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Research

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Impact of a University-Community Partnership Approach to Improving Health Behaviors and Outcomes Among Overweight/Obese Hispanic Adults

Abstract: Objective. To examine the impact of a community-informed and community-based Health-Smart Church (HSC) Program on engagement in health promoting behaviors (healthy eating and physical activity) and health outcomes (body mass index, weight, and systolic and diastolic blood pressure). Design. A total of 70 overweight/obese Hispanic adults participated in an intervention group ($n = 37$) or a waitlist control group ($n = 33$) in 2 Hispanic churches in Bronx, New York. Results. Post-intervention the intervention group significantly increased in frequency of healthy eating and physical activity compared to the waitlist control group. Although no significant changes in body mass index or systolic blood pressure were found for either group, the intervention group decreased significantly in weight from pre-intervention to post-intervention. Conclusions. The results of the present study add to the growing body of literature evidencing the successful use of community-engaged and community-based participatory

health promotion interventions with racial/ethnic minority populations and highlight important practices and considerations for similar health promotion interventions with these communities.

to non-Hispanic White (68.5%) adults and non-Hispanic Black (76.3%) adults.¹ Overweight and obesity is associated with multiple chronic health conditions including cardiovascular disease, hypertension, and diabetes.²

Overweight and obesity and the associated chronic health conditions can often be prevented and reduced by increased engagement in health promoting behaviors . . .

Keywords: health disparities; health promotion; community-based participatory research; Hispanic adults

In the United States, over two thirds of adults (69%) are classified as overweight or obese.¹ Hispanic adults have a higher prevalence of being overweight or obese (77.1%) compared

to non-Hispanic White (68.5%) adults and non-Hispanic Black (76.3%) adults.¹ Overweight and obesity is associated with multiple chronic health conditions including cardiovascular disease, hypertension, and diabetes.²

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behaviors related to healthy eating (e.g., eating a healthy breakfast; eating fruits, vegetables, and whole grains) and physical activity (e.g., moving and walking more; engaging in moderate to intense physical activity; limiting screen time). The term *health-smart* may be especially desirable and positive for racial/ethnic minority groups and groups with low socioeconomic status as such groups have historically and unfairly been stereotyped as not smart. The association of “health-smart” with health promoting behaviors may increase the occurrence of these behaviors since “smart” is a very positive and valued attribute among most cultural groups within the United States.³

The present study focuses on engagement in health-smart behaviors because overweight and obese Hispanics eat fewer vegetables and eat fast food more frequently than their non-Hispanic White counterparts.⁴ In addition, research suggests that Hispanics engage in less physical activity than their non-Hispanic White counterparts.⁵ Therefore, finding effective strategies to increase engagement in health-smart behaviors among Hispanic adults is important.

Partnering with churches and other faith-based organizations to implement health promotion interventions is beneficial because these organizations can (a) effectively recruit participants for these interventions, (b) promote participant engagement in health promoting behaviors through providing social and emotional support of these behaviors, and (c) provide the human and physical infrastructure for sustaining these behaviors.^{6,7}

Health promotion intervention programs conducted within churches and other organizations have demonstrated significant increases in physical activity and fruit and vegetable intake and significant decreases in fried food consumption.^{8,9} Most of these church/fair-based intervention programs have targeted rural communities and African Americans.¹⁰ To the authors’ knowledge, limited instances of church/fair-based intervention programs targeting Hispanics in urban areas exist.¹¹

The present university-community partnership team developed the Health-Smart Church (HSC) Program—an intervention program to promote health-smart behaviors among participating church members and nearby community members within target churches and faith-based organizations. The HSC Program is based on the tenets of the Health Self-Empowerment Theory (i.e., health motivation, health self-efficacy, active coping styles/skills for managing emotions, self-praise of health-smart behaviors, and health knowledge/responsibility).^{3,12} These tenets are used to inform strategies that increase health-smart behaviors among individuals, families, and communities regardless of the social and ecological factors that deter these behaviors.

