perceive as core/adaptable functions and forms of the intervention (interview)	1 (community); 1 (professionals)
Assess community needs, priorities, assets • Open-ended questions about anticipated implementation barriers and facilitators for future spread (interview)	1 (community) 1 (combined)
Generate and refine intervention priorities • Create draft of core functions and forms of the intervention to begin to focus intervention goals on community needs and priorities (interview + survey + real-time voting)	2 (combined)
Evaluate and incorporate meaningful theory • Identify and incorporate any theories that may provide systematic knowledge check of existing perspectives (interview) • Refine list of red/yellow/green light adaptations (interview + survey + real-time voting)	1 (combined)
Design an intervention logic model • Draft and finalize a visual logic model to depict links between suicide risk factors, intervention functions and forms, and hopeful outcomes (interview)	1 (combined)
Create objectives, activities, materials • Determine which materials and activities need to be adapted (interview + real-time voting) • Generate list of important measures of acceptability, feasibility, and fidelity for future pilot (interview + real-time voting)	1 (combined)
Bonus topic: "member checking" results including (1) Red/Yellow/Green light adaptations, (2) implementation barriers and facilitators, (3) logic model with measures for future pilot to finalize analysis and interpretation (interview + real-time voting)	1 (combined)

notes and answer questions regarding logistics such as scheduling and participant payment; they did not conduct group interviews.

2.3.1.2. Group meeting processes

The process used for each workgroup meeting followed a general agenda of greeting each other, reviewing community agreements made collaboratively as ground rules for discussion, presenting information needed to discuss the topic, open-ended or "fill-in-the-blank and elaborate" questions about the topic, and if related to making decisions about adaptations, anonymous real-time voting on adaptations. Tasks varied each meeting depending on the step from the ENGAGED for CHANGE framework that allowed us to meet research aims; see Table 2 for a list. We also added one meeting for member checking, a method in qualitative research to enhance internal validity of results (27). For member checking in our study, we analyzed results and presented them to research participants in writing 1 week before meeting, and discussed them verbally in a 2 h meeting, asking questions to expand depth, clarify errors, or add missing data.

2.3.2. Data collection

2.3.2.1. Qualitative interviews

The primary data collection method was group qualitative interviews, documented through audio recording and intensive notetaking during meetings to identify: (1) adaptations; (2) potential barriers and facilitators to eventual implementation and spread of the adapted intervention; and (3) creating a community-academic logic model of how peer-to-peer Safety Planning Intervention might reduce suicide risk (not the focus of this manuscript). Qualitative questions about adaptations were broader in initial meetings and became more focused closer to making decisions. Questions were designed before each meeting by the two meeting co-facilitators. Before participants completed the anonymous survey about adaptation preferences and their priority (i.e., red/yellow/green light), broad question examples were "What parts could remain the same and would work if a peer were doing this with a veteran?," What parts do you think should be changed and why?" and "What do you think is the least/most important aspect? Why?" After reviewing the survey (below), co-facilitators created narrow qualitative questions about each step for discussion, asking specifically for thoughts on each step of the safety planning process in which there was not consensus.

2.3.2.2. Survey

After three meetings using qualitative interviews with workgroup participants, our research team realized we might not be hearing every participant's voice when it came to making decisions about adaptations to Safety Planning Intervention peer-to-peer. Suggested by community members on our research team, we modified our protocol and created a one-time anonymous survey about each step in the Safety Planning Intervention process as traditionally used in healthcare settings. We sent participants the survey through a web-based survey platform, RedCAP, and ensured it was anonymous by not tracking their IP address nor asking for identifiable information. Questions asked about comfort sharing during group meetings and also asked participants to review each step of safety planning and whether they wanted to retain that step, change it, or were unsure about adaptation (see Supplementary File).

If there was clear consensus with >70% of participants reporting the same preference for the adaptation on the survey, the researcher team recorded this as a decision, still presenting it at the next meeting to workgroup participants as a decision on which they predominantly agreed. When there was not clear consensus on an adaptation in survey results, data were used to formulate qualitative questions at the next two meetings to clarify perspectives, elaborate on differing viewpoints, generate possible adaptations, and eventually, narrow options for voting (see below).

2.3.2.3. Real-time voting

For each adaptation decision made, after discussion and some verbal indication of consensus in workgroup meetings (not anonymous), group interviewers created a voting poll using Zoom videoconference software in real-time to assess whether participants agreed or disagreed with a proposed decision for adaptation. All participants were requested to vote anonymously on the poll during the meeting whether they (1) "mostly agreed" or "strongly agreed," (2) were " unsure," or (3) "mostly disagreed" or "strongly disagreed" about the adaptation. Decisions were considered final when all participants anonymously voted they "mostly agreed" or "strongly agreed." If anyone voted for other responses, discussion continued until a decision was made.

2.3.3. Data analysis

Data were integrated after each data collection point in an ongoing, iterative template analysis and interpretation process (28, 29). Using audio recordings and summary meeting notes (not transcription), two research team members served as coders of qualitative data in between each meeting and record quantitative data results as well (blinded for peer review), which would then be brought to the entire research team where they would interpret findings and use them to inform the next meeting topic. One coder was the research PI and the other was a research assistant who was present at all workgroup meetings and received training in qualitative template analysis from the PI for this study.

For all analysis, we sorted qualitative and quantitative data into templates, reflecting data gathered at one point in data collection. The templates were organized into three categories aligned to research aims: (1) adaptation suggestions or decisions, (2) implementation barriers and facilitators, or (3) other (which over time, became training for peers in Safety Planning Intervention, informed by qualitative data) (see **Supplementary Files**). For adaptation, we merged quantitative findings from the one-time survey and real-time voting with qualitative data about preferences. For implementation barriers and facilitators, we used only qualitative analysis. Coders reviewed meeting notes and audio recordings and, if relevant, survey findings or real-time voting results, and create separate templates independently. Then, they would meet to compare findings in their templates, discussing divergence, referring to original data as needed, and ultimately, creating one master template of each meeting. Together, the coders would extract data from the master template into one of three formats that served as "deliverables" for this study and allowed for clearer interpretation:

1. FRAME system to track adaptations made to Safety Planning Intervention (30),
2. Red/yellow/green traffic light categories for categorizing how freely a peer could adapt each step of Safety Planning Intervention (31), and
3. Barriers and facilitators to implementation of peer-to-peer Safety Planning Intervention organized using domains of the Health Equity Implementation Framework (32)

2.3.3.1. Analytic frameworks

The FRAME coding system enables teams to note multiple facets of adaptations to an intervention, including but not limited to when it was made, why, type of modification, and who prompted the adaptation. Red/yellow/green traffic light categories have been used as a dissemination tool in training people learning an intervention on what should be modified and what should remain intact. Using the metaphor of a traffic light in the U.S., each color of the traffic light signifies what intervention components are core and should be retained in their original state (red light), could be adapted but should occur with caution or under certain conditions (yellow light), and can be adapted freely (green light). The Health Equity Implementation Framework is an implementation science framework documenting factors of successful and *equitable* implementation. Applied to this study, domains include factors about Safety Planning Intervention peer-to-peer, peers delivering the intervention, veterans in need of a suicide safety plan who are at moderate risk of suicide, interaction between a peer and a veteran to engage in Safety Planning Intervention, local contexts within community organizations, the U.S. state, and broader societal contexts including VA healthcare, sociopolitical forces such as laws or policies, economic concerns such as what goods might be exchanged for safety planning, and physical structures such as the built environment in rural communities where safety planning might occur (33).

Because the coders had analyzed data in between each meeting, they were prepared to present preliminary results to workgroup participants at the last meeting for member checking (see **Table 2**). Coders incorporated all additions and elaborations recommended by participants from that meeting, although they were minor. Final analyses were presented to the entire research team, who assisted with interpretation and finalized results.

3. Results

3.1.1. Adaptations to safety planning intervention for peer-to-peer delivery

One major finding from this study was that participants declined to significantly change the intervention, but strongly recommended robust training for peers and had suggestions about content for the training (the latter not the focus of this manuscript). Although there appeared to be diverse opinions initially on quantitative survey ratings, once those topics were discussed with participants, they asked questions, heard others' viewpoints, and learned more about Safety Planning Intervention, and ended with unanimous real-time voting results on every decision to adapt (or not) Safety Planning Intervention peer-to-peer. They made few actual adaptations.

The adaptations to Safety Planning Intervention from professionals delivering it in healthcare settings to peers delivering it in community settings included: (1) the intervention can be delivered by peers in the community; (2) coping strategies and social settings for distraction must fit the veteran's life situation including housing, social connections, physical ability, interests, transportation, and income; (3) peers providing safety planning can have written or pictorial information such as visual aids showing the efficacy of safety planning and the suicide risk curve; (4) when peers are learning about the veteran's suicidal crisis, this information may be in the form of written thoughts from the veteran, a text message, received face-to-face, or via telephone; and (5) an optional follow up contact line can be added to the bottom of the safety plan copy if there is a safe and clear choice for follow up. See more modification details in FRAME coding log as a **Supplementary File**.

Participants also categorized each step in the process of conducting a safety plan as core or adaptable using the red/yellow/green traffic light categories (see **Table 3**). As an example of a core component in the red light category, participants reported the first 3 steps in the process of safety planning (not the first 3 steps on a written safety plan) should occur if a veteran at moderate suicide risk was willing and able, and otherwise, they should not proceed with safety planning. Those first three steps are: (1) get the veteran's story of most recent suicidal crisis, (2) show veterans the suicide risk curve, and (3) explain suicidal thoughts come and go. This is an example of an instruction in how to conduct safety planning trained to healthcare professionals that the workgroup participants in our study chose to retain. An example of an adaptable component that should only be adapted with caution or under certain conditions was about peers asking a veteran with whom they would like to share the safety plan, if anyone. Participants agreed that peers could ask this if the veteran had social contacts listed on the plan but should not ask if the veteran could not identify anyone to call for distraction or crisis in earlier safety planning steps. An example of an adaptable component that could be freely altered was how the peer received the veteran's recent suicidal crisis story—it could be received in any format including written, text message, verbal in person, or verbal via telephone call.

TABLE 3 Core and adaptable parts of safety planning intervention for peer-to-peer delivery by red, yellow, and green traffic light categories.

Red light—must not change (core)
• The first three steps of safety planning should happen if veteran is willing and can do the safety plan:
○ Get the veteran's story of most recent suicidal crisis
○ Show veteran the suicide risk curve
○ Explain suicidal thoughts come and go
• Safety planning should not be done with people who are intoxicated, high, or cannot problem solve to complete safety planning
• When understanding veteran's most recent suicidal crisis, the peer needs to understand what got the veteran to that point, so the peer may need to ask follow-up questions.
• The peer must tell veterans the safety planning process is a team effort.
• Listing warning signs should remain as first formal written step before working on other steps of the plan
• Peer must ask veterans if their personal warning signs listed would signal a crisis is coming or remind them to use the safety plan
• For the following steps, they must fit the veteran's life situation including housing, social connections, physical ability, interests, transportation, and income:
○ List *distractions* they can use by themselves (internal coping strategies)
○ List people to call or places to go for *distraction*
○ List at least one person to call for help with *crisis*, including professionals, regional sources of healthcare, hotlines, or a peer
• The peer must explain how to follow the safety plan (e.g., as soon as they feel better, they can stop, also can skip to whatever step they want)
• The peer must ask about the chances of veteran actually using safety plan. Examples include: How likely are you to use this? How comfortable are you in using this properly? Do you see any barriers to using the safety plan?
• Veterans must get a copy of their safety plan
Yellow light—can make changes with caution (adaptable)
• Peers can also have written handouts on some facts about need for safety planning and other pictures like the risk curve, but do not need this.
• The following steps are very important and ideally should be done in order, but if veteran is having difficulty, these steps could be skipped and come back to later, or left empty if unable to brainstorm good ideas for safety plan:
○ List *distractions* they can use by themselves (internal coping strategies)
○ List people to call or places to go for *distraction*
• Lethal means safety counseling should happen at the end of safety planning where it is listed but could happen at any step before conversation ends if there is limited time, an interruption, or needs to end before the entire plan is completed.
• When discussing lethal means, another support person can be discussed or brought in the conversation but does not have to be.
• It is important to make sure veterans have a clear place they will access the safety plan, but the peer should be aware it may be redundant depending on format.
• Peer can ask veteran who they would like to share the safety plan with depending on whether the person had social contacts listed on the plan or not. Do not ask if they could not identify anyone to call for distraction or crisis.
• Adding a line on the safety plan for follow up contact can happen if there is a safe and clear choice, but is not required.
Green light—changes can be freely made (adaptable)
• How the peer explains the suicide risk curve to veterans can be in any format—draw out it, show a written handout, or use hands to show, while explaining verbally
• Veteran's recent suicidal crisis story can be received in any format including written, text message, verbal in person, or verbal via telephone call.
• Safety plan can be in any format such as photo, screenshot, smartphone app, wallet size card, or full-size paper.

3.1.2. Barriers and facilitators to implementing peer-to-peer safety planning intervention

Regarding implementation barriers and facilitators, participants identified 27 facilitators, or strengths to harness, and 47 barriers, or challenges to overcome or plan to work around, should peer-to-peer Safety Planning Intervention be deployed in community settings. All were categorized into domains of the Health Equity Implementation Framework (see **Table 4**). Among facilitators, majority were identified in domains of the intervention itself, peers who would be offering safety planning, and factors in rural Arkansas and our existing healthcare systems. For example, regarding the intervention itself, participants perceived it very favorably with relative advantage over current suicide prevention interventions participants experienced (e.g., some advantages to medication because it gave veterans tools to use). Among peers who would offer safety planning, one major strength participants reported was peers with suicide experience were very motivated to help, as one community participant said, "*I want to make sure that, after all*

TABLE 4 Implementation barriers and facilitators to spreading peer-to-peer safety planning intervention in rural Arkansas community organizations.

