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Journal

American Journal of Health Promotion, 33(4)

ISSN

0890-1171

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Publication Date

2019-05-01

DOI

10.1177/0890117118813333

Peer reviewed

HHS Public Access

Author manuscript

Am J Health Promot. Author manuscript; available in PMC 2020 April 21.

Published in final edited form as:

Am J Health Promot. 2019 May ; 33(4): 586–596. doi:10.1177/0890117118813333.

Eat, Pray, Move: A Pilot Cluster Randomized Controlled Trial of a Multilevel Church-Based Intervention to Address Obesity Among African Americans and Latinos

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Abstract

Purpose: To implement a multilevel, church-based intervention with diverse disparity populations using community-based participatory research and evaluate feasibility, acceptability, and preliminary effectiveness in improving obesity-related outcomes.

Design: Cluster randomized controlled trial (pilot).

Setting: Two midsized (~200 adults) African American baptist and 2 very large (~2000) Latino Catholic churches in South Los Angeles, California.

Participants: Adult (18+ years) congregants (n = 268 enrolled at baseline, ranging from 45 to 99 per church).

Intervention: Various components were implemented over 5 months and included 2 sermons by pastor, educational handouts, church vegetable and fruit gardens, cooking and nutrition classes, daily mobile messaging, community mapping of food and physical activity environments, and identification of congregational policy changes to increase healthy meals.

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Authors' Note

The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH or AHRQ.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Supplemental Material

Supplemental material for this article is available online.

Measures: Outcomes included objectively measured body weight, body mass index (BMI), and systolic and diastolic blood pressure (BP), plus self-reported overall healthiness of diet and usual minutes spent in physical activity each week; control variables include sex, age, race–ethnicity, English proficiency, education, household income, and (for physical activity outcome) self-reported health status.

Analysis: Multivariate linear regression models estimated the average effect size of the intervention, controlling for pair fixed effects, a main effect of the intervention, and baseline values of the outcomes.

Results: Among those completing follow-up (68%), the intervention resulted in statistically significantly less weight gain and greater weight loss (−0.05 effect sizes; 95% confidence interval [CI] = −0.06 to −0.04), lower BMI (−0.08; 95% CI = −0.11 to −0.05), and healthier diet (−0.09; 95% CI = −0.17 to −0.00). There was no evidence of an intervention impact on BP or physical activity minutes per week.

Conclusion: Implementing a multilevel intervention across diverse congregations resulted in small improvements in obesity outcomes. A longer time line is needed to fully implement and assess effects of community and congregation environmental strategies and to allow for potential larger impacts of the intervention.

Keywords

church-based; obesity; interventions; African Americans; Latinos; multilevel

Purpose

Obesity is a worldwide public health problem; however, in the United States, certain groups are disproportionately affected, including African Americans, Latinos, and those with low income.[1–3] Among US adults, 48% of African Americans and 43% of Latinos have obesity compared to 33% of whites and 11% of Asians.[4] These disparities are important because obesity increases the risk of serious illnesses, including type 2 diabetes, hypertension, coronary artery disease, stroke, and certain cancers,[5] as well as mental health problems and reduced quality of life.[6] Finding effective ways to reduce obesity among African Americans and Latinos is imperative to achieve health equity.

Church-based health programming has gained increasing prominence over the past several decades and may be a particularly effective way to reach African Americans and Latinos. There are an estimated 300 000 religious congregations in the United States,[7] and national surveys have found that about half of all adults attend religious services at least monthly.[8] Churches are often trusted community resources for health information and play a particularly critical role among Latinos and African Americans who report higher levels of religious affiliation than other populations.[9,10] Congregations offer an opportunity to address health issues at various levels—individual, group, congregation, and community—which is important for addressing the complex factors associated with health disparities. Congregations have historically played an important role in the civic and social integration of recent immigrants.[11,12] Black churches and their leaders have been noted for playing important roles in addressing broad social justice issues, which suggests that these

institutions can play a role in affecting both their membership and the broader communities that they serve.[13]

Obesity has been one of the more common health issues addressed through church-based programming, yet, even so, the evidence regarding the extent to which such programming has been effective in addressing obesity among African Americans and Latinos is limited. In a systematic review of quantitative studies evaluating church-based obesity interventions, we identified 40 unique studies; however, most of these focused only on African American churches (n = 31 studies), with only 2 including Latino churches.[14,15] Among these church-based obesity interventions, 23 reported statistically significant improvements in obesity outcomes—specifically, 13 had reductions in weight or body mass index (BMI),[16–28] 7 had improvements in self-reported dietary behavior (most frequently fruit and vegetable consumption),[19,29–34] and 8 had improvements in physical activity.[21,26,28,34–38] However, the majority of these studies targeted only individual behavior, and few addressed organizational and community-level factors. For example, only a handful incorporated church policy-level strategies, such as getting churches to alter the types of food offered at congregational meals.[33,39–41] Thus, questions remain about how to develop sustainable church-based approaches to addressing the disparities in obesity and resultant comorbid health conditions among African Americans and Latinos.

In this article, we examine the feasibility, acceptability, and preliminary effectiveness of a multicomponent, church-based obesity intervention among African American and Latino congregants in South Los Angeles, an area highly impacted by health disparities. To our knowledge, ours is the first to test a multilevel intervention in both African American and Latino churches using community-based participatory research (CBPR) and a rigorous design. The intervention called *Eat, Pray, Move (Come, Ora, Muévete)* was developed in collaboration with faith and public health partners after an extensive community engagement process through which partners identified obesity as the priority health condition. The intervention drew on the socioecological theory, which posits that health is influenced by multiple levels (intrapersonal, interpersonal, organizational, physical and social environment, and policy)[42] and incorporated multiple activities targeting the individual, congregation, and community levels to support healthy eating and increase physical activity among congregants. We included congregation and community-level strategies because these were deemed important by community partners, and few such strategies are documented in previous church-based interventions and across diverse religious and cultural settings.

Methods

Design

We used a CBPR approach throughout all phases of the study. The study team was co-led by researchers from a nonprofit research organization and leaders from a faith-based nonprofit organization (Los Angeles Metropolitan Churches or LAM). A community steering committee composed of local religious and public health leaders was actively involved in decision-making regarding all key aspects of the study, including: (1) a community consensus-building process to select a priority health issue, (2) design of the

multicomponent intervention, (3) selection of the pilot churches, (4) design of data collection and evaluation procedures, (5) interpretation of preliminary results, and (6) dissemination of findings. In addition, the research team worked closely with the pilot churches to plan, schedule, and implement all church-based assessments and intervention activities.

The study design was a pilot cluster randomized controlled trial with randomization occurring at the church level to intervention or waitlist control. Churches were matched on race–ethnicity (African American or Latino), membership size, and denominational type. In designing this church-level pilot study, we aimed to optimize the study to allow for efficient estimation of the standard deviation (SD) and distributions of the outcomes being considered for the study. Such estimates will prove useful for future large-scale studies involving the intervention. Since it was a pilot, we did not design the study with a goal of detecting statistically significant differences between the intervention and control arms. Thus, by enrolling 4 churches with an average of 48 people per church, our pilot study had precision to obtain estimates of the SD of our outcomes that would be no bigger than 33% to 50% of the true SD under a range of assumptions about the intraclass correlations for individuals within churches and within families.

Sample

Our study area focused on LA County Service Planning Area 6, which includes South Los Angeles, Lynwood, and Compton (hereafter called “South LA”). South LA has poor health outcomes relative to other communities in Los Angeles, and its residents are disadvantaged in terms of socioeconomic status (eg, income, education, wealth, employment) as well as access to health-care resources.[43] In 2017, nearly all (95%) of South LA’s residents were Latino (68%) or African American (27%). Just under half of adults (42%) in South LA had not graduated from high school, and 34% of residents were living in poverty (the highest rate in LA County).

South LA offers an important setting in which to address health disparities in partnership with African American and Latino churches. African Americans and Latinos in South LA share a common geography and thus are exposed to and/or affected by many of the same neighborhood influences on health, including limited access to health-care services and increased exposure to environmental hazards. Both populations share a tradition of involvement with the church as a religious and a social institution in the community. And even though the percentage of South LA residents who are African Americans has declined substantially over the last several decades as these residents move elsewhere, many of these individuals retain ties with African American churches in South LA and commute back for services and other congregation activities.[44]

We conducted extensive community engagement over approximately a 1-year period to develop our Multi-Ethnic Faith and Public Health Partnership and identify partnership health priorities and intervention strategies.[45] This included recruiting over 60 congregations (41 predominantly African American and 21 predominantly Latino) to participate in partnership activities, which included the identification of the partnership’s priority health issue (obesity) and design of a multilevel church-based intervention. We worked with our

community steering committee to select 6 congregations from the partnership and match them on race–ethnicity, denomination, and congregation size. We sent the pastor of each congregation a recruitment letter with a project brochure inviting the congregation to participate and requesting a meeting with church leaders to provide more details about the project. Members of the community research team followed up with churches over the phone, and, once contact was made, in-person meetings were held with pastors and designated church coordinators to discuss project aims, project activities, church coordinator roles, and project incentives.

Ultimately, all 6 churches agreed to participate in the pilot: 4 medium-sized (200–300 member) African American Protestant churches (3 baptist and 1 nondenominational) and 2 large (2000+ member) Latino Catholic churches. The 4 African American churches were matched in pairs and together with the Latino pair were randomized to either intervention or control conditions within their matched pair. However, a week before one of the baseline surveys, a baptist African American church that was assigned to the control condition decided to drop out of the study. Because of the lead time needed to coordinate data collection with our community health center partners, we were unable to find a suitable replacement and lost a control African American church for one of the pairs, ending up with 5 churches in the study (2 matched pairs and 1 African American intervention church without a control).

Intervention

Intervention components are outlined in Table 1. All intervention materials were professionally translated into Spanish and reviewed by bilingual members of the research team; adaptations were made by consensus.

The overall intervention aimed to support healthy eating and increase physical activity through multiple strategies, including pastors' sermons, distributing educational materials, implementing church vegetable and fruit gardens and garden-based cooking and nutrition classes, mapping local food and physical activity resources and identifying areas for advocacy, and, ultimately, congregational policy changes that would create a healthier church environment. A mobile messaging component was included based on community partner input and the fact that few church-based interventions had incorporated this recent innovation. The messages mapped to 5 healthy eating and physical activity categories, each with weekly health promotion behavior themes that linked to other intervention components.

The intervention was implemented over approximately 5 months in each church. Pastors were asked to implement 2 sermons during this time, one on healthy eating and one on the importance of physical activity. Churches were provided with a series of handouts and posters that mapped to weekly themes. Study participants received a daily text or e-mail message per their preference that also mapped to the weekly theme (over 4 months). A community partner agency (Seeds of Hope) worked with each church to (1) implement a community garden and/or fruit trees, (2) conduct a 5-week series of weekly cooking and nutrition classes, (3) conduct an environmental assessment at the church to identify recommendations for improving access to healthy foods (eg, making fruit infused water ["spa water"] and other healthier options available at church), and (4) schedule at least

weekly physical activity classes (Zumba, yoga, etc). Los Angeles Metropolitan Churches and RAND collaborated to conduct a systematic assessment of the nutrition and physical activity environments in neighborhoods surrounding each church (within 0.5-mile radius) using the Communities of Excellence in Nutrition, Physical Activity and Obesity Prevention (CX3). These procedures use geographic information system mapping and field surveys to (1) map food sources in the church neighborhood (grocery and convenience stores, fast food restaurants, farmers' markets, emergency food outlets, mobile food vendors) and (2) collect data on food availability, affordability, and quality; marketing; environmental safety; and neighborhood walkability.[46,47] A mapping report including assessment results and recommendations was then provided to each church in a meeting of congregants and leaders and points of advocacy were identified (for longer term strategies).

Measures

Individual survey and biometric assessments were performed 2 times at each church, before and after intervention implementation at the intervention churches (spanning approximately 6–7 months). Control churches were given the option to complete intervention activities after the second assessment was completed. Church coordinators and other congregational leaders helped to promote the survey and biometric assessments. Trained survey administrators conducted the English and Spanish language group survey and health screening sessions at church sites before and after religious services. Biometric assessments were conducted by trained staff from local community clinics of the Southside Coalition of Community Health Centers, a project partner.

Sampling and recruitment.—Participant eligibility criteria included age (18 years and older) and a minimum of monthly attendance in the past year at the participating church. We aimed to have at least 50 adults per church, but given church requests for enrolling larger numbers as well as the disparate sizes of congregations, we allowed for up to 60 adult participants at the African American churches and up to 100 adult participants at the Latino churches. Study participants provided written consent.

At baseline, study participants received a $20 gift card and refreshments or a light meal for completing the survey and biometric assessments; at follow-up, participants received a $30 gift card and refreshments or a light meal.

Biometric outcomes included *weight, BMI*, and *systolic and diastolic blood pressure* (BP). Each participant's height, weight, and BP (systolic and diastolic) were assessed using the community clinic's standard procedures and recorded on the study's Screening and Linkage to Care Form (with a duplicate copy given to the participant). Individuals with abnormal BP (>120/80, borderline high, high and very high) were referred to their personal physician (or, if reporting none, to the community clinic) for follow-up. Body mass index was calculated by the research team using body weight (kg)/height (m^2).

Self-reported outcomes included *overall healthiness of diet* and *usual minutes spent in physical activity each week*. For self-reported *healthiness of diet*, we asked respondents: "Thinking only about yourself, in general how healthy is your overall diet? Would you say (mark one), excellent, very good, good, fair, poor (1 = poor, 5 = excellent)."[48] For self-

reported *physical activity each week*, we derived this based on respondent's answer to the following questions: (1) How many times per week do you engage in physical activities such as walking, cycling, or any activity that causes increased breathing or heart rate, leg fatigue, or causes you to perspire? (2) What is the usual length of these physical activities? These 2 items come from the Minnesota Heart Health Program[49] and are being assessed in routine doctor visits and have demonstrated face and discriminant validity among a racially and ethnically diverse sample of health plan members in Southern California.[50] Further, these measures have been used previously with diverse populations in Los Angeles.[51,52]

Respondents provided various types of demographic and socioeconomic/cultural background information, which we used as control variables. Since obesity is influenced by cultural norms, we created subgroups related to *race–ethnicity* and *English-language fluency* (a proxy for acculturation): (1) African Americans (reference group); (2) Latinos who reported speaking English "well" or "very well" (English-speaking Latinos); (3) Latinos who reported speaking English "not well" or "not at all" (Spanish-speaking Latinos).

Other variables were defined as follows: (1) *gender or sex* (male, female); (2) *education* (less than high school, high school graduate or GED, some college, bachelor's degree, some graduate school, or graduate degree); (3) *household income* (<$20 000, $20 000-$39 999, $40 000-$59 999, $60 000-99 999, and $100 000 or more); (4) *age* (continuous) calculated from year of survey and year born. Additionally, *health status* was controlled for when we modeled physical activity outcome using responses to the question "Would you say that in general your health is … " with responses ranging from excellent = 1 to poor = 5.

Analysis

Missingness rates in survey items ranged from 0% to 12% (household income) with a mean of 3%. We used multiple imputation (IVEware in SAS 9.2) to avoid dropping cases with missing data. Five imputed data sets were created using the Sequential Regression Imputation Method.[53] Chi-square and *t* tests were used to examine participant characteristics at baseline and assess any differences between churches within our matched pairs. Additionally, our follow-up rate was 71.7% overall (64.8%–79.5% within each church), and we assessed the representativeness of our study completers who had follow-up data by examining the absolute standardized mean difference (ASMD) between our study completers and the original baseline sample (ASMD < 0.20 is considered to be small and suggestive that responders are representative of the original baseline sample).[54]

Multivariate analyses.—We estimated the average effect size of the intervention on our outcomes using multivariate linear regression models. All models were estimated using data from the 4 churches that formed complete pairs (thus, the fifth church was excluded from our models since it did not have a matched pair control church). All models controlled for pair fixed effects, a main effect of the intervention, and baseline values of the outcomes. We standardized each outcome by dividing by the baseline SD of the given outcome in the entire sample at baseline. This allowed the estimated regression coefficients from the models to represent the average effect size impact of the intervention on the outcome. Typically, effect

sizes of 0.2, 0.5, and 0.8 are considered to be small, moderate, and large, respectively.[55] Statistical significance was assessed at the 0.05 level for all models.

We note that random effects or normal survey cluster adjustments could not be applied in this study to control for clustering within churches since there are only 4 clusters[56]; fixed effects of churches and pairs were the best available means we had to account for the similarity of responses expected within churches and to ensure our standard errors for other predictors in the model are not underestimated. Nevertheless, the cluster randomized study design does not guard against potentially meaningful imbalances within church pairs at the individual level (as shown in Table 2); thus, we conducted 2 sets of sensitivity analyses: (1) using additional covariate adjustment (including age, gender, race/language, education, and income) and (2) using propensity score weights to balance the groups of individuals within matched pair churches in terms of age, gender, race/language, education, income, and the baseline outcomes. We note that the pilot nature of the study made it difficult to successfully implement both sets of sensitivity analyses (eg, only so many control covariates could be included in our adjusted models and balance was difficult to obtain in the African American church pair on all key confounding factors). However, we implemented and report on these analyses to highlight for the field important analytic issues that must be tackled when analyzing cluster randomized trial data. We note that all covariates used in our adjusted models for our first set of sensitivity analyses were chosen a priori, prior to implementation of any outcome modeling.

Results

Sample Characteristics

Table 2 shows that there are no major differences in overall sample means across the 5 churches for the study completers (n = 213) and the entire baseline sample (n = 307; ie, all ASMDs were <0.20). Most study completers were female(78.4%), with a mean age of 51.1 years. Overall, nearly three-quarters (71.4%) had at least a high school diploma or GED; however, there was great variation between participants at the African American churches and the Latino churches. Forty-one percent of the sample reported low household income (< $20 000). Nearly half (48.4%) of the sample was African American, while 20.7% was English-speaking Latino and 31.0% was Spanish-speaking Latino. In terms of key study outcomes at baseline, averages were as follows: BMI, 32.2 (obese); healthiness of diet, 2.6 (1 = poor, 5 = excellent); and usual exercise, 89 minutes per week. Converting BMI values to categories based on standard cutoffs (BMI 25.0–29.9 = overweight; BMI 30.0+ = obese) resulted in an estimated 86.8% having obesity or overweight, 53.6% having obesity, and 33.2% were overweight.

Table 2 also shows how comparable our matched church pairs were at baseline. Compared to participants at their respective intervention church, participants at the African American and Latino control churches were on average younger and had lower systolic BP. The proportion of participants at the Latino control church that were African American was also much lower than the intervention church. Participants at the African American control church also differed substantially from those at the respective intervention church, having lower levels of education and income and reporting greater amounts of exercise. Given these imbalances, as

noted earlier, we utilized our 2 sensitivity analyses to assess the potential impact these imbalances might have on our findings. We discuss these results in detail in our Supplementary Material, noting key lessons learned below.

Average Impact of the Intervention on Biometric Outcomes

Table 3 shows our regression results when controlling for matched pair indicators and the baseline outcome in question for the two matched pairs in our pilot. There was statistically significant evidence of the impact of the intervention on several key outcomes. First, the intervention was found to result in significantly less weight gain (treatment coefficient = −0.05 effect sizes; 95% confidence interval [CI] = −0.06 to −0.04) and BMI (treatment coefficient = −0.08 effect sizes; 95% CI = −0.11 to −0.05) for individuals in the intervention churches relative to the control churches. Individuals in the intervention churches also experienced an improvement in overall healthy diet (−0.09; 95% CI = −0.17 to −0.00), where negative means a healthier diet relative to the control church individuals. There was no evidence of an impact of the intervention on BP or self-reported physical activity minutes per week. All the significant effect sizes are small in size, although nonetheless notable for initial evidence regarding the potential impact of the intervention over a 5- to 6-month period. We also note that the weight data show that the control group tended to gain weight over time but that the intervention group on average lost weight (average weight gain in control group = 1.78 lbs [95% CI = 0.15 to 3.42] and average weight loss in the intervention arm = −0.87 [95% CI = −2.67 to 0.92] lbs).

The findings from our sensitivity analyses using additional covariate adjustment and propensity score weights were consistent with the results in Table 3. Our Supplementary Material provides extensive details on those analyses. First, models using additional covariate control show stable effect size estimates for BMI and weight, although with losses in statistical precision as the model size grew. The effect size of healthy diet grew in magnitude, as additional controls were added with marginally significant results remaining. Similar patterns were found in our analyses using propensity score weights, with little change happening on the estimated effect sizes of the intervention on weight and BMI and larger sensitivity shown for healthy diet with more control leading to larger estimated effects of the intervention on healthy diet (effect size estimate = 0.13; $P < .01$).

Discussion

In this study, we successfully implemented a church-level pilot study of a multicomponent, multilevel intervention in African American and bilingual Latino churches of diverse sizes and religious denominations using a rigorous experimental design. Several features of this study distinguish it from previous research. First, although a number of church-based obesity interventions have been tested, to our knowledge, ours is the first to include both African American and Latino churches using a rigorous design. Gutierrez et al report on a study from African American and Latino churches in Harlem and South Bronx and is among the few church-based studies to have developed bilingual obesity-related materials for a racially and ethnically mixed sample.[14] However, there were no control churches, as it was described by the authors as “a community-based evaluation (rather than a rigorous scientific study).”

Given the increasing heterogeneity of urban regions, developing and rigorously testing church-based and other community-based interventions across racial–ethnic groups is increasingly important. In addition to providing details of preliminary effectiveness, feasibility, and acceptability, our study high-lights important analytic issues that should be considered in future analyses of cluster randomized studies. In particular, our proposed use of propensity score weights to ensure balance within church pairs is important to consider in future analyses of such trial data.

A second unique aspect of our study was our multilevel approach to address elements from each domain in the socioecological framework. Specifically, we sought to influence dietary and physical activity behaviors through not only individual-level and group-level approaches but also environmental supports and changes and community-level actions. Furthermore, the inclusion of an organizational policy component in our pilot study is valuable, since only a few prior interventions have incorporated policy,[33,39–41] and policy can greatly expand an intervention's reach and may be sustained after other approaches have ended. Group-level classes are the most common modality for church-based interventions—not surprising given that most churches routinely hold groups meetings (eg, Bible study, prayer)—and can offer social support to promote health behavior change.[57,58] To date, however, no other church-based obesity interventions have reported innovative aspects such as the community mapping of the food and physical activity environments surrounding the church. The mapping component was feasible and important for longer term strategies to address the broader environmental factors influencing the food and physical activity venues in the churches' communities.

The inclusion of a text/e-mail component of the intervention, although at the individual level, was also innovative. Some prior work has suggested potential barriers to technology-based interventions with older African American church members,[59] although text messages were found feasible and acceptable in a church-based prostate cancer awareness intervention among African American men.[60] As we report elsewhere,[61] we found that the text/e-mail intervention was feasible to implement and acceptable to our racially–ethnically diverse study sample. Sending these evidence-based messages is a low-resource approach that churches can take toward informing their congregation about healthy eating and physical activity.

At the same time, however, our multilevel approach proved challenging to implement evenly across all churches. Similar to the PREDICT study in African American churches, the dose and duration of certain activities (eg, advocacy-related activities) were difficult to determine.[62] Adequate dosage of physical activity was difficult to achieve due to some churches not having available space and congregants living far from the church. Further, we found that policy and advocacy activities required a longer time line than was possible in our pilot study. A longer intervention period would be needed to both implement and see changes from these broader environmental changes. One of the few previous church-based obesity interventions that included activities in the broader community surrounding the church (Black Churches United for Better Health) had an implementation period of 20 months.[30] Certainly, effecting change in the broader community would likely involve a longer time line as well as partnerships with additional community stakeholders.

Given these challenges in implementing a multilevel approach and the restricted time line of our pilot study, our somewhat modest effects on biometric outcomes (eg, less weight gain or modest weight loss, small effect sizes) are not all that surprising. In a recent review of church-based obesity interventions, we found that most were small, similar to a meta-analysis of physical activity interventions across diverse settings that found a mean effect size of 0.19.[63] Community-level and mixed-level interventions often have smaller effect sizes than only individual-level interventions as measured by conventional methods.[64,65] In addition, we should note that our intervention was implemented between November and March, that is, over the Thanksgiving, Christmas, and New Year holidays, a period over which weight gain is common. Given this and the generally positive association between age and weight gain, the fact that we did have a statistically significant reduction in weight gain and some weight loss due to the intervention is promising, especially since primary weight maintenance has been shown to reduce diabetes risk and burden.[40,66] Further, even though a small study with a relatively brief intervention period, ours was still a church-level intervention—that is, intervention activities were implemented at the church level and not only with study participants, as has been common with pilot interventions at churches.

Future faith-based studies may wish to explore obstacles and motivators to behavior change among church-going African American and Latino populations and use this information to tailor intervention materials. One of the few previous church-based studies with a mixed racial–ethnic sample found that both African Americans and Latinos identified a lack of motivation/will power as a key obstacle; however, more African American participants identified a lack of access to exercise facilities compared to Latinos who reported lack of support from their partners, family members, and friends.[14]

Limitations

In addition to the challenges noted about implementation and the brief intervention period, our small sample size and loss of control church for one pair limited our ability to assess the effects of our intervention. Further, 2 of our measures were based on self-report (overall healthiness of diet, usual weekly physical activity), which can be subject to recall and social desirability bias. Finally, although we controlled for household income, we did not adjust for household size or any other household variables.

Nevertheless, our study adds to the literature in several ways. It used a rigorous experimental design and involved both African American and Latino churches in a socioeconomically disadvantaged urban area. Community-based participatory research was used throughout the study, including to identify the health focus and design the intervention, which mapped to various levels of the social–ecological framework. This church-level intervention was feasible and acceptable across diverse churches and populations and provided evidence of preliminary effectiveness in reducing weight gain, increasing weight loss, and improving diet quality among study participants. Future efforts will focus on providing a longer time line for implementation of policy and environmental strategies and a larger number of churches to allow a fuller test of these effects on obesity outcomes at the congregational level.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

The authors are grateful for the participation of Seeds of Hope of the Episcopal Diocese of Los Angeles, which provided in-kind support for the garden and cooking classes at participating churches, and thank Tim Alderson, Steven Trapasso, and Erica Nieves for their partnership. The authors also acknowledge the important role played by other members of the Community Steering Committee, especially the Rev Dr Clyde W. Oden, Rev Rosalynn Brooks, Rev John Cager, Rev Walter Contreras, Rev Jawane Hilton, Jaime Huerta, Rev Martín García, Dr Jan King, Rev Felipe Martínez, Bp Gwendolyn Stone, Nina Vaccaro, and Bp Craig Worsham.

Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: Research reported in this publication was supported by the National Institute of Minority Health and Health Disparities of the National Institutes of Health (NIH) under Award Number R24MD007943. Dr. Payán received salary support from grant number T32HS00046 from the Agency for Healthcare Quality (AHRQ).

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SO WHAT? Implications for Health Promotion Practitioners and Researchers

What is already known on this topic?

Church-based obesity programs have been found to effective, but most have focused only on African Americans and influencing individual-level behavior and not congregational policies and community context.

What does this article add?

This article evaluates a multilevel, church-based obesity intervention that was developed through community-based participatory research and implemented across African American and Latino churches using a pilot cluster randomized controlled trial.

What are the implications for health promotion practice or research?

Multilevel, church-based interventions are feasible and acceptable across diverse congregation types and populations and, over the short term, demonstrate modest improvements in obesity and dietary outcomes. Such interventions provide opportunities to improve health equity for health disparity populations such as African Americans and Latinos. Full-scale effectiveness trials of multilevel, church-based interventions are needed to assess this potential and will require sufficient time to implement and measure effects from congregational policies and community advocacy activities.

Table 1.

Eat, Pray, Move Intervention Activities, Descriptions, and Levels.

Intervention Activity	Description	Level of Intervention
Community garden	• Garden and fruit trees on church property • Garden work days to plant and harvest vegetables • Ongoing maintenance by church members	Individual Congregation
Cooking and nutrition classes, physical activity classes	• Series of 5 cooking/nutrition classes • Weekly physical activity classes	Individual
Messaging regarding healthy eating and physical activity	• Daily text messaging to study participants • Two sermons (one on healthy eating and the other on physical activity) • Bulletin inserts and posters (tip sheets on healthy eating and physical activity)	Individual Congregation
Mapping church and community food and physical activity environments	• Assessed food environment of church and provided results and recommendations to church leadership • Inventoried all food establishments (stores, restaurants, etc) and physical activity venues (parks, health clubs, etc) within a 1-mile radius of the church and brainstormed with church members about points for advocacy	Congregation Community

Table 2.

Characteristics of Study Participants at Baseline by Church.[a]

	Study Completers						Total Baseline Sample
	African American	African American		Latino			
Predictors and Outcomes	**Intervention,[b] n = 30**	**Intervention, n = 30**	**Control, n = 35**	**Intervention, n = 50**	**Control, n = 68**	**Overall,[c] n = 213**	**Overall, n = 307**
Individual characteristics							
Female, %	80.0	90.0	85.7	76.0	70.6	78.4	74.6
Mean age, years	53.3	62.3	45.9[d]	54.9	45.0[d]	51.1	50.8
Race–ethnicity/language[e], %							
African American	100.0	96.7	97.1	18.0	1.47[f]	48.4	45.3
English-speaking Latino	0.0	3.3	2.9	24.0	44.1	20.7	19.2
Spanish-speaking Latino	0.0	0.0	0.0	58.0	54.4	31.0	31.9
Highest level of education (%)							
Less than high school	0.0	0.0	2.9[f]	52.0	50.0	28.6	31.3
High school or GED	10.0	10.0	42.9	20.0	25.0	22.5	20.5
Some college/associate's degree	50.0	43.3	42.9	16.0	16.2	29.1	30.3
Bachelor's degree	20.0	23.3	8.6	2.0	5.9	9.9	9.5
Some graduate school or degree	20.0	23.3	2.9	10.0	2.9	9.9	8.5
Income (%)							
<$20 000	13.3	20.0	45.7[f]	44.0	57.4	40.9	41.0
$20 000-$39 999	13.3	16.7	34.3	32.0	27.9	26.3	28.3
$40 000-$59 999	30.0	33.3	8.6	14.0	8.8	16.4	14.0
$60 000 or more	43.3	30.0	11.4	10.0	5.9	16.4	16.6
Outcomes at baseline							
Mean weight, lbs	200.4	206.4	215.8	165.9	175.2	187.5	184.9
Mean body mass index (BMI)	32.9	35.2	35.6	30.8	29.9	32.2	31.7
Overweight or BMI 25–29.9, %	26.7	23.3	26.5	44.0	35.9	33.2	33.4
Obese or BMI 30+, %	60.0	56.7	67.6	50.0	44.8	53.6	52.1

Predictors and Outcomes	Study Completers						Total Baseline Sample
	African American	African American		Latino			
	Intervention,[b] n = 30	Intervention, n = 30	Control, n = 35	Intervention, n = 50	Control, n = 68	Overall,[c] n = 213	Overall, n = 307
Mean systolic blood pressure (BP)	123.8	150.7	140.2[g]	132.8	122.1[f]	131.8	131.9
Mean diastolic BP	72.4	82.8	82.9	75.1	72.0	76.1	76.2
Physical activity, mean, min./week	82.8	62.7	120.4[f]	103.4	77.7	89.3	95.3
Mean self-rated healthiness of overall diet[e] (scale, 1–5)	2.8	2.7	2.7	2.6	2.4	2.6	2.6

Abbreviations: ASMD, absolute standardized mean difference; GED, general equivalency diploma.

[a] n = 213.

[b] No paired control church.

[c] All ASMD < 0.20 when comparing study completers to the overall baseline sample.

[d] $P < .001$, for difference between intervention and control churches.

[e] The outcome *self-rated healthiness of overall diet* (mean on scale of 1–5, where excellent = 1 and poor = 5). For the total baseline sample, the percentages for race–ethnicity/language will not add up 100%, as 3.6% of the baseline sample was an unknown race–language/ethnicity.

[f] $P < .01$, for difference between intervention and control churches.

[g] $P < .05$, for difference between intervention and control churches.

Table 3.

Summary of Regression Results on the Impact of the Intervention on Biometric, Dietary, and Physical Activity Outcomes.

Outcome (at Follow-Up)	Observations, N	Treatment Coefficient[a]	*P* Value
Biometric			
Weight in lbs (continuous)	162	−0.05 (−0.06, −0.04)	**.0004**
BMI (continuous)	161	−0.08 (−0.11, −0.05)	**.0045**
Systolic BP (continuous)	162	−0.07 (−0.88, 0.74)	.8016
Diastolic BP (continuous)	162	−0.07 (−0.77, 0.62)	.7547
Self-reported			
Physical activity minutes per week (continuous)	175	−0.00 (−0.23, 0.22)	.996
Healthy overall diet	183	−0.09 (−0.17, −0.00)	**.0448**

Abbreviations: BP, blood pressure; BMI, body mass index.

[a]Standardized and controlling for treatment/intervention assignment, matched pair indicator, and individual-level baseline outcome. Bolded text is $P < .05$.