



A community-based, culturally relevant intervention to promote healthy eating and physical activity among middle-aged African American women in rural Alabama: Findings from a group randomized controlled trial



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ABSTRACT

Objective: We examined the efficacy of a community-based, culturally relevant intervention to promote healthy eating and physical activity among African American (AA) women between the ages of 45–65 years, residing in rural Alabama.

Methods: We conducted a group randomized controlled trial with counties as the unit of randomization that evaluated two interventions based on health priorities identified by the community: (1) promotion of healthy eating and physical activity; and (2) promotion of breast and cervical cancer screening. A total of 6 counties with 565 participants were enrolled in the study between November 2009 and October 2011.

Results: The overall retention rate at 24-month follow-up was 54.7%. Higher retention rate was observed in the “healthy lifestyle” arm (63.1%) as compared to the “screening” arm (45.3%). Participants in the “healthy lifestyle” arm showed significant positive changes compared to the “screening” arm at 12-month follow-up with regard to decrease in fried food consumption and an increase in both fruit/vegetable intake and physical activity. At 24-month follow-up, these positive changes were maintained with healthy eating behaviors, but not engagement in physical activity.

Conclusions: A culturally relevant intervention, developed in collaboration with the target audience, can improve (and maintain) healthy eating among AA women living in rural areas.

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Introduction

Unhealthy eating and sedentary lifestyle have been identified as the second leading cause of death (after tobacco use) in the United States (Mokdad et al., 2004). Although the potential mechanisms require further investigation, there is strong evidence that these behaviors are associated with a number of chronic illnesses (Ye et al., 2012; Hooper et al., 2012; McGavock et al., 2006). Racial/ethnic minorities in the United States, especially African Americans, experience higher incidence and mortality rates of heart disease, stroke, diabetes, and cancer than whites (Smedley et al., 2002; U.S. Department of Health and Human Services, 2009).

Recent findings show that African Americans have the highest age-adjusted rates of obesity (49.5%) as compared to Hispanics (39.1%) and non-Hispanic whites (34.3%) (Flegal et al., 2012). African American women also had nearly double the rates of extreme obesity as compared

to white and Hispanic women (17.8% versus 7.1% and 6.0%) (Flegal et al., 2012).

Place of residence (rural vs. urban) is also an important variable to be considered when examining obesity disparities. Obesity prevalence in rural areas is significantly higher than in urban areas (Befort et al., 2012; Boggs et al., 2011a). Some factors that may contribute to increased obesity in rural areas include remoteness/isolation (Befort et al., 2012), poverty (Centers for Disease Control and Prevention, 2007), lack of recreational facilities (Keberhardt and Pamuk, 2004; Humpel et al., 2002), lack of sidewalks and walking trails (Keberhardt and Pamuk, 2004; Humpel et al., 2002), lack of nutrition education (Thakur and D'Amico, 1999), and food insecurity (Rose and Bodor, 2006). Studies have also shown that rural African American women are more likely to be overweight/obese and experience obesity-related health problems than their rural white counterparts, and, therefore, experience double disparities (race/ethnicity and place of residence) (Befort et al., 2012; Boggs et al., 2011a). Therefore, promotion of healthy eating habits and physical activity could have an impact on lowering the risk of chronic diseases associated with these behaviors among African Americans, particularly among middle-aged African American women living in rural areas.

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It has been shown that African Americans' daily fruit and vegetable intake is much lower than national recommendations, while the daily intake of saturated fat is higher and the majority does not meet the recommended levels of physical activity (Gary et al., 2004; Li et al., 2012; Mathieu et al., 2012). This scenario is even worse for African American women as compared to African American men (Gary et al., 2004; Li et al., 2012). It has also been shown that African Americans 50 years of age and older have lower fruit and vegetable intake than African Americans under 50 years of age (Gary et al., 2004).

Due to cultural differences and life experiences, strategies that have been successful in other populations may not be easily transferable to African American women in rural areas, where poverty and unemployment are high and access to healthy food and recreational activity centers are limited. Furthermore, studies have found African American women to be more self-accepting of weight, body shape, and appearance than white women (Abrams et al., 1993; Akan and Grilo, 1995). As such, African American women may engage in behaviors that promote a larger body size or have beliefs that perpetuate a cultural preference for heavier figures. Given African American women's views about attractiveness, messages that emphasize enhancement of one's current shape may have greater socio-cultural relevance than messages that promote weight loss or thinness (Blixen et al., 2006). Therefore, strategies that do not focus on weight loss but rather on healthy eating and physical activity may be a promising approach to promote a healthy lifestyle in this population given the proven benefits of engagement in these healthy behaviors (Reiner et al., 2013; Willett and Stampfer, 2013). The present study tested the efficacy of a community-based, culturally relevant intervention to promote healthy eating and physical activity among African American women between the ages of 45 and 65 years residing in rural counties in Alabama. In addition to older African American women having lower fruit and vegetable intake than African Americans under 50 years of age, this age range (45–65 years of age) was chosen to be consistent with the age requirements in the comparison group (breast and cervical cancer screening). At the time of the study, the Alabama Breast and Cervical Early Detection Program only provided breast and cervical cancer to eligible women between the ages of 45 and 65 years (Gary et al., 2004).

Methods

Geographic setting

The study took place in six counties in the Alabama Black Belt — Dallas, Marengo, Sumter, Lowndes, Green, and Choctaw counties. The state of Alabama has over 1 million African Americans, and out of its 67 counties, 55 counties are classified as rural (Alabama Rural Health Association, 2014). We chose to work in 6 counties where we had existing infrastructure in place from our previous studies (Wynn et al., 2006; Fouad et al., 2010; Scarinci et al., 2009). Alabama also has a disproportionately large population of socioeconomically disadvantaged individuals. This is especially pronounced in Alabama's Black Belt, an area stretching across the state's south-central counties and named for both the dark color of its fertile soil as well as the extremes of poverty and deprivation among its African American population (Wikipedia, 2014; Black Belt Fact Book, 2002; Wynn and Fouad, 2012).

Philosophical framework

Community-based participatory research (CBPR) represents a philosophical framework through which evidence-based interventions using “gold standard” methodologies (e.g., randomized trials) are developed and implemented in the context of community engagement, which, in turn, facilitates the transition to translation of this level of evidence into interventions that benefit both individuals and the community. CBPR “is a partnership approach to research that equitably involves, for example, community members, organizational representatives, and researchers in all aspects of the research process” (Israel et al., 2003). WHO defines health promotion as the “process of enabling people and communities to take control over their health and its determinants” (World Health Organization, 1984). Thus, by definition, health should be promoted

through community involvement in which community members decide what, when, where, and how health will be promoted in their communities.

Study design overview

This study was designed as a cluster randomized study, a total of six counties, Dallas, Marengo, Sumter, Lowndes, Green, and Choctaw counties were randomized into either screening or healthy lifestyle arms. With at least 75 participants in each county, this study has 80% power to test an absolute difference of 12% between two arms on the primary outcomes of increase in breast and cervical cancer screening at two sided type I error rate of 0.05 considering an inflation factor of an ICC of 0.009 based on pilot data. This study was conducted in collaboration with members of the Alabama Racial and Ethnic Approaches to Community Health (REACH) Coalition, a diverse and well-established partnership that is composed of state, local, faith-based, grassroots, and academic organizations with more than 10 years working together to eliminate breast and cervical cancer health disparities in Alabama (Wynn et al., 2006; Fouad et al., 2010). Although the initial charge of the coalition was promotion of breast and cervical cancer screening among African American women, the coalition's mission has evolved to focus on health issues identified by the community, including healthy eating and physical activity. Therefore, the present study addressed the two major health concerns raised by community residents, and consisted of a group randomized controlled trial that evaluated two interventions: (1) promotion of healthy eating and physical activity (healthy lifestyle); and (2) promotion of breast and cervical cancer screening (screening). That is, one arm served as the comparator for the other resulting in two interventions addressing relevant health issues identified by community members. The choice of “group” randomized trial (counties) vs. randomization at the individual level was based on the fact that “word of mouth” is very powerful among the target audience. The research protocol was reviewed and approved by the University of Alabama at Birmingham Institutional Review Board.

Intervention and comparison arms

The *intervention arm* consisted of a 5-week healthy lifestyle intervention (four group sessions and one individual session) that was adapted from the “New Leaf... Choices for Healthy Living with Diabetes” (Keyserling et al., 2000; Ammerman et al., 2007). The “New Leaf... Choices for Healthy Living” program is a structured nutrition and physical activity assessment and a counseling program that emphasizes practical strategies for change. It was originally developed for low-income adults with limited literacy skills residing in the south-eastern United States and is based on a combination of behavior change theories, including social cognitive theory, the transtheoretical model, and basic behavior modification principles (Melvin et al., 2013; Keyserling et al., 1997, 1999, 2000, 2002; Bandura, 1986; Eraker et al., 1984; Prochaska and Di Clemente, 1983; Rosamond et al., 2000; Ammerman et al., 2003; Cheng et al., 2004; Samuel-Hodge et al., 2006). For the current study, sessions were adapted to address healthy eating choices, promote physical activity, and provide practical applications of the newly acquired knowledge and skills in order to encourage behavior modification (Table 1). We also addressed stress management based on feedback from our partners and our previous work with African Americans in rural areas (Parham and Scarinci, 2007).