About safety planning intervention veteran-to-veteran in rural Arkansas
Facilitators
• Easier for veterans to relate to other veterans—peer delivery is very acceptable.
• Peers can share their experiences with the veteran in crisis, which may lead to trust and a greater connection.
• Veterans feel safety planning is important and has potential to be impactful.
• Safety planning is something to learn with skills to use—a relative advantage over current management of higher suicide risk (e.g., medications).
• Peer-to-peer safety planning is important because most providers are not trained in safety planning and a veteran peer can make a bond with another veteran that some providers cannot make.
Barriers
• Some veterans will not tell the whole truth to questions that are sensitive or personal.
• The safety planning process may take a while and the veteran may walk away or disengage.
Recipients: about veterans considering suicide—at moderate risk in rural areas
Facilitators
• For people who are religious, trusting in a higher power and having faith is a resource (culturally relevant belief).
• Safety planning, especially steps about connections with others, plant a seed that others value them and enhance the veteran’s self-worth.
• Safety planning is a good start to find out what works and what does not, possibly bridge to treatment, and is flexible for the veteran.
Barriers
• People who are actively using drugs or alcohol might not be able to engage in a safety plan.
• Some veterans have distrust in the government, although this is lessened by peer outreach (culturally relevant belief).
• Some veterans are programmed from military training not to discuss problems, to keep secrets (culturally relevant belief).
• Veterans do not discuss mental health enough.
• Veterans trained to be combative in military, and if frustrated, might be combative with a peer trying to help (culturally relevant belief).
• Veterans with personal suicide experiences are a minority even though it is a huge problem. It may be hard to find these Veterans in crisis.
• Veterans are fearful they will be “locked up” and cannot get out, so delay seeking mental healthcare (culturally relevant belief).
• Veterans may not be able to think of a list of contacts or healthy distractions, it may take a while to come up with answers.
• Veterans may fear others will take away their firearms or important medications.
• Feeling of being a burden to others prevents calling on others during times of crisis.
Recipients: about peers offering safety planning (not trained professionals)
Facilitators
• Peers are unrelated to any institution—not medical, not police, not government—and so might be more acceptable.
• Peers have “*walked in their shoes*” (connection), might have a safety plan themselves, and speak from experience about usefulness. (V1, age 62, identified as male)
• Peers with suicide experience are very motivated to help. “*I want to make sure that, after all the effort my family put into saving me, it’s not lost on the next generation.*” (Veteran, age 55, identified as male)
• People in the military work with people across difference—race, state of origin, sexual identity, and can stay focused on “*finishing the mission*.” (Veteran, age 62, identified as male)
Barriers
• May not be enough peers to match veterans based on lived experience (e.g., women sexual assault survivors, suicide survivors).
• Peers will be exposed to scenarios that are triggering to them based on their lived experience (e.g., active drug use).
• Safety concerns for peers: veterans or their families could be potentially dangerous to peers.
• Peers will need scripts, checklists, and a lot of training and debriefing to feel comfortable doing safety planning.
• It will be hard to figure out how to assign a certain number of veterans per peer so not overloading one peer.
• Unclear how peer support will be different from clinicians.
• Without written notes documented and stored by peers, it would be hard for one peer to pick up where another peer left off.
• Where would peers store safety plan with veteran’s information securely if they use it for follow up?
• Peers fearful to call veterans to follow-up in the event the veteran is in immediate crisis and peer does not know what to do.
Interaction: the moment when a peer tries to connect with a veteran considering suicide
Facilitators
• Timely—being able to offer it when they need it, rather than wait for a healthcare appointment.
Barrier
• Peers need to establish trust quickly with veterans they do not know. “*You have to prove that you are there to help and not manipulate.*” (Veteran, age 57, identified as male)
Inner context: state-level community and professional settings where safety planning intervention might be delivered, including organizations in Arkansas (e.g., VFW, American legion, churches)
Facilitators
• Multiple veteran groups are available to spread safety planning as many have established networks statewide. They can also train peers.
• Some gun manufacturers and VA give gun locks and medication storage as a resource.
• One good entry into each community is the county Veteran Service Officer through state-level veteran affairs office.
Barriers
• Peers could get calls about someone who is not a veteran (e.g., a veteran’s child).
• Training peers in safety planning would need to be regular, with ongoing support so they can deliver it well.

(Continued)

TABLE 4 Continued

• Some organizations are motivated the moment you talk with them and want to help right away. When actual work is ready, there can be low or no response.
• Professional resources like counselors or doctors are not always available immediately because of other patients and not usually free during evening hours, so peers and veterans would need to have some resources like this available 24/7.
Outer context: state-level settings relevant to peer-to-peer delivery of safety planning intervention in community organizations (including rural areas and healthcare settings in Arkansas)
Facilitators
• Some counties already have veteran crisis programs that we can collaborate with.
• There exist multiple generations of veterans here in Arkansas to help each other.
• We have a state suicide hotline that is not VA (~5% of veterans who call suicide crisis line choose the state version).
• There are already places who have trained peers and we can learn from them.
Barriers
• May not be enough providers to include as professional contacts on safety plan in rural areas.
• May not be enough police force for safety/wellness checks in rural areas.
• Sometimes in healthcare, providers and staff are rotating so frequently that it is hard to get the same provider twice.
• If emergency department is needed in rural areas, they are often not equipped to assist with suicide prevention.
• Non-VA emergency services or mental health providers need to understand military culture working with veterans (e.g., screening for common problems like post-traumatic stress disorder or traumatic brain injury).
• Current emergency department way of doing things can be further alienating, isolating, and cause anxiety.
• Ambulances take people to the closest emergency department, so they are not guaranteed to go to the VA.
• Not sure where we will find moderate risk veterans, as existing veteran crisis programs tend to serve people at imminent risk.
• Moving through healthcare systems is hard, and can be a taxing job for caregivers or families to help veteran.
Broader VA-related contexts
Facilitators
• VA mental healthcare is available to any veteran who presents or calls. They can see a provider in person or via video that day in primary care or the mental health clinic and the veteran does not have to be enrolled at the VA.
• There are different types of suicide prevention treatments available in VA and all of them are evidence-based.
• There is an entire psychotherapy program for suicide prevention available at the regional level.
• Providers have experience dealing with veterans and veterans have different issues than the civilian population.
Barriers
• Rides to VA healthcare offered by Disabled American Veterans are not accessible—too early, run only once daily in the morning.
• There is a belief that some veterans aggravated the VA healthcare system and got banned so are unable to use those services.
• Some veterans have bad feelings towards VA based on negative experiences such as "*they don't help and they don't care*" so it is hard to use VA as a professional resource reliably. (Veteran, age 33, identified as female)
Economic or financial factors
Facilitators
There are a lot of free, trustworthy online resources for managing mental health distress to apply at home (e.g., apps, youtube channels, websites such as Urban Valor, PTSD Coach, Virtual Hope toolbox).
Barriers
• If veteran is not connected to VA, do not have easy or affordable services to refer to (on the safety plan).
• Poverty and economic distress in rural Arkansas led to veterans not having insurance or funds to get care that would be part of a safety plan.
Physical environment in which peers will be conducting safety plans with veterans
Facilitators
• Being outside and away from people can be soothing, calming, and private for sensitive conversations about suicide.
• Many veterans are overwhelmed by crowded places, so fewer people in rural areas is comforting.
• Peer-to-peer delivery is flexible and can go to where the veteran is located. It can even take place on private chats or via telephone in the format the veteran in crisis prefers.
Barriers
• Hard to find veterans in rural areas who are considering suicide, especially those living in secluded environments.
Sociopolitical forces: social norms of our culture, state or county politics, policies, laws or legal factors
Facilitators
• Arkansas has a perceived culture of support for veterans.
• Veterans want to help and support each other, and it lends itself to peer-to-peer safety planning.
Barriers
• Participants heard of situations where police departments took firearms or veterans gave them to police, but firearms were not returned.
• Some stigmas about mental health and drug use problems—e.g., even going to VA community based outpatient clinics in rural areas evokes a belief if you are there, you are there because of drug use or mental health treatment.
• Peer concern about legal liability in making suggestions about suicide prevention, firearm, or medication safety.
• Strong culture of hunting and owning firearms in Arkansas, so if peers are going to bring up gun safety, they need to be careful on wording.
• Structure of the military is not present in veteran status, so the transition from military to veteran status can make it such that veterans are unsure how and when to get help for others.

the effort my family put into saving me, it's not lost on the next generation." (Veteran, age 55, identified as male) Among the state-level context, specifically our healthcare systems and rural communities, participants identified one strength being multiple existing generations of veterans here in Arkansas to help each other. See **Table 4** for a list of implementation facilitators.

Regarding implementation barriers, majority of barriers were identified among similar domains in which majority of facilitators were identified: veterans considering suicide at moderate risk in rural areas, peers offering safety planning, state-level contexts including our healthcare systems and rural communities, and sociopolitical forces including social norms, state or county policies, laws and legal factors. Among veterans who might need safety planning, participants reported multiple barriers that would result in a veteran declining or prematurely dropping out of the intervention, even if a one-time interaction, including culturally relevant beliefs that veterans are programmed from military training not to discuss problems, especially mental health problems. Among peers offering the intervention, participants reported several implementation barriers related to logistics and workflow, such as being unsure if or how peers should document Safety Planning Intervention like healthcare professionals do and where they would store that information. In the state-level context domain, one barrier reported was that they reported if a peer should need to help a veteran access an emergency department in a rural area, emergency departments were not perceived as equipped to assist adequately with suicide prevention. Among the sociopolitical domain, one barrier for implementing this intervention, which involves discussion of safe firearm and medicine storage when in suicidal crisis, is that there was a strong culture of hunting and owning firearms in Arkansas, so if peers are going to bring up gun safety, they need to be careful on wording so as not to cause defensiveness among veterans. See **Table 4** for full list of implementation barriers.

4. Discussion

In this study, we assembled a workgroup of participants in one U.S. state, Arkansas, to adapt Safety Planning Intervention from being delivered by healthcare professionals in clinical settings to being delivered by peers without medical or mental health training in community settings. Through multiple group interviews, a one-time anonymous survey, and anonymous real-time voting during workgroup meetings, participants suggested few changes to adapt Safety Planning Intervention delivered peer-to-peer. Initially, in survey results, there appeared to be much difference in opinion on whether intervention components were core or adaptable, and after discussing these items with open-ended questions and role plays of what safety planning looks like traditionally delivered by a healthcare professional, participants formed consensus on adaptations with few changes to the intervention delivery or format. One concern might have been that the consensus resulted from social desirability bias or perceived pressure to conform, however, we used several strategies to offset this and believe research participants genuinely agreed on adaptations over time. One strategy we used was to closely review and record each participants' anonymous survey results because the quantitative ratings made it appear their views were quite divergent from one another, yet their qualitative responses in the open-text boxes showcased more of a cohesive viewpoint. Another strategy we used was to ensure anonymous ways of decision making with a range of response options (rather than only agree/disagree)—the survey was anonymous, and at the end of discussing each possible adaptation, we created anonymous polls in real-time to ask how much participants agreed or disagreed with the proposed change. Our final strategy was to ensure the group interviewers were not espousing any position on each component of the intervention, rather, they made efforts to clarify participants' viewpoints and roleplay examples to showcase an intervention step.

One concern could be whether having community members suggest core and adaptable components is recommended. Similar to other work to merge community and professional knowledge on adaptation (34), we included healthcare professionals with content expertise, meeting with them separately from and together with community members, such that their perspectives informed decision making. Also, involving community members with lived experience in intervention adaptation is essential to ensuring the intervention is useful, supported by an entire field (human-centered design) dedicated to ensuring interventions are tightly mapped to needs of the end-user to optimize implementation (35). Prior research found community input into implementation to result in better intervention fidelity (36), better health outcomes (37), and reduced inequities in access to, satisfaction with, and quality of care (38).

Overall, community members reported Safety Planning Intervention was acceptable and desirable (see **Table 4**), which matches another study finding high feasibility and acceptability among professionals in healthcare clinical settings (39). One major recommendation from participants was that peers need intensive training with continued supervision and debriefing if providing this service in their communities. Indeed, higher *quality* of Safety Planning Intervention has been associated with better patient outcomes, strengthening the need for continued support of peers providing the intervention (40). In brief (as it is not the focus of this manuscript), community members reported feeling motivated and prepared to assist other veterans with suicide risk and also concerned about not having enough training and potentially harmful effects on peers delivering it, such as the psychological impact of a suicide among their "clients" or even legal ramifications of such situations (among barriers in **Table 4**). These needs have been recognized by ongoing efforts to properly support peers through ongoing training, supervision, and dissemination of suicide prevention interventions (22, 23), including Safety Planning Intervention using peer-to-peer delivery by one of the developers, the late Dr. Barbara Stanley (41).

Our findings of barriers and facilitators to the implementation of peer-to-peer Safety Planning Intervention showcase a wide range of promising factors to be harnessed and key challenges to plan for in future deployment of the intervention, notably in rural community settings where suicide deaths are higher. One finding surprised our research team—despite societal challenges in rural communities leading to disproportionate suicide deaths in the U.S (3, 4, 8).—participants identified several strengths about implementing this intervention in rural communities. As examples, being in rural settings with fewer people can be less overwhelming for people in suicidal crisis and being outside can be a soothing complement to any suicide prevention intervention. Rural culture can involve a perceived sense of support for one another, which lends itself to offering help during a suicidal crisis. One important next step will be mapping these barriers and facilitators to implementation strategies for this context. Our results mirror those of implementation assessments deploying *other* suicide prevention interventions for rural veterans. Similar to our results, another community engaged initiative to reduce rural veteran suicide also reported the major barriers to uptake of effective suicide prevention interventions were: stigma to seeking mental health care or assistance, fears that having a mental health diagnosis would lead to losing one's right to own firearms, not enough healthcare professionals or clinic environments, including 24/7 crisis centers and psychiatric hospitals, that could adequately assess and treat suicide risk (42). They also reported that one facilitator to implementation is that that community organizations and partners want to be involved quickly and with action-oriented responses (42).

Aside from our study, there are few published reports on assessing implementation context or preparing implementation strategies for spread of Safety Planning Intervention. There is one study suggesting that, in pediatric healthcare settings, collaboration with multiple personnel and brief provider training would be two suggested implementation strategies (43). Another study documented staff perspectives on Safety Planning Intervention in emergency departments (44), finding that the intervention not only helped veterans connect to follow-up services, but also benefitted staff as it increased their comfort in perceiving greater safety for veterans with suicide risk upon discharge. It is possible these findings might translate in peer-to-peer delivery in the community, although this would require further study. The dearth of implementation research on Safety Planning Intervention might be because current implementation strategies are undocumented, naturally occurring in real-world clinical settings (45). A practical next research step would be evaluating the implementation of peer-to-peer Safety Planning Intervention in U.S. rural communities.

4.1. Limitations

There are some items which could limit the generalizability of these results. Since data were collected from participants that live in rural areas of Arkansas, these results may not be generalizable to urban or other rural areas across the U.S. The Arkansas Safety Planning Intervention Workgroup included 12 participants, with a predominantly white sample, limiting validity of results for racially and ethnically minoritized individuals. The homogenous racial identity of our sample was despite conscious attempts to recruit more Black and African American veterans living in rural Arkansas, including reaching out to Arkansas chapter members of the National Association for Black Veterans and working with established, informal liaisons in Black, rural communities in Arkansas. It is possible that adaptation results or implementation barriers and facilitators might be different among Black and African American, Hispanic and Latinx, and veterans of other racial/ethnic backgrounds. Since workgroup participants were being observed (by the research team and other participants) while conducting interviews, it is possible they may not have given their true thoughts and feedback. This was why it was important to orient the group before interviews, review the community agreements, and conduct anonymous surveys and voting during data collection.

5. Conclusions

Safety Planning Intervention via peer-to-peer delivery, especially in rural community settings where suicide disparities exist, was seen as very acceptable and advantageous given existing contextual barriers to spreading this effective intervention to all who need it. We identified adaptations needed for peer-to-peer delivery for this intervention and produced a document for future dissemination and training efforts for other rural states that may wish to adopt peer-to-peer Safety Planning Intervention for veterans in their communities. We also identified copious barriers and facilitators to real-world implementation of this intervention in rural communities, which can be used to inform implementation strategies and planning efforts in a thoughtful way, centering the community voice from the beginning. This study is an example of community-engaged implementation science in pre-implementation stages to promote future equitable spread and scale of an effective intervention.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by University of Arkansas for Medical Sciences Institutional Review Board. The studies were conducted in accordance with the local legislation and institutional requirements. The Ethics Committee/institutional review board waived the requirement of written informed consent for participation from the participants or the participants' legal guardians/next of kin because It was deemed not feasible to obtain written signatures on a consent form from participants dispersed many miles from the study site. Also, the study was low risk to participants. Researchers engaged participants in a verbal consent process and mailed them a paper copy of study information.

