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Factors influencing evidence-based cardiovascular disease prevention programming in rural African American communities: a community-engaged concept mapping study

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Abstract

Background African Americans experience cardiovascular disease (CVD) disparities, and the burden is greatest in the rural south. Although evidence-based CVD prevention and management programs have been tailored to this context, implementation has been limited and not sustained long-term. To understand how to implement and sustain evidence-based CVD programs at scale, we must explore the perspectives of organizations serving rural African American communities and situate findings within foundational Implementation Science frameworks.

Methods This study used group concept mapping (GCM) to elicit and synthesize stakeholder perspectives into an action-focused conceptual model depicting factors influencing implementation of evidence-based CVD programs. Representatives of community-based, faith, and healthcare organizations serving African Americans in five rural North Carolina counties were recruited via purposive sampling techniques. Participants (total n = 31) completed three activities: 1) brainstorming in response to an open-ended prompt (n = 31); 2) sorting brainstorm data into wider concepts and rating each in terms of relative importance and feasibility (n = 26); and 3) collaborative interpretation and refinement of the concept map (n = 19). Multivariate statistical analysis was used to generate a concept map. Absolute pattern matches comparing ratings of the relative importance and feasibility of each factor were generated and depicted via ladder graphs.

Results The final concept map included five factors: *Accessibility, Community and Social Factors, Education and Training, Financial/Resource Development,* and *Organization Capacity and Staffing.* There was high agreement (*r* = .98) between ratings of importance and feasibility. *Education and Training,* both within organizations and the wider community, was rated as the most important and feasible factor and *Financial/Resource Development* was the least important and feasible.

Conclusions The concept map emphasizes aspects of organizations (inner setting), their surrounding community (outer setting), and individual stakeholders (participants, implementers) as influencing implementation of evidencebased CVD prevention and management programs in rural African American communities. The nature of the intervention or implementation processes were de-emphasized. Organizations in rural African American communities may feel equipped to implement a range of evidence-based programs, provided strategies address the contextual

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and structural barriers that impede their success. Group concept mapping helped distill and prioritize initial leverage points for action in our project catchment area by facilitating a community-engaged process of data generation and interpretation.

Keywords Cardiovascular disease, Evidence-based programs, Implementation, Group concept mapping, Community-engaged research

Contributions to the literature

- This study characterizes the unique factors influencing implementation of evidence-based cardiovascular disease prevention and management programs in rural African American communities, from the perspective of implementing organizations, a critical yet underexplored setting and stakeholder voice.
- We interpret the emerging concept map in terms of the Consolidated Framework for Implementation Research. Results provide novel community-grounded insight into the relative salience of components of this predominant framework in rural African American communities.
- This study provides a practice-based model for how practitioners can use community-based participatory methodology with an Implementation Science lens to identify and prioritize actions within a regional implementation strategy.

Background

African Americans in the United States experience disproportionate cardiovascular disease (CVD) morbidity and mortality, and the burden is greatest in rural communities in the south [1]. CVD prevention and management programs (CVD EBPs) have been developed [2, 3] and there has been preliminary work to tailor and test their impacts among African Americans living in rural settings [4]. Despite their proven effectiveness, even tailored CVD EBPs are not widely or sustainably implemented [4]. There is a dearth of studies applying implementation science methods or frameworks to look at the specific determinants of CVD EBP implementation [5]. Additionally, failure to thoroughly examine and account for the unique implementation assets and challenges within rural African American communities compounds this evidence-to-practice problem [6]. Broadly, assets include a strong sense of community [6], robust institutions (e.g., faith communities) [7], and collective resilience to adversity [8]. While barriers include structural racism and its effects [9] involving a historical under-resourcing of human services and community infrastructure [9]. Each community and region are unique, however, and an indepth understanding of the specific interplay of these factors is needed to develop actionable local implementation plans. Community-based participatory research (CBPR) approaches can help us develop this understanding. CBPR engages stakeholders as experts in meaning and decision making and is increasingly recognized as useful in bridging research-to-practice gaps, especially in historically marginalized communities whose perspectives and priorities are often underrepresented in research [10].