Health Self-Empowerment Theory recognizes that multiple social and ecological factors influence the occurrence of health-smart behaviors. The theory also recognizes that many of these factors are intractable. Consequently, it is important to empower individuals, families, and communities to take charge of their health and health behaviors by modifying variables that they have control over or can learn to control despite their current living conditions.

The aforementioned HSC Program specifically focuses on increasing the following health-smart behaviors: (a) eating a healthy breakfast; (b) eating fruits and vegetables each day; (c) eating whole grains; (d) drinking water and other beverages low in sugar; (e) eating foods and snacks low in calories, fat, salt/sodium, and cholesterol; (f) moving and walking more each day rather than engaging in sedentary activities; (g) engaging in moderate-to-intense physical activity; and (h) restricting leisure screen time (i.e., television/video/ computer time) to no more than 2 hours per day.¹³

A major characteristic of the HSC Program is that it embraces cultural sensitivity, which has been defined as being understanding and responsive to the values and beliefs of culturally diverse populations and of the multilevel

and multidimensional factors that influence these values and beliefs and the associated health behaviors.¹⁴ The HSC Program embraces cultural sensitivity in that implementation of all components of this program is guided by seeking to understand and being responsive to the health-related values and beliefs of culturally diverse program partners and participants, and by awareness of the cultural, social, and ecological influences that affect health behaviors.^{14,15} Additionally, cultural sensitivity is conveyed by having university-community partnership members implement the HSC Program in ways that enable others (i.e., other program implementation partners and the program participants) to feel comfortable, respected, and trusting in all components of the program.

In the research literature on university-community partnerships, it is advocated that these partnerships should be equitable with regard to power and influence in all aspects of the work.¹⁶ Use of the Community-Based Participatory Research (CBPR) Model enables this shared power and influence in intervention research and other research involving community members. The CBPR Model advocates involving community members in all aspects of research, including selection of the research topic and research methodology, participant recruitment, research implementation, data collection, interpretation of study results, and dissemination of research findings.^{17,18}

It is realized that the power of universities and researchers and their control of grant funding for intervention research and other research make it difficult to achieve equity in university-community research partnerships.^{16,19} However, efforts were made to promote such equity in the HSC Program. Specifically, culturally diverse university researchers and their students worked in partnership with multilevel leaders in the participating churches to develop, implement, and evaluate the HSC Program and to interpret and disseminate the results of the program.

The purpose of the present study was to use an intervention-waitlist control design to examine the impact of the HSC Program on engagement in health promoting behaviors and health outcomes among overweight and obese Hispanic adults. The following hypotheses were examined in this study:

1. From the pre-intervention period to the post-intervention period, the overweight or obese Hispanic adults who participate in the HSC Program (intervention group) will show significantly greater increases in levels of healthy eating and physical activity compared to the Hispanics adults waiting to participate in this program (waitlist control group).
2. From the pre-intervention period to the post-intervention period, the overweight or obese Hispanic adults who participate in the HSC Program (intervention group) will show significantly greater decreases in body mass index (BMI), weight, and systolic and diastolic blood pressure compared to the Hispanic adults, waiting to participate in this program (waitlist control group).

Methods

Participants

The participants in this research study were 70 Hispanic/Latino adults (80.0% female, 17.1% male, 2.9% did not respond) who were members of either of 2 participating churches located in the Bronx, New York—a Catholic Church (the intervention church) and a Seventh-day Adventist Church (the waitlist control church). At the Catholic Church, there were 37 Hispanic/Latino adult study participants (intervention group), and at the Seventh-day Adventist Church, there were 33 Hispanic/Latino adult study participants (waitlist control group).

Inclusion criteria for being participants in the HSC Program consisted of (a) being 18 years of age or older, (b) giving written consent to participate in the program, (c) being capable of reading and understanding either English or Spanish at a sixth-grade reading level,

and (d) being a member of the 2 churches participating in the HSC Program or a community member residing in close proximity to 1 of the 2 participating churches. Though being overweight or obese was not an inclusion criterion for participation in the HSC Program, all of the participants in the current study were overweight or obese (i.e., had a measured pre-intervention BMI exceeding 25). Exclusion criteria included (a) having a blood pressure measured at 160/100 or higher, (b) being pregnant, and (c) receiving medical treatments associated with major side effects such as chemotherapy, radiation, or dialysis.