Author contributions

EW conceptualized the study, design and executed all data collection and analyses, and contributed to this manuscript. AL recruited participants, executed data collection and analyses, and contributed to this manuscript. RB conceptualized the study and study design, recruited participants, interpreted results, and contributed to this manuscript. DD executed data collection, interpreted results, and contributed to this manuscript. IB helped design the study, assisted with participant recruitment, interpreted results, and contributed results to this manuscript. JG-K conceptualized the study, design data collection, interpreted results, and contributed to this manuscript. AS conceptualized the study, helped design the study methods in this manuscript, and assisted with participant recruitment. OA recruited participants, helped lead some data collection, and interpreted results in this manuscript. TG recruited participants and assisted in writing sections of this manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/frhs.2023.1225171/full#supplementary-material

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Situating implementation science (IS) in res(IS)tance: a conceptual frame toward the integration of scholarship from the black radical tradition

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This manuscript undertakes a disciplinary self-critique of the field of implementation science, a field which attempts to bridge the gap between evidence-based interventions and their practical application. Despite the heightened emphasis on health equity and racial disparities, the field's current discourse is limited by key epistemic shortcomings. First, even though prevalence of implementation gaps between racialized groups in the United States necessitates a comprehensive understanding of the systems perpetuating these disparities, the field does not operate with a general explanation for disparities not as a failure of systems, but a system historically and structural designed to produce disparities. Second, the field has attempted to address disparities without adequate dialog with a broad tradition of anti-racist and anti-colonial sociology, history and epistemology, and therefore risks a decontextualized analysis of disparities and under-informed approaches to achieving equity. Fortunately, scholarship from the Black radical tradition (BRT), such as the Public Health Critical Race Praxis (PHCRP), Critical Race Theory (CRT), and more broadly conceptual frameworks from post-modern, anti-colonial, Black feminist studies and social epistemology can offer to implementation science frameworks that center power dynamics and racialized oppression. This epistemic re-alignment of implementation research to "center at the margins" can enable the field of implementation science to more critically examine and dismantle systems that perpetuate racial inequalities in access to and utilization of health interventions. For example, normalization and dynamic fit, which are thought to be key mechanisms of implementation, are revealed in the light of this tradition of scholarship to be potentially problematic acquiescence to oppressive systems. Drawing from the concept of resistance anchored in the scholarship of the Black radical tradition as well as contemporary social epistemology such as the work of José Medina and Maria Fricker about epistemic justice, the authors further advance that implementation science could make more substantial contributions to the dismantling of racialized systems and actively work toward health justice through the transdisciplinary lens of resistance. This is a call to action for integrating implementation science with critical philosophical and theoretical perspectives rooted in Black studies and related insights, which have been acquired through the struggle for social justice, to inform the design of implementation strategies and research projects that improve health services and health outcomes for health disparity populations.

KEYWORDS

health equity, social justice, implementation science, structural racism, resistance, black studies, public health, health disparities

1 Current lens: lifting the veil of implementation science

1.1 Implementation science: the "gap" and its discontents

The emergent prioritization of equity in implementation science demands, first and foremost, a disciplinary self-critique to ensure that the field's perspectives are sufficiently rooted in equity-making concepts. At this point, the motivating narrative for the field of implementation science is thought to be well understood. Implementation science begins with recognizing a wealth of technologies—evidence-based interventions—have been produced that can improve health and well-being. The field's unifying analysis is the recognition that these scientific products have not been adequately used in 'real world' settings. Often cited is the finding that Americans receive about half of indicated health interventions (1). Many examples of basic, affordable interventions (such as beta-blockers after heart attacks) took decades to become routine (2). Hence, the science of implementation has generated a focus toward the development and empirical testing of implementation strategies as methods to improve the adoption and sustained utilization of interventions in diverse contexts.

> *"Resistance is a choice made in community, made possible by community and informed by memory, tradition and witness… Resistance is our heritage. And resistance is our healing."*
>
> —**Robin D. G. Kelley (3), p. 161**

While this offers a compelling account of a crisis in the use of evidence-based interventions, the field has not widely provided unifying or even middle-range explanations or theories for racialized disparities in the gap between research evidence and the routine use of that evidence in practice. An examination of the implementation of evidence-based practices in the United States, however, reveals not only the fact that many interventions are sub-optimally used but another unavoidable and equally obvious feature: gaps in the use or uptake of evidence-based interventions differ across racialized groups. In fact, evidence for interventions that could reduce disparities and improve population health is limited because too few interventions have successfully been disseminated and translated into diverse practice settings, which Cooper et al. characterize as "an implementation of evidence gap" (4). Moreover, racism and discrimination have been identified as a fundamental cause by which those racialized evidence gaps are performed (5–7). For example, in one study, change in condom use for Black participants was effective and increased over time for Black participants when residential segregation was relatively low and the attitudes of White people toward Black people were relatively favorable. Moreover, the study found that tailoring of interventions for targeted participants improved intervention success by mitigating the statistical effect of White people's racist attitudes toward Black people (8). Racialized differences appear in virtually all health conditions and span diverse delivery modalities (e.g., preventative, acute, behavioral or surgical). This "implementation of evidence gap" means that our society and science have failed to fully deliver the promises[1] of translational science benefits, and this chasm can be characterized as inequity—avoidable, unnecessary, and unjust differences in health status (10). While it is true that there are failures of implementation in privileged or dominant groups too, there are not many examples of implementation gaps and health outcomes that are not differential by race in the United States. Racialized health disparities, therefore, cannot be considered a "special case of implementation failure" (11), but rather—in the terminology of Critical Race Theory (CRT)—an ordinary and routine feature of implementing systems. Following the field's raison d'être, the prevalence of racialized health gaps in implementation implies that the entirety of implementation science must be committed to understanding and undoing the work of systems that maintain *racialized* gaps in health outcomes.

Given the centrality of disparities, it is surprising that theories and frameworks most frequently invoked in implementation science are relatively silent on this issue. Diffusion of Innovations theory, which is widely cited and considered an influential forerunner of implementation science, viewed the spread of innovations as occurring in a social system over time, the kinetics which could be determined by characteristics of the social system or characteristics of the intervention (e.g., trialability) (12). But Rogers did not discuss racialized social systems that exclude and disadvantage particular individuals and, therefore, is silent on the role of racism in spread and access, whether passive or managed. More recently, the popularized Consolidated Framework for Implementation Research (CFIR) offers a compilation of domains useful for identifying several potential determinants of implementation success, but it does not privilege any particular set of relationships of power (13). If looking for an

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[1] The discursive frame, "a failure to fully deliver on its promises," hearkens to Dr. Martin Luther King Jr.'s I Have A Dream speech (9) in which he stated, "In a sense we have come to our Nation's Capital to cash a check. When the architects of our great republic wrote the magnificent words of the Constitution and the Declaration of Independence, they were signing a promissory note to which every American was to fall heir…It is obvious today that America has defaulted on this promissory note insofar as her citizens of color are concerned. Instead of honoring this sacred obligation, America has given its colored people a bad check, a check that has come back marked "insufficient funds." But we refuse to believe that the bank of justice is bankrupt. We refuse to believe that there are insufficient funds in the great vaults of opportunity of this nation. So we have come to cash this check, a check that will give us upon demand the riches of freedom and security of justice…Those who hope that the colored Americans needed to blow off steam and will now be content will have a rude awakening if the nation returns to business as usual."

explanation of racial disparities in implementation, beyond suggesting relevant domains of inquiry, CFIR is limited in promoting critical race-consciousness regarding the ubiquity of racialized differences in the use of evidence-based intervention (14). Recent calls for an emphasis on equity in implementation have given this topic long overdue prominence (15–17). To do so, implementation science as a field must be intentional about incorporating perspectives that help us understand not only that such barriers exist but *why* those gaps in adoption, implementation, sustainability, and scale-up of evidence-based interventions and practices are often racially differential. Understanding *how* they come into being so that they may be undone. Furthermore, we must remain uncomfortable with why our explanations to date have been so quiet on an issue that is so clearly a historical and contemporary hallmark of the formation of American society.

1.2 The science of systems-breaking and justice-making

Paul Batalen's insight that "every system is perfectly designed to deliver the results it delivers (p. 1059–1,061)" (18) prompts a crucial question when examining the prevalence of racialized health disparities: could these gaps be the intended outcome of systems and processes that were designed to reproduce those gaps? Systems, after all, are designed to hold things in place—to maintain the status quo. This notion aligns with the systems justification theory, asserting that individuals are inclined to justify and defend existing social, economic, and political systems. According to this theory, people find satisfaction in the status quo as a means to alleviate existential anxiety stemming from uncertainty, threat and social discord. Moreover, experiments have suggested that exposure to system criticism or threat can actually increase commitment to the status quo as a system-justifying response (19).

This leads to the intriguing proposition that inequities perceived as a "special case of implementation failure" might be the result of systems—both implicitly and explicitly—crafted to disproportionately concentrate access to and utility of goods and services, including evidence-based health interventions, innovations, and technologies. Such a reinterpretation of evidence-to-practice gaps holds profound implications, not only for enhancing the capacity of implementation research to address racialized disparities but also for shaping the field's identity and response to the societal challenges contributing to these implementation failures and inequitable health outcomes.

First, seeing racialized implementation gaps as a product of the design of social stratification presents an opportunity to align implementation research with the intellectual and philosophical traditions of critical social theories explaining power and oppression such as postmodern and anti-colonial scholarship, Black and ethnic studies including Critical Race Theory (CRT) and the Public Health Critical Race Praxis (PHCRP) which is a framework derived from empirical methods in CRT, Black Feminisms and Black Queer Theory alongside the poignant and prolific scholarship of scholar-activists such as Frantz Fanon, W.E.B. Dubois, and Ida B. Wells and countless more contemporary scholars whose work has centered the struggle for racial justice. In short, implementation research has the potential to enrich its insights by integrating critical perspectives that have long focused on the dynamics of power and racialized oppression within American institutions and systems. By doing so, it enables exploration of the impact of social, legal and broader systems, extending beyond the realm of health systems, that contribute to the persistence of health inequalities. That is particularly useful in examining structural racism as it has been identified as a system, in collusion with capitalism and other structures of oppression that produces a distribution of goods and services which disadvantages non-white populations (20–26).

Rachel Hardeman and J'Mag Karbeah critique health services research as consisting of methods that are "fundamentally flawed because they rarely identify, name, and interrogate the influence of white supremacy, the white racial frame, and structural racism (25) (p.770)." Robin D. G. Kelley, in his essay entitled *Black Study, Black Struggle* advocates that "struggle, deep study, and critique [offered through Black studies]" gets us to "the root—the historical, political, social, cultural, ideological, material, economic root—of oppression" in order to unearth and generate pathways to liberation. Inherent to such scholarly frameworks, he adds, is the task of illuminating the hidden, as "most structures of oppression and all of their various entanglements are simply not visible and not felt (3), p. 164." Understanding racialized implementation gaps must draw guidance from frameworks, models, and theories that center on understanding racialized hierarchies of power. Inattentiveness to the normative, sometimes silent influences of racialized socialization on social real-world contexts affects scientific theorizing and the credibility of the claims science makes (27).

Much is at stake in this (re)alignment. Implementation gaps investigated without such frameworks will not yield implementation strategies that adequately and accurately counteract systems of oppression. Health delivery systems and their processes of implementation require reconfiguration, and reconstruction, akin to the kinds of non-reformist reforms that have been pursued to achieve political, economic, and social transformation strategies and maneuvers (26). To be concrete, the notion of "fitting" interventions into systems is considered a good thing in implementation, and feasibility is championed. Yet fit into racialized systems and structures may merely perpetuate racialized differences in access and "feasibility" within unmodified racialized systems implies conformity to those systems.

What we as a field come to believe to be true depends on social relations, social structures and attendant assumptions that are hidden but ultimately could perpetuate harm in practice, policies, and subsequent implementation strategies. Systems and norms reproduce racialized inequities when those factors are not explicitly named, interrogated, and disrupted. Thus, implementation research needs an orientation that allows us to detect and respond to social forces that exert their influence through mechanisms of context, both materially and nonmaterially, that structure the delivery, receipt, and operationalization of health interventions and research evidence. With implementation science poised to act as a tool for justice-making, its aspiration should be to resist the unjust influences of the worlds we make and that make us, to eliminate those barriers and deploy local assets and strategies to move us forward along the path of health justice. Throughout this paper, we seek to characterize the resistance that is required.

1.3 The "work" racism does upon implementation context

Context can sometimes be treated as a problem in the social sciences and, more specifically, implementation science (28). However, a scientific understanding of context is fundamental to understanding what works for whom and under what conditions. Understanding context facilitates a deeper engagement as to why some interventions or practices fail to be embedded or are difficult to de-normalize or de-implement so that new approaches can be embedded. One analysis noted in 2004, "Investigation of how intervention effects are modified by context is a new methodological frontier in community intervention trial research (pp. 788) (29)." Still today, it is widely acknowledged that the implementation and effectiveness of evidence-based interventions are inextricably linked to the dynamic and multilevel contexts in which they are implemented (30). Yet although implicated in racial health disparities and implementation outcomes such as reach, adoption, adaptation, and sustainability, for example, *methods* for considering the dynamic interplay between health interventions/innovations and their implementation in racialized context have not been well articulated; nor have the mechanisms by which racialized social systems affect outcomes of implementation adequately explained within the field.

Unquestionably, attention to racial socialization in implementation is significant to context. Pfadenhauer et al. define the function of context beyond the role of backdrop for the implementation of the intervention; rather, context possesses an active and dynamic role exerted through interaction, influence, modification, facilitation, and constraint upon the intervention and its implementation (31). Through their definition, then it must also be apparent that racialized contexts wield an impact upon implementation. Further characterizing the work context enacts upon implementation, May notes that 'contexts' are not so much "organizational" or static as organiz*ing* in non-linear, emergent, and dynamic ways. As a point of leverage, Hawe and colleagues suggest that because there is an interaction between interventions and their implementation, there exists the potential for system transformation whereby "the evolution of new structures of interaction and new shared meanings" emerges (32) to enhance the intervention's context fit, a necessary condition for successful implementation. Rather than implementation science taking a pose that ignores or controls for context, its task can be actively seeking to intervene by transforming the context in which health innovations are deployed to enhance equitable uptake and embedding (33); therein, opportunities within implementation scholarship to assess and adapt racialized contexts to facilitate successful implementation figures as a critical tool of resistance (34).

1.4 Resisting normalization: understanding racialized implementation failures through denormalization

It is a foregone conclusion that the implementation gap is racialized. Such racialization is perpetuated by a system of rules and regulations that are both explicit and implied. Eduardo Bonilla-Silva defines racialization as "the extension of racial meanings to actors and practices (21), p.515." The everyday phenomenon of race-making in tandem with various concrete, material practices (e.g., policies, distribution of determinants of health) ultimately manifests the practices, policies, and mental models that produce advantages for some and disadvantages for others (35). Disparities in the uptake, implementation, sustainability, and scale-up of evidence-based interventions undergird population health disparities, which differ by race across all age groups, conditions, and geographies in the US. From Batalen's notion of a system's intended design, these resulting failures of implementation arguably are successes at maintaining the American caste[2] through racialized social systems: that is, they are doing what they were intended to do (18). Juxtaposing the impact of racism as a public health crisis (38) on implementation failure means that a central task for implementation research is identifying and understanding how such social pathologies in our systems operate across myriad phases and activities of implementation. Furthermore, it gestures toward the actions that should be taken to counteract this. The stakes are high – implementation science can only solve the problems it identifies. Otherwise, misidentifying the problem and why those problems exist might mean our efforts at solutions will also miss the mark. As Kimberley Crenshaw has stated of Critical Race Theory (CRT), an intellectual and activist framework fostered through the Black radical tradition as an analytic tool to systematically detect and analyze racial inequality in the US legal framework, CRT enables one to see the problem of racial domination more clearly; otherwise, she remarks, "If you cannot see a problem, you cannot solve it (39)." Implementation science needs a lens to see the problem of racism (40).

Alas, it is not, however, a forgone conclusion that the field of public health and implementation science adeptly perceives the mechanisms of racism and the impact of racialized social systems as central to driving implementation gaps; consequently, these fields risk (re)producing the epistemically numbing qualities that can unknowingly perpetuate the normalization of work that sustains racial inequities. Vital to the elimination of health inequities, Hardeman and Karbeah admonish (25):

> "…health services researchers must emancipate ourselves from the dominant white supremacist framing that has touched every aspect of our science. We must strive to make what for so long has been invisible in health services research visible –there are lives depending on it (p.779)."

A resistance approach seeks to do just that. Toward the mobilization of cognitive activism (41), resistance reflects movements in research inquiry that interrogate, disrupt, and counter hegemonic and taken-for-granted assumptions long established. Those assumptions tend to uphold partial, singular, and excluding narratives while *othering* and delegitimizing perspectives deemed outside of that frame as inferior. In response, resistance consciousness counters through the transdisciplinary use of philosophical and critical theoretical tools to uncover less visible relations among knowledge and regimes of power in a given context, system, research design, or implementation practice. Most significantly, resistance approaches tend to be identifiable among marginalized knowers through their

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[2] From the viewpoint of Pulitzer prize-winning author Isabel Wilkerson in her book Caste: The Origins of Our Discontents (36), racism is an insufficient term for the systemic oppression Black people in America experience. She prefers the frame of America as having a "caste" system defined as an "artificial hierarchy that helps determine standing and respect, assumptions of beauty and competence and even who gets benefit of the doubt and access to resources." The use of "caste" is intended to emphasize the infrastructure of racialized social systems that we often cannot see but undergirds the injustices and disparities we often do see (37).

various forms of communicative expressions, yet go unacknowledged by mainstream perspectives which results in the exclusion of those knowledges as irrelevant and inferior to the perspective of the dominant group. Throughout the rest of this paper, we forge the conceptualization of a resistance approach (interchangeable with resistance framework, resistance consciousness, resistance lens) for implementation science by motivating philosophical and critical theoretical tools to make the role of racialization and racial bias more visible in implementation research and practice, and ultimately counteracted through strategies designed to promote social justice.

2 Different lens: elaborating a resistance approach through an integration of social epistemology and BRT scholarship

2.1 The inherent necessity of a resistance lens in implementation science

In accordance with CRT, Bonilla-Silva underscores that participation in systemic racism is "normative and routinized," yet "if systems have continuous productive and reproductive force, then [necessarily] resistance becomes a unifying approach to disrupt these systems (21)." The resistance framework strategically seeks to undermine unjust or oppressive hegemonic social meanings and power relations; examining implementation failures through the interactional nature of resistance focuses the central role of power in implementation and efforts to attain health equity. Thus, we place resistance at the center of implementation science's response to racialized oppression in three senses. First, and foremost because there is something *wrong* that must be resisted to *right*. According to Anderson's account toward a philosophical approach to justice, theorizing toward change must begin from an account of the wrong: systematic disadvantages that have been imposed (42). A just approach to the translation and implementation of evidence-based findings into communities, therefore, must begin with an account of the harm of racialized social systems that enduringly exist in the present rather than a presumption of justice and fairness referred to as post-racialism or color-blindness. Resistant consciousness that does not grasp for the ideal should enable an analysis that reveals the presuppositions of our most habitually expressed behaviors and open the analysis to a set of alternative assumptions that bring into existence methods and strategies that counter the status quo and potentially promote racial justice and health equity (43).

Second, is that scholarship about implementation must resist the otherwise unseen normalization of racialized inequities. The philosophy of social epistemology and Black radical scholarship invoke theorizing that recognizes that "the normalization of a presumed justice and the concomitant *ab*normalization of injustice have ideological effects which contribute to the invisibility of everyday injustices as well as the formation of active bodies of ignorance that perpetuate the injustices and desensitize us to the suffering they cause (Medina, p.13)." Initiating implementation inquiry from a resistance consciousness situates an analysis of implementation failure to resist explanations that bury the implications of racial oppression and rather facilitate the identification, classification, and design of implementation strategies that will disrupt the underlying factors of systemic racism in the context in which implementation failure occurs.

Third, without a resistance consciousness rooted in BRT which assists to detect those underlying realities, we are involuntarily and, at times, willfully complicit in the normalization of racialized inequities. Bonilla-Silva's theory of racialized social systems contends that the bulk of white [people's] participation in systemic racism is "normative and routinized[3]," necessarily making resistance an active and deliberate rather than passive effort (p. 524). Thus, CRT surfaces the sources of racialized disparities by posing, "How is racism working here?" in order to unearth racialized perspectives, ideologies, and artifacts perhaps normalized beyond conscious awareness. Such an analysis destabilizes the insidious influence of latent racism in social systems through an explicit appreciation and interrogation directed at exploring how implementation processes are shaped. CRT, daughter of the legacies of scholarship within BRT, potentially serves as a tool of resistance in the analysis of implementation context by identifying the work that is done and work that should be undone which manifests in collective practices, mechanisms and strategies that reproduce racial domination.

2.2 Critical race theory as exemplar of resistance

Attention to a structural understanding of disparities may be newly heightened for implementation science. Still, it has long been the focus of scholarship from the Black radical tradition (BRT), including anti-colonial, antiracist, and Black feminist traditions (e.g., Sojourner Truth's 'Ain't I A Woman', The Combahee River Collective). Fortunate for implementation research consequently, BRT offers several insights through a diversity of communicative engagements (such as cultural esthetics of art, poetry and music, speeches, historical narratives, intellectual and activist collectives, accounts of social movements and civil rights engagements, etc.) to draw on and apply in health disparities research. Instead of depending on solutions for racialized disparities exclusively in the archival disciplinary knowledge of implementation science literature, we should first recognize that the absence of these frameworks or related constructs in implementation science is in and of itself a symptom of color-blindness and therefore complicit, and part of the problem (45). However, implementation science could remedy this limitation by earnestly studying anti-racist scholarship outside of the implementation and health sciences canons. Pursuing multi-disciplinarity in dissemination and implementation investigations, especially that which is specific to the conditions that sustain racialized disparities by utilizing BRT scholarship, potentially

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[3] Bonilla-Silva's perspective on "White people's participation in systemic racism" is cited in this discussion to point to the effect of being socially racialized in whiteness or white privilege, which predominately occurs to/among individuals racially identified as White and is an inherent feature of the American racialized hierarchy. Liu has said, "Critiques of whiteness as a condition do not assume an essentialist character among people who are racialized as White" but is rather concerned with the structural dimensions of racial power (44). In fact, Eduardo Bonilla-Silva goes on to argue that we all participate in the reproduction of the racialized order through behaviors and actions that are normatively structured so that no one is truly outside of systemic racism.

disrupts the hegemony of scientific knowledge and its harmful (re) production rooted in the philosophy of science approaches that dictate the conduct of scientific inquiry. To address the influence of colonization and imperialism, philosopher Lewis Gordon points to emanant insights from BRT articulated by Frantz Fanon, a Francophone Afro-Caribbean psychiatrist, philosopher, and activist against coloniality who argued that addressing colonization at the level of method requires a suspension of method: a "method of no method" as Lewis Gordon describes:

> "…as he [Frantz Fanon] argued in the first chapter of *Black Skin, White Masks*, colonization is also manifested by its means of implementation. Such instruments are also epistemological, and if the disciplinary practices that construct the modern colonized subject as subhuman are to be interrogated, that includes, as well, the presuppositions of unprejudiced interrogation (46), p.89."

While there are many to draw on, extending core tenants of CRT as a theoretical lens and approach to anti-racist implementation science uniquely offers a resistance-enabling path of inquiry. CRT proliferates a range of analytic observations that ultimately recast the problem of racism not so much as rooted in individual malice but positioned within the structures of systems (47). The tenets, methodological approaches, and strategies of CRT were organized into a framework by a group of legal scholars of color in the 1980s, yet CRT has migrated across many disciplines, including education, psychology, cultural studies, public health, political science, and philosophy (47). CRT defines a set of anti-racist tenets and methodological approaches to knowledge production through transdisciplinary scholarship, which guide subsequent strategies for action. CRT tenets, methodological approaches, and claims are enmeshed with the rich intellectual and activist legacy of the Black Radical Tradition.

CRT arrived in the discourse of justice because of a perceived inadequacy of the prevailing definition of racism framed by liberal civil rights discourse, which largely defined racism as "discrete, easily identifiable, invariably intentional, always irrational acts that are perpetrated by bad actors" (47). CRT contests this definition, attending to the fact that racism is not always manifested in discrete actions; rather, it can also be the result of the intersections and actions of multiple institutions of society. Thus, because they are not always specific behaviors, they can manifest unaware and unintentionally (47). The potential for CRT to advance health equity in health services research is that it proposes to make visible the relationship between power and social roles and the patterns and habits that make up racialized hierarchies of domination, which are often invisible. Supporting our paper's characterization of a resistance approach, Foucault admonishes that "in order to understand how resistance works," we need to understand "the strictly relational character of power relations" including more relevantly to this discussion, the relational character of hierarchical racialized power relations among the intervention and implementation assemblages which include the implementing team as well as the setting or context (48).

The implications of a CRT analysis are considerable: what if our justice-making institutions are fundamentally unjust, it asks. While legal scholars have contended with that question for decades, public health imminently confronts a similar inquiry: what if mechanisms for creating population health improvements, influencing the adoption/uptake and implementation and sustainability of health interventions, fundamentally produce and reproduce inequities in health outcomes? Or at the least harbor remnants and shards of the injurious, pervasive, and historical patterning of racism and social exclusion? If that is accepted as true, then it problematizes a public health and implementation scholarship that goes uncontested; absent of centering an interrogation of discriminatory systems, the task of implementation concedes to what has been inherited. While the insights offered through CRT hold that racial subordination is structured in social relations, the methods that empirically substantiate this in the social sciences have not been as well developed. The historical and theoretical critiques that are platformed by CRT analysis do not "offer a measurable basis" *per se* but contribute to the integration of critical race perspectives by prompting resistance to "theoretical and methodological silos" that preclude a deeper understanding of race and racism (20, 49, 50).

An explanation as to one mechanism by which CRT enables resistance in scientific analysis can be inferred through Medina's conceptualization of epistemic resistance: that is, it operates by disrupting the status quo through an interrogation of silent and taken-for-granted institutional rules and regimes. He notes, "Critical Race Theory teach[es] us the importance of unmasking and undoing the process of the social construction of our perspective, of interrupting the flow of familiarity and obviousness, making the familiar unfamiliar and the obvious bizarre (42), p. 19." This process, Medina advocates, ultimately cultivates a "self-estrangement" and openness to perplexity in which epistemic resistance is enshrined and manifested (42).

A robust translation of CRT in public health and health services research is exemplified by Drs. Ford & Airhihenbuwa in the Public Health Critical Race praxis (PHCRP), which is intended to guide health equity researchers and practitioners to explain and challenge power hierarchies that undergird health inequities (51, 52). The PHCRP is the first public health framework that translates CRT for empirical research. It was developed in response to the disconnect between public health frameworks that identify racism as a social determinant of health and racial theorizations that are critical to identifying, understanding, and addressing racism as the perpetrator of racialized disparities. PHCRP advances health equity and social justice with the intent of dismantling public health practices, systems, and structures that produce racialized inequities through multiple methods, including "counter-storytelling." Counter-storytelling is inherently resistant and a foundational method of CRT. Another example, among many, of PHCRP resistance orientation is through its principled inquiry anchored in the 'ordinariness of racism', a principle which sensitizes and enable's one's perceptions of logics that perpetuate the normality of racism.

2.3 A metaphor to unfold the process of deploying resistance through CRT inquiry

Camara Jones elaborates on a metaphor first introduced by Beverly Daniel Tatum in her book *Why Are All The Black Kids Sitting in the Cafeteria and Other Conversations About Race* which we will use to motivate the transformative process of resistance and principles of anti-racist action involved in resistance to racism (53). In the metaphor, racism is characterized as a conveyor belt moving people to and through racism as they go about living their ordinary lives.

Upon realizing the conveyor belt is moving toward racism, people can respond by turning their back to move against that direction in order to chart a different path than the conveyor belt is taking everyone. As one walks in the opposite direction, Jones highlights the first opportunity for anti-racist action occurs as one moves in the opposite direction of racism though inconvenienced by running into and bumping into people moving in the direction toward racism and its outcomes: that is to actively name racism among individuals moving with the flow or status quo. As people seek to resist the belt's movement toward racism, they seek to dismantle the conveyor belt's motor—the source of the racialized power; this engages the second principle of anti-racism as resistant action, which requires asking and seeking to understand: "how is racism operating here?" Upon understanding how racism operates and identifying its lever(s), the opportunity arises to engage the third principle of active antiracist resistance, which Jones describes as organizing and strategizing to act with others to dismantle the system (conveyor belt motor) and put in place a system (engine/motor) that leads to the development of one's fullest health potential. The conveyer belt metaphor, or the contention that racism is both ordinary and ubiquitous moving us all along, at times stealthily, illustrates the core tenant necessitating a resistant implementation science.

Power gains force and traction through social relational structures, yet those structures are dynamic, much like the conveyor belt, and comprise or structure the process as much as they are made by the process. Eduardo Bonilla-Silva, articulating systemic racism, argues that we all participate in the reproduction of the racialized order through behaviors and actions that are normatively structured such that none is outside of systemic racism, thus supporting the argument that participation in systemic racism is "normative and routinized," which requires resistance while also making resistance even more of a challenge (54). Opportunities for intervention must be analyzed and strategized with intentionality to attend to those nuances. Such normative participation in racialized structures in everyday life reproduces racial order beyond patently "racist" actions and behaviors. Though individual race-related behavior may vary, the "path of least resistance" reproduces the racial status quo in ways that extend beyond overt racially motivated behavior. From the racialized social systems perspective, the key to confronting systemic racism is identifying the collective practices, mechanisms, and behaviors that reproduce racial domination. Within the normalization process theory's (NPT) capture of implementation (55), the key analytic is "characterizing the work that is done" to reproduce racial domination. Identifying that work requires an analysis of the normative and often unconscious behavior, actions, or negligence to act (which is referred to as epistemic ignorance) rooted in hegemonic systems. Uncovering and dislodging them requires resistance to the status quo.

The language of resistance points to possibilities for alternative approaches to implementation outside the frame of present realities largely responsible for the reproduction of racialized hierarchies by inviting action through strategies of implementation that are designed to promote racial justice. These possibilities invite emancipatory and liberatory ways of knowing and doing that eschew oppressive forces of power and generate political action toward health equity.

In the framework of resistance, CRT, for example, can support implementation processes to advance health equity by focusing on the ways that racism co-constitutes social context as well as encourages action to counter racist contexts by embedding justice-oriented approaches and principles through strategies of dissemination and implementation. A failing of public health research and practice is its "tendency to treat racism as…an easily identifiable and treatable hazard that individuals can be taught to avoid." However, as Chandra Ford notes, "It is more appropriate to consider racism an integral element of the social context in which all populations exist and within which all studies of health disparities are conducted (31), p. 481." CRT holds that racism is not something that will disappear rather, it mandates ongoing, iterative work on that problem. As such, an analysis advancing equitable implementation of health interventions should be processually iterative and facilitate normalizing a practice and way of doing and working that can be monitored and analyzed through continual engagement and relentless inquiry concerning racism and racialized perspectives, which is embodied in CRT and well-translated through the PHCRP tenets.

2.4 Resistance combats epistemic injustice and overcomes the injustice of epistemic resilience

Jose Medina in his text, *The Epistemology of Resistance: Gender & Racial Oppression, Epistemic Injustice, and Resistant Imaginations* (42) offers a socially and politically philosophical perspective on resistance that conjoins scholarship from the Black radical tradition. He deploys a concept called 'epistemic resistance' which is defined as "the use of epistemic resources (knowledge production and knowledge translation capacities and abilities) to undermine and change oppressive normative structures and the complacent cognitive-affective functioning that sustains those structures...(Medina, p.3)." For our purposes, epistemic resources in implementation research include tools such as the development of research questions, research designs, data collection, analytic methods, use of theories/frameworks/models, participatory implementation approaches, implementation methods and strategies such as the guidance by ERIC (Expert Recommendations for Implementing Change) as well as dissemination and implementation practice.

When forms of epistemic ignorance (i.e., research perspectives that are silent about racism) are operational and the norm, the consequence are forms of epistemic injustice. Features of racialized social systems potentially enact epistemic injustice on implementation research and practice through several paths. One of those paths particularly relevant to knowledge/evidence translation which occurs in implementation research impacts on processes and activities of knowing that can result in what is known as epistemic injustice. Epistemic injustice is a concept thought to be introduced as early as the mid to late 1800s by Black female intellectuals and activists such as Anna Julia Cooper though the expression has been coined and popularized by philosopher Maria Fricker (56). Epistemic injustice describes a wrong done to someone in their capacity as a knower (57) and manifests in the exclusion of marginalized and oppressed people from being heard and understood by others in communicative expressions. It manifests in exclusion from the following:

1) being heard and understood by others in the diverse expressions of communication. That is, prejudice is enacted by the receiver of knowledge predicated upon the identity of the knower which serves to undermine the credibility of the

knowledge holder resulting in a dysfunctional and incomplete knowledge dissemination. This form of epistemic injustice Fricker calls testimonial injustice (57);

2) contributing to social understandings and interpretations of the lived experiences and understandings about marginalized and oppressed people. That involves, at the systemic level, the identity-based exclusion of groups of knowers from participating in the shaping of collective understandings regarding their humanity; it is an expression of epistemic injustice Fricker identifies as hermeneutical injustice.
3) inequitable participation in debate, discussion, inquiry, and offering ideas for consideration toward posing alternative possibilities (58). It involves the discriminatory mistreatment of the epistemic agency of members of marginalized groups wherein the exercise of that agency is "unfairly constrained, manipulated, or subverted (42, 57, 58).

Epistemic injustice, occurring in different forms and functions as described, is viciously maintained and sustained by access to boundless resources scoured through colonialist and appropriative means. As such, efforts to transform structures and systems of oppression are often thwarted by their innate ability to reform and rebound; this is referred to as epistemic resilience and is further defined by Rogers as "the phenomenon whereby an epistemological system remains stable despite counterevidence or attempts to alter it" (59). It is from here where resistance calls upon us through the ephemeral voice of Audre Lorde to venture beyond the "master's tools" (60), which includes the dominant, hegemonic epistemological systems and resources of oppression and to utilize tools that effectively dismantle epistemic injustice using resources designed, defined, and determined toward catalyzing transformation through resistance. Rogers highlights resistance as the antidote to this unavoidable form of epistemic resilience—a resistance appropriately birthed outside the bounds of dominant epistemology and destined to unearth its statute. Hence, we advocate for resistance as a tool for justice-making and a critical tenet of an equitable, anti-racist implementation science. In other words, to advance implementation science for equity and dismantle systems of oppression fortified by epistemic resilience, we should call upon resistance through the scholarship of the BRT. For resistance is an epistemically just response.

3 Designing resistant strategies for implementation

> "Design is the process by which the politics of one world become the constraints on another."—Fred Turner (61).

3.1 Resistance and the design of multi-faceted and multi-level implementation strategies

All design reproduces ways of being, knowing, and doing, which is referred to as the ontological dimension of design (62). To concede that every system delivers what it was "designed for" means that when racial health disparities result from a failure of equitable implementation, we must soberly consider that the design of health interventions, including the design of strategies for their translation, implementation, and sustainment, have the capacity to silently reproduce systemic racial injustices to the being, knowing and doing of minoritized and marginalized populations which we observe in those self-same disparate health outcomes. As astutely insighted by Mohamed, Png & Isaac in their discussion of the challenge of deploying decolonial theory in artificial intelligence (AI):

> "…whereas in a previous era, the intention to deepen racial inequities was more explicit, today *coded* inequity is perpetuated precisely because those who design and adopt such tools are not thinking carefully about systemic racism" (63).

Plainly, Mohamed et al. warn that the tools of 'new' health innovations, interventions, technologies, and practices recapitulate and perpetuate racial injustice and harm in contemporary racialized social systems in the absence of apt consideration as to the influence of systemic racism. Similarly to AI, the charge remains for justice-making in the science of implementation to discover how to break, disrupt, and decipher the "coded inequity." Ontological design then would suggest that the inclusion of equitable implementation efforts and access to optimal health in their design has the capacity to affirmatively impact the ways of being, knowing, and doing of populations.

Racialized social systems enact their effect on implementation through the design and deployment of implementation strategies, generating designs rooted in assumptions that can be violent and hostile to individuals who have been "Othered" by those systems; they may widen inequities, or at best leave racialized barriers to equitable implementation in place, unmoved, and untransformed. It may also mean that assets or facilitators of implementation among marginalized communities and through indigenous knowledge are devalued and therefore ignored in the design of strategies, robbed of their capacity to generate equitable outcomes. Implementation strategies may necessarily need to look and be more disruptive to the status quo of operations when that way of doing "business as usual" could be holding inequity in place. Contrary to technocracy, implementation may need to take on a social justice and disruptive tone to mark significant change toward health equity.

Reframing the reasons for implementation gaps as "designed for" by racialized social systems and institutions means that the central task of implementation research is to identify and understand how certain drivers reproduce racialized gaps and disparities in outcomes and then to design strategies that counteract these processes through a resistant imagination. Rather than solutions that target people and their behavior as the problem, developing a resistant implementation strategy chiefly involves shifting the gaze by asking what kind of structural world (environment) must exist to produce equitable implementation and health outcomes, and then resistant strategy design goes about acting on that. Consequently, implementation strategies are obliged to secure not only the routinization and embedding of interventions in practice but also to do so in a way that is equitable and can potentially mitigate group differences in health outcomes. Racial disparities in health outcomes persist in part when the evidence of health interventions has limited reach or poor translation for identity groups disproportionately impacted by disadvantage; those poor dissemination outcomes persist without dissemination and implementation strategies that challenge the status quo which makes it acceptable (normative). Thus, it is critical that scholarship about implementation no longer ignore or be silent about racism; rather, brings it center stage to uncover and explore its performance in dynamic contexts while interacting with features of the intervention and selected implementation strategies.

Another path by which racialized social systems may critically enact their effect on implementation is through muting or disabling the necessary (re)arrangements of relational and material capacities, including power, that would facilitate successful implementation and embedding. Aligning implementation strategies with social justice unfolds the opportunity for health interventions and their implementation through resistance-informed multifaceted and multilevel impacts to counteract the existing structures of racism that have been normatively embedded in US social systems and institutions. In essence, implementation strategies can be made to become artifacts of resistance against the status quo and enable opportunities and capabilities that promote improved health outcomes. Learning from the strategies of social justice movements and social resistance efforts chronicled in the scholarship of the BRT could be penetrative, resonant and relevant for designing strategies and approaches that build community or collective power and raise value for the relational and material agency required for health improvements. As the complexity of racism and its impact on the health of Black Americans is better grasped, the more equipped the science will be to successfully intervene rather than applying strategies that cause harm because they are ill-informed (49) and misdirected.

3.2 Design justice, denormalization and disrupting coherence

If it is accepted that the system is designed to produce inequities, how can strategies to advance implementation at the same time resist the tendencies to implement inequitably? Are there particular implementation strategies that are more reflective of and sustain the function of systems rooted in racial hiearchies or racialized power? Is there an interrogation of the underpinning principles by which implementation strategies are generated or deployed? What is the relationship of those core underpinning principles to projects of emancipation, liberty, and social justice? Implementation typically takes the concept of "coherence" as the point of departure. Per the normalization process theory, coherence is a fundamental accomplishment or "generative mechanism" in normalization. Coherence involves an agent's understanding of an intervention, in context, and its *possibilities* [italics authors] as antecedent to other generative mechanisms such as cognitive participation and collective action (50).

Resistant strategy design for implementation should begin envisioned by resistant imagination, disruptive meaning-making, and critical appraisal of the default collective imaginaries. Resistant implementation means that the interaction between what we do and the meanings it can take on starts with a shared recognition or coherence about the system as producing results that are as designed but unacceptable. In a sense, this could be considered "denormalization." If the universe of possibilities as (re)imagined by actors is the basis of establishing coherence in order to reach normalization, we propose that the first act of resistance must be one of collective imagination to collectively amplify the possibilities and disrupt coherence for the former in order to achieve denormalization. The actors must imagine different possibilities to ensure that those take on meaning, leading to a particular kind of coherence. It can be characterized as coherence to a vision of justice and health equity and, at the same time, willing to be made uncomfortable, inconvenienced, and disrupted in order to achieve that vision, which requires a resistance consciousness. Coherence work is as integral to building practice as it is to changing it (50). The role of champions is perceivably significant when establishing collective coherence in implementation that interrogates and breaks with systems of oppression as well as is open to designing better futures.

Delving into the forefront of implementation research for equity involves the active process of unpacking, dissecting, and adapting strategies—an approach that diverges from perpetuating a closed, "one world" design ontology. When designing implementation strategies with a focus toward justice, Arturo Escobar's perspective in *Designs for the Pluriverse* offers valuable guidance. Escobar advocates for a design orientation centered on collaborative and place-based practices that recognize the interconnectedness of all people, beings and materiality of the earth (62, 64). Similarly, the capture of a resistant imagination in the design of implementation strategies the same seems resonant with deploying a resistant imagination in the design of implementation strategies and methods suggests a need for collaboration, a grounded sense of place and an amplification of the interdependence among all beings and the environment. To counteract the unequal distribution of benefits and burdens inherent in design, a resistance-conscious approach to strategy design should prioritize the reorganization of processes around three key principles: (1) collective capabilities, assets, and capacity building, (2) collective liberation, and (3) ecological sustainability. This shift toward a more inclusive, interconnected and environmentally mindful framework is essential for fostering equitable outcomes and dismantling the structural barriers that perpetuate disparities (62, 65).

4 Conclusion: SANKOFA invoking the legacy and promise of black scholarship

Sankofa is a principle derived from the Akan people of Ghana; its direct translation in the Twi language is "to retrieve," and its expanded translation is that "it is not taboo to fetch what is at risk of being left behind." Sankofa is a reminder to identify what is being left behind during the sweeping momentum of scientific advancement. Instead of looking for tools and solutions to address racialized disparities exclusively in implementation science or even behavioral sciences, we should first recognize their absence or silence in related frameworks and related constructs in implementation science, which in and of itself is complicit and part of the problem. Though its theories, models, and frameworks have been critiqued for not addressing issues that are critical to advancing health equity, such as power, reflexivity, and inequality (66), implementation science *can* ameliorate such deficits through a resistance consciousness activated by an earnest study and inclusion of scholarship beyond the discipline that speaks to issues of power, equity, and social justice used to interrogate the hegemony that maintains inequality. Fortunately, for implementation science, there is an opportunity to seek, understand,

and retrieve insights from the scholarship of Black studies broadly. The Black radical tradition is a disciplinary focus most notably recognized as Black studies or African American studies in higher education. In an interview with Robin D. G. Kelley, the Distinguished Professor and Gary B. Nash Endowed Chair in U.S. History and professor of African American studies at UCLA, Keeanga-Yamahatta Taylor, writing for the New Yorker, features his articulation of Black studies, with a paramount clarification that looms over the distortions of an anti-Black political agenda (67). Kelley says:

> "…It [Black studies] is really about examining Black lives: the structures that produce premature death, that make us vulnerable; the ideas that both invent Blackness and render Black people less than human; and perhaps most important, the struggle to secure a different future." He continues, "It's about interrogating racial categories, understanding the persistence of inequality…and finally the way that African people really tried to remake and re-envision the world, through art, through ideas, through social movements, through literature, through study in action" (3).

As such it is our stance that the scientific translation of health innovations and technologies charged with the explicit goal of advancing health equity will be enhanced guided by the scholarly insights, analyses and insights emanating from scholarship within the BRT discourse. We offer the praxis of resistance which we analytically motivate through linking connotations of social and political philosophy as well as the critical scholarship rooted in the Black radical tradition with implementation science and efforts to pursue health equity.

Despite racialization or the practice of race-making serving as "the template for subordination and oppression" for multiple racial groups, it can also be redemptively a "template for resistance to many forms of marginalization and domination (68)." Omi & Winant in *Racial Formation in the United States* reflect that drawn upon myriad theoretical insights embodied within BRT, new social movements of The Black Movement in the 1960s and 1970s too were inspired by the strategies, organizing tactics, political demands, and more broadly challenges to practices of subordination and exclusion. This paper elaborates upon that claim by conceptualizing the relevance and significance of embodying a resistance consciousness in the pursuit of centering the elimination of racialized health disparities in the science and practice of the translation and implementation of health technologies and novel approaches and innovations to improve population health.

We champion the integration of resistance within implementation science, a stance aimed at actively challenging racial oppression and dismantling prevailing modes of knowledge that are embedded with racial bias. In drawing inspiration from Pierre Bourdieu who raises concerns about the potential drawbacks of an "established social science" impeding progressive and innovative research, we advocate with Guttormsen & David for the use of epistemic reflexivity to counteract this risk (69). Epistemic reflexivity involves an approach to science that aligns "not only with one's scientific training but also against it"—a resonant call for epistemic resistance. To generate the essential friction required for this resistance, we propose engagement with scholarship of the Black radical tradition and critical social theories as powerful candidates. Such scholarship could serve as a catalyst for questioning established norms of racial hierarchy and their intersectionalities, fostering a dynamic environment that encourages critical reflection and innovative thinking within implementation science (69, 70)."

Finally, for the sake of solidarity it is important to acknowledge this analytic approach in no way isolates racism as the only contextual factor underlying racialized and other group health disparities to the exclusion of colluding oppressions (23). Noteworthy, the practice of "making up people" racially or otherwise has proven transferrable and has been imported to other marginalized identities and political struggles (68). Therefore, it is held that the latitude and range inherent within the resistance praxis of BRT allows for the transmutation of a resistance approach across studies involving multiple other oppressive ideological domains that belie inequality.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

CB: Conceptualization, Formal Analysis, Data Curation, Investigation, Methodology, Writing – original draft, Writing – review & editing. WI: Formal analysis, Writing – original draft, Writing – review & editing. EG: Conceptualization, Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Implementation of LGBTQ+ affirming care policies in the Veterans Health Administration: preliminary findings on barriers and facilitators in the southern United States

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Background: In the United States Department of Veterans Affairs (VA), veterans who are lesbian, gay, bisexual, transgender, queer, and similar gender and sexual minoritized people (LGBTQ+) experience health disparities compared to cisgender, heterosexual veterans. VA's LGBTQ+ Health Program created two healthcare policies on providing LGBTQ+ affirming care (healthcare that is inclusive, validating, and understanding of the LGBTQ+ population). The current project examines providers' barriers and facilitators to providing LGBTQ+ affirming care and LGBTQ+ veterans' barriers and facilitators to receiving LGBTQ+ affirming care.

Methods: Data collection and analysis were informed by the Consolidated Framework for Implementation Research, which was adapted to include three health equity domains. Data collection involved telephone interviews conducted with 11 VA providers and 12 LGBTQ+ veterans at one rural and one urban VA medical center, and one rural VA community clinic. Qualitative data were rapidly analyzed using template analysis, a data reduction technique.

Results: Providers described limited education, limited time, lack of experience with the population, and a lack of awareness of resources as barriers. Providers discussed comfort with consulting trusted peers, interest in learning more about providing LGBTQ+ affirming care, and openness and acceptance of the LGBTQ+ community as facilitators. LGBTQ+ veterans described a lack of provider awareness of their needs, concerns related to safety and discrimination, and structural discrimination as barriers. LGBTQ+

veterans described positive relationships with providers, knowledge of their own healthcare needs, and ability to advocate for their healthcare needs as facilitators. Although VA's LGBTQ+ affirming care policies are in place, providers and veterans noted a lack of awareness regarding specific healthcare processes.

Conclusion: Allowing more time and capacity for education and engaging LGBTQ+ veterans in determining how to improve their healthcare may be the path forward to increase adherence to LGBTQ+ affirming care policies. Engaging patients, especially those from marginalized backgrounds, in strategies focused on the uptake of policy may be a path to improve policy implementation. It is possible that creating truly collaborative structures in which patients, staff, providers, leadership, and policymakers can work together towards policy implementation may be a useful strategy. In turn, improved policy implementation would result in increased physical and mental health for LGBTQ+ veterans.

KEYWORDS

LGBTQ+, policy implementation, inequity, veterans, implementation

1 Introduction

Lesbian, gay, bisexual, transgender, queer, and similar gender and sexual minoritized (LGBTQ+) people experience health disparities disproportionately compared to cisgender, heterosexual people (1, 2). Similarly, LGBTQ+ veterans experience greater health disparities than cisgender, heterosexual veterans (3, 4). These health disparities include a greater prevalence of certain mental health problems, including alcohol and substance use disorders, anxiety, depression, posttraumatic stress disorder (PTSD), and higher rates of suicidal ideation and attempts (3, 5–9). LGBTQ+ veterans also experience disparities in social stressors, including decreased emotional and social support and higher rates of homelessness and military sexual trauma (4, 5).

Having other intersecting marginalized identities, in addition to being LGBTQ+, can place veterans at heightened risk for health disparities due to the effects of discrimination. Additional marginalized identities may be shaped by race, ethnicity, socioeconomic status, and place of residence to name a few. Previous research on health disparities for Black and Hispanic veterans indicates that they experience worse health and greater combat exposure compared to white Veterans (10). Rural veterans are more likely to experience health disparities than their urban counterparts as a result of less accessible and available healthcare and public health services, lower socioeconomic statuses, and lower health literacy (11–13). Overall, research on LGBTQ+ veterans with intersecting marginalized identities is sparse. The limited literature indicates that Black transgender veterans are more likely to be socially disadvantaged and experience more mental health and medical conditions compared to white transgender veterans (14). Veterans who are gay men in rural settings report greater depressive and anxiety symptoms and greater tobacco use than their suburban/urban counterparts (15).

Minority stress theory helps explain the causes and consequences of health disparities (16–18). This theory posits that minority group members, such as LGBTQ+ people, experience distinct and chronic stressors due to the societal response to their social identities, including identities based on sexual orientation or gender (16–18). The excessive and cumulative toll of structural factors, such as social stigma, discrimination, and prejudice, experienced by LGBTQ+ people can adversely impact mental and physical health and overall well-being. These same factors can undermine access to and utilization of healthcare by LGBTQ+ people, contributing to unmet needs (19). Historically, healthcare systems in the United States pathologized and discriminated against LGBTQ+ people by applying stigmatizing psychiatric diagnoses and refusing to care for patients with HIV/AIDS (19). Providers may hold negative attitudes toward and lack knowledge about LGBTQ+ people and often report feeling ill-prepared to provide high-quality care to this population (19, 20).

Provider perceptions and understanding of LGBTQ+ people and their healthcare needs may vary based on the setting in which clinical care occurs (e.g., rural facility). Research examining Veterans Health Administration (VHA) providers' viewpoints on LGBTQ+ veterans is limited. However, civilian examinations of provider perceptions and understanding of LGBTQ+ people and their healthcare needs indicate variations in rural provider understanding of LGBTQ+ patient needs (21, 22). For example, rural, civilian healthcare providers reported no difference in how they approach working with LGBTQ+ and non-LGBTQ+ patients (22). Studies of rural providers also illustrate a lack of knowledge and preparation related to addressing LGBTQ+ patient needs, including limited formal education and minimal training upon entering their respective professions (21, 22). Rural providers report that they are less likely to work with openly LGBTQ+ people in their practice (23). LGBTQ+ people in rural-dwelling places are more likely to experience disparities. Because most research on LGBTQ+ veterans focuses on urban populations, it is important to examine patient and provider perspectives to better understand what is common and different about the experiences and needs of rural and urban dwellers (15). In the current study, we define urban and rural based on where the veterans who were served by the facilities lived (e.g., urban-dwelling vs. rural-dwelling).

To increase health equity, the VHA has taken several steps to improve healthcare for LGBTQ+ veterans. In 2012, VHA created a national LGBTQ+ Health Program and currently has two specific directives for LGBTQ+ affirming care: VHA Directive 1341 (Providing Health Care for Transgender and Intersex Veterans) and VHA Directive 1340 (Provision of Health Care for Veterans Who Identify as Lesbian, Gay, Bisexual, or Queer). LGBTQ+ affirming care is healthcare that is inclusive and understanding of the unique healthcare needs of LGBTQ+ people. These directives provide policy and guidance on how to provide LGBTQ+ affirming care and treat all LGBTQ+ veterans with dignity and respect. For example, the directives offer information on how to use a veteran's appropriate name and pronouns and refer to care and the frequency in which sexual health assessments should be conducted. These policies also prohibit harmful sexual orientation and gender identity and expression change efforts or so called "conversion" therapy practices. The delivery of LGBTQ+ affirming care benefits LGBTQ+ veterans by reducing barriers to access and utilization in VHA, increasing comfort among medical providers, and encouraging patients to disclose their health issues, thus leading to improved healthcare and mental and physical health (24, 25).

Although these policies are in place, there is limited data on their implementation in VHA healthcare practice from the perspectives of providers and veterans. The goal of this project was to (1) document provider understanding of and LGBTQ+ veterans experience of LGBTQ+ affirming care in VA, (2) identify barriers and facilitators associated with provider delivery and LGBTQ+ veteran experience of LGBTQ+ affirming care, and (3) assess variations in provider understanding and LGBTQ+ veteran experience of LGBTQ+ affirming care in rural versus urban settings. This manuscript reports findings from qualitative interviews with providers and LGBTQ+ veterans, analyzing their perceptions of barriers and facilitators to accessing, delivering, and receiving LGBTQ+ affirming care in two VHA medical centers (VAMCs) and one VHA community-based outpatient center (CBOC) in the southern United States.

2 Materials and methods

One-time qualitative interviews were conducted with VHA providers and LGBTQ+ veterans. Constructs from the Consolidated Framework for Implementation Research (CFIR), adapted to include three health equity domains (i.e., culturally relevant factors, clinical encounter, and societal context), informed data collection and analysis (26–28). Incorporating the health equity domains into CFIR allowed for the specific measurement of health inequities for LGBTQ+ veterans and were used design interview questions and guide analysis. Provider interviews focused on their awareness, understanding, and experience of providing LGBTQ+ affirming care. LGBTQ+ veteran interviews focused on their experiences receiving LGBTQ+ affirming care at VHA. Interview data were analyzed using template analysis. All research activities were approved by the Central Arkansas Veterans Healthcare System Institutional Review Board and conducted following the Declaration of Helsinki as revised in 2013.

2.1 Setting

This study was conducted within the VHA. Potential participants were identified at three VHA facilities: one urban medical center, one rural medical center, and one rural CBOC. The urban medical center was in southeast Louisiana and the rural medical center and CBOC were both located in Arkansas. In VHA, medical centers offer a wide array of inpatient and outpatient services, including surgery, critical care, mental health services, radiology, and physical therapy. The CBOCs typically only offer limited outpatient services (e.g., primary care, outpatient mental health) in locations that are geographically distinct from the medical center. Each CBOC has a "parent" medical center and most medical centers have multiple CBOCs.

2.2 Framework

CFIR is an implementation determinants framework, meaning it was designed to identify factors believed or empirically shown to influence implementation (28). Five major domains comprise CFIR, including intervention characteristics, outer setting, inner setting, characteristics of the individuals involved in implementation, and implementation (28). There are several constructs within each overarching domain. For the current study, we examined the outer setting, inner setting, and individual-level characteristics. Specifically related to the outer setting, we examined patient needs and resources and external policies and incentives. Related to the inner setting, we examined culture, implementation climate, learning climate, available resources, and access to knowledge and information. Finally, regarding the characteristics of the individual, we examined knowledge and beliefs about the intervention (i.e., LGBTQ+ affirming care as indicated by two VHA policies), individual stage of change, and other personal attributes (e.g., tolerance of ambiguity, intellectual ability, values).

Per recommendations by Woodward and colleagues, we enhanced the CFIR domains with the three health equity domains identified in the Health Equity Implementation Framework (27). These include culturally relevant factors, clinical encounter, and societal context. Culturally relevant factors of recipients include characteristics of people affected by the implementation effort (e.g., socioeconomic status, race and ethnicity, language, health beliefs, or trust in providers). The clinical encounter refers to the transaction between patients and providers during healthcare appointments. Providers' and patients' verbal and nonverbal behaviors shape the clinical encounter. The interactions during this encounter influence decisions about diagnosis and treatment and how care is delivered. Finally, the societal context includes economics, physical structures, and sociopolitical forces (e.g., structural discrimination from institutions, state level laws, political beliefs).

2.3 Participants and procedure

Providers were recruited through snowball sampling across services (e.g., primary care, mental health, audiology, infectious disease). We began by asking the LGBTQ+ veteran care coordinator for the names of providers who worked with LGBTQ+ patients and who they believed would be willing to speak with us about their experiences providing LGBTQ+ affirming care at each of our identified sites. We then asked this initial set of providers to suggest their peers with variability in awareness, understanding, and use of LGBTQ+ affirming care ("Would you be willing to provide some names of providers who we could talk to? Can you think of any providers who may approach LGBTQ+ affirming care differently than you do?"). We then contacted potential participants based on the recommendations we received. Providers were VHA employees completing the qualitative interviews during their work duty time, so they could not be compensated for their participation.

Inclusion criteria for providers included (1) being employed as a VHA provider and (2) treating LGBTQ+ veterans. Potential participants were scheduled and screened for eligibility before completing the informed consent process. After completing this process, providers were asked what service they worked in and their discipline. Qualitative interviews were conducted virtually with the option of visual or audio conferencing and were 30 min long. Providers were interviewed between July and December 2021.

LGBTQ+ veterans receiving VHA care were identified through a one-time chart review of veterans previously enrolled in LGBTQ+ specific programming (e.g., support groups) or with a diagnosis often associated with LGBTQ+ identities (e.g., gender dysphoria, high-risk homosexual behavior). At the time of the study, VHA did not have available fields for self-reported sexual orientation and gender identity in the electronic health record. Therefore, these diagnoses served as a proxy measure of LGBTQ+ identity. Of note, patient-reported sexual orientation and gender identity are the gold standards for identifying LGBTQ+ people (4). If participants agreed to participate, they were asked to self-identify their sexual orientation and gender identity at the time of the interview. The identified veterans were recruited via opt out letters. These letters were modified from opt out letters that were used to contact Veterans with recent suicidal ideation and attempts (29, 30). Additionally, we asked participants about the acceptability of these letters, and they found them to be acceptable. Table 1 lists ICD-9 and ICD-10 codes used to send opt out letters to veterans. The letters stated that if they did not call to opt out in 2 weeks, they would receive a phone call from researchers asking them to participate in the study. LGBTQ+ veterans received $50 for participating in the study.

It is important to note that as proxy measures, the ICD 9 and ICD 10 codes, are outdated and include harmful language. Gender identity disorder and transsexualism are no longer appropriate terms to use when describing people who are transgender and gender diverse (31). Gender identity disorder suggests the experience of being transgender is a disorder and transsexualism is an older term derived from obsolete medical beliefs that conflate gender identity and sexual orientation (7). The use of transvestism stigmatizes people who do not conform to gender stereotypes or within the gender binary (7). Finally, the term homosexual is considered an antiquated clinical term derived from medical gatekeeping and a misunderstanding of the LGBTQ+ community (31). Although we used these codes initially to identify veterans to recruit by mailing opt out letters, we did ask them if they self-identified as part of the LGBTQ+ community and to list their identities.

Inclusion criteria for LGBTQ+ veterans included (1) self-identifying as part of the LGBTQ+ community and (2) taking part in any VHA healthcare visit in the last 3 months. During the phone call to screen and recruit veterans, interested candidates were instructed to answer "yes" or "no" to the following questions (1) Do you identify as LGBTQ+? and (2) Have you had a VHA healthcare visit in the last 3 months? Eligibility required an answer of "yes" to both questions. Candidates were either scheduled to complete the 30–60 min phone interview or offered the opportunity to complete it at that time. At the start of the interview, Veterans were then asked, "How would you describe your gender identity?" and "How would you describe your sexual orientation?" to document their self-described sexual orientation and gender identity at the time of the interview. LGBTQ+ veteran interviews were conducted between October and December 2021.

2.4 Qualitative interviews

The CFIR-informed interview questions provided by framework developers for public use were used for semi-structured interview guide development. Questions were tailored to be specific to LGBTQ+ affirming care by the investigators and informed through consultation with other investigators who have conducted LGBTQ+ research with providers in civilian samples (22). See Table 2 for examples of interview questions.

2.5 Data analysis

All interviews were recorded, transcribed verbatim, and rapidly analyzed using template analysis (32). The version of the approach used in this study is a data reduction technique developed by health services researchers (32). Template analysis is useful when there is a relatively short turnaround for information to inform implementation in health services settings. Template analysis involves developing a template aligned with the interview guide and includes potential

TABLE 1 ICD-9 and ICD-10 codes used to potentially identify LGBTQ+ veterans.

ICD-9 Codes		ICD-10 Codes	
302.85	Gender identity disorder in adolescents or adults	F64.0	Transsexualism
302.6	Gender identity disorder not otherwise specified	F64.1	Dual role transvestism
302.5	Transsexualism	F64.2	Gender identity disorder of childhood
302.3	Transvestic fetishism	F64.8	Other gender identity disorders
302.0	Ego-dystonic homosexuality	F64.9	Gender identity disorder, unspecified
302.52	Trans-sexualism with homosexual history	F65.1	Fetishistic transvestism
		Z87.890	History of sex reassignment surgery
		Z72.52	High risk homosexual behavior
		Z72.53	High risk bisexual behavior

TABLE 2 Example interview guide questions by participant group and CFIR domain.

Participant group	Domain	Subdomain	Example question
Provider	Outer setting	Patient needs & resources	How familiar do you think other providers at your VA are with LGBTQ+ veteran issues?
			What evidence do you see of LGBTQ+ affirming care at your facility?
			Have you heard any stories about the experiences of LGBTQ+ veteran patients at your VA?
		External policies & incentives	What kind of guidance is available to you regarding providing LGBTQ+-affirming care?
LGBTQ+ veteran	Outer setting	Patient needs & resources	Do you see any evidence that employees at your VA are LGBTQ+ affirming?
			Probe (if needed): What do you see? What do you wish you saw?
			What has your experience as an LGBTQ+ veteran been like receiving care at this VA?
			What have you heard from other LGBTQ+ veterans regarding the care they receive at your VA?
	Inner setting	Culture	How would you describe the openness and acceptance of the provider you saw during your last visit towards LGBTQ+ veterans? *Follow up:* The openness and acceptance of providers in general at your VA?
			Can you think about anything about your VA that makes it easier or harder to receive care as someone who is [Veteran's self-described sexual orientation and/or gender identity]? (urban vs. rural, provider factors, staff factors?)

domains, subdomains, and categories. The lead analyst (RSS) reviewed interviews and developed domains, subdomains, and categories based on interview content. Domains and subdomains were based on the overall CFIR domains (e.g., the domain of characteristics of the individual and the subdomain of knowledge and behaviors). Categories were developed based on participant responses (e.g., uncertainty in delivering LGBTQ+ affirming care). Although domains, subdomains, and categories were developed *a priori* based on the interview guides, they were modified as the analysis was conducted.

The lead analyst then reviewed interview transcripts and summarized the content gathered from the interviews in a template. A senior analyst and expert in template analysis (THA) consulted on this project. The senior analyst synthesized content from individual templates to achieve consensus, provided feedback during template development, piloting, and analysis, and audited every fourth template. Upon completion of templating all interviews, the lead analyst created a template matrix that included domains, subdomains, and categories which could be viewed by site and by participant to examine differences across sites and individuals.

3 Results

Of the 32 providers identified, 11 participated in the study. Twenty-one providers across all three sites either did not respond or declined. Reasons for provider declination included (1) reporting that they did not see LGBTQ+ veterans, (2) time constraints, and (3) affirmation that they already provided LGBTQ+ affirming care and did not think they needed to participate. Of the 73 veterans identified, 12 participated in the study. Two veterans called to opt out of participation. One noted they were not out publicly yet and did not wish to participate. Another left a message stating they were not interested. Four opt out letters were returned as undeliverable. Table 3 shows demographic data for VHA provider participants and LGBTQ+ veteran participants, respectively.

Results are grouped into barriers and facilitators to LGBTQ+ affirming care. We present a full overview of barriers and facilitators in Supplementary Tables S1, S2, respectively. Barriers that converged between providers and veterans included (1) providers lack experience in delivering LGBTQ+ affirming care, (2) non-affirming institutional structures within VHA, and (3) societal discrimination impacts what LGBTQ+ veterans expect at VHA.

3.1 Barriers to LGBTQ+ affirming care

Provider and veteran responses were categorized into barriers to delivering and receiving LGBTQ+ affirming care. We elaborate on categories where the reports of providers and veterans converged, including providers' lack of experience in delivering LGBTQ+ affirming care, non-affirming institutional structures within VHA, and concerns about societal discrimination.

3.1.1 Providers lack experience in delivering LGBTQ+ affirming care

Approximately half of the providers admitted they felt unprepared to deliver LGBTQ+ affirming care, as the topic was not integrated into their previous medical education. The providers who reported feeling unprepared were based in primary care and one in women's health. When asked about this topic, one provider readily disclosed, "I was immediately thinking my blood pressure just went up about twenty points because honestly, I feel extremely unprepared."

Similarly, all the LGBTQ+ veterans reported a wide variability in their healthcare experience; some reported no issues and high satisfaction with their care, and others reported experiencing discrimination or a general lack of knowledge by their VHA providers. One veteran explained,

> "I have to remind my [Department of Veterans Affairs] (VA) doctor that I need to have blood work done or get my results from my endocrinologist. I have to remind them that I need to have my labs drawn …. then it's like an afterthought of, 'Oh, yes, I guess you do need this refill.' Or 'Oh, yeah, we better request those records.'"

TABLE 3 LGBTQ+ veteran and provider participant demographics.

LGBTQ+ veterans		*n*
Age	Median Age: 48 (Range 27–74)	
Race	White	8
	Black/African American	3
	American Indian	1
Gender	Transgender women	6
	Transgender men	3
	Cisgender men	3
Sexual orientation	Gay	1
	Lesbian	1
	Bisexual	1
	Pansexual	1
	Unsure	1
	Straight	5
	Attracted to emotional intelligence	1
	No response	1
Facility	Urban VAMC	5
	Rural VAMC	5
	Rural CBOC	2
Providers		
Role	Physician	6
	Psychologist	1
	Speech pathologist	1
	Social worker	3
Service	Audiology	1
	Mental health	2
	primary care	4
	Primary care mental health	1
	Women's health	3
Facility	Urban VAMC	5
	Rural VAMC	5
	Rural CBOC	1

Several transgender veterans wished their providers in VHA healthcare settings were better versed in and able to share accurate information about the physical and psychological aspects of medical transition.

3.1.2 Non-affirming institutional structures within VHA

A majority of providers attributed other barriers to delivering LGBTQ+ affirming care to difficulties related to VHA as an institution. Broader categories pertaining to the institution of VHA include "VA culture" and deficiencies associated with the electronic health record, which at the time of data collection did not have sexual orientation and gender identity data available to providers. Without easy access to this information in the electronic health record, providers could not rely on conducting chart reviews to adequately identify and address the needs of LGBTQ+ veterans.

A few providers also discussed the formal culture of the VA. For example, there is an expectation that one should be referred to by honorifics often associated with perceived gender (e.g., Ms. and Mr.). One provider in Women's Health described coaching another provider caring for a transgender man. The participant said the other provider habitually used "Ms." as a women's health provider and continued accidentally misgendering the patient.

> "I had one issue with one provider [misgendering a transgender man] but she knew when she was doing it, and the more she tried to correct herself with the pronoun, the worse it got. She was so upset with it that she picked up the phone afterwards and called me to talk to me about it. And we continued to work with her on that because it's a habit."

A majority of providers discussed concerns about LGBTQ+ veterans not feeling welcome and affirmed at VA. One provider described a patient who did not disclose his sexual orientation and HIV status out of worry of negative stereotypes.

> "I had a patient who passed away recently. He'd been my patient forever, and he had HIV and for years did not tell me. He got his treatment outside the VA. He used to hide it because he worked at the VA years ago. He was worried that if that ever got into his chart, people would associate it with negative stereotypes about his sexual preferences."

Providers described structures within VHA that were not designed for LGBTQ+ veterans. For example, if a transgender man with anatomy commonly ascribed as female was seeking care through the women's clinic, this man automatically "outed" himself when sitting in a waiting room designed specifically for women. Providers also voiced concerns that LGBTQ+ veterans would not be comfortable being open and honest with their providers due to anticipated and actual discrimination within the VHA and society in general (as discussed below). In this vein, a veteran raised concerns about presenting at the VHA and the potentially detrimental consequences of entering the VHA or military-related functions as a transgender veteran.

> "If a person walks into the VA and they do not pass … that makes the facility dangerous. It could put the veteran at risk from other veterans, and I say that because many people within the veteran community are very vocal about trans people even serving in the military. It's like we do not exist…. If you flub up, like your presentation is not as good, or your voice is not as clear, or maybe something happens, that can put you in danger. And if you are in the wrong environment with the wrong people, especially with males to females, that's how trans people get beat to death, beaten in a parking lot, and it happens. That happens every day. I've had negative experiences at military veteran-related functions."

The veteran's experience highlights how what happens outside of VHA can directly translate to concerns about what to expect at VHA. If an LGBTQ+ veteran encounters an unsafe environment in an event or area where other veterans are present, the worry about the VHA being similar is present.

Veterans struggled with institutional policies or infrastructure that reinforced discrimination against LGBTQ+ veterans. For example, one veteran discussed difficulty finding a gender-neutral bathroom when visiting the VHA. Another veteran described how they had been denied care at the VHA in their home state and forced to drive hours to receive hormone therapy due to a lack of providers willing to deliver it.

> "They were forcing me to go to [another city in another state]. They said there was no other trans hormone doctor in Louisiana, but I knew there was. They were making me go to [city] and when I went there, it wasn't even a good experience. The doctor came in and said, 'You want to be a man. Here, take these to be a man.' That was the full interaction."

A majority of the transgender veterans who were interviewed stated institutional barriers made it difficult for them to access care or want to access care at VHA. Another discussed the bureaucratic burdens of getting his name changed on all his VHA records and forms. This veteran described the additional frustration of knowing he was being turned away by clerical staff because he was transgender. He described being told if he were changing his name due to marriage, they could assist him. However, he stated that because he was changing his name on court documents to reflect his current gender identity, he was turned away despite being against VA policy. The veteran wanted someone who could assist him in overcoming the administrative hassles or explain all the pieces of paperwork necessary to update his name in the VHA system.

3.1.3 Societal discrimination impacts what LGBTQ+ veterans expect at VHA

Veterans and providers discussed how discrimination outside of VHA can impact what LGBTQ+ veterans expect to experience inside VHA. Further, providers and LGBTQ+ veterans discussed concerns about structural discrimination through anti-LGBTQ+ laws and policies. Although these policies would not apply to VHA, they reported concerns about how these laws and policies influence access to care. One provider discussed that even when providers were affirming, it would be reasonable that LGBTQ+ veterans may be hesitant to disclose information about their sexual orientation or gender identity due to societal discrimination in general.

> "Based on the remarks and judgment and harassment they feel in general in the community may make them less comfortable or less willing to disclose things about their identity to their provider or even come here to seek care. Harassment can happen on their bus trip here or outside [of the VA]."

Similarly, one veteran discussed the detrimental effects of societal discrimination on transgender veterans. She noted the concerns transgender veterans may have due to a history of real violence towards themselves or towards transgender communities in general.

> "[Transgender veterans] feel isolated, and some of them live in fear of being hurt. At one time or another they were mistreated, but I think if somebody does not like them, they'll wait for them to corner them if you know what I mean.… If you look at it in society there's been a lot of violence toward LGBT [people]."

Although the experiences described were not directly at VHA, both providers and veterans highlighted how they can impact the willingness to seek VHA care. If a veteran encounters discrimination in society in general, they are likely going to perceive that discrimination will also occur within VHA.

3.2 Facilitators of LGBTQ+ affirming care

We elaborate on categories in which provider and veteran reports converged, including provider interest's impact in delivering LGBTQ+ affirming care and acceptance towards LGBTQ+ veterans. Some key differences by group noted by several participants include consultation with trusted peers (providers) and advocating for and awareness of one's own healthcare needs (veterans).

3.2.1 Positive impact of providers invested in delivering LGBTQ+ affirming care

A majority of the providers interviewed expressed a desire to build their skills to delivering LGBTQ+ affirming care. One provider explained, "Even before we talked today, [I] have had a strong interest in more educational development about this community and even maybe some interest in doing more with the hormone therapy." A second provider elaborated, "Anything I can do to help out with this particular population has personal meaning for me, but also just in general, it's a good thing to provide care to people who for a long time have not gotten the care that they need." Even with personal reasons and trusted peers as resources, providers still reported aspirations to increase their education in LGBTQ+ affirming care. Almost all providers wanted more education and training to enhance care for LGBTQ+ veterans. However, they also described time constraints as preventing them from participating in training and, if they were able to attend such training, to then become practiced at applying the new knowledge and skills they learned.

Relatedly, veterans clarified the impact of knowing that providers care and were working towards providing LGBTQ+ affirming care. One veteran appreciated the proactiveness of the care team coordinating her hormone therapy, "They're not just [saying] come see us when you need care. They make sure you are okay, and they do the right things…. My last visit was with [hormone therapy doctor]. Her and her nurses are fabulous." Another veteran reported generally being treated well by his providers and not experiencing heterosexism. "Because I'm openly gay and any healthcare provider I'm dealing with where it might be a relative issue, I am very forthright about it and I've never seen any kind of negative reaction at all." Nevertheless, several LGBTQ+ veterans suggested recommendations for VHA to improve LGBTQ+ affirming care, such as organizing support and educational groups. Veterans also requested a desire for more knowledgeable providers.

Veteran participants clarified that the range of medical services they could obtain from the VHA were limited, observing that VHA does not provide gender-affirming surgeries at this time. One veteran hoped this would change soon and that if other federally-funded healthcare options (e.g., Medicaid) allow for gender-affirming surgeries, the VHA should also.

3.2.2 Openness and acceptance towards LGBTQ+ veterans

In addition to delivering and receiving specific types of care, providers and veterans emphasized the importance of openness and acceptance as part of high-quality LGBTQ+ affirming care. Some providers described their own experiences as belonging to the LGBTQ+ community or valuing social justice during the interviews. One provider described how the facility responded to LGBTQ+ veterans,

> "I think that our facility is very open and accepting. I think that the providers do not pass any kind of predetermined judgment…. I think that as a group we are all very open and we have many staff, many residents, many employees that belong to that community as well. So, I think as a group in general we are very accepting."

Similarly, veterans discussed the importance of acceptance received from providers and staff. One veteran stated, "They are open, accepting, and understanding… for the most part, I have not had any issues gender-wise. I have had the utmost respect." A veteran who was a cisgender, pansexual man stated, "I feel they are open and accepting. I feel like they do a good job." Veterans emphasized the importance of being affirmed and seen as they are in their healthcare environment. These experiences of being accepted and affirmed reportedly increased the likelihood that these veterans would continue to access VHA care. In interviews, veterans highlighted that providers who truly understood and provided LGBTQ+ affirming care enhanced their trust and engagement in healthcare at VHA.

3.2.3 Providers are comfortable consulting with trusted peers

Providers discussed the power of personal connection and resources. For example, several providers referred to a previous clinic director who identified as a transgender woman. Although this director no longer worked in this clinic, the providers reported feeling comfortable contacting her for support. Providers also mentioned key contacts within their own VHA system, including the LGBTQ+ veteran care coordinator, transgender care coordinator, and women's health service leads to name a few. Providers expressed comfort reaching out to colleagues they knew possessed subject-matter expertise in LGBTQ+ affirming care. This willingness to seek support from trusted colleagues underscores the importance of professional resources and consultation within the VHA system.

3.2.4 Veterans as knowledgeable about and able to advocate for their healthcare needs

Although veterans expressed frustration about knowing more than their doctors, they also discussed how it is helpful for patients to understand their own healthcare needs. "If I could give a veteran who was coming out as transgender advice, I would tell them to do the research on everything: blood levels, the effects of hormones, how to mentally transition first before your body, specifically that mental transition first then seek medication. But to learn everything first because more than likely they need to know everything. They need to know more than the average doctor would know."

Similar to knowing their own healthcare needs, veterans emphasized the importance of advocating for their own needs and responsiveness from providers. One veteran stated, "I knew there was a trans doctor at the VA, but they would not let me go to [closest VA]. So, I ended up looking online and finding her. I requested to meet with her.… She actually called me at six o'clock in the morning and said, 'I'll be your doctor.' So, I did not have to go to [another city in another state] anymore."

The three veterans who were cisgender men with sexually minoritized identities all received pre-exposure prophylaxis (PrEP) at VHA. They were all able to speak to their needs of accessing PrEP to reduce the risk of getting HIV. One veteran stated, "I feel like anyone who has sexual relations with anybody should have HIV checks more regularly. I try to get one at least every 2 to 3 months. If I do not personally go on my own, [the HIV test] gets done when I get my PrEP with my blood drawn. They also check for [sexually transmitted diseases]. If most people know [their sexual health] it protects others."

3.3 Recognizing intersecting identities

In addition to examining overall barriers and facilitators, we were interested in differences based on living in an urban vs. rural setting. Participants discussed differences based on the locations in which they received healthcare. For example, one cisgender, gay male participant who accessed care at the urban VAMC stated, "I think a factor for the providers and staff is that New Orleans has historically been very accepting situation for that community. [LGBTQ+ issues are] something that if you live in that region, you have to deal with it. It's not a closeted community." In contrast, a transgender woman accessing care at a rural CBOC stated,

> "I happen to be living in Arkansas, which is bible belt territory and if I'm more openly presenting – Say I dress very feminine and have facial hair because ladies can have a beard too – if I'm running around all femmed up with a beard down to my Adam's apple, I'm probably going to get my ass beaten simply for being in the wrong place because it's 50 years behind here."

Providers also spoke about locational differences. For example, one provider at the rural VAMC commented, "I think in states that are less accepting, like Arkansas, there's the danger of knowing what is an affirming space […] I think for someone who is trans and without very clear spaces, it can be scary, and people can feel hypervigilant to danger if they aren't sure who is going to say or do something." Another provider discussed the difference between the urban VAMC and living in the urban city: "I would imagine in my mind that people coming to the VA would probably feel more comfortable in New Orleans just because I feel like people can be a little more free to be themselves [here]."

In addition to rurality, considerations about the intersection between LGBTQ+ identity and race were discussed by veterans as well. For example, one veteran noted attending LGBTQ+ support groups but realized he was the only Black person who attended. He stated he asked another Black LGBTQ+ veteran why they did not attend, and the response was, "It's because they did not really see people like themselves really doing it. The providers were all white people." Veterans reported a desire for community, with several noting that LGBTQ+ support groups were limited due to the COVID-19 pandemic or there was limited representation in the LGBTQ+ support groups.

Related to race, veterans called attention to how they may experience anti-LGBTQ+ discrimination in diverse racial and ethnic communities, including communities to which they may or may not belong. The experience of anti-LGBTQ+ discrimination from different marginalized groups (e.g., rural-dwelling people, racial and ethnic minoritized people) highlights how although people may share some aspect of similarity in identity or even both belong to marginalized groups, they can experience discrimination of their additional marginalized identities. Societal discrimination can be pervasive through all people resulting in further discriminating and harm.

4 Discussion

LGBTQ+ affirming care is crucial for LGBTQ+ veterans to comfortably access and remain engaged in VHA care. The main goal of this paper was to understand the implementation determinants of LGBTQ+ affirming care at two VAMCs and one CBOC in the southern United States. Applying an enhanced CFIR to organize and interpret our findings, we identified barriers and facilitators within the outer setting, inner setting (VHA), individual characteristics, and health equity domains (i.e., culturally relevant factors, clinical encounter, societal context).

Although VHA's LGBTQ+ affirming care policies are in place, VHA providers and LGBTQ+ veterans described a lack of overall awareness regarding the policies and how to provide or access healthcare optimally aligned with the policies. However, providers reported a strong desire to learn more and enhance care for LGBTQ+ veterans, while LGBTQ+ veterans wanted providers to be more aware of their unique needs and experiences. Of note, few providers referenced the numerous VA online training materials in LGBTQ+ health or the national provider-to-provider transgender e-consult as tools that they used for education and training, suggesting that more widespread dissemination is needed. VHA's LGBTQ+ affirming care policies state that care for LGBTQ+ veterans should be offered in VHA facilities. Although care may be offered, both veterans and providers discussed gaps in providers' knowledge and ability to deliver high-quality care for LGBTQ+ patients. For example, being turned away for care that was not available (i.e., hormone therapy). Notably, veterans were satisfied with care when their providers were open and affirming. This finding dovetails with previous research indicating that LGBTQ+ people may be satisfied with care if providers make some effort to affirm their identity (even if it is not perfect or care is suboptimal) (33, 34).

Results are similar to evaluations of LGBTQ+ affirming care implementation outside of VA. For example, providers are interested in more learning and training and find it difficult to find the time to attend training (20). Civilian LGBTQ+ affirming care implementation studies found concerns over the messages the system sends and how these may impede LGBTQ+ affirming care (e.g., unenforced policies, physical structures not designed for LGBTQ+ patients) (20, 35). Our results support VHA and civilian concerns from providers about comfort, how to provide LGBTQ+ affirming care, and desires for more training. LGBTQ+ veteran concerns about VHA being a welcoming environment were also echoed in the current study.

The results align with previous studies examining VHA providers' experiences of working with LGBTQ+ veterans and LGBTQ+ veterans' perceptions of VHA care (36, 37). The current study's findings support literature suggesting LGBTQ+ veterans experience ambivalence and reluctance to seek treatment at VHA due to experiences with other veterans and the military (11). Veterans discussed this related to discrimination within VHA and society in general.

Veteran and provider reported experiences of societal discrimination and discrimination within VHA, as well as the interaction between the two, speak to how LGBTQ+ veterans may experience minority stress and how their environment can exacerbate it. For example, if an individual encounters discrimination in the community while walking to VHA or using public transportation, it likely will make them even more on guard when they enter the facility. They may begin to anticipate discrimination from other veterans, staff, or providers as they enter their healthcare environment. This compounding effect of minority stress can negatively impact their physical and mental health. It may be helpful to improve LGBTQ+ affirming care throughout the entire VHA system to reduce minority stress. LGBTQ+ affirming care includes affirming actions of providers and staff (e.g., using correct name and pronouns, asking about partners in a gender-neutral manner) as well as the environment (e.g., safety signals, materials with same-gender couples).

Results of the current study contribute additional information to the literature on provider- and patient-level barriers to LGBTQ+ affirming care. Further, these results add helpful information to consider intersecting identities. For example, veterans and providers noted the difficulties of living as an LGBTQ+ veteran in rural settings. Veterans who were transgender and lived in rural areas reported differences from those who were cisgender and lived in urban areas. Given that much of the research on LGBTQ+ affirming care happens in urban environments, the current study provides some unique considerations to the situation of rurality and living as an LGBTQ+ veteran. For instance, providers and clinics in rural settings may need to pay even more attention to LGBTQ+ affirming care. This could include ensuring safety signals are in major entryways and patient exam rooms so that LGBTQ+ veterans know the location is safe and affirming. Making healthcare settings more inclusive could also include providing more training to providers in rural settings to ensure they can provide LGBTQ+ affirming care as well as be thoughtful to the environment LGBTQ+ veterans may be experiencing.

In addition to rurality and gender, we observed difficulties for participants who identified as transgender and part of an ethnic and racial minoritized group. It may be important to consider the needs for veterans and their many identities in designing services that are made for or designed by people with multiple shared identities (e.g., peer support groups, providers who themselves who share similar characteristics to veterans). If people cannot create or offer services specifically based on identity considerations, then providers should consider their own positionality and ways to make veterans feel welcome and included. Additionally, the LGBTQ+ community is not a monolith and includes multiple genders and sexual orientations (e.g., non-binary people, bisexual people). Therefore, providers and staff should consider patients' specific identities versus generalizing information about LGBTQ+ people overall.

In this study, several barriers to delivering LGBTQ+ affirming care (providers) and receiving LGBTQ+ affirming care (veterans) were identified. VHA currently has two specific policies focused on providing LGBTQ+ affirming care – one for transgender and gender-diverse veterans and one for LGBQ+ veterans. Policies are an effective initial step to creating an inclusive and affirming environment for LGBTQ+ Veterans. However, policies alone do not create change. Mechanisms need to be in place to facilitate dissemination, awareness, and enforcement. Without specific mechanisms for implementation and accountability to these policies, change will not occur. There are certain mechanisms already in place at the national level (e.g., the LGBTQ+ veteran care coordinator program (38), national availability of trainings), and more mechanisms are needed.

Results from this paper can support additional work to improve the implementation of these policies. The next steps after identifying barriers would be to purposefully identify implementation strategies (i.e., activities within a setting to address barriers and ideally assist with effective implementation) to improve the implementation of the LGBTQ+ affirming care health policies. These strategies may target the healthcare system, providers and staff, and LGBTQ+ veterans. Regarding strategies that face the healthcare system, developing relationships between several invested key personnel (e.g., network directors, facility directors, LGBTQ+ veteran care coordinators) may be a successful strategy to address structural and systems-level barriers to improve LGBTQ+ affirming care. Examining and evaluating LGBTQ+ affirming care at the systems level may also be beneficial to identify how many LGBTQ+ veterans are accessing VHA care and whether their needs are being met.

Participants clarified the need for more education and training for providers and staff. Some providers noted this during their interviews and included providers' willingness to learn (e.g., the provider in Women's Health who recognized she was misgendering someone and reached out for support). The potential need for more education and training was also gathered from provider declination to participate. For example, one provider declined to participate because they said they do not treat LGBTQ+ veterans and another declined because they felt they already provide LGBTQ+ affirming care. These suggest maybe a limited awareness of LGBTQ+ veterans and the changing and evolving nature of their needs. Educational meetings to provide training and resources would be beneficial, including protected time for participants to attend and practice what they have learned (20). Despite the availability of two dozen trainings in the VA online education portal, this resource was only mentioned by a few providers. It may also be possible to change the infrastructure so that providers and staff are required, at minimum, to learn the basics of LGBTQ+ affirming care, including inclusive language practices to prevent misgendering. For example, certain VAMCs mandate that all providers and staff complete basic online training in LGBTQ+ affirming care. Such a mandate could be broadened to other VHA facilities. It may be helpful to design specific tools (e.g., pocket cards) and focused education (e.g., fast facts during team huddles) that can be quickly and efficiently delivered to overcome time constraints shaping providers' workdays.

Providers also brought up consulting trusted peers. Although this is a facilitator, it may place undue burden on a handful of people to be the only local LGBTQ+ affirming providers. Meanwhile use of nationwide provider-to-provider transgender e-consultation was not mentioned. Recognizing the trusted and expert peers may be a helpful building block to leverage for further education and create greater capacity within healthcare systems.

Finally, LGBTQ+ veterans in this study provided several recommendations related to how they would like to receive care. All the veterans reported knowledge of their own healthcare needs as LGBTQ+ veterans. Typically, policies are not implemented or considered with those most affected by them in mind (39). It is possible that substantively including LGBTQ+ veterans in policy implementation may increase the likelihood that policies are implemented with their needs in mind and reach those most in need of the policies (39). Practically, this could include allowing veterans to provide input on policy implementation strategies, materials, and resources. Co-designing the policy implementation resources or creating resources with LGBTQ+ veterans may allow more collaborative power sharing with LGBTQ+ veterans as well as integrate their lived experience into implementation. This would allow for veterans' points of view and needs to be centered in the work of policy implementation.

4.1 Limitations

We attempted to recruit providers with diverse viewpoints, but the majority recruited for this study were highly invested in LGBTQ+ affirming care. Although we recruited a couple of providers with limited LGBTQ+ affirming care knowledge, it would be helpful to recruit providers who were opposed to or had extremely limited knowledge related to LGBTQ+ affirming care. Further, we did not collect demographic information from providers beyond their work setting and role. Another limitation is using diagnoses as a proxy measure to identify potential participants because these diagnoses can be stigmatizing as well as inaccurate in identifying LGBTQ+ people, as described above. It is best practice to use self-identified gender identity and sexual orientation to identify LGBTQ+ people (4). This was not possible at the time of this study as the gender identity and sexual orientation data fields only recently became available in VHA. It is likely that accurate identification of LGBTQ+ veterans in the electronic health record (instead of using proxy measures of ICD codes) will allow for more effective recruitment of these veterans for research in the future. Additionally, we were not able to recruit any people with genders outside of the binary and were unable to recruit any cisgender women; therefore, various gender experiences as well as sexual minoritized people are underrepresented in the sample.

4.2 Conclusion

Both LGBTQ+ veterans and VHA providers reported a desire for more LGBTQ+ affirming care in VHA. Veterans also felt affirmed and welcomed when they believed they received LGBTQ+ affirming care. Veterans provided several recommendations for what they would like to see within VHA. Engaging LGBTQ+ veterans in determining how to improve their healthcare may be a promising path forward to increase understanding to LGBTQ+ affirming care policies as well as ultimately improve access to and reduce inequitable healthcare for LGBTQ+ veterans. Creating collaborative structures can enable LGBTQ+ veterans and VHA personnel to work together to implement these healthcare policies. Using the information in this study may be one solution that increases the effective implementation of LGBTQ+ affirming care in VHA.

Data availability statement

The datasets presented in this article are not readily available because they are qualitative data specific to a marginalized population. Requests to access the datasets should be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by Central Arkansas Veterans Healthcare System. The studies were conducted in accordance with the local legislation and institutional requirements. The ethics committee/institutional review board waived the requirement of written informed consent for participation from the participants or the participants' legal guardians/next of kin because This study required interviews conducted via telephone.

Author contributions

RS, SL, JK, TA, MK, and JS assisted with conception and design of the project. PM provided feedback on the project, assisted with site identification, and recruitment of provider participants. CW provided feedback on measurement tools. RS and TA performed the qualitative analyses. RS wrote the first draft of the manuscript. SL and CW wrote sections of the manuscript and heavily revised initial drafts. All authors contributed to manuscript revision, read, and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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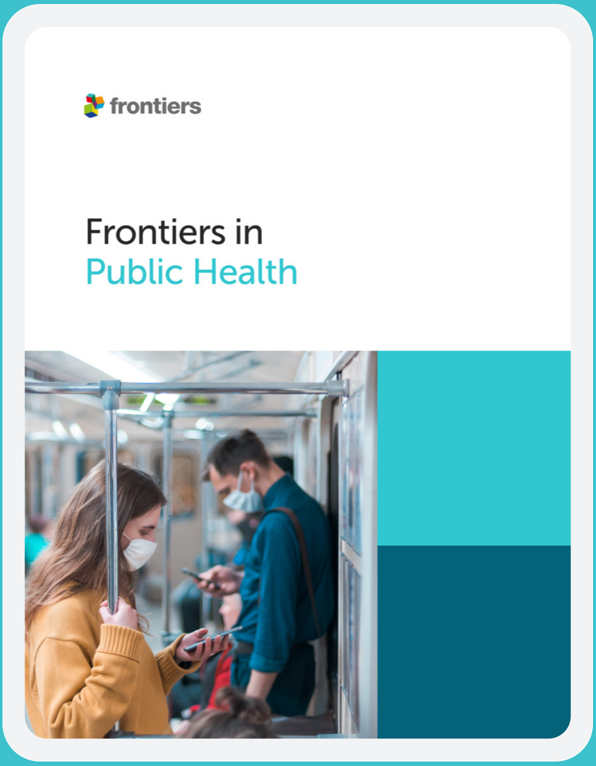

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