Group concept mapping (GCM), a participatory method for eliciting and synthesizing group perspectives, is a promising CBPR-aligned approach [11]. It is recognized as well suited for examining complex health issues in collaboration with communities, and over 100 such studies have been published [12]. In GCM, key stakeholders are engaged in cycles of data generation, synthesis, and review resulting in a concept map, a visual and mathematical representation of their shared understanding of an issue. There are several aspects of the concept mapping process that are thought to facilitate community engagement. First, stakeholders are directly involved in the generation and processing of the source data. Additionally, the output includes rich and visually organized quantitative and qualitative information that facilitates engagement from diverse audiences [13]. Finally, participants interpret the findings as a group, finalizing the concept map through shared sense making. Greater community engagement is thought to benefit both the research and the community, by improving the validity and utility of the findings [14].

This study uses a GCM approach to explore the question: What factors influence implementation of evidence-based CVD programs in rural African American communities? The work was grounded in and guided by CBPR principles [15], with the goal of generating community-centered insight to leverage assets and overcome barriers to implementing a CVD EBP named Heart Matters.

Methods

Setting

North Carolina (NC) is part of the nation's 'stroke belt' — a region in the southeast with high rates of CVD. Eastern NC, which is predominantly rural with large African

American populations, has some of the highest prevalence of CVD risk, morbidity, and mortality in the state [16]. In 2021, the University of North Carolina, Chapel Hill's Center for Health Equity Research (UNC CHER) launched the Collaborate and Leverage Evidence in an African American Rural Network (Co-LEARN) study (R01HL157255, Corbie, Dave), which seeks to scale and test the effectiveness of Heart Matters, across five rural counties in eastern NC. Heart Matters is a 12-month behavioral change intervention targeting multiple CVD risk factors. Heart Matters consists of 26 group sessions and 7 individual visits. Its lifestyle goals include: 1) reducing weight by 15 lbs. or another agreed upon goal, 2) limiting fat intake by consuming 20-50% or less of total calories from fat, 3) limiting daily sodium intake to 2300 mg or less, 4) accumulating 150 min of moderateintensity exercise each week, 5) limiting alcohol intake; women are advised to consume no more than one alcoholic drink per day and men are advised to consume no more than two alcoholic drinks per day, and 6) diet and physical activity tracking [16]. Heart Matters has demonstrated effectiveness in key near-term outcomes, including promoting healthy eating, physical activity, and family support for lifestyle change, critical behavioral and psychosocial predictors of hypertension control [17]. The Heart Matters program had been previously adapted from PREMIER, an evidence-based CVD treatment program, and tailored to our study catchment area in partnership with Project GRACE, an 18-year community-academic partnership in the region [16]. The Co-LEARN study aimed to build on this foundation by developing and testing a durable local infrastructure for program implementation that tapped the potential of trusted organizations within African American communities. Using GCM to understand, from the perspective of these key stakeholders, the contextual landscape influencing Heart Matters scalability and sustainability was a key first step. The core GCM research team (hereafter referred to as the research team) included academic partners, community partners, and methodological experts. Specifically, academic partners were faculty and staff of UNC CHER. Community partners were members of Project GRACE, representing community-, clinic-, and faith-based organizations/sectors, including a fulltime coordinator who was from and resided in the study catchment area. Methodological experts were researchers from Concept Systems, Inc., the progenitors of the GCM methodology and leading experts on its application. The wider Project GRACE steering committee provided regular guidance to the initiative.

Sample and recruitment

Recruitment activities occurred between June and November 2022. The research team designed sampling and recruitment methods through a series of collaborative meetings. Plans and materials were shared with the Project GRACE Steering Committee during monthly meetings to solicit feedback and allow the team to respond proactively to comments or concerns. Recruitment used a mixed purposive and convenience sampling approach that engaged community partners as trusted messengers, in line with best practices for recruiting groups who are frequently underrepresented in research [18–20].

We aimed to recruit one representative per organization. Organizations were eligible to participate if they were: 1) community-based organizations providing services related to CVD or its social risk factors (e.g., emergency food assistance, housing rental assistance); healthcare organizations providing or overseeing clinical care (e.g., hospitals, public health agencies); or faithbased organizations; 2) located in the study catchment area (focused on five rural counties but inclusive of neighboring counties with comparable rurality and socioeconomic profiles), and 3) served African American adults. We asked eligible organizations to identify a representative with sufficient historical and content knowledge to participate.