The *comparison arm* consisted of educational and behavioral strategies to promote breast and cervical cancer screening. In this arm we addressed the importance of knowing their family health history (perceived susceptibility), barriers and facilitators to screening, problem solving and communication skills. Both the intervention and comparison arms were delivered by lay health educators who lived in the targeted counties and went through extensive training. Once participants completed the 5-week intervention (four group sessions and one individual session), a number of retention strategies were implemented to keep women engaged in the program during the follow-up period and reinforce the knowledge and skills addressed in the intervention: newsletters, phone calls from the lay health educators, and bimonthly “reunions”. Except for content, all the intervention and retention components were the same in both arms. Group sessions took place at locations that were convenient for participants (e.g., churches, community centers). Most of the individual sessions took place at participant's homes.

Participants

Participants were approached through numerous methods. Flyers were distributed in high traffic areas of the counties such as libraries, grocery stores

Table 1
“Healthy lifestyle” and breast and cervical cancer interventions—sessions outline.

Healthy lifestyle	Breast and cervical cancer screening
<p><i>Group Session 1: Overview of Healthy Eating and Physical Activity</i></p> <ul style="list-style-type: none"> Understand the goals of the program Commit to participating in the program Understand the benefits of having healthy eating habits & being active Establish goals to improve their health (IN and OUT) Identify ways to be more active Learn and practice exercises that can be done in a chair/at home <p><i>Individual Session: Evaluation of Eating Habits & Activity Level</i></p> <ul style="list-style-type: none"> Dietary risk and physical activity evaluation Understand and know height, weight, BMI Receive feedback regarding personal diet & physical activity Learn and practice additional exercises to promote physical activity <p><i>Group Session 2: The Basics of Eating</i></p> <ul style="list-style-type: none"> Understand the importance of healthy eating habits Learn the food groups and understand the pyramid Learn how to improve personal diet Understand the importance of portion control Learn and practice additional exercises to promote physical activity <p>Learn tips on choosing healthy foods when eating out</p> <ul style="list-style-type: none"> Understand the importance of reading labels Learn to read food labels Learn to plan a healthy grocery list Learn and practice additional exercises to promote physical activity <p><i>Group Session 4: Stress Management & Review</i></p> <ul style="list-style-type: none"> Recognize signs and symptoms of stress Learn coping techniques for stress management Recognize signs and symptoms of depression Practice brief relaxation exercises Review healthy eating habits & importance of being active Learn and practice additional exercises to promote physical activity Close out 	<p><i>Group Session 1: Cancer and Breast Cancer</i></p> <ul style="list-style-type: none"> Understand the goals of the program Commit to participating in the program Understand cancer and breast cancer Understand the benefits of early detection and the available screening modalities Know where to go to get screened Recognize the importance of annual screening Know how to perform BSE Understand the importance of getting to know their body and reporting abnormalities to health care providers <p><i>Group Session 2: Cervical Cancer and Problem Solving Skills</i></p> <ul style="list-style-type: none"> Understand what cervical cancer is Understand what a Pap smear is and the importance of having one for early detection of cervical cancer Understand the steps involved in problem solving Demonstrate ability to problem solve to reduce barriers to healthcare access for self and friends <p><i>Group Session 3: Importance of Knowing Family Health History, Self-Efficacy, Communication, and Self-Responsibility</i></p> <ul style="list-style-type: none"> Understand the need to know their family health history Create a family health history chart Be comfortable communicating with family and friends about their health history Challenge the belief that having cancer is a burden to the family Understand the importance of self-responsibility Recognized the degree of personal control over behaviors Understand how we build up fears through self-talks Understand how fear plays a role in avoiding engaging in cancer screening Identify motivators to keep healthy Understand the seriousness of breast and cervical cancer Understand that every woman is at risk Understand early detection is the key Display confidence in overcoming barriers to screening <p><i>Group Session 4: Communication and Importance of Relying on Others</i></p> <ul style="list-style-type: none"> Articulate the role body language plays in the listening process Demonstrate ways to be a good listener Understand the key components of effective communication with providers Understand how to interpret what is being communicated Indicate ways to build trust and enhance reliance on others Summarize what they have learned over the course of the training

and post offices. Educators recruited through churches and relied on word of mouth referrals. Eligibility criteria included: African American woman, 45–65 years old (in accordance with Alabama Breast and Cervical Cancer Early Detection Program eligibility during the study enrollment period), and living within the county. Counties were randomized at the beginning of the trial and participants were enrolled in each arm based upon the county in which they lived.

Assessments

Primary outcomes for the healthy lifestyle intervention arm included: consumption of five or more servings of fruit and vegetables/day, consumption of fried food less than once/week, and engagement in physical activity at least 5 times/week. Participants were first administered a 105-item questionnaire at baseline (prior to the first session). Healthy eating and physical questions were adapted from the Behavioral Risk Factor Surveillance Survey (Centers for Disease Control and Prevention, 2002). Within 2 weeks of completing the intervention, participants were administered a 76-item post-test. They were also administered a short questionnaire at 12- and 24-month follow-up via telephone by a staff member not involved in intervention delivery. Participants were given a \$10 gift-card for each completed questionnaire.

We also implemented a number of activities to assure treatment fidelity as recommended by Bellg et al.: study design (equivalent dose within and between conditions), staff training (standardized training), delivery of treatment (quality assurance of random sessions), receipt of treatment, and enactment of skills (Bellg et al., 2004). In order to assure receipt of treatment and reenactment of skills, a stratified random sub-sample (10% of participants per arm)

were interviewed by the Program Manager using a 10-item questionnaire (see Table 4). The Program Manager was tasked with probing participant answers for an understanding of the concepts as well as their overall opinion of the program. Questions 1–7 were then rated on a scale of 1–5 for understanding and/or application of knowledge and/or skills. Scores were assigned by the Program Manager based on participants' ability to demonstrate the acquired knowledge and/or skills.

Statistical analysis

The primary outcomes included fruit and vegetables consumption; fried food consumption and physical activity, which were defined as binary variables (yes, no), and they were measured at baseline, and then at 12 and 24 months. Univariate analysis of healthy lifestyle changes from baseline after intervention was assessed with McNemar's test. Further generalized linear mixed model using logit link function, PROC GLIMMIX was used to account for the cluster randomization effect by adjusting for nesting of participants within county (Table 4) (Littell et al., 1996; Murray et al., 1994). County is treated as random effects in the model and baseline measurement was controlled. In addition, demographic characteristics are considered as covariate in the model. Treatment fidelity was scored using a scale of 1–5 with 5 being a good understanding of the concept. Scores were summarized and reported as means. Only those who completed the 24-month follow-up assessments were included in this analysis. Demographic variables were described using frequencies and proportions or mean with variation when it is appropriate. Statistical analysis was performed with SAS v 9.3 (SAS Institute Inc. Cary, NC USA).

Results

Demographics and health care utilization

A total of 565 participants from 6 counties were enrolled in the study (screening = 267 with an average of 89 participants in each county; healthy lifestyle = 298 with an average of 99 participants in each county), and 495 (88%) participants completed all five sessions (86% – screening and 89% – healthy lifestyle). The overall retention rate at 12-month follow-up was 60.9% with a much higher retention rate in healthy lifestyle arm as compared to the screening arm (74.1% and 46.1% respectively, $p < .0001$). At 24-month follow-up the overall retention rate dropped to 54.7% with a still higher retention rate in the healthy lifestyle arm as compared to the screening arm (63.1% and 45.3% respectively, $p < .0001$) (Fig. 1).

The participants' mean age was 53.9 years with approximately 50% of them being married or living with a significant other, and 46% being employed full- or part-time. The majority of the sample was educated at or above the high school level and approximately 70% reported an income of less than \$30,000/year. Most participants (76.2%) reported having health insurance coverage with one-third of these either receiving Medicaid or Medicare benefits (i.e., government subsidized health insurance programs for individuals with chronic illnesses and/or elderly). Most participants (90%) reported having a regular doctor, and 90% reported having seen a doctor within the last 12 months for a check-up not due to illness (Table 2). There were significant differences between the intervention and comparison arms with regard to employment status at 12 and 24 months ($p = .001$, 12 months and $p = .031$, 24 months). There were significant differences between these two arms with regard to annual income at 12 months ($p = .003$,

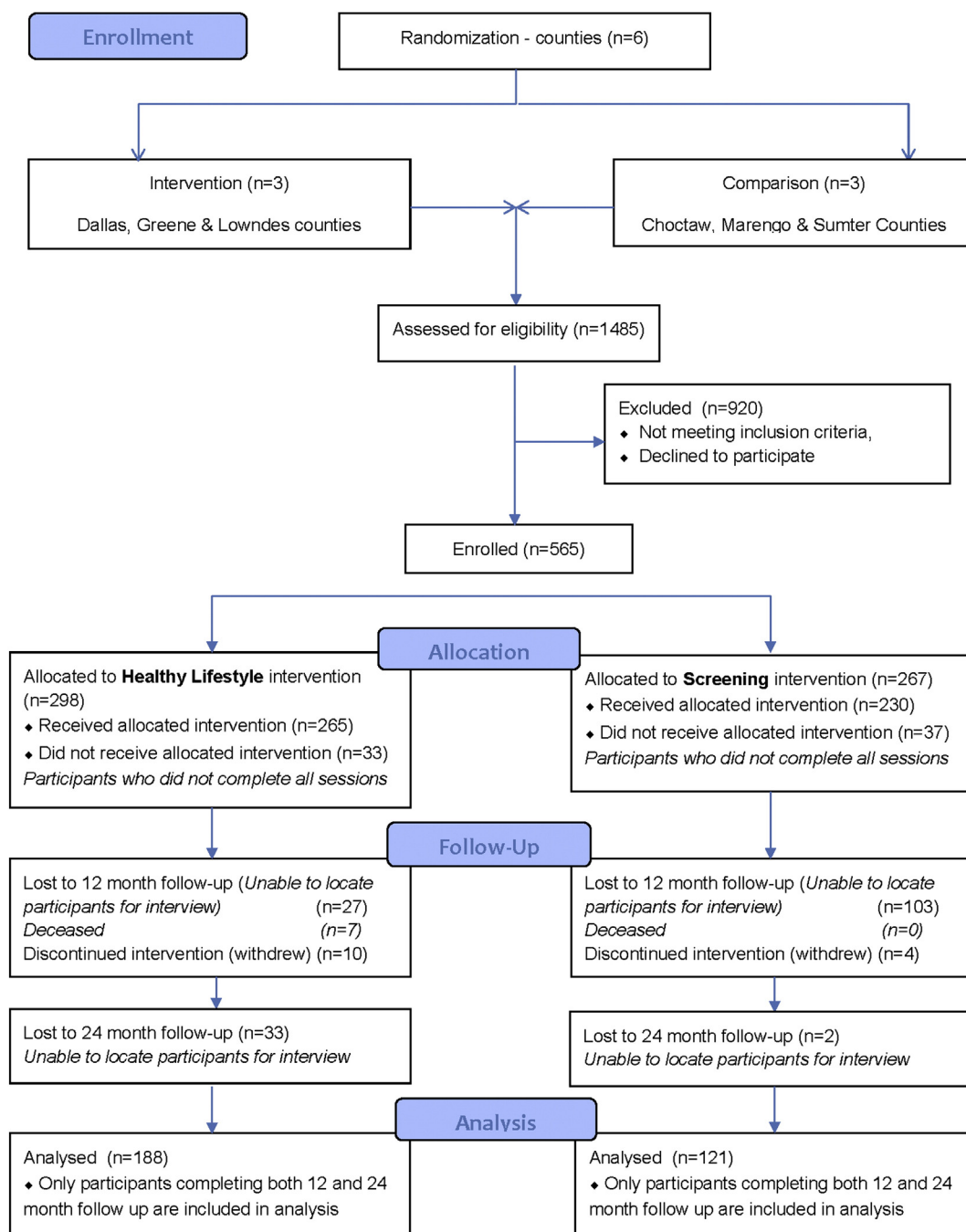


Fig. 1. Recruitment and retention of participants.

Table 2

Participant characteristics: total sample, and randomization status.

	Healthy lifestyle (n = 188)		Screening (n = 121)		p-value ^a	p-value ^b
	Baseline	24-month f/u	Baseline	24-month f/u		
Age ^c	54.2(6.8)	54.5(6.9)	53.4(5.5)	53.8(4.9)	.314	.341
Education ^d						
<12	8.1	5.4	15.9	13.2	.198	.160
High school diploma	39.9	38.6	45.8	44.6		
13+ years	52.0	56.0	38.3	42.6		
Marital status ^d						
Single	20.4	20.0	23.6	22.3	.289	.596
Married/Living together	48.2	50.3	42.4	47.1		
Separate/Divorced	18.7	16.2	25.1	20.7		
Widowed	12.4	13.5	8.9	9.9		
Employment status ^d						
Full-time	39.1	38.4	32.8	32.2	.001	.031
Part-time	9.4	10.3	10.3	5.8		
Homemaker	5.0	5.9	10.7	9.9		
Retired	16.7	16.2	8.5	11.6		
Other/disabled	14.1	14.1	24.4	28.0		
Unemployed	15.7	15.1	13.3	12.4		
Income (annual) ^d						
<10 K	22.8	24.7	34.0	33.9	.003	.078
10–30 K	39.5	36.0	43.1	41.5		
30–60 K	26.6	27.5	16.6	17.8		
60–100 K	9.7	9.0	5.5	6.7		
>100 K	1.4	2.8	0.8	0		
Insurance status ^d (including Medicare/Medicaid)	77.3	83.5	74.6	78.6	.295	.367
Having a regular physician ^d	90.0	95.6	91.1	94.2	.883	.475
Check-up in the past 12 months ^d	91.8	91.8	88.6	94.1	.660	.478

^a p-value between arms at 12 months follow-up.^b p-value between arms at 24 months follow-up.^c Age reported as mean (SD).^d Percentage of respondents.

12 months and $p = .078$, 24 months). A larger percentage of participants in the healthy lifestyle arm were employed full-time or retired as compared to participants in the screening arm. Also, a smaller percentage of participants in the healthy lifestyle arm reported annual income of \$30,000 or less as compared to participants in the screening arm (60.7% and 75.4% respectively). There were no significant differences between participants who completed the 12- and 24-month follow-up assessments and dropouts.

Primary outcomes

There were no significant differences in the primary outcomes between the intervention and comparison arms at baseline. Considering the cluster randomization, and other demographics covariates listed in Table 2, we found that employment status (0.0005) and income (0.004) were associated with the change of consumption of fried food. Fried food consumption was not significantly different by arms ($p = 0.31$) at

10% significant level after controlling age, income, employment and baseline measurement. There was a significant change in physical activity between arms (0.004), but the change in physical activity was not associated with any other factors. There was not a significant change in fruit and vegetable consumption, and marital status did not play any role on the three primary outcomes (Table 3). However, based on univariate analysis, participants in the healthy lifestyle arm who were eating fried foods less than once a week at baseline increased by 54% at 12 months as compared to only 18% in the screening arm ($p < .0001$), at 24 months an increase of 42% was maintained from baseline for healthy lifestyle arm as compared to only 20% in the screening arm ($p < .0001$). Likewise, there was a 69% increase in the number of participants eating five or more servings of fruit and vegetables per day in the healthy lifestyle arm at 12-month follow-up. There was a 21% increase from baseline at 24 months. These are compared to a 3% change in the screening arm at 12-month follow-up, and a 31% decrease at 24 months ($p < .0001$, $p = .021$). A large percentage of participants in the healthy

Table 3

Primary outcomes cluster analysis using multilevel model.

Effect	Fried food consumption			Physical activity			Fruit/Vegetable intake		
	Estimate	Standard error	Pr > t	Estimate	Standard error	Pr > t	Estimate	Standard error	Pr > t
Intercept	−0.1928	1.6221		1.0351	1.2252		1.2066	1.2364	
Baseline	2.5646	0.3428	<.001	−0.4186	0.2533	0.0995	−0.1823	0.2503	0.467
Age	−0.043	0.02561	0.0944	−0.0024	0.0207	0.9061	−0.0131	0.02067	0.5283
Employment status	−0.2479	0.07047	0.0005	−0.0285	0.05648	0.6148	−0.047	0.05651	0.4062
Income	−0.2024	0.07034	0.0043	0.03299	0.05771	0.568	−0.0549	0.0578	0.3431
arm	0.5492	0.3142	0.0815	−0.5628	0.2455	0.0226	−0.2818	0.2462	0.2533

Table 4
Primary outcomes: comparisons between arms.

	Healthy lifestyle (n = 188)						Screening (n = 121)						12 months	24 months						
	Baseline			12 months			24 months			Baseline			12 months			24 months			p-value ¹	p-value ²
		% change (12 months)	% change (24 months)		% change (12 months)	% change (24 months)		% change (12 months)	% change (24 months)		% change (12 months)	% change (24 months)		% change (12 months)	% change (24 months)					
Less than 1 × week fried foods	26% n = 48	40% n = 75	37% n = 70	54%↑	42%↑	28% n = 34	33% n = 40	33% n = 40	18%↑	20%↑	<.0001	<.0001								
Five or more servings of F&V	29% n = 55	49% n = 92	35% n = 66	69%↑	21%↑	35% n = 42	36% n = 44	24% n = 29	3%↑	31%↓	<.0001	.021								
Physical activity 5 or more days/week	38% n = 71	47% n = 88	32% n = 60	24%↑	16%↓	36% n = 44	37% n = 45	40% n = 48	3%↑	11%↑	<.0001	.024								

Less than 1 × week fried foods
Five or more servings of F&V
Physical activity 5 or
more days/week

p-value¹ = p-value between arms for percent change at 12 months follow-up.
p-value² = p-value between arms for percent change at 24 months follow-up.

lifestyle arm also reported engaging in physical activity five or more days per week at 12 months (24% increase) as compared to the screening arm (3% increase) ($p < .0001$). However, physical activity decreased by 16% from baseline at 24 months in the healthy lifestyle group while the screening group increased by 11% from baseline ($p = .024$) (Table 4).

Treatment fidelity

Overall treatment fidelity for the healthy lifestyle arm showed that participants had a good understanding of the knowledge and skills addressed in the intervention and how to implement them in their daily lives. In particular, participants were able to elaborate on how they have used what they learned and were able to demonstrate how they make healthier choices when shopping and eating out (Table 5). When asked their overall opinion of the program most responses were positive with the most frequent responses being that the program was informational and helpful. Participants liked the opportunity to “bond with new people” and the “instructor”. When asked what they disliked the most, the most frequent responses were related to the length of the assessments.

Discussion

This study examined the efficacy of an intervention to promote healthy eating and physical activity among African American women between the ages of 45 and 65 living in rural counties in Alabama. Our results indicate that the intervention was efficacious in promoting fruit and vegetable intake, and reducing fried food intake at 12- and 24-month follow-up. However, the changes in engagement in physical activity five or more times per week observed at 12-month follow-up were not sustained at 24-month follow-up.

National data derived from surveys and clinical examinations of 7325 urban and 1490 rural residents between the ages of 20 and 75 years revealed that 40% of rural adults were obese and had a BMI of ≥ 30 as compared with 33% of urban adults. Among rural participants, variables such as being African American and consuming a higher daily calorie intake or a higher percentage of calories from fat were associated with higher rates of obesity (Befort et al., 2012). Recent results from the Black Women's Health Study have shown that African American women who maintained a “vegetable/fruit” diet pattern for a period of 14 years had significantly less weight gain than African Americans who maintained a “meat/fried food” diet pattern (Boggs et al., 2011b). These findings reinforce the importance of addressing fat/fried food consumption and fruit/vegetable intake among African American women, particularly in rural areas.

Our results indicated that at baseline only one-fourth of middle-aged African American women living in rural counties in Alabama reported eating fried food less than once per week at baseline, and only 29% reported having five or more servings of fruit and vegetables per day. At 12-month follow-up, 40% of participants in the healthy lifestyle arm reported eating fried food less than once a week with a slight decrease to 37% at 24-month follow-up (42% change between baseline and 24-month follow-up) as compared to 33% in the screening arm at 24-month follow-up (20% change). There was also a major increase in the percentage of participants reporting consuming five or more servings of fruit and vegetables per day in the healthy lifestyle arm — 69% change between baseline and 12-month follow-up and 21% change at between baseline and 24-month follow-up as compared to 31% change at 24-month follow-up in the screening arm in the opposite direction. These findings are consistent (or superior) with previous studies addressing fat and fruit/vegetable intake (Ammerman et al., 2002; Resnicow et al., 2005). In a meta-analysis of studies focusing on fat and fruit/vegetable intake, Ammerman and colleagues found that goal setting and small groups (strategies used in our study) were the most promising strategies in modifying dietary behavior. They also found

Table 5Treatment fidelity—healthy lifestyle arm ($n = 20$).

Question	Score/Responses ^a
Q1. What have you learned in Reach Up and Out? Have you used what you have learned? (Give examples.)	4.2
Q2. Tell me about a situation in the past few months where you tried to make healthy food choices when eating out.	3.4
Q3. Has there been a time when you made a healthy food choice when shopping at the supermarket. How did you determine it was healthy?	4.0
Q4. Tell me about something you are doing now to be more physically active.	3.4
Q5. Tell me about your short and long terms goals regarding your health.	2.8
Q6. Tell me about how you deal with stressful situations.	3.5
Q7. Rate your experience between 1 = not at all satisfied to 5 = very satisfied	3.9
Q8. Tell me what you liked most about this program. ^b	45% – information 27% – meeting new people 10% – instructor
Q9. Tell me what you liked least about this program. ^b	47% – nothing 17% – length of assessments 17% – length of the sessions
Q10. Tell me what you would do differently if you were in charge of developing a similar program? ^b	35% – nothing 25% – longer sessions 25% – involvement of more people and different ages

^a Scores for questions 1–5 ranged from 1 (non understanding/application) to 5 (good understanding/application).

^b Open question – listed responses reflect most frequent feedback from participants.

that culturally relevant interventions seemed to be more likely to influence dietary behavior change among racial/ethnic minorities, but emphasized the need for studies focusing on low-income and racial/ethnic minority populations (Ammerman et al., 2002).

Similar results were found with regard to physical activity at 12-month follow-up, but not at 24-month follow-up. Consistent with a previous study among African Americans, primarily middle-aged women, the percent change in physical activity was smaller than changes in fried food and fruit/vegetable intake between baseline and 12- and 24-month follow-up (Gray, 1998). In fact, there was a decrease in physical activity at 24-month follow-up in the healthy lifestyle arm, and a slight increase in the comparator group. This may be due to the fact, that the major emphasis of the intervention was healthy eating rather than physical activity, and, therefore, the changes were not maintained. It is difficult to speculate the slight increase in physical activity in the breast and cervical screening. We examined whether such increase was accounted for in one specific county, and also kept track of competing health promotion activities in all participating counties. However, none of these seemed to have accounted for such increase.

This study has some shortcomings that should be considered when interpreting its results. First, there was a great difference in the retention rates across intervention arms. One possible explanation is that randomization occurred at the county level prior to recruitment of participants. That is, when participants were approached to be enrolled in the study they already knew which intervention they would participate in. A second potential explanation is that the healthy lifestyle intervention may have been more appealing to participants than an intervention to promote cancer screening, which focused on two behaviors that tend to occur once a year or less (cancer screening). Participants in the healthy lifestyle arm indicated that they enjoyed learning “how to eat right”, “how to choose the better foods” and “the right amount to eat”. These findings suggest that participants may have perceived more benefits from the intervention to their day-to-day lives than women in the screening arm. Second, the assessments were based on self-reported information. Third, these results do not provide information

on the long-term impact of healthy eating and physical activity on weight and development or management of chronic diseases. During intervention development, community members made it very clear that they were interested in learning more about healthy eating and how to incorporate physical activity in their daily lives rather than a weight loss intervention. Therefore researchers, in collaboration with the coalition, made a deliberate decision to not include weight measurements.

Conclusions

Despite its limitations, we believe this study has made three major contributions to the literature and the advancement of efforts in addressing unhealthy eating and sedentary lifestyles among African American women living in rural areas in the United States, a sub-population experiencing a high burden of disease associated with these behaviors. First, this intervention originated from the needs identified by community members in these rural counties. Through our efforts and partnerships we have established a participatory community infrastructure where community members have identified priorities to be addressed and they are actively involved in the solutions for identified problems. Through this participatory process, community members identified unhealthy eating and sedentary lifestyle as priorities and we have begun to collaboratively address this concern. This study represents the third step toward this goal. The first step was an assessment of the problem. The second step was the development of an evidence-based intervention in collaboration with community members. The third step consisted of testing the efficacy of such intervention, which resulted in an efficacious intervention that can be disseminated to African American women living in other rural areas in the United States. This participatory approach is particularly relevant among African Americans where past racial injustices have perpetuated in underserved minority communities under the banner of “research” and have caused some African Americans to reject conventional “top-down” programs (Gray, 1998). The effects of exposure to repeated racial slights can create a situation of reduced self-worth and “invisibility” and this perceived sense of “psychological invisibility” often leads to self-destructive behaviors, including indulging in high calorie food. The summative effect of these experiences may be a generalized distrust of institutions, individuals and programs outside of their immediate social sphere. As a result, African American women have been socialized to “be strong” and solve their own problems. Therefore, issues of trust, power and control are central themes in the lives of African American women and can be important barriers to effective efforts to promote a healthy lifestyle in this population. By engaging the target audience, we developed, implemented, and established efficacy of an intervention that was designed by them, and, therefore, has greater acceptability and ownership. Second, this study has shown that lay individuals living in rural areas can be trained to deliver interventions focusing on behavior change. This is particularly relevant for sustainability of health programs in rural areas. Third, instead of focusing on weight loss, the intervention focused on behaviors that contribute to obesity making it more positive. That is, it emphasized small and measurable steps women could take toward a healthy lifestyle making it sustainable. In summary, we have demonstrated that healthy lifestyle interventions can be tested and implemented in rural communities to reach individuals who have not been reached through other efforts.

Conflict of interest statement

The authors declare that there are no conflicts of interest.

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