Participants ranged in age from 18 to over 60 years, with 17.1% of the participants between ages 18 and 34, 21.4% between ages 35 and 49, 40.0% between ages 50 and 59, 8.6% over age 60, and 12.9% not reporting their age. A majority of Bronx residents (69.2%) reported obtaining a high school diploma/GED or higher between the years 2007 and 2011.²⁰ Similarly, most participants in our sample (67.2%) reported having a high school education or higher, though 21.4% reported only completing elementary or middle school. The median annual household income range for participants was \$20,000 to \$39,000. This is reflective of the median household income of Hispanic individuals residing in the Bronx in 2011, which was \$32,630.²¹

Measures

Demographic and Health Information Data Questionnaire (DHIDQ). The DHIDQ is a questionnaire designed to obtain the participants' basic health and demographic information. Demographic items obtained included (a) age, (b) sex, (c) race/ethnicity, (d) annual household income range, and (e) highest level of education completed.

Health-Promoting Lifestyles Profile-II (HPLP-II). The HPLP-II is a 52-item inventory that assesses overall level of engagement in health promoting behaviors.^{22,23} The HPLP-II includes 6 subscales; however, only the physical

activity and the healthy eating (nutrition) subscales were used in the present study. Participants rated the frequency of their engagement in each behavior. Items are scored using a 4-point Likert-type scale ranging from 1 (*never*) to 4 (*routinely*). Higher scores indicate a higher level of engagement in a health promoting lifestyle. In the present study, the physical activity subscale demonstrated relatively high internal consistency (Cronbach's $\alpha = .84$ at pre-intervention; Cronbach's $\alpha = .85$ at post-intervention). The healthy eating subscale demonstrated acceptable internal consistency (Cronbach's $\alpha = .75$ at pre-intervention; Cronbach's $\alpha = .83$ at post-intervention).

Biometric Health Data. Each participant's height, weight, and diastolic and systolic blood pressure were measured at pre-intervention and again at post-intervention. The height and weight data for each participant were used to determine that participant's BMI.²⁴

Procedure

Institutional review board approval was obtained for the present study from the university in the southeast where the university partners were based. A faculty member at a university located in the Bronx was hired to be the on-site research coordinator.

Recruitment of Community/Church Partners. The 2 participating churches were volunteer churches, which responded to a written request for Hispanic churches to participate in a health promotion study—a request prepared by the university partners in the university-community partnership and disseminated to Hispanic churches in the Bronx via a bishop of Hispanic churches in the Bronx and by Hispanic members of the Bronx City Council. A pastor of a Catholic Church and a pastor of a Seventh-day Adventist Church with a large Hispanic membership agreed to have their churches participate in the HSC Program. The pastors were asked to identify 5 leaders in their church who along with the pastors would be

community partners in the university-community partnership. The pastors and the identified 5 church leaders were trained to be Health Empowerment Coaches (HECs) who participated in all components of the HSC Program, including the research component of this program.

Training of Partners. The university partners then arranged (a) a 2-day training for the on-site research coordinator that emphasized her roles in the HSC Program and the associated research, and (b) a 2-day training with the 12 HECs (i.e., 5 church leader HECs and the pastor HEC at each of the 2 churches) that focused on implementing all components of the HSC Program at the respective churches and on the research components of this program.

The HEC training consisted of training these HECs to recruit participants, collect the participants' study-related data (i.e., administer assessment batteries and measure height, weight, and blood pressure), and implement the various intervention components of the HSC Program. In this training, the HECs were also informed that their feedback on the program would be included in a community-friendly report describing the program and the research findings regarding the impact of the program on participants' health promoting behaviors and health outcomes (e.g., BMI).

Recruitment of Participants for the Intervention Component of the HSC Program. The HECs at each of the 2 participating churches (the intervention church and the waitlist control church) recruited members of their church and community members to participate in the 8-week intervention component of the HSC Program—this component focused on empowering church members in the program to engage in health-smart behaviors, particularly healthy eating behaviors and physical activity behaviors. This participant recruitment at each church involved (a) the Pastor HEC making announcements about the HSC

Program and encouraging church members to participate in the program and to invite members of the surrounding community near the church to participate in it and (b) the Church Leader HECs distributing recruitment flyers about the program—flyers that included program duration, the inclusion/exclusion criteria, and how to enroll in the program. These flyers were disseminated by the Church Leader HECs during/after their church services and at nearby community events. The flyers were also displayed on posters mounted in the church and the information on the flyers were read during their church services and shared by word of mouth at church and community events.

Enrollment, Screening, and Pre-Intervention Data Collection. Adult church members interested in participating in the HSC Program were instructed to enroll in the program at their church. Interested adult community members were asked to enroll at the participating church near them. This enrollment involved the Church Leader HECs asking the interested adults to read and sign an informed consent form, and providing any reading assistance needed by the program enrollees. The Church Leader HECs then asked the participants who signed informed consent forms to complete the Demographic and Health Information Data Questionnaire and to have their diastolic and systolic blood pressures taken. These data were used as screening data to determine if the interested participants met the criteria for participation in the HSC Program.

Those individuals who met the criteria for participating in the HSC Program were asked to complete the remainder of the pre-intervention assessment battery during the screening appointment or later at home with assistance from a family member if needed. Participants who chose to complete the assessment battery at home were asked to (a) bring the completed assessment battery in the provided envelope to any 1 of 3 sessions where their weight and height would be taken and their BMI would be calculated and then all of these data would be

recorded, and (b) give the envelope to a Church Leader HEC at the session. This HEC placed received envelopes into a drop box located in a secure cabinet in the church's main office.

Participants who chose to complete the remainder of the baseline assessment battery immediately following the pre-screening data collection did so with any needed/desired reading assistance from the HECs present. Each of these participants' completed assessment battery was placed in the provided envelope and was then put into the earlier mentioned drop box. Next, their weight and height were obtained and their BMI was calculated.

All participants' weight, height, BMI, and blood pressure readings were obtained/determined by the Church Leader HECs, with supervision by members of the local Hispanic Nurses Association. Each participant received \$20 in cash immediately after providing these data. Participants who did not meet the program participation criteria and thus did not complete the remainder of the assessment battery were paid \$10 in cash immediately after the pre-screening data collection. The on-site research coordinator in the Bronx, New York, collected all envelopes from the drop boxes and mailed them to the principal investigator (PI) via a secure courier service.

Implementation of the Intervention Component of the HSC

Program. Following the 2-week pre-intervention data collection period, the intervention group began participating in the 8-week intervention component of the HSC Program. The waitlist control group did not begin participating in the intervention component until after the intervention group had completed it in its entirety and both of the groups had provided post-intervention data (i.e., the same data that constituted the pre-intervention data collection). The intervention component included 5 types of sessions that were each co-led by the HECs and that occurred in a different week, with the exception that the physical activity sessions were ongoing throughout

the intervention component. Below is a description of each of the 5 intervention session types.

Session 1: Individualized

Coaching. In this session, a Church Leader HEC reviewed a participant's top motivators of and barriers to engaging in 4 health-smart behaviors (i.e., eating a healthy breakfast; eating food low in fat, sugar, sodium, and cholesterol; drinking water and other low/no sugar beverages; and engaging in physical activity). These health-smart behaviors are listed in the PI's published Motivators of and Barriers to Health-Smart Behaviors Inventory (MB-HSBI).¹³ The MB-HSBI was included in the assessment battery completed by the participants. High agreement ratings indicated the top motivators and barriers for each of the 4 health-smart behaviors.

The participant was then encouraged by the Church Leader HEC to identify 2 health-smart behavior goals and to commit to self-identified strategies for achieving these goals—strategies that took into consideration the barriers to these goals as well as the motivators relevant to achieving these goals. The HEC assisted the participant with identifying strategies if needed and made sure that the strategies and goals were specific, measurable, attainable, realistic, and time-bound.

Session 2: Viewing and discussing a Family Health Self-Empowerment/Health-Smart DVD. In this 4-week session (i.e., week 2 to week 5 of the intervention component), the HECs co-led a 90-minute group session each week during which participants watched a different segment of a Family Health-Self Empowerment/Health-Smart DVD (created by the university partners), which displays culturally diverse experts, community members, families, and children sharing effective strategies for engaging in health-smart behaviors. Following the viewing of each segment of the DVD, the HECs facilitated a group discussion of the material that was viewed and participants shared personal barriers and identified strategies that may be helpful for overcoming these barriers.

Session 3: Reading and reviewing segments of a Health-Smart Behavior Resource Guide. In this 3-week session (i.e., week 6 to week 8 of the intervention component), each participant received a copy of a Health-Smart Behavior Resource Guide, which parallels the Family Health Self-Empowerment/Health-Smart DVD and enables everyday application of the content in the DVD. The Resource Guide is written at a low-to-moderate reading level and includes tips and information for increasing and sustaining health-smart behaviors, as well as tools for charting the occurrence of these behaviors, and tips for identifying and managing stress and depression. The HECs co-led 3 weekly 90-minute sessions during which a section of the Health-Smart Behavior Resource Guide was discussed with a small group of participants. During these group discussions, props were used to teach the information contained in the Health-Smart Resource Guide. For example, a deck of cards was used to show the size of a healthy portion of chicken.

Session 4: Engaging in individual and group physical activity. This session occurred throughout the 7 weeks following the individualized coaching session (i.e., physical activity did not occur during week 1 of the intervention component). It involved participants engaging in 150 minutes of moderate-to-intense physical activity each week. These minutes could be achieved through individual activities of choice and/or through engaging in a group activity (e.g., salsa dancing) organized by the HECs. The group activity was for 1 hour each week and was led by one or more HECs or by a community member recruited by the HECs.

Session 5: Provider and community member panel to address participants' anonymous and other questions. In this session, program participants asked health-related questions to a volunteer panel of professionals (e.g., physicians, nutritionists, psychologists, and physical fitness experts) and community

members who engage in a healthy lifestyle. Participants were able to ask these questions aloud, anonymously via a drop box, or whispered their questions to a HEC who asked the question aloud to the panel. These different options allowed all participants regardless of their level of comfort and/or writing abilities to get their questions asked and answered. This intervention session also occurred during week 8 of the program.

Post-intervention Data Collection. Five weeks following the last session of the HSC Program, the participants in this program completed the same assessment battery as at the pre-intervention data collection session. Height, weight, and blood pressure were also collected again at this time. Participants received \$30 in cash immediately following the collection of these post-intervention data.

Results

Prior to data analysis to test the 2 hypotheses in the present study, all data were checked to ensure that the assumptions of hypothesis testing were met. No outliers were removed. All variables of interest (i.e., levels of healthy eating and physical activity, BMI, weight, and systolic and diastolic blood pressure) were examined for differences at pre-intervention between the intervention and waitlist control participant groups.

See Table 1 for all pre-intervention and post-intervention means for all major study variables. Data analyses were performed to test Hypothesis 1, which stated that from the pre-intervention period to the post-intervention period, the overweight or obese Hispanic adults who participate in the HSC Program (intervention group) will show significantly greater increases in levels of healthy eating and physical activity compared to the Hispanic adults waiting to participate in this program (waitlist control group). Specifically, a 2-way between-subjects repeated-measures analysis of variance (ANOVA) was

Table 1.

Pre-Intervention and Post-Intervention Means for Major Study Variables Among the Intervention and Waitlist Control Groups.

	Intervention Group				Waitlist Control Group			
	Pre-Intervention		Post-Intervention		Pre-Intervention		Post-Intervention	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Healthy eating	2.50	0.44	3.02	0.44	2.30	0.55	2.54	0.58
Physical activity	2.01	0.64	2.91	0.61	1.84	0.71	2.27	0.78
Body mass index	32.08	5.20	32.07	6.87	33.21	6.70	32.87	6.72
Weight	174.89	37.64	169.37	37.50	188.81	46.78	187.46	45.80
Systolic	126.71	14.60	125.69	12.12	117.38	14.30	122.24	16.81
Diastolic	76.04	7.37	83.43	10.02	75.46	8.66	75.62	8.54

conducted to examine the effect of the HSC Program on healthy eating between pre-intervention and post-intervention. Both the waitlist control and intervention groups showed increases in their levels of engagement in healthy eating, $F(1, 52) = 36.96, P < .001, \eta^2 = .42$, although the intervention group showed significant gains over the waitlist control group, $F(1, 52) = 6.56, P < .05, \eta^2 = .10$. A follow-up pairwise comparison using a Bonferroni correction indicated that the intervention (mean [M] = 2.50) and waitlist control ($M = 2.30$) groups did not differ significantly on level of engagement in healthy eating at pre-intervention, $F(1, 52) = 2.00, P = .16, \eta^2 = .04$; however, post-intervention, the intervention group ($M = 3.02$) showed significantly higher engagement in healthy eating than the waitlist control group ($M = 2.54$), $F(1, 52) = 3.14, P < .05, \eta^2 = .19$.

A second 2-way between-subjects repeated-measures ANOVA was conducted to examine the effect of the HSC Program on physical activity between pre-intervention and post-intervention. Both the waitlist control and intervention groups showed increases in their levels of engagement in physical activity, $F(1, 53) = 51.52, P < .001, \eta^2 = .49$; however, the intervention group showed significantly greater gains

over the waitlist control, $F(1, 53) = 6.470, P < .05, \eta^2 = .11$. A follow-up pairwise comparison using a Bonferroni correction indicated that the intervention ($M = 2.01$) and waitlist control ($M = 1.84$) groups did not significantly differ in level of engagement in physical activity at pre-intervention, $F(1, 53) = 0.84, P = .37, \eta^2 = .02$; however, post-intervention, the intervention group ($M = 2.91$) showed a significantly higher level of engagement in physical activity than the waitlist control group ($M = 2.27$), $F(1, 53) = 11.43, P < .001, \eta^2 = .18$.

Data analyses were also performed to test Hypothesis 2, which stated that from the pre-intervention period to the post-intervention period, the overweight or obese Hispanic adults who participate in the HSC Program (intervention group) will show significantly greater decreases in BMI, weight, and systolic and diastolic blood pressure compared to the Hispanic adults waiting to participate in this program (waitlist control group). Specifically, 3 two-way between-subjects repeated-measures ANOVAs were conducted to test this hypothesis. Findings include that the intervention group showed no significant change in BMI (pre-intervention = 32.08, post-intervention = 32.07) and the waitlist control group showed no significant

change in BMI (pre-intervention = 33.21, post-intervention = 32.87).

The waitlist control and intervention groups showed decreases in weight, $F(1, 52) = 32.36, P < .001, \eta^2 = .38$. A follow-up pairwise comparison using a Bonferroni correction indicated that only the weight change experienced by the intervention group (pre-intervention = 174.89, post-intervention = 169.37) was significant, $F(1, 52) = 45.117, P < .001, \eta^2 = .46$. The weight change experienced by the waitlist control group (pre-intervention = 188.81, post-intervention = 187.46) was not significant, $F(1, 52) = 2.33, P = .133, \eta^2 = .04$.

The waitlist control and intervention groups did not experience significant changes in systolic blood pressure between pre-intervention and post-intervention, $F(1, 51) = 1.014, P = .319, \eta^2 = .02$. However, it is noteworthy that the intervention group showed nearly no change in systolic blood pressure (pre-intervention = 126.71, post-intervention = 125.69), and the waitlist control group showed an approximately 5-point increase in systolic blood pressure (pre-intervention = 117.38, post-intervention = 122.24).

The waitlist control and intervention groups did show significant changes in diastolic blood pressure between

pre-intervention and post-intervention, $F(1, 51) = 8.41$, $P < .01$, $\eta^2 = .14$. A follow-up pairwise comparison with a Bonferroni correction showed that only the intervention group experienced a significant increase in diastolic blood pressure (pre-intervention = 76.04, post-intervention = 83.43), $F(1, 51) = 17.08$, $P < .001$, $\eta^2 = .25$. The waitlist control group did not experience a significant change in diastolic blood pressure (pre-intervention = 75.46, post-intervention = 75.62), $F(1, 51) = 0.01$, $P = .933$, $\eta^2 = .00$.

Discussion

The purpose of the present study was to empirically investigate the impact of a 6-week, church-based health promotion program, called the Health-Smart Church (HSC) Program, on health behaviors and health outcomes of overweight or obese Hispanic adults who attend or live near the 2 participating churches in this study. The specific health behaviors investigated are levels of healthy eating and physical activity, and the specific health outcomes investigated are BMI, weight, and diastolic and systolic blood pressure.

Hypothesis 1 in this study was that from the pre-intervention period to the post-intervention period, the participants in the HSC Program (intervention group) will evidence significantly greater increases in levels of healthy eating and physical activity compared to participants waiting to participate in this program (waitlist control group). Results of the analyses to test Hypothesis 1 show that although the participants in the intervention group and the participants in the waitlist control group increased in their levels of healthy eating and physical activity from the pre-intervention period to the post-intervention period, the increases in these behaviors were significantly greater for the intervention group. These findings provide support for Hypothesis 1.

The unanticipated increase in healthy eating and physical activity by the waitlist control group could have been due to an effort by these participants to increase their levels of engagement in

these behaviors once becoming aware of their level of engagement in these behaviors at the pre-intervention data collection. It is also possible that some members of the intervention group conveyed intervention session information on healthy eating and physical activity to some members of the waitlist control group (e.g., their friends in the waitlist control group). This is a possibility given that the church where participants experienced intervention activities (e.g., individualized coaching sessions) and the church where the participants experienced waitlist control activities (e.g., pre-intervention data collections) were located within the same community.

Hypothesis 2 in this study was that from the pre-intervention period to the post-intervention period, the participants in the HSC Program (intervention group) will evidence significantly greater decreases in BMI, weight, and systolic and diastolic blood pressure compared to the participants waiting to participate in this program (waitlist control group). Results of the analyses to test Hypothesis 2 are as follows: (a) the intervention group and the waitlist control group showed no significant changes in BMI from the pre-intervention period to the post-intervention period; (b) the intervention group showed significant decreases in weight from the pre-intervention period to the post-intervention period, whereas the waitlist control group showed a decrease in weight that was not significant; (c) the waitlist control and intervention groups did not show significant changes in systolic blood pressure from pre-intervention to post-intervention; however, the intervention group showed nearly no change in systolic blood pressure whereas the waitlist control group showed a moderate (approximately 5-point) increase in systolic blood pressure; and (d) from the pre-intervention period to the post-intervention period, the intervention group showed a significant increase in diastolic blood pressure, whereas the waitlist control group showed no significant change in diastolic blood

pressure. These findings together provide partial support for Hypothesis 2.

The finding that BMI did not significantly decrease for the intervention group is surprising, particularly given that weight did significantly decrease for this group. These findings may suggest that it is difficult to show changes in BMI compared to changes in weight because BMI is a ratio of weight to height and height among adults does not typically change over a period of about 2.5 months—the time from the pre-intervention data collection to the post-intervention data collection in the present study. It is also possible that height/weight measurements were not accurately taken because some participants in both the intervention group and the waitlist control group refused to take off their shoes when their weight and height were taken at pre-intervention or at post-intervention data collections.

The finding that the intervention group showed a significant increase in diastolic blood pressure is surprising given the focus in the HSC Program on eating healthy, which includes eating a low-sodium diet. This blood pressure–related finding might be explained by the fact that blood pressure was measured and recorded by Church Leader HECs. Volunteer nurses were present to supervise biometric data collections, however, there were not enough nurses available for a nurse to observe each time a blood pressure measurement was taken by a HEC.

As with many community-based and community member engaged studies, the present study had noteworthy limitations that justify viewing the findings from this study with caution. One of these limitations is the use of self-report data to assess levels of healthy eating and physical activity. The study participants may have overreported their engagement in these health-smart behaviors. However, it is important to note that self-report measures are commonly used in health research and is likely reliable.^{25,26}

Another limitation of this study is that the post-intervention data collection for

the intervention participants and the waitlist control participants occurred only 5 weeks after the last session of the HSC Program. This time period between data collections allowed only a short time for intervention effects to occur and for maintenance of any intervention effects to be tested.

Additionally, Church Leader HECs collecting data may be a possible study limitation. Participants may have perceived the Church Leader HECs as authority figures. This may have been compounded by the sensitive nature of the biometric data (i.e., height, weight, and blood pressure readings). Future similar studies may benefit by using third party investigators (e.g., the HECs of other churches in the study) to gather biometric data.

The fact that the study participants were volunteers rather than randomly selected participants assigned to the intervention group or the waitlist control group is also a limitation of this study. This limitation restricts the generalizability of the findings in this study to participants similar to those in the present study. It is noteworthy, however, that the study participants who were actual members of one or the other of the 2 participating churches were representative of their church with regard to sex, age, and income level composition at the time of the present study.

The fact that the intervention group participants were members of or lived near a Catholic Church and the waitlist control group participants were members of or lived near a Seventh-day Adventist Church is a possible study limitation given that the latter church strongly advocates a meat-free diet. However, most of the study participants from the Seventh-day Adventist Church reported that they did not adhere to a meat-free diet and that such a diet is considered an ideal rather than reality. It is also the case that at pre-intervention data collection, there were no significant differences in the measured health behaviors and health outcomes in association with church-type/group assignment (i.e., intervention vs waitlist control group).

Finally, a study limitation is that 20% of the participants in the study dropped out prior to the post-intervention data collection (i.e., 18.9% dropped out of the intervention group and 24.2% dropped out of the waitlist control group). Perhaps only the study participants who were strongly motivated to improve or sustain healthy behaviors and health outcomes remained study participants for the duration of the HSC Program; consequently, this program may not have been tested with participants who did not have such strong motivation. It is important to note, however, that the overall dropout rate in the present study is lower than what is typical for minority study participants such as the Hispanic participants who constituted the participants in the present study.^{27,28}

In spite of the limitations of this study, this study had several important strengths that render it a significant contribution to the community-engaged research literature and the community-based participatory research literature. One of these strengths is that this study involved a low-income skewed group of Hispanic participants—a demographic group underrepresented in health research and overrepresented with regard to those in the United States plagued by overweight and related diseases (e.g., type 2 diabetes and hypertension). A related strength is that this study occurred in churches that are attended by the majority of the Hispanic participants. Since such churches typically offer services and programs to meet the physical and social needs as well as the spiritual needs of Hispanics, the churches in the present study hold much potential for institutionalizing programs such as the HSC Program. Given the positive impact of the HSC Program on the healthy eating and physical activity behaviors as well as the weight of the participating Hispanics, this intervention program has potential for reducing obesity among Hispanics similar to those in the present study. Since the HSC Program was tested with and implemented by Hispanics, it is likely that members of Hispanic communities similar to that in the present study will

likely be receptive to further testing of this program in their community.

Training church leaders to be HECs was also a novel strength of this study. Such training is responsive to the calls for community and individual empowerment in efforts to promote health among racial/ethnic minority groups and groups with low household incomes and in efforