

Mobile Clinics for Brain Health Equity: A Feasibility Study of Dementia Risk Reduction in Underserved Communities

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Abstract

Introduction: Mobile health clinics (MHCs) may improve access to dementia risk-reduction (DRR) services among underserved populations, yet evidence supporting their use for Alzheimer's disease and related dementias (AD/ADRD) prevention remains limited. This pilot study evaluated the feasibility of implementing an MHC-based DRR (MHC-DRR) program and explored preliminary changes in knowledge, risk awareness, motivation, and brain-health behavior engagement.

Methods: A single-arm pilot feasibility study was conducted at two MHC sites. Feasibility was assessed through recruitment, retention, protocol fidelity, outcome data availability, and perspectives from program participants and implementation staff. The program included individualized dementia risk assessment, tailored brain-health education, and community resource linkage. Exploratory outcomes included DRR knowledge, individualized risk awareness, motivation for brain-health behavior change, and reported brain-health behavior engagement.

Results: Recruitment (88.0%) and protocol fidelity (100%) met or exceeded prespecified progression criteria, whereas retention and follow-up data availability were 59.1% (13/22), slightly below the predefined 60% criterion. Participants and implementation staff reported favorable perceptions of acceptability, implementation, and maintenance. Among participants with complete assessments, self-knowledge and demonstrated knowledge improved from baseline to follow-up, with large effect sizes (Cohen's $d = 1.44$ and 0.90 , respectively). Participants also demonstrated favorable changes in motivation, identified multiple personally relevant dementia risk factors, and reported changes in physical activity, diet, sleep, cognitive engagement, and social participation.

CONCLUSION: The MHC-DRR program was feasible to implement within an MHC serving underserved American adults. Findings provide preliminary support for using MHC infrastructure to expand access to dementia risk-reduction services and inform future evaluation, sustainability, and scale-up efforts.

1. INTRODUCTION

The 2024 Lancet Commission identified 14 potentially modifiable risk factors, including low education, hearing loss, hypertension, smoking, obesity, depression, physical inactivity, diabetes, excessive alcohol consumption, traumatic brain injury, air pollution, social isolation, untreated vision loss, and high low-density lipoprotein (LDL) cholesterol, that collectively contribute substantially to Alzheimer's disease and related dementias (AD/ADRD) risk [1]. Evidence suggests that addressing these risk factors could prevent or delay a substantial proportion of dementia cases [1]. Despite this prevention potential, access to preventive healthcare services remains limited for many Americans, particularly among populations experiencing health disparities [2, 3]. Cultural and language barriers, socioeconomic constraints, limited healthcare access, and geographic isolation further restrict opportunities to engage in dementia prevention and brain-health promotion [3–5].

Mobile health clinics (MHCs) offer a promising strategy for expanding access to preventive healthcare among underserved populations [6, 7]. MHCs provide health screenings, education, chronic disease management, and connections to community resources while addressing both medical and social determinants of health [6, 7]. National data indicate that MHCs serve diverse populations across the lifespan, including uninsured

individuals, publicly insured, and members of racial and ethnic minority groups [6]. By bringing services directly into communities, MHCs may help reduce barriers that limit participation in preventive health programs and facilitate access to brain-health promotion activities among populations historically underrepresented in dementia research and prevention efforts.

Although guidance for AD/ABRD primary prevention continues to evolve, implementation in community and clinical settings remains limited [8]. In 2022, the UsAgainstAlzheimer's Risk Reduction Workgroup released 11 consensus recommendations spanning six domains: neurovascular risk management, physical activity, sleep, nutrition, social connection, and cognitive stimulation [8]. Despite growing consensus regarding the importance of dementia risk reduction, few implementation models and real-world evaluations have been reported, and practitioners have identified a need for practical tools, training, educational resources, and community-tailored approaches to support implementation [8, 9]. At the same time, workforce shortages, competing clinical demands, and access barriers in traditional healthcare settings continue to constrain the delivery of preventive services, particularly among underserved populations [2, 3, 10]. While MHCs have demonstrated value in improving access to preventive healthcare and chronic disease management, their application to dementia risk reduction remains largely unexplored [6, 7].

Accordingly, this pilot study evaluated the feasibility of implementing a mobile health clinic-based dementia risk reduction (MHC-DRR) program among underserved middle-aged and older adults. Guided by the RE-AIM framework, the study examined feasibility through study process indicators and perspectives from program participants and implementation staff. Exploratory outcomes included changes in DRR knowledge, individualized risk awareness, motivation for brain-health behavior change, and brain-health behavior engagement. In addition, contextual barriers and facilitators influencing participation, implementation, and sustainability were examined to inform future refinement and evaluation of the intervention [11–13].

2. METHODS

2.1 Study Design

This feasibility study employed a community-engagement informed, multilevel implementation design to pilot an MHC-DRR program in underserved communities. Institutional Review Board approval was obtained (IRB# 202401224), and all participants provided written informed consent.

2.2 Stakeholder Co-Development and Program Architecture

We used an iterative, community-engaged process to co-develop the MHC-DRR program from conception through implementation procedures and materials design. The stakeholder group included primary care clinicians, mobile clinic collaborators, researchers with expertise in aging, dementia, and implementation science, health educators, staff from aging-focused nonprofit organizations (e.g., Alzheimer's Association Iowa Chapter), and middle-aged and older adults from underserved communities.

Working collaboratively, the group co-designed all program components, including: (i) adapting the 5As counseling framework [14], originally developed for chronic disease and diabetes management, to support dementia risk reduction in mobile clinic contexts, emphasizing brief, culturally responsive interactions and resource-conscious follow-up; (ii) Developing a community-informed dementia risk assessment tool covering

hypertension, diabetes, obesity, physical inactivity, sleep deprivation, excessive alcohol consumption, tobacco/nicotine/vaping use, loneliness/social isolation, depression, and low cognitive activity; (iii) Creating a decision-support algorithm to guide provider decision-making and map assessment results to individualized counseling, goal-setting, and referral options feasible within the operational constraints of MHC workflows and the needs of underserved communities; (iv) Designing bilingual educational materials aligned with health literacy principles and tailored to cultural and linguistic preferences (e.g., English or Spanish); (v) Producing a 5As fidelity checklist and provider prompts consistent with motivational interviewing to promote standardization and implementation quality, and (vi) Developing a training micro-curriculum specifying competencies, performance tasks, and applied skill-building for MHC staff.

2.3 Study Setting and Recruitment

The study was conducted at two urban sites in Johnson County, Eastern Iowa, through a university-affiliated and student-run MHC program that provides free primary care and preventive services to underserved populations. The MHC operates a sustainable model by leveraging volunteer healthcare students to reduce staffing costs while maintaining consistent service delivery[6, 15]. Recruitment for this study occurred through direct outreach at MHC sites and through community engagement events conducted in partnership with local nonprofit organizations. Recruitment materials, including flyers, brochures, social media posts, and community-based networks, were used to raise awareness. Interested individuals were referred by an MHC staff member to bilingual nurse research assistants (NRAs), who obtained informed consent. The recruitment period covered December 2024 to March 2025.

2.4 Participants

Community participants were eligible if they were aged ≥ 40 years; experienced health disparities (e.g., racial/ethnic minority status, sexual/gender minority status, disability, annual income at/below the poverty level, uninsured/underinsured status, or residence in underserved communities); and did not self-report a dementia diagnosis. Exclusions included inability to complete procedures due to cognitive or literacy barriers unrelated to language, or current institutionalization. We planned to enroll approximately 20 participants, a pragmatic target selected to evaluate recruitment, intervention delivery, retention, and data collection procedures before a larger trial. Twenty-two individuals met the inclusion criteria.

2.5 Intervention: delivery, training and theoretical basis

The MHC-DRR program was delivered by trained MHC healthcare student volunteers during brief (approximately 20-minute), culturally responsive encounters and guided by an adapted 5As (Ask, Assess, Advise, Agree, Assist) behavior change framework designed to support reduction of modifiable dementia risk factors [14]. Participants completed a structured, community-informed assessment of major modifiable AD/ADRD risk domains, including cardiometabolic health, physical activity, sleep, smoking, alcohol use, obesity, hearing health, social connectedness, mood, and cognitive engagement. Assessment results were used to tailor educational messages, behavior change goals, and community resource referrals. Detailed descriptions of assessment items, scoring procedures, and risk thresholds are provided in the Supplementary Material (**Table S1**). Each encounter began with a culturally sensitive introduction to brain health and an invitation to participate in screening (Ask). Staff then administered the structured risk assessment (Assess), followed by personalized feedback linking identified risk factors to brain health outcomes and provision of brief bilingual

educational materials tailored to participants' health literacy and cultural context (Advise). Using motivational interviewing techniques, participants identified one or two priority risk factors and collaboratively developed specific, achievable behavior change goals (Agree). Staff subsequently supported action planning and facilitated connections to relevant community resources, including food assistance programs, food pantries, recreational facilities, parks, affordable healthy food options, and mental health or social support services (Assist). Educational and goal-setting discussions addressed dementia risk reduction behaviors, including physical activity, sleep hygiene, smoking cessation, alcohol moderation, management of hypertension and diabetes, healthy diet, social and cognitive engagement, and hearing care when indicated. Participants were invited to return for a 3-month follow-up visit to review progress, address barriers, and revise goals as needed using motivational interviewing principles [16].

Prior to program implementation, MHC healthcare student volunteers completed a standardized 2-hour training program designed to ensure conceptual understanding, procedural competence, and fidelity to the adapted 5As framework. Training content included dementia epidemiology and public health impact, evidence regarding modifiable dementia risk factors, recommendations from the RWWG, administration of the community-informed dementia risk assessment tool, delivery of tailored brain health education, and identification of local social and community resources to support behavior change. Training was delivered through a combination of didactic instruction, facilitated discussion, applied case scenarios, and brief video demonstrations illustrating culturally responsive communication and motivational interviewing techniques. Particular emphasis was placed on translating identified risk factors into personalized feedback, collaborative goal setting, and actionable behavior change strategies within time-limited clinical encounters.

The MHC-DRR intervention activities were informed by self-awareness and self-reflection theories of behavior change [17]. Applying this theory, self-awareness was conceptualized as recognition of one's personal risk profile and its relevance to brain health, whereas self-reflection involved consideration of personal priorities, barriers, and opportunities for change [17]. Within the 5As framework, individualized risk assessment and feedback were intended to increase self-awareness of modifiable risk factors, while motivational interviewing and collaborative goal setting were designed to promote self-reflection, prioritization, and commitment to behavior change.

2.6 Outcomes and Measures

2.6.1. Feasibility outcomes

Feasibility was assessed using a combination of quantitative study process indicators and implementation experiences reported by program participants and implementation staff. Prespecified process indicators included recruitment, participant retention, protocol fidelity, and outcome data completeness. Recruitment was defined as the proportion of eligible individuals who enrolled in the study. Retention was defined as the proportion of enrolled participants who completed the 3-month follow-up assessment. Protocol fidelity was assessed using two complementary approaches. First, *Research Electronic Data Capture* (REDCap) implementation records were used to document completion of core intervention components for each participant, including risk assessment, tailored education, and community resource linkage. Fidelity was calculated as the proportion of required intervention components completed as intended. Second, implementation staff completed post-intervention surveys assessing perceptions of protocol adherence,

including agreement with the statement that the dementia risk reduction protocol was applied as intended. Outcome data completeness was defined as the proportion of participants with complete primary outcome data at each assessment time point. Baseline completeness was calculated as the percentage of enrolled participants with complete baseline data across all primary outcomes, whereas follow-up completeness was calculated as the percentage of participants eligible for the 3-month assessment who provided complete follow-up data.

Consistent with recommendations for pilot and feasibility studies, progression criteria were established a priori to guide interpretation of study feasibility and inform decisions regarding future evaluation and implementation of the intervention [18]. These criteria were selected to address key uncertainties related to recruitment, retention, intervention delivery, and data collection within a community-based mobile health clinic serving historically underserved populations. Prespecified criteria included recruitment of $\geq 70\%$ of eligible individuals, retention of $\geq 60\%$ at 3-month follow-up, protocol fidelity of $\geq 80\%$, and completeness of primary outcome data of $\geq 85\%$. Feasibility outcomes were evaluated against these criteria and classified using a traffic-light progression approach (green = proceed, amber = proceed with modifications, red = major redesign required) to identify areas requiring refinement before future effectiveness testing.

Additional feasibility measures were obtained from program participants (MHC-DRR program recipients) and MHC implementation staff involved in program delivery, including the implementation coordinator and healthcare student volunteers. Program participants completed REDCap-based open-ended surveys exploring the adoption, implementation, and maintenance of dementia risk-reduction behaviors. Survey questions examined perceived usefulness of intervention content and educational materials, barriers and facilitators to implementing recommendations, and additional support needs for long-term engagement.

Implementation staff completed post-implementation surveys consisting of Likert-scale and open-ended items assessing adoption of the intervention, including perceptions of training effectiveness, knowledge gained, and preparedness to deliver dementia risk-reduction education. Implementation measures evaluated protocol feasibility, workflow integration, delivery experiences, and barriers encountered, while maintenance measures assessed willingness to continue dementia risk-factor screening and education and perceptions of long-term sustainability within the MHC setting. Qualitative responses from program participants and implementation staff were analyzed using directed content analysis and organized according to *Reach, Effectiveness-Adoption, Implementation and Maintenance* (RE-AIM) domains [19], with a primary focus on Adoption, Implementation, and Maintenance. Barriers and facilitators identified by both groups were examined to contextualize feasibility findings and inform refinement of the MHC-DRR intervention and implementation procedures for future testing and scale-up.

2.6.2. AD/ABRD Prevention Knowledge, Individualized Risk Awareness, Motivation, and Brain-Health Behavior Engagement

Exploratory effectiveness outcomes included changes in AD/ABRD prevention knowledge, individualized risk awareness, motivation for brain-health behavior change, and brain-health behavior engagement from pre-intervention to post-intervention and 3-month follow-up. These outcomes captured complementary aspects of the intervention, including: (i) *perceived knowledge*, defined as participants' self-assessed understanding of

dementia risk factors and risk-reduction strategies; (ii) *demonstrated knowledge*, defined as participants' ability to identify established dementia risk factors and evidence-based risk-reduction strategies; (iii) *individualized risk awareness*, defined as participants' ability to identify which modifiable dementia risk factors applied to them personally; (iv) *motivation*, including willingness to change, perceived value of change, and perceived ability to initiate and sustain health behavior changes; and (v) *brain-health behavior engagement*, reflecting actions participants reported taking and behavior changes made following the intervention.

Perceived knowledge was measured by asking participants to rate their knowledge of dementia risk factors and dementia risk-reduction strategies on separate 0–10 scales. Scores were summed to create a total *Perceived knowledge* score ranging from 0 to 20, with higher scores indicating greater *perceived knowledge*.

Demonstrated knowledge was assessed using item-based questions requiring participants to identify established modifiable dementia risk factors and evidence-based strategies for reducing dementia risk and promoting brain health. Participants received one point for each correctly identified risk factor (maximum = 12 points) and one point for each correctly identified risk-reduction strategy (maximum = 16 points). Scores were summed to create a total demonstrated knowledge score ranging from 0 to 28, with higher scores indicating greater knowledge of dementia risk factors and prevention strategies. Incorrect responses were not penalized.

Motivation to engage in brain-health behaviors was assessed using an adapted version of the Motivation and Attitudes Toward Changing Health (MATCH) questionnaire, a validated 9-item measure developed by Hessler, Fisher [20]. The items were adapted to address dementia risk reduction by replacing references to “health problems” or “managing health” with language focused on reducing modifiable dementia risk factors (e.g., brain health, dementia risk factors), while retaining the original MATCH domains, item structure, response scale, and scoring procedures. The original and adapted items are provided in the Supplementary Materials (**Table S2**). The three domains assess *willingness to change*, *perceived worthwhileness of change*, and *perceived ability to make and sustain changes*.

Brain-health behavior engagement was assessed at 3-month follow-up only. Participants identified which dementia risk-reduction actions they currently practiced and reported whether they had noticed or made specific behavior changes since starting the program. Participants also rated the extent to which they had followed program recommendations and the ease or difficulty of doing so. Open-ended questions elicited specific behavior changes, the influence of the program on those changes, and barriers and facilitators to implementing the recommendations. These measures characterized participants' reported translation of intervention recommendations and collaboratively established goals into brain-health behavior change during the 3-month follow-up period.

2.7. Additional Measures

Additional measures were collected using self-report questionnaires to characterize the study population, modifiable AD/ADRD risk factors, and contextualize participant experiences with the program.

Sociodemographic characteristics included age, sex, race, ethnicity, education, income, insurance status, and modifiable dementia risk factors included hypertension and diabetes (self-report with objective confirmation via blood pressure measurement and HbA1c testing when risk factor present), physical inactivity (single-item assessment of ≥ 30 minutes of moderate activity on ≥ 5 days/week), sleep disturbance (8-item symptom screener), alcohol use (≥ 2 drinks/day), current smoking (yes/no), obesity (body mass index – BMI), hearing

loss risk (noise exposure and untreated hearing difficulty), loneliness (3-item UCLA Loneliness Scale, score > 6) [21], depressive symptoms (PHQ-2, score ≥ 2) [22], and cognitive inactivity (lack of engagement in cognitively stimulating activities). Risk for each domain was dichotomized (present/absent) based on predefined thresholds. A detailed description of items, scoring criteria, and clinical cutoffs is provided in Supplementary Material (Table S1).