We used a multi-step process to identify eligible organizations with the goal of achieving even representation across sectors and counties. First, we referenced a comprehensive list of organizations that had been compiled during the exploratory planning phase. To update and augment this list, community partners added any potentially eligible organizations within their professional networks. Then, we shared the list with the Project GRACE steering committee, soliciting input on organizations that were missing or could be removed (e.g., due to closure), and suggested points of contact. Lastly, we conducted a final round of targeted outreach to community, government (e.g., health departments), and academic partners working in the area, and used confirmatory internet searches to finalize the list.

Community partners made initial outreach attempts to organizations within their respective sectors via phone and email. If initial attempts were not successful, then community partners attempted to contact them a second time at least two days later. After three unsuccessful attempts, organizations were not contacted further. If organizations indicated interest in participating in the study or wanted additional information, they were connected to the local field coordinator, who reviewed study details, confirmed eligibility, and addressed any questions or concerns with participants. They were asked to identify a back-up within their organization to complete activities if they were not able to do so, although the goal was to have the same representative complete all three activities, and incentives were provided at the organizational level (i.e., \$50 for brainstorming, \$50 for sorting and rating, and \$75 for group interpretation). Finally, participants were asked to help identify any organizations that may be eligible and interested in this research study and provide their contact information to, or put the organization in contact with, the project coordinator. The snowball sampling approach [17] helped augment the list-based purposive sample.

Group concept mapping process Brainstorming

The first activity, brainstorming, involves soliciting group input in response to a focus prompt. In our study, enrolled participants were invited to complete brainstorming asynchronously and virtually using the groupwisdom platform [21], to reduce participation barriers related to scheduling, transportation, or COVID-19 safety concerns. They received instructions for accessing the platform using an anonymous login and were encouraged to complete the ~ 30-60-min activity in one sitting, although they could return as many times as needed while the activity was open (October-December 2022). After logging in and providing informed consent, they were asked to complete a brief 8-item structured questionnaire collecting information on their role in their organization and organizational characteristics, including size, service area, and sector (e.g., healthcare-, faith-, or community-based). They were also asked to describe the type of CVD-related services they offer and the length of their experience offering these services. Questions were developed by the research team and/or adapted from prior instruments utilized by the academic partners in comparable GCM studies.

Next, participants were asked to respond to a single focus prompt: 'What are the factors that can affect the delivery of a high-quality heart disease prevention program by your organization in your community?' and provided with the reference text:

As a reminder, high-quality heart disease prevention programs help participants lower their risk in multiple ways including eating less salt and fat, moving more, limiting alcohol, and losing weight. Programs use interactive individual and group sessions to help participants learn new information, build new skills, and set and track their goals over a year-long period. Sessions are led by community members trained to deliver the program, such as teachers, coaches, and clergy members, and health professionals, like nutritionists, nurses, and personal trainers.

The research team, inclusive of community partners and researchers at Concept Systems Inc., developed the focus prompt and reference text to address our unique research goals. The team included a general description of the program model, versus a more specific description of the Heart Matters program, for several reasons. First, a goal of the Co-LEARN initiative was to collaboratively refine the HeartMatters program, through concept mapping and related participatory planning activities. As such, the exact details of the program and implementation model weren't known at the time we conducted the study. Additionally, there was concern that respondents would struggle to engage with long or overly technical implementation details. Community partners involved in the development and feasibility trial of the Heart Matters program helped to develop the general program description in the focus prompt, ensuring it was accurate and would be clearly understood by the intended participants. Instructions in the platform encouraged participants to respond to the prompt by typing a statement that answers the focus prompt, with each statement representing one unique idea. There was no limit to the number of statements participants could submit.

After six weeks and three reminders to those who had not yet logged into the platform, we closed the brainstorming activity. To prepare the statements for sorting and rating, first, we took the full statement list and cleaned it by combining overlapping or repeating statements, removing particularly unclear or partial responses, and grouping the resulting unique statements into seven larger categories. Next, we reviewed and made minor edits to statements to relate them more clearly to the focus prompt, as needed. For instance, we edited "Women need to be educated on heart disease" to "lack of education for women focused on their experience of heart disease".

Sorting and rating

In the second activity, participants worked with the cleaned statement list, grouping the statements into wider concepts, and then rating the concepts in terms of importance and feasibility. They were encouraged to log into the platform anonymously, view the final statement list, and then sort them into groups with similar meanings. They were asked to give each group a thematic name based on the contents of the statements. Participants were allowed to create as many groups as they needed and could make edits as needed. Once sorted, they were

asked to rate each statement based on importance and feasibility with two prompts: 'We'd like to know how important you think each idea is to the delivery of highquality programs, in comparison to other ideas in the list' and 'Please also tell us how feasible you think each idea is to address, compared to other ideas in the list.' Response options used a four-point Likert structure ranging from 'not at all important/feasible (1)' to 'very important/feasible (4)!

Multivariate statistical analysis

We conducted multivariate statistical analysis within the groupwisdom software program (Concept Systems, Inc, Ithaca, NY). First, we arranged data in a total similarity matrix which tallies the number of times two statements are sorted together, indicating their conceptual closeness. Then, we used multidimensional scaling to create a point map, which visually depicts the spatial distribution of the statements generated during brainstorming. The closer points are to each other, the more frequently the corresponding statements were sorted together by participants, and the stronger their conceptual relationship. During this analytic process, the software program iterates point maps until it converges on a version with the lowest possible stress value, between 0 and 1. A higher stress value represents more variability in how participants grouped statements, making it more difficult to 'fit' a singular visual depiction to the data.

Next, we conducted hierarchical cluster analysis to describe secondary structures, i.e., discreet clusters, within the data based on the location of the points on the map. There is no mathematical criterion for defining clusters, rather research teams explore various cluster solutions and decide on the most parsimonious structure to describe the configuration. We reviewed several solutions and finalized the optimal one during the collaborative interpretation activity (described below). Finally, we generated absolute pattern matches to compare clusters in terms of participant ratings, looking across multiple scales (i.e., perceived importance versus feasibility for all participants). We produced ladder graphs visually depicting pattern matches, including the ordinal relationships among clusters and the range of rating values across scales. We generated correlation coefficients for each pattern match to assess the ordinal similarity between the scales being compared (e.g., the extent to which the cluster rated as the most important was also rated as the most feasible).

Collaborative interpretation

In the final activity, we invited participants to interpretation sessions focused on confirming or modifying the group's initial conceptual model, as represented by point and cluster maps (based on sorting data), and pattern matches (based on rating data). Four interpretation sessions were held in late March. All sessions were held virtually and both daytime and evening options were provided, considering accessibility and ongoing pandemic related safety concerns. Each session lasted for approximately one hour and was facilitated by the community field coordinator who led recruitment for all prior activities. Community partners within the research team were involved in developing the materials we reviewed in the sessions to ensure the information and messages would be acceptable to the audience. The field coordinator walked attendees through a summary of the concept mapping methods and the main results, and responded to open ended prompts designed to surface reactions and elicit feedback (e.g., What does the group think about these findings? What, if anything, is surprising about these results?). She reminded attendees there were no right, or wrong, answers and their feedback was important for finalizing the results. We transcribed sessions verbatim using the built-in functionality of the video conferencing platform, with de-identified transcriptions referenced in developing results, as needed.

Results

Thirty-one participants completed brainstorming. There was attrition after each activity, with 26 of the original sample completing some or all the sorting and rating tasks, and 19 taking part in the interpretation sessions. No new participants were added over time. Table 1 presents characteristics of organizations, and their representatives, that provided data in the Brainstorming phase. Participants most frequently reported offering services in Nash (32%) and Edgecombe (26%) counties, with less presence in the other counties (Franklin, Vance, Warren). Approximately half of participants (48%) represented faith-based organizations and a third (35%) represented community-based organizations; healthcare organizations were the least represented (13%). The vast majority (89%) reported offering at least one service or support related to CVD, with close to half offering these services for longer than five years. The most reported service was education programs, offered by just under half of participating organizations, followed by external referrals to CVD services/supports and navigation assistance. On average, participants had long tenures at their organizations (~16 years), with over half (58%) serving in senior management or supervisory roles (Table 1).

Generated statements and clusters

Participants contributed 86 statements during brainstorming. The cleaning process yielded a final set of 66 unique statements. **Table 1** Characteristics of organizations participating in the Group Concept Mapping study examining factors influencing implementation of evidence-based cardiovascular disease prevention and management programs in rural African American communities (n = 31)

Characteristic	Percent (Count) ^a
Organization	
Counties in which services were provided (respondents could select more than one answer)	
Nash	32 (15)
Edgecombe	26 (12)
Franklin	10 (5)
Warren	9 (4)
Vance	6 (3)
Other: Wilson, Halifax, Northampton, Bertie, Lenoir, Durham	17 (8)
Organization type	
Faith-based	48 (15)
Community-based	35 (11)
Healthcare: clinical care provider or public health agency	13 (4)
Don't know	3 (1)
Organization size: Number of employees/volunteers	
Less than 5 individuals	13 (4)
6–10 individuals	10 (3)
11–49 individuals	19 (6)
50–249 individuals	45 (14)
250 or more individuals	10 (3)
Don't know	3 (1)
Services and supports offered related to cardiovascular disease (CVD) (respondents could choo	se more than one answer)
Educational programs (e.g., weight management)	42 (13)
Referrals to external CVD services or supports (e.g., food pantry)	32 (10)
Assistance navigating or accessing external CVD services or supports	32 (10)
Resources to support a healthy lifestyle (e.g., exercise space/equipment)	29 (9)
Clinical care (i.e., diagnosis to management of CVD and its risk factors)	23 (7)
Other (e.g., social support groups, walking clubs)	29 (9)
Offered no CVD related services/supports	23 (7)
Time offering services and supports related to CVD	
Less Than 1 year	3 (1)
Between 1 to 5 years	21 (6)
More than 5 years	45 (13)
Don't know	31 (9)
Representative	
Primary role in organization	
Senior Management or Supervisor	58 (18)
Administrative Staff	23 (7)
Front Line Staff	19 (6)
Years employed at organization	
Mean (Standard Deviation)	15.9 (11.2)

^a Percentages may not add to 100 due to rounding

Cluster map

Multidimensional Scaling analysis of the similarity matrix converged after 16 iterations, resulting in a final stress value of 0.28, indicating a good fit to the underlying data (mean stress value across 69 published GCM studies = 0.28 [Rosas & Kane, 2012]). Figure 1 shows the cluster map depicting how participants arranged the 66 unique brainstorming statements. Brainstorming statements, by cluster are available in the Appendix. Hierarchical cluster analysis of this distribution yielded five



Fig. 1 Cluster map depicting participant reported factors influencing evidence-based cardiovascular disease prevention and management program implementation in rural North Carolina

distinct clusters, or factors: Accessibility, Community and Social Factors, Education and Training, Financial/ Resource Development, and Organization Capacity and Staffing. Interpretation sessions confirmed results, no modifications were made following these discussions. Ideas in the Accessibility cluster comprised access to healthy and affordable food, walkable environments, transportation, and community services. Ideas in the Community and Social Factors cluster comprised community support and commitment of individuals and organizations in the community to CVD EBPs, as well as digital literacy and Internet access. Education and Training ideas spanned education and conceptions of heart disease in the community and training for program implementers. Financial/Resource Development ideas pertained to financial barriers and funding for programs directly or indirectly related to heart disease. Finally, ideas in the Organization Capacity and Staffing cluster dealt with adequate staffing and trained community members in appropriate organizations.

Pattern matches

Figure 2 depicts comparisons of cluster ratings (represented by the colored points) across importance and feasibility scales (represented by the vertical lines). Ratings of importance and feasibility were highly correlated (r=0.98) for all clusters; factors seen as the most important for promoting implementation of high-quality heart disease prevention programming were also seen as the most feasible (See Fig. 2). *Education and Training* was rated as both the most important and the most feasible factor to address, *Financial/Resource Development* was rated as the least important and least feasible. The range of rating values on the importance scale (2.87–3.91) was narrower than the feasibility scale (2.46–3.44). While all clusters received higher importance than feasibility ratings, clusters with particularly large differentials between perceived importance and feasibility, shown via the colored lines, highlight factors that could be deprioritized in planning decisions; the steeper the line, the less agreement there is between the perceived importance and perceived feasibility of that factor. For instance, the red line (*Accessibility*) and dark green line (*Financial/Resource Development*), are relatively steeper than the orange line (*Education and Training*).

Discussion

Our study distilled five key influences on the implementation of high-quality CVD EBPs in a rural, predominantly African American region: education and training, community and social factors, organization capacity and staffing, accessibility, and financial resource development. Overlaying this conceptual model with Implementation Science frameworks, specifically the Consolidated Framework for Implementation Research (CFIR), we see an emphasis on organizational contexts, including the inner setting (Organizational Capacity and Staffing; Financial and Resource Development), outer setting (Community and Social Factors, Accessibility), and participating and implementing individuals (Education and Training), and a deemphasis on aspects of the innovation itself (e.g., the complexity, source, or design of the intervention) or the implementation processes (e.g., use of data). This emphasis on contextual factors, present even at the item level (see Appendix), is perhaps not surprising given the entrenched structural dynamics underlying



Fig. 2 Absolute Pattern Match comparing importance to feasibility of the five clusters as rated by participants

CVD disparities in our study region. For instance, organizations in rural African American communities are often less resourced [22] and less networked as a partial function of being more geographically dispersed [23], making it harder to cultivate a sufficient talent pool or leverage funding. As noted by participants, individuals in rural communities face unique community and social barriers, like limited Internet access, that hamper their engagement [24]. It is worth noting that our sample was skewed towards representatives in management or administrative roles versus frontline staff potentially more involved in intervention development or day-to-day implementation. Even so, findings suggests that organizations in this context may feel equipped to implement a range of EBPs, if we can begin to grapple with the structural barriers that impede their success.

The concept map resulting from our study represents a cohesive model that highlights very clear leverage points for action, making it unique among published GCM studies [25]. Across the board, factors rated as the most

important were also seen as the most feasible, starting with Education and Training. Respondents felt it was more important than feasible to tackle every factor, but the difference was particularly pronounced for Accessibility, i.e., community conditions that either support or inhibit lifestyle change, and Financial and Resource Development, i.e., funding to offset costs of implementation and participation. Thus, focusing on training and educating stakeholders seems like a clear first step in this region, and one likely to also build commitment and support for CVD EBPs (the focus of Community and Social Factors cluster which was rated as the second most important and feasible leverage point). Our findings suggest multi-level strategies to build knowledge and buy-in in the wider community and among organizational staff are warranted. However, systems thinking tells us that the five factors in our map are likely not independent of each other and should not be addressed in isolation [26]. For instance, as part of a training around CVD EBP implementation, organizations could explore how accessibility

and resource development intersect to influence program success. Alternately, planners could consider how public education efforts, with the potential to increase demand for EBPs, could be timed so as not to overwhelm existing program resources. The concept map and ratings information collected here provides a solid foundation from which to explore these interdependencies (e.g., causal relationships, feedback loops) to inform a more holistic action plan.

This study addresses an important evidence gap around how best to support African American-serving organizations in rural areas to implement and sustain CVD EBPs. Critically, however, it also provides insights which are locally meaningful and actionable, as they emerged from a participatory, community-engaged process. These insights inform the next steps for our implementation strategy under the Co-LEARN study. A cornerstone will be convening organizations interested in offering the Heart Matters EBP in a Learning Collaborative to address areas highlighted in the concept map. For instance, participants can share promising practices and collaborate to develop community and organizational education and training resources. To complement and extend the concept mapping data, Learning Collaborative members will next explore connections and causal pathways in the map and ultimately home in on a detailed implementation blueprint [27]. Other practitioners can build on this example to develop community- and data-grounded planning projects to address complex health equity challenges in their areas.

Despite its strengths, this study has several limitations. To maximize participation among our small sample pool, and given ongoing pandemic-related safety concerns, all activities were conducted virtually and brainstorming and sorting and rating were conducted asynchronously. It was not possible to clarify or confirm our understanding of brainstorming ideas. Although we used sampling and recruitment techniques that have been shown to increase engagement among groups not typically represented in research [17], we encountered difficulty reaching organizations in the wake of the COVID-19 pandemic. Many had closed, experienced staff turnover, or had out-of-date contact information, fracturing the networks we hoped to leverage in recruitment. Nevertheless, our sample is over the minimum threshold (10) considered necessary to produce a valid concept map [28]. Exploring differences across sub-groups in our sample, including clinic-, community-, and faith-based organizations was beyond the scope of this analysis, and was complicated by the lower than desired sample size. As sectors differ significantly in their structure and resource landscapes, disaggregating results could have provided additional or different insight and represents a key next step for future research.

Furthermore, we collected data at the organizational level and participating organizations were asked to selfidentify a representative to complete activities on behalf of their organization. Including different representatives (e.g., with more/less/different experience) within a given organization could have yielded different perspectives. Unfortunately, validated measures were not available for constructs of interest. Although we used the CFIR to structure our research goals and reporting, better integrating it into the design of all GCM activities could have improved the validity and interpretability of findings. We balanced this consideration against the risk of alienating community participants and partners by emphasizing technical research frameworks, as well as the potential to increase time burden given challenges with recruitment. The high correlation between importance and feasibility ratings raises concerns these scales are not independent. However, a core goal of the concept mapping methodology is supporting action planning through comparison of rating scales (i.e., via GoZone matrices). The scales used in this study have been used in a robust body of concept mapping literature involving these comparisons and similar concerns around scale independence have not been previously documented [25]. Results are intended to inform local planning and are, by nature, highly contextualized within the study catchment area, so they may not generalize to other samples or contexts. While a goal of the study was to generate insight unique to rural areas, addressing a critical knowledge gap, having an urban comparator would further clarify the aspects of our results that are specific to a rural context. Some, but not all, respondents had familiarity with the EBP being considered for scale-up under this initiative, and the focus prompt provided a general overview of the key features of the program model, without specific implementation details. It is possible the deemphasis around aspects of the innovation or implementation processes are tied to this incomplete understanding. We used a modified version of the Conducting and REporting DElphi Studies (CREDES) standards [29] to guide development of this manuscript. There are presently no reporting standards for group concept mapping methodology; the Delphi method was deemed to be the closest approximation.

Conclusions

The findings from this concept mapping study can inform how best to support organizations serving African Americans in rural areas to implement and sustain CVD EBPs, a novel contribution with important implications for the reduction of disparities in CVD morbidity and mortality. Stakeholder organizations identified five factors influencing implementation of CVD EBPs in their communities: *Education and Training*, Community and Social Factors, Organization Capacity and Staffing, Accessibility, and Financial/Resource Development. Characteristics of the intervention or implementation processes, predictors of implementation success in prevalent models such as CFIR, were not emphasized in this study. In historically marginalized rural communities, there may be a relative need to address structural barriers both inside and outside of the organization to ensure environments are conducive to implementation. Group concept mapping helped our group distill and prioritize action steps in an emerging implementation plan by facilitating a collaborative, community-driven process of data generation and interpretation.

Abbreviations

CVD	Cardiovascular disease
CVD EBPs	Evidence-based CVD prevention and management programs
CBPR	Community-based participatory research
GCM	Group concept mapping
NC	North Carolina
UNC CHER	University of North Carolina, Chapel Hill's Center for Health
	Equity Research
Co-LEARN	Collaborate and Leverage Evidence in an African American Rural
	Network
CFIR	Consolidated Framework for Implementation Research
EBP	Evidence-based program

Supplementary Information

The online version contains supplementary material available at https://doi. org/10.1186/s43058-024-00692-8.

Additional file 1. CREDES Reporting Standards: Author Checklist. The file contains the author's completed checklist reflecting adherence to modified version of the CREDES reporting standards.

Additional file 2.

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Authors' contributions

AD's contributions include conceptualization, methodology, data curation, original draft writing, review and editing, supervision, and project administration. BW's contributions include conceptualization, methodology, formal analysis, data curation, original draft writing, reviewing, and editing, supervision, and project administration. MW's contributions include conceptualization, original draft writing, reviewing, and editing, supervision, project administration, and funding acquisition. KB's contributions include data curation, project administration, and original draft review and editing. SR's contributions include methodology, formal analysis, software, data curation, original draft review and editing, and visualization. MWM's contributions include original draft review and editing. BE's and SM's contributions include conceptualization, project administration, original draft review and editing, VR's contributions include formal analysis and original draft review and editing. GC's contributions include conceptualization, original draft review and editing, and funding acquisition. GD's contributions include conceptualization, methodology, original draft reviewing and editing, supervision, project administration, and funding acquisition.

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Data availability

The datasets analyzed by this study are available from the corresponding author upon request.

Declarations

Ethics approval and consent to participate

This study has been approved by the University of North Carolina, Chapel Hill's Institutional Review Board (study number: R01HL157255-01).

Consent for publication

All study participants consented to participate in the research, including aggregation and dissemination of results.

Competing interests

The authors declare that they have no competing interests.

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