2.8 Data Collection Procedures

Data were collected at baseline and 3-month follow-up using REDCap, a secure, web-based platform for research data collection and management. When electronic administration was not feasible, participants completed paper-based surveys that were subsequently entered into REDCap by trained research staff. All participant-facing materials, including screening instruments, educational materials, and surveys, were available in English and Spanish. MHC healthcare student volunteers completed post-implementation surveys assessing MHC-DRR experiences. To promote data quality, standardized data collection procedures were used, including staff training, real-time review of survey completeness, range and logic checks within REDCap when applicable, and verification of paper-form data entry.

2.9 Statistical Analysis

Analyses primarily summarized feasibility outcomes and exploratory signals of MHC-DRR program effectiveness on AD/ADRD knowledge, motivation, and brain health behavior engagement. Feasibility outcomes were summarized using descriptive statistics, including frequencies, percentages, means, and standard deviations. Qualitative findings were summarized using directed content analysis and organized according to relevant RE-AIM domains. For exploratory effectiveness outcomes, descriptive statistics were calculated at each assessment time point using all available observations. Among participants with complete repeated assessments, within-person changes from baseline to post-intervention and/or 3-month follow-up were summarized using mean differences, 95% confidence intervals (CIs), and Cohen's *d* effect sizes for paired observations. Given the pilot nature of the study and small sample size, analyses emphasized estimation of change and effect size magnitude rather than formal hypothesis testing. Missing data were not imputed, and analyses were conducted using available-case and complete-case approaches, as appropriate. All analyses were conducted using IBM SPSS Statistics (Version 31.0).

3. RESULTS

3.1. Participants' characteristics

The 22 patient participants represented a diverse sample, with 54.6% identifying as White and 50.0% identifying as Hispanic; 63.6% were female, and 45.5% were aged ≥ 65 years. Approximately two-thirds (63.6%) reported having health insurance, with private insurance and Medicare each reported by 50.0% of insured participants. Baseline dementia risk factors were common, particularly sleep difficulties (81.8%), physical inactivity (45.5%), obesity (31.8%), diabetes (27.3%), and unhealthy diet (27.3%) (Table 1).

3.2. MHC-DRR Program Feasibility: Study Process Indicators and Participant and Implementation Staff Perspectives

Feasibility based on quantitative study process indicators is presented in **Table 2**. Twenty-five eligible individuals were approached across two MHC sites, of whom 22 enrolled in the study, yielding a recruitment rate of 88.0% (**Table 2**). Participant characteristics further indicated successful recruitment of the intended target population (**Table 1**). Of the 22 enrolled participants, 13 completed the 3-month follow-up assessment, corresponding to a retention rate of 59.1% (**Table 2**). Attrition was greater among Hispanic/Latino participants, with 5 of 11 retained at follow-up compared with 8 of 11 non-Hispanic participants. Regarding protocol fidelity, REDCap implementation records indicated that all core intervention components, including dementia risk assessment, tailored brain health education, and community resource linkage, were delivered as intended for all enrolled participants (**Table 2**). Staff perceptions of fidelity were similarly favorable, with a mean rating of 4.5 (SD = 0.84) on a 5-point scale regarding implementation of the protocol as intended. Outcome data completeness varied by measure at baseline but converged at follow-up because outcome assessments were completed only by participants retained in the study. Dementia risk-factor data were available for 21 of 22 participants (95.5%) at baseline, and motivation data were available for 18 of 22 participants (81.8%) at baseline. At the 3-month follow-up, outcome data were available for 13 of 22 enrolled participants (59.1%) across both outcome domains, reflecting participant attrition rather than missing item responses. Among participants completing the follow-up assessment (n = 13), item-level completeness was 100% across all collected outcome measures. Based on the prespecified progression framework, recruitment and protocol fidelity received green ratings, indicating that predefined criteria were met, whereas retention and follow-up outcome data availability received amber ratings and were identified as areas for refinement in future evaluations (**Table 2**).

Feasibility findings from program participants and implementation staff, organized according to the RE-AIM domains of Adoption, Implementation, and Maintenance, are presented in **Tables 3 and 4**. Among program participants, *Adoption* domain findings reflected positive perceptions of the program's influence on motivation to engage in healthier behaviors (**Table 3**). Qualitative responses indicated that educational sessions, interactions with healthcare students and nurses, personalized information, and increased awareness of dementia risk factors were important sources of motivation. Participants also identified tailored education, personalized feedback, and information related to sleep, physical activity, blood pressure management, social engagement, and interest in healthy aging as particularly motivating and beneficial aspects of the program (**Table 3**). Within the **Implementation** domain, participants generally described the educational materials as clear, understandable, and useful for supporting behavior change. Topics related to nutrition, physical activity, sleep, blood pressure control, and healthy aging were frequently identified as helpful. Participants also highlighted the value of receiving information in Spanish and reported that the materials were accessible and easy to understand (**Table 3**). Regarding **Maintenance** domain, participants described family members, nurses, and follow-up visits as important sources of support throughout the 3-month follow-up period. Participants identified several resources that could support continued engagement with dementia risk-reduction behaviors, including ongoing educational opportunities, periodic follow-up contacts, recipes, reminders, support groups, and interactions with healthcare professionals. Positive experiences were commonly attributed to receiving personalized information, follow-up visits, direct interactions with healthcare staff, and access to educational materials in Spanish. Suggestions for program improvement included shorter surveys, additional follow-up visits, increased opportunities for in-person interaction, and culturally tailored resources. Participants also expressed appreciation for the program, particularly the inclusion of Spanish-language materials and

education, and described benefits extending beyond themselves to family members and household health practices (**Table 3**).

Among implementation staff, adoption findings indicated positive perceptions of the training and educational materials, including their contribution to learning about dementia risk factors and dementia prevention (**Table 4**). Staff also reported opportunities to demonstrate knowledge acquired during training and expressed motivation to incorporate dementia risk-factor screening and education into practice (**Table 4**). Within the implementation domain, staff reported that the protocol could be applied in MHC settings and that intervention activities were delivered as intended (**Table 4**). Qualitative feedback indicated that implementation did not substantially affect clinic operations, with one staff member noting that *“our intervention did not impact MHC flow.”* MHC staff also described a cascading training process in which implementation staff trained healthcare student volunteers, who subsequently delivered dementia risk-reduction education to program participants (*“I was able to teach students... they taught their patients.”*). Reported implementation barriers included language-related challenges for Spanish speakers’ participants during screening and education delivery, raised by three staff members, as well as participant frustration with the timing of pre- and post-surveys, reported by one staff member. Maintenance findings reflected staff perspectives regarding the continued use of dementia risk-factor screening and education within the MHC setting and potential integration of the protocol into routine practice. Qualitative responses highlighted considerations related to staffing and time requirements for ongoing implementation, with one staff member noting that *“assessing risk factors takes time... a master’s-prepared nurse could perform this.”*

3.3. Exploratory effectiveness of the MHC-DRR program on AD/ABDR Knowledge, Self-awareness and Motivation

Findings on AD/ABDR modifiable risk-factor and prevention knowledge among participants completing assessments at baseline, post-intervention, and 3-month follow-up are presented in **Figure 1**. Mean *Perceived knowledge* scores increased from 8.00 (SD = 5.27) at baseline to 12.89 (SD = 4.49) immediately following the intervention and 14.11 (SD = 2.89) at the 3-month follow-up (Figure 1). The mean change from baseline was 4.89 points immediately post-intervention (95% CI: 1.60 to 8.18; Cohen's $d = 1.14$) and 6.11 points at follow-up (95% CI: 2.33 to 9.89; Cohen's $d = 1.44$). Mean *demonstrated knowledge* scores increased from 16.44 (SD = 8.95) at baseline to 23.44 (SD = 5.76) immediately following the intervention and were 22.00 (SD = 5.68) at follow-up (Figure 1). The mean change from baseline was 7.00 points immediately post-intervention (95% CI: 1.94 to 12.06; Cohen's $d = 1.06$) and 5.56 points at follow-up (95% CI: 0.49 to 10.62; Cohen's $d = 0.90$). Descriptive statistics based on all available observations at each assessment are presented in supplementary materials (Table S3).

Individualized risk-awareness findings are presented in **Table 5**. At the 3-month follow-up, participants identified multiple modifiable dementia risk factors that applied to their own health. Sleep issues were the most frequently identified risk factor, followed by hypertension, physical inactivity, depression, loneliness, low cognitive stimulation, and diabetes. Fewer participants identified high ultra-processed food intake, alcohol use, obesity, smoking, and hearing-loss risk as personal dementia risk factors (Table 5).

Findings on motivation for brain-health behavior change among participants completing assessments at baseline and 3-month follow-up are presented in **Figure 2**. Mean *willingness to change* scores increased from

3.89 (SD = 0.93) at baseline to 4.44 (SD = 0.41) at follow-up (Figure 2). The mean change from baseline was 0.56 points (95% CI: -0.18 to 1.29; Cohen's d = 0.58). Mean *perceived worthwhileness of behavior change* scores increased from 3.89 (SD = 0.75) at baseline to 4.37 (SD = 0.63) at follow-up. The mean change from baseline was 0.48 points (95% CI: -0.12 to 1.08; Cohen's d = 0.61). Mean *perceived ability to make and sustain changes* scores increased from 3.63 (SD = 0.70) at baseline to 3.81 (SD = 0.50) at follow-up. The mean change from baseline was 0.19 points (95% CI: -0.48 to 0.85; Cohen's d = 0.21). Descriptive statistics based on all available observations at each assessment are presented in supplementary materials (**Table S4**).

3.3.4. Brain-Health Behavior Engagement

At the 3-month follow-up, participants reported implementing dementia risk-reduction behaviors introduced during the program. When asked to rate their agreement with the statement, *"I have noticed specific behavior changes after participating in the program,"* participants reported high levels of agreement (mean = 4.08, SD = 0.64). Among participants providing qualitative responses (11/13, 84.6%), reported changes included increased physical activity, healthier dietary habits, improved sleep routines, cognitive engagement, and greater social interaction. Representative responses included, *"When I received the information about physical activity, I walk more often,"* and *"I learned a new skill, how to ride a bike and not use electronic devices before going to sleep."* Participants also reported some difficulties implementing recommendations. Responses to the statement, *"I did not encounter any challenges while following the recommendations,"* were more variable (mean = 3.69, SD = 1.11). More broadly, participants identified limited time, work demands, financial constraints, lack of insurance, chronic health conditions, language barriers, and stress as barriers to behavior change. For example, participants noted that *"Time to eat better is hard to find," "No insurance,"* and *"Depression makes it hard to care."* Family dynamics were also frequently described as barriers, with one participant reporting, *"It was a challenge to follow a healthy diet and make changes that my family was not happy about."* Participants described overcoming these challenges through gradual adaptation, problem-solving, and family communication, as illustrated by the response, *"My kids did not want to eat vegetables, but we incremented the amount in each meal."* Despite these challenges, participants frequently identified improved health, dementia prevention, quality of life, longevity, and family well-being as benefits of adopting the recommendations, with responses including *"Health and avoid dementia," "Longer, happier life span,"* and *"Spend more time with my family."*

4. DISCUSSION

This pilot study evaluated the feasibility of implementing a dementia risk-reduction program in a mobile health clinic serving underserved middle-aged and older adults. The program was informed by input from program participants and implementation staff. Findings demonstrated strong recruitment, high protocol fidelity, and favorable perceptions among both groups, supporting the feasibility of integrating dementia risk-factor screening and brain-health education into existing mobile health clinic services. Participants also demonstrated improvements in AD/ADRD prevention knowledge, motivation for brain-health behavior change, individualized risk awareness, and reported behavior engagement, providing preliminary support for further refinement and evaluation of the intervention. Although retention and follow-up data availability fell slightly below prespecified targets, these findings identified important areas for optimization in future studies.

Feasibility findings were supported by both study process indicators and perspectives from program participants and implementation staff. Recruitment exceeded the prespecified progression criterion, suggesting that the MHC served as an acceptable and accessible platform for engaging underserved middle-aged and older adults in dementia risk-reduction activities. This finding is consistent with prior research demonstrating that MHCs successfully reach populations that experience persistent barriers to health care access, including uninsured, underinsured, rural, and racial/ethnic minority communities, while delivering preventive health services and chronic disease screening directly within community settings [6, 23]. Mobile clinics have been described as an important mechanism for extending preventive care to vulnerable populations and strengthening connections between communities and healthcare systems [6, 23]. Protocol fidelity also met predefined benchmarks, indicating that core intervention components, including individualized dementia risk assessment, tailored brain-health education, and community resource linkage, were delivered consistently across participants. Retention and follow-up data availability fell slightly below prespecified targets and represented the primary area requiring refinement. Attrition was greater among Hispanic/Latino participants than non-Hispanic participants. Although reasons for withdrawal were not systematically collected, follow-up data collection occurred between December 2024 and March 2025, a period characterized by changes in federal policies, funding, and enforcement environments that may have influenced healthcare utilization, community engagement, and participation in research among some underserved populations [24, 25]. Because these factors were not directly assessed, no conclusions can be drawn regarding their impact on study retention. However, this observation highlights the broader social and contextual influences that can affect participation in community-based research and should be considered when designing retention strategies for underserved populations. Retention challenges have similarly been reported in evaluations of MHC serving low-income and underserved populations, where competing social, economic, and logistical demands frequently affect sustained participation in health programs [6, 23].

Implementation staff perspectives similarly supported feasibility. Staff reported that training effectively prepared them to deliver dementia risk-reduction education, that the protocol could be incorporated into routine MHC activities, and that intervention delivery did not substantially disrupt clinic workflow. The cascading training model, in which implementation staff trained healthcare student volunteers who subsequently delivered education to participants, suggests a potential approach for expanding dementia risk-reduction capacity in resource-constrained settings [26, 27]. This finding may be particularly relevant for university-affiliated mobile health clinics, which comprise approximately one-quarter of mobile clinics operating in the United States [6] and serve as training environments for future healthcare professionals while simultaneously providing services to medically underserved communities. MHCs have been recognized as an important mechanism for extending preventive care to vulnerable populations through academic-community partnerships [6, 23]. In this context, integrating dementia risk-reduction education into student training and supervised community service activities may represent a feasible and potentially cost-efficient strategy for expanding access to brain-health services while simultaneously strengthening workforce development. The alignment of educational, service, and community-engagement missions within university-affiliated mobile health clinics may provide a unique opportunity to support broader dissemination and sustainability of DRR initiatives.

At the same time, program participants and implementation staff identified several factors that warrant attention in future iterations of the intervention. Language-related barriers and the time required for individualized screening and education emerged as important implementation challenges. These findings are

consistent with broader implementation and community-based intervention research showing that sustainability depends not only on intervention acceptability but also on adequate staffing, workflow integration, cultural and linguistic responsiveness, and ongoing organizational support [28–30]. Collectively, these findings suggest that the MHC-DRR program was acceptable to both program participants and implementation staff while identifying opportunities to strengthen linguistic accessibility, streamline assessment procedures, and provide continued reinforcement and follow-up to support long-term implementation and sustainability.

Participants demonstrated promising improvements in both perceived and demonstrated DRR knowledge. Improvements were observed immediately following the intervention and remained evident at the 3-month follow-up, suggesting retention of key educational content over time. Increases were observed in both self-reported knowledge and participants' ability to correctly identify established dementia risk factors and prevention strategies. These findings are consistent with the program's educational objectives and with prior dementia prevention research demonstrating that targeted risk-reduction education can improve knowledge and understanding of modifiable dementia risk factors [31, 32]. Improvements in knowledge were accompanied by evidence of individualized risk awareness. At the 3-month follow-up, participants identified multiple modifiable dementia risk factors that applied to their own health, most commonly sleep problems, hypertension, physical inactivity, depression, loneliness, low cognitive stimulation, and diabetes [33]. Although individualized risk awareness was not formally assessed at baseline, follow-up findings suggest that participants were able to recognize and reflect on personal dementia risk factors following exposure to individualized risk assessment and tailored educational feedback received during the MHC-DRR program. This finding is notable because awareness of personal risk is often considered a critical step between acquiring health information and developing motivation to initiate behavior change. For example, participants described the importance of personalized feedback in increasing awareness of their own risk profile, with one participant noting that *“all the information I received was beneficial, especially because it was tailored to me.”* Dementia prevention studies have similarly emphasized that communicating individualized risk profiles may increase the personal relevance of prevention messages and enhance engagement with risk-reduction strategies [31, 32].

Participants also demonstrated favorable changes in motivation for brain-health behavior change. Increases were observed in willingness to change, perceived worthwhileness of behavior change, and perceived ability to make and sustain changes, with the largest changes observed for willingness and perceived worthwhileness. Although confidence intervals were wide because of the pilot nature of the study and small sample size, the observed pattern suggests that participants increasingly viewed dementia risk reduction as relevant, valuable, and achievable. These findings are consistent with prior behavior-change research showing that increases in knowledge and perceived personal relevance are often associated with greater readiness to adopt health-promoting behaviors [17]. Importantly, motivation gains were observed despite participants identifying substantial barriers related to time, competing responsibilities, financial constraints, and existing health conditions, suggesting that participants viewed dementia risk reduction as worthwhile even in the context of everyday challenges.

Considered together, the observed improvements in knowledge, individualized risk awareness, and motivation are consistent with theoretical models of self-awareness and self-regulation of behavior [17]. Self-regulation theories propose that behavior change is more likely to occur when individuals become aware of discrepancies

between their current health status and desired future goals, perceive those risks as personally meaningful, and believe they have the capacity to act [17]. Within this framework, the individualized risk assessment component delivered through the MHC-DRR program may have helped participants recognize personally relevant dementia risk factors, while tailored educational materials and counseling may have increased understanding of opportunities for risk reduction. Participants' qualitative responses provided additional support for this progression. For example, one participant reflected that *"just to realize how many risk factors apply to me"* increased awareness of personal dementia risk, while another reported that *"reading about blood pressure, healthy food, eat more fruits and vegetables, made me think about my health and motivation."* Evidence of self-reflection and self-regulation was also apparent in participants' descriptions of the perceived benefits of behavior change. One participant noted that *"sleeping and controlling my blood pressure motivated me because I noticed stress reduction,"* suggesting that recognizing positive outcomes associated with behavior changes may have reinforced continued motivation to engage in brain-health practices. Together, these responses suggest a process in which participants connected personalized risk information to their own health, reflected on opportunities for change, and monitored the benefits of newly adopted behaviors. The combination of increased knowledge, greater awareness of personal risk, and favorable changes in motivation suggests that participants progressed along key cognitive and motivational pathways hypothesized to precede health behavior change [17]. Although the study was not designed to establish causal relationships, the observed pattern provides preliminary support for the conceptual pathways targeted by the MHC-DRR program, whereby increased knowledge, individualized risk awareness, and motivation may facilitate engagement in brain-health behaviors.

Consistent with observed improvements in knowledge, individualized risk awareness, and motivation, participants reported engagement in several brain-health behaviors targeted by the intervention. Participants described changes in physical activity, dietary habits, sleep routines, cognitive engagement, and social interactions, suggesting that they were able to translate dementia risk-reduction information into actions relevant to their daily lives. At the same time, participants identified multiple barriers to behavior change, including time constraints, work demands, financial limitations, lack of insurance, chronic health conditions, stress, language barriers, and family resistance to lifestyle modifications. These findings are consistent with broader behavior-change literature demonstrating that adoption and maintenance of health behaviors are influenced not only by individual motivation but also by social, economic, and environmental factors. Despite these challenges, participants frequently described perceived benefits of change, including improved health, dementia prevention, quality of life, longevity, and family well-being. Participants also reported using problem-solving strategies, gradual adaptation, and family communication to overcome barriers, suggesting active engagement in the self-regulatory processes necessary to initiate and maintain behavior change. Together, these findings provide preliminary evidence that participants were able to move beyond knowledge acquisition and risk awareness to engage in behavior changes aligned with the intervention's brain-health objectives.

4.1. Limitations and Future Directions

Several limitations should be considered when interpreting these findings. First, the study was conducted with a small sample from two MHC sites and was not designed or powered to determine intervention effectiveness, limiting the precision and generalizability of the observed changes. Second, the absence of a comparison group precludes attribution of observed improvements in knowledge, motivation, risk awareness, and behavior

engagement to the intervention itself. Third, the follow-up period was limited to three months, preventing assessment of longer-term maintenance of the MHC-DRR program delivery and the behavior changes, sustained risk-factor modification and, or downstream cognitive outcomes. Fourth, several outcomes, including motivation, individualized risk awareness, and behavior engagement, relied on self-report and may have been influenced by recall, social desirability, or response biases. Retention was also lower than anticipated, with greater attrition among Hispanic/Latino participants, which may have influenced follow-up findings and reduced representativeness of the retained sample. Finally, individualized risk awareness was assessed only at follow-up; therefore, changes in awareness over time could not be formally evaluated. Despite these limitations, the study achieved its primary objective of assessing feasibility and generating preliminary data to inform refinement of the MHC-DRR program, implementation procedures, and outcome measures for future evaluation in larger and more rigorous studies.

Building on these findings, future research should focus on evaluating the MHC-DRR program in larger and more diverse populations, using designs capable of assessing effectiveness and long-term sustainability. Efforts to improve participant retention should be prioritized, including flexible follow-up procedures, multiple modes of participant contact, culturally and linguistically tailored retention strategies, and stronger community partnerships. Given the important role of family support identified by participants, future iterations of the program may also benefit from incorporating family-centered components and ongoing opportunities for reinforcement of behavior change.

Additional research is needed to determine whether the observed improvements in knowledge, risk awareness, motivation, and self-reported behavior engagement are sustained over longer periods and translate into meaningful reductions in modifiable dementia risk factors. Future studies should consider incorporating objective measures of health behavior and risk-factor change, longer follow-up periods, and repeated assessments of individualized risk awareness to better characterize potential mechanisms of behavior change. Because participants frequently identified psychosocial barriers, including stress, loneliness, depression, financial constraints, and competing life demands, future interventions may also benefit from integrating strategies that more directly address social and behavioral determinants of brain health.

From an implementation perspective, findings suggest opportunities to refine language support, streamline assessment procedures, and further develop the student-supported delivery model. The cascading training approach used in this study may represent a scalable strategy for expanding dementia risk-reduction capacity within university-affiliated MHC while simultaneously supporting workforce development and community engagement. Future implementation studies should evaluate the sustainability, cost, reach, and scalability of this model across diverse community settings.

5. CONCLUSION

This pilot study demonstrated the feasibility of implementing a dementia risk-reduction program within a mobile health clinic serving underserved middle-aged and older adults. Recruitment and protocol fidelity met prespecified progression criteria, and both program participants and implementation staff reported favorable perceptions of program acceptability and implementation. Participants demonstrated improvements in AD/ABDRD prevention knowledge, individualized risk awareness, motivation for brain-health behavior change, and reported engagement in behaviors aligned with the intervention objectives. While retention and follow-up

data availability warrant further refinement, these findings provide preliminary support for the program and its delivery through mobile health clinic infrastructure as a strategy to improve access to brain-health and DRR services among underserved populations. Future studies are needed to evaluate effectiveness, sustainability, and scalability in larger and more diverse populations over longer follow-up periods.

Declarations

DIVERSITY, EQUITY, AND INCLUSION (DEI) Statement

Diversity, equity, and inclusion were integrated throughout the design and implementation of this study. The MHC-DRR program was developed through a community-engaged process and designed to improve access to dementia risk-reduction services among underserved populations. Recruitment intentionally included individuals experiencing health disparities, and study procedures and educational materials were available in English and Spanish and tailored to participants' health literacy and cultural and linguistic preferences. The study sample included participants from diverse racial, ethnic, socioeconomic, and insurance backgrounds. However, the small sample size and recruitment from two urban mobile health clinic sites in Eastern Iowa limit representation and generalizability. Greater attrition among Hispanic/Latino participants also highlights the need for culturally and linguistically responsive retention strategies in future studies.

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AUTHOR CONTRIBUTIONS (CRediT)

Juliana N. Souza-Talarico: Conceptualization, Methodology, Supervision

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

De-identified data supporting the findings of this study are available from the corresponding author upon reasonable request and subject to institutional and ethical approvals.

Data Availability Statement: De-identified data supporting the findings of this study are available from the corresponding author upon reasonable request and subject to institutional and ethical approvals.

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References

1. Livingston G, Huntley J, Liu KY, Costafreda SG, Selbæk G, Alladi S, et al. Dementia prevention, intervention, and care: 2024 report of the Lancet standing Commission. *Lancet*. 2024;404(10452):572-628. [https://doi.org/10.1016/s0140-6736\(24\)01296-0](https://doi.org/10.1016/s0140-6736(24)01296-0)
2. National Association of Community Health Centers. Closing the primary care gap: How community health centers can address the nation's primary care crisis. National Association of Community Health Centers; 2023.
3. Agency for Healthcare Research and Quality (US). 2021 National Healthcare Quality and Disparities Report. Rockville, MD: Agency for Healthcare Research and Quality (US); 2021. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK578537/>.
4. Douthit N, Kiv S, Dwolatzky T, Biswas S. Exposing some important barriers to health care access in the rural USA. *Public Health*. 2015;129(6):611-20. <https://doi.org/10.1016/j.puhe.2015.04.001>
5. Alzheimer's Association. 2024 Alzheimer's Disease Facts and Figures. *Alzheimers Dement*. 2024;20(5). <https://www.alz.org/getmedia/76e51bb6-c003-4d84-8019-e0779d8c4e8d/alzheimers-facts-and-figures.pdf>
6. Malone NC, Williams MM, Smith Fawzi MC, Bennet J, Hill C, Katz JN, et al. Mobile health clinics in the United States. *Int J Equity Health*. 2020;19(1):40. <https://doi.org/10.1186/s12939-020-1135-7>
7. Yu SW, Hill C, Ricks ML, Bennet J, Oriol NE. The scope and impact of mobile health clinics in the United States: a literature review. *Int J Equity Health*. 2017;16(1):178. <https://doi.org/10.1186/s12939-017-0671-2>
8. Sabbagh MN, Perez A, Holland TM, Boustani M, Peabody SR, Yaffe K, et al. Primary prevention recommendations to reduce the risk of cognitive decline. *Alzheimers Dement*. 2022;18(8):1569-79. <https://doi.org/10.1002/alz.12535>
9. Godbee K, Guccione L, Palmer VJ, Gunn J, Lautenschlager N, Francis JJ. Dementia risk reduction in primary care: a scoping review of clinical guidelines using a behavioral specificity framework. *J Alzheimers Dis* 2022;89(3):789-802. <https://doi.org/10.3233/JAD-220382>
10. Britt KC, Alaa Harb M, Heil AB, Jen DeBerg M, Langel AM, Ashida S, et al. A Scoping Review of Interventions Supporting Dementia Risk Reduction, Delaying Cognitive Decline, and Promoting Early Detection in Rural US Communities. *Research Square*. 2026. <https://doi.org/10.21203/rs.3.rs-9726634/v1>
11. Rahman M, White EM, Mills C, Thomas KS, Jutkowitz E. Rural-urban differences in diagnostic incidence and prevalence of Alzheimer's disease and related dementias. *Alzheimers Dement*. 2021;17(7):1213-30. <https://doi.org/10.1002/alz.12285>
12. Nianogo RA, Rosenwohl-Mack A, Yaffe K, Carrasco A, Hoffmann CM, Barnes DE. Risk factors associated with Alzheimer disease and related dementias by sex and race and ethnicity in the US. *JAMA Neurol*. 2022;79(6):584-91. <https://doi.org/10.1001/jamaneurol.2022.0976>

13. National Institute on Minority Health and Health Disparities. NIH Health Equity Factsheet: National Institute on Minority Health and Health Disparities; 2017 [Available from: <https://www.nimhd.nih.gov/docs/uhdhealthEquityfactsheetNIH.pdf>.
14. Glasgow RE, Davis CL, Funnell MM, Beck A. Implementing practical interventions to support chronic illness self-management. *Jt Comm J Qual Saf*. 2003;29(11):563-74. [https://doi.org/10.1016/S1549-3741\(03\)29067-5](https://doi.org/10.1016/S1549-3741(03)29067-5)
15. Banegas MP, Nightingale CL, Dressler EV, Cooley ME, Kamen C, Wagner LI, et al. Screening and referral for health-related social needs and financial distress: current processes among national cancer institute community oncology research program practices. *JCO Oncology Practice*. 2025;21(10):1512-21. <https://doi.org/10.1200/op-24-00902>
16. Bischof G, Bischof A, Rumpf H-J. Motivational interviewing: an evidence-based approach for use in medical practice. *Dtsch Arztebl Int*. 2021;118(7):109. <https://doi.org/10.3238/arztebl.m2021.0014>
17. Ludwig VU, Brown KW, Brewer JA. Self-regulation without force: Can awareness leverage reward to drive behavior change? *Perspect Psychol Sci*. 2020;15(6):1382-99. <https://doi.org/10.1177/1745691620931460>
18. Mellor K, Albury C, Dutton SJ, Eldridge S, Hopewell S. Recommendations for progression criteria during external randomised pilot trial design, conduct, analysis and reporting. *Pilot Feasibility Stud*. 2023;9(1):59. <https://doi.org/10.1186/s40814-023-01291-5>
19. Holtrop JS, Estabrooks PA, Gaglio B, Harden SM, Kessler RS, King DK, et al. Understanding and applying the RE-AIM framework: clarifications and resources. *J Clin Transl Sci*. 2021;5(1):e126. <https://doi.org/10.1017/cts.2021.789>
20. Hessler DM, Fisher L, Polonsky W, Bowyer V, Potter M. Motivation and attitudes toward changing health (MATCH): a new patient-reported measure to inform clinical conversations. *J Diabetes Complicat*. 2018;32(7):665-9. <https://doi.org/10.1016/j.jdiacomp.2018.04.009>
21. Hughes ME, Waite LJ, Hawkey LC, Cacioppo JT. A short scale for measuring loneliness in large surveys: Results from two population-based studies. *Res Aging*. 2004;26(6):655-72. <https://doi.org/10.1177/0164027504268574>
22. Löwe B, Kroenke K, Gräfe K. Detecting and monitoring depression with a two-item questionnaire (PHQ-2). *J Psychosom Res*. 2005;58(2):163-71. <https://doi.org/10.1016/j.jpsychores.2004.09.006>
23. Coaston A, Lee S-J, Johnson J, Hardy-Peterson M, Weiss S, Stephens C. Mobile medical clinics in the United States post-affordable care act: an integrative review. *Popul Health Manag*. 2022;25(2):264-79. <https://doi.org/10.1089/pop.2021.0289>
24. Ahluwalia E. The New Barrier of Fear: The Impact of Immigration Enforcement on Healthcare Utilization Among Immigrant Populations in the United States. *SJPH*. 2026;4(3). <https://doi.org/10.58445/rars.3599>
25. Vital V. The impact of immigration policies on health outcomes. SAGE Publications Sage CA: Los Angeles, CA; 2025. p. 137-8. <https://doi.org/10.1177/15404153251352356>
26. Irby MB, Moore KR, Mann-Jackson L, Hamlin D, Randall I, Summers P, et al. Community-engaged research: common themes and needs identified by investigators and research teams at an emerging academic learning health system. *Int J Environ Res Public Health*. 2021;18(8):3893. <https://doi.org/10.3390/ijerph18083893>

27. Kaiser BL, Thomas GR, Bowers BJ. A case study of engaging hard-to-reach participants in the research process: Community advisors on research design and strategies (CARDS)®. *Res Nurs Health*. 2017;40(1):70-9. <https://doi.org/10.1002/nur.21753>

28. Boden-Albala B, Draughter-Espinoza D, Castro M, Gutierrez D, Cardenas C, Landry MJ, et al. Knowledge, barriers, and facilitators for promoting cardiovascular health in a Latino community: a qualitative sub-study of the Skills-based Educational Strategies for Reduction of Vascular Events in Orange County. *Front Public Health*. 2025;13:1531775. <https://doi.org/10.3389/fpubh.2025.1531775>

29. Ceptureanu SI, Ceptureanu EG. Community-based healthcare programs sustainability impact on the sustainability of host organizations: A structural equation modeling analysis. *Int J Environ Res Public Health*. 2019;16(20):4035. <https://doi.org/10.3390/ijerph16204035>

30. Ceptureanu SI, Ceptureanu EG, Luchian CE, Luchian I. Community based programs sustainability. A multidimensional analysis of sustainability factors. *Sustainability*. 2018;10(3):870. <https://doi.org/10.3390/su10030870>

31. Levinson AJ, Ayers S, Clark S, Woodburn R, Schneeberg A, Hadid D, et al. Effects of internet-based dementia risk reduction education on risk and protective factor knowledge, intentions, and health behaviors: randomized controlled trial. *J Med Internet Res*. 2026;28:e79405. <https://doi.org/10.2196/79405>

32. Aravena JM, Hamilton MI, Giordano F, Rodriguez J. Efficacy of dementia prevention awareness campaigns in the general population: a systematic review. *Alzheimers Dement*. 2025;21:e103510. https://doi.org/10.1002/alz70860_103510

33. Orji R, Vassileva J, Mandryk R. Towards an effective health interventions design: an extension of the health belief model. *Online J Public Health Inform*. 2012;4(3):ojphi. v4i3. 4321. <https://doi.org/10.5210/ojphi.v4i3.4321>

Tables

Table 1. Characteristics of Program Participants and Baseline Dementia Risk Factors (n = 22)

Characteristic	n (%)
Race	
White	12 (54.6)
Asian	0 (0.0)
American Indian/Alaska Native	1 (4.6)
Other	6 (27.3)
Ethnicity	
Hispanic	11 (50.0)
Non-Hispanic	11 (50.0)
Sex (% female)	14 (63.6)
Age group, years	
40–64	12 (54.5)
≥65	10 (45.5)
Household income	
< \$20,000	7 (31.8)
\$20,001–\$30,000	7 (31.8)
\$30,001–\$40,000	2 (9.1)
Education	
No formal schooling	1 (4.6)
Elementary school (1st–5th)	5 (22.7)
Middle school (6th–8th)	3 (13.6)
Some high school (9th–12th)	2 (9.1)
High school diploma	3 (13.6)
Postsecondary (associate degree or higher)	5 (22.7)
Graduate/professional degree	2 (9.1)
Number of dependents	
1	7 (31.8)
2	2 (9.1)
3–5	7 (31.8)
6–9	2 (9.1)
Not applicable	4 (18.2)

Health insurance coverage (% yes)	14 (63.6)
Type of health insurance among insured participants (n = 14)	
Private insurance	7 (50.0)
Medicare	7 (50.0)
Medicaid	3 (21.4)
Veterans Administration/military-sponsored	1 (7.1)
Other	1 (7.1)
Baseline dementia risk factors	
Sleep difficulties	18 (81.8)
Physical inactivity	10 (45.5)
Obesity	7 (31.8)
Diabetes	6 (27.3)
Hearing loss risk	4 (18.2)
Smoking	1 (4.5)
Loneliness	1 (4.5)
Depression	4 (18.2)
Low cognitive stimulation	4 (18.2)
High ultra-processed food intake	6 (27.3)
Alcohol use >1 drink/day	0 (0.0)

Note: Baseline data were collected from all enrolled program participants (n = 22). Risk factor prevalence reflects participants' self-reported status at program entry. Participants could report more than one health insurance type; therefore, percentages for insurance type among insured participants do not sum to 100%. Categories with no reported responses (e.g., "Prefer not to answer") are not displayed.

Table 2. Progression Criteria Findings and Implications for Future Evaluation of the MHC-DRR Program

Feasibility Domain	Prespecified Progression Criterion	Observed Result	Progression Assessment	Interpretation	Implications for Future Evaluation
Recruitment	≥70% of eligible individuals enrolled	22/25 (88.0%)	Green (Proceed)	Recruitment exceeded the prespecified criterion, indicating strong community interest and successful engagement of the intended population through the MHC.	Retain current recruitment strategies and consider expansion to additional MHC sites and community partners.
Retention	≥60% completed 3-month follow-up	13/22 (59.1%)	Amber (Proceed with Modifications)	Retention was slightly below the prespecified criterion but suggests follow-up procedures were largely feasible in this community-based setting.	Strengthen follow-up procedures through reminder systems, flexible scheduling, telephone outreach, and culturally tailored retention strategies.
Protocol Fidelity	≥80% of core intervention components delivered	100% completion of required intervention activities mean staff fidelity rating = 4.5/5	Green (Proceed)	Core intervention components were delivered consistently across participants, and staff reported high adherence to the protocol.	Maintain standardized training, fidelity monitoring, and implementation procedures.
Outcome Data Completeness	≥80% complete primary outcome data	Baseline: 21/22 (95.5%) for knowledge 18/22 (81.8%) for motivation; Follow-up: 13/22 (59.1%)	Amber (Proceed with Modifications)	Baseline data collection was highly feasible. Reduced follow-up completeness reflected participant attrition rather than missing responses among retained participants. Item-level completeness among follow-up completers was 100%.	Retain data collection procedures while implementing enhanced retention strategies to improve follow-up data availability.

Note: Progression assessment interpretation: Green = criterion achieved and no major modifications required; Amber = criterion not fully achieved but feasible with targeted modifications; Red = substantial concerns

requiring major redesign before future implementation or evaluation. Progression decisions were informed by both quantitative indicators and stakeholder perspectives.

Table 3. Program Participant Quantitative and Qualitative Responses Organized by RE-AIM Domain (n = 13)

RE-AIM Domain	Quantitative measure ^a	Mean (SD)	Qualitative indicator	n (%) ^b	Summary of Findings	Illustrating Quotes
Adoption	The program has positively impacted my motivation to adopt healthier behaviors	4.00 (0.41)	What specific moments or aspects of the program that significantly influenced your motivation?	10 (76.9)	Educational sessions, interactions with students and nurses, and increased awareness of dementia risk factors influenced motivation.	<p>“Just to realize how many risk factors apply to me.”</p> <p>“Meeting with students & getting all the handouts. Then meeting with [staff name].”</p> <p>“Reading about blood pressure, healthy food, eat more fruits and vegetables, made me think about my health and motivation.”</p>
	There were parts of the program that I found particularly motivating.	4.31 (0.48)	Can you share which parts of the program were most motivating for you and why?	8 (61.5)	Tailored education, personalized feedback, and support for healthy behaviors.	<p>“All the information I received was beneficial, especially because it was tailored to me.”</p> <p>“All the information I received was beneficial and unknown to me and now I can share it with my parents.”</p> <p>“More self-aware of which</p>

						<p>behaviors to avoid and which to promote.”</p> <p>“Depression and social activities because I noticed that I was relaxed and calm when I spent more time with my family.”</p> <p>“Sleeping and controlling my blood pressure motivated me because I noticed stress reduction.”</p>
Implementation	<p>The educational materials were clear, understandable and helpful to implement healthier behaviors</p>	<p>4.38 (0.51)</p>	<p>Can you describe any specific parts of the flyers that were particularly helpful or challenging?</p>	<p>5 (38.5)</p>	<p>Nutrition, physical activity, sleep, blood pressure control, and healthy aging information were described as most helpful;</p> <p>Most participants found materials understandable</p>	<p>““Sleep issues were addressed, which I learned some strategies to help.”</p> <p>“Nutrition information.”</p> <p>“Colorful and easy to understand.”</p> <p><i>“It was positive to have the information in Spanish about health things that I did not know.”</i></p>

Maintenance	I felt I had enough support throughout the 3-month follow-up	4.08 (0.64)	What kind of support did you find most helpful, and what additional support would you have liked?	7 (53.8)	Family, nurses, and follow-up visits were helpful; participants requested recipes, support groups, classes, and periodic follow-up.	<p>“The follow-up visits to review information.”</p> <p>“More information about eating healthy, recipes to cook with low-cost ingredients.”</p>
	I believe additional program resources or support would help me maintain the changes I've made.	3.69 (0.63)	What resources or support would be most beneficial for maintaining your changes?	6 (46.2)	Participants requested regular meetings, classes, reminders, recipes, support programs, and healthcare professional interactions.	<p>“Meetings every 3–4 months with new information.”</p> <p>“Text messages about health, emails, or group classes.”</p>
	My overall experience with the program 3-month follow-up has been positive.	4.31 (0.48)	What aspects contributed to your overall positive or negative experience?	6 (46.2)	Receiving information in Spanish, personalized results, follow-up visits, and direct interaction with healthcare staff contributed to positive experiences.	<p>“It was positive to have information in Spanish.”</p> <p>“It was positive to have a personal and private interview plus a translator.”</p>
	I believe the program could be improved based on my 3-month follow-up experience	3.15 (0.99)	What specific improvements would you suggest for the program?	5 (38.5)	Suggested improvements included shorter surveys, additional follow-up visits, more in-person interactions, and culturally tailored resources. One participant suggested, “Maybe every 3	“I appreciate all the information I received in Spanish”

			<i>months another in-person follow-up."</i>
Is there anything else you would like to share about your experience with the program?	9 (69.2)	Participants expressed gratitude, emphasized the value of Spanish-language materials, and described benefits extending to family members.	<p>"Thank you for including Hispanics in the study."</p> <p>"All the information influenced not only me but also my family."</p> <p>"I am grateful to everyone for taking the time to educate us."</p>

Note. ^a Quantitative values are presented as mean (SD) based on 1-5 Likert-scale ratings. ^b Response rates for qualitative measures are based on the number of participants providing responses to each open-ended question (N = 13). Not all participants responded to each qualitative item. Quotes are presented verbatim with minor edits for spelling and punctuation where needed to improve readability.

Table 4. RE-AIM Feasibility Outcomes Among Implementation Staff (n = 6)

Outcome Domain	Measure/Data Source	Mean (SD)
Adoption	Training supported learning about modifiable dementia risk factors and brain health	4.67 (0.52)
	Trainer was clear about modifiable dementia risk factors and brain health	5.00 (0.00)
	Training met expectations	4.67 (0.52)
	Training enhanced interest in the topic	4.50 (0.55)
	Opportunity to verbalize and demonstrate knowledge on dementia risk reduction and brain health	4.83 (0.41)
	Motivation to incorporate dementia risk reduction and education into clinical practice	4.67 (0.82)
Implementation	MHC-DRR program activities applied as intended	4.50 (0.84)
	Ease of applying the MHC-DRR program protocol	9.00 (0.00)
Maintenance	Likelihood of continued MHC support for the protocol	7.33 (2.16)
	Likelihood of protocol integration into routine clinic practice	6.50 (2.12)

Note. Measures were derived from the post-training survey (n = 6 implementation staff). Values are presented as mean (SD). Training-related and protocol adherence items were assessed on 5-point Likert scales, whereas ease of protocol application and maintenance measures were assessed on 0-10 scales.

Table 5. Participant-Identified Modifiable Dementia Risk Factors at 3-Month Follow-up (n = 13)

Risk Factor	n (%)
Sleep Issues	9 (69.2)
Hypertension	6 (46.2)
Inactivity	5 (38.5)
Depression	5 (38.5)
Loneliness	4 (30.8)
Low Cognitive Stimulation	4 (30.8)
Diabetes	4 (30.8)
High ultra-processed food intake	3 (23.1)
Alcohol Use	2 (15.4)
Obesity	2 (15.4)
Smoking	1 (7.7)
Hearing Loss Risk	0 (0)

Note. Values reflect participants' self-identification of modifiable dementia risk factors at the 3-month follow-up and are presented as indicators of individualized risk awareness. These values should not be interpreted as estimates of risk-factor prevalence or changes in risk-factor prevalence over time.

Figures

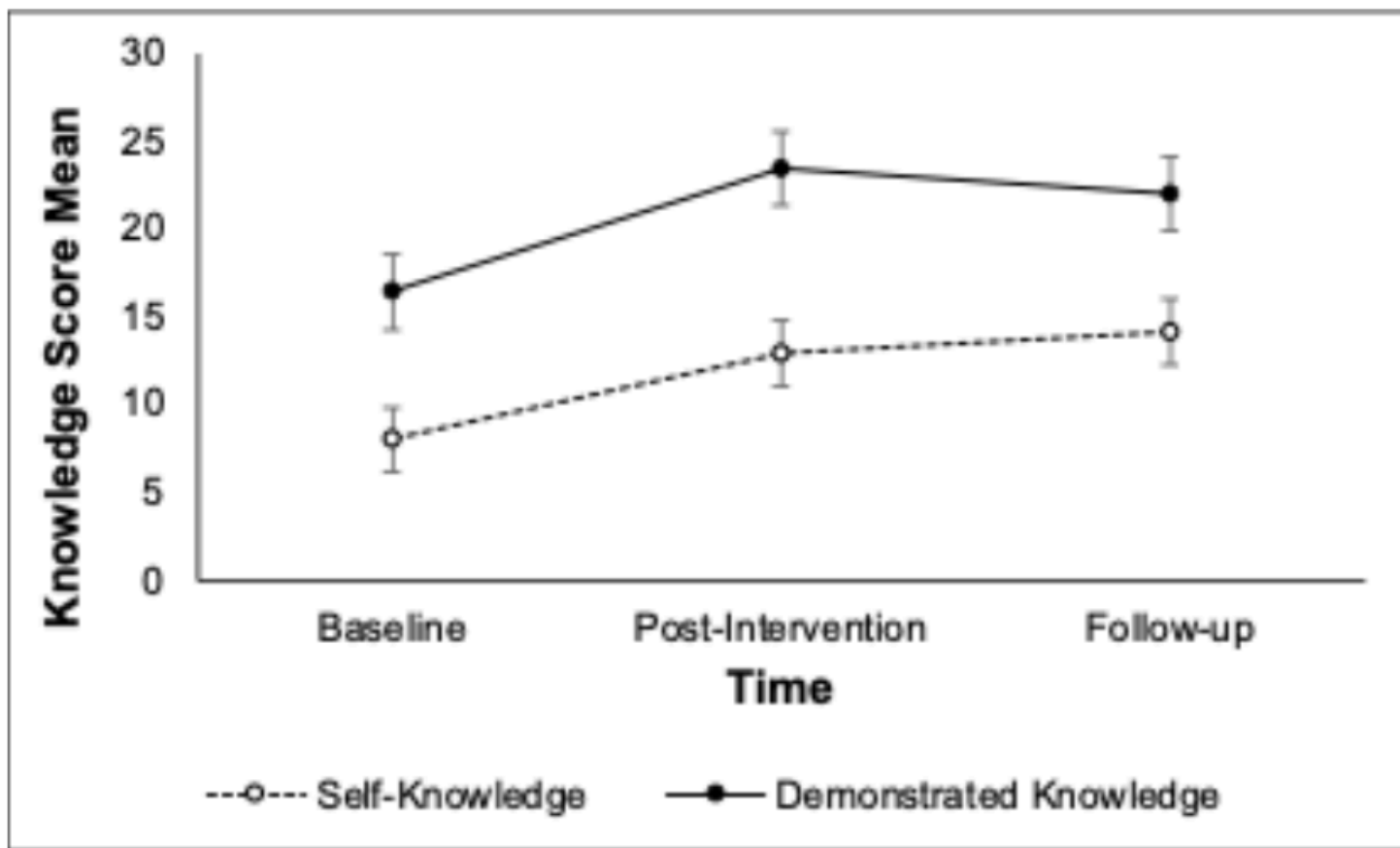


Figure 1

Changes in self-reported and demonstrated knowledge of AD/ADRD modifiable risk factors and prevention strategies from baseline to 3-month follow-up among participants completing follow-up assessments (n = 13). Self-knowledge scores ranged from 0 to 20 and reflected participants' perceived knowledge of dementia risk factors and risk-reduction strategies. Demonstrated knowledge scores ranged from 0 to 28 and reflected participants' ability to correctly identify established modifiable dementia risk factors and evidence-based prevention strategies. Points represent mean scores and error bars represent 95% confidence intervals.

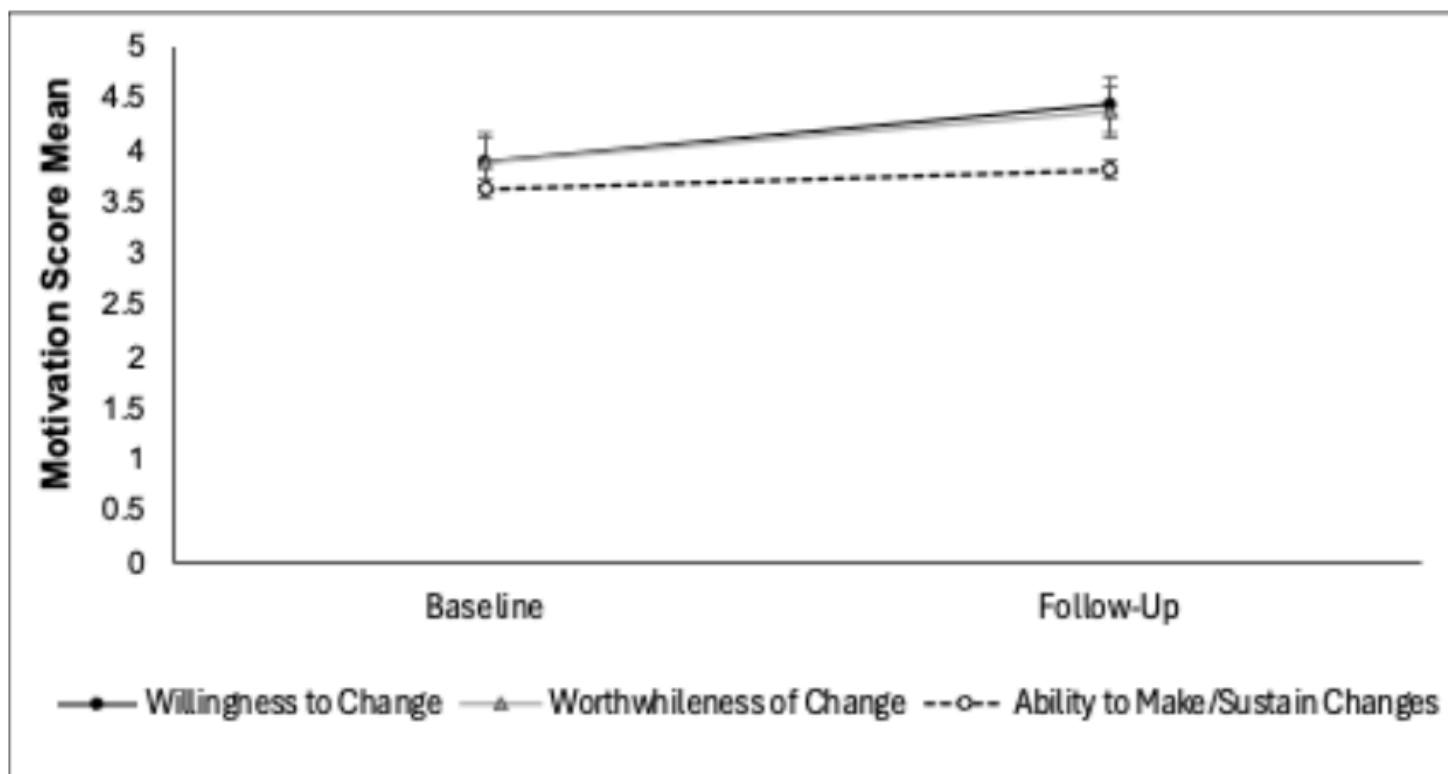


Figure 2

Changes in motivation domains from baseline to 3-month follow-up among participants with complete assessments (n = 9). Higher scores indicate greater willingness to change, perceived worthwhileness of behavior change, and perceived ability to make and sustain health behavior changes. Negatively worded items were reverse coded prior to score calculation. Error bars represent 95% confidence intervals.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [SupplementaryMaterials.docx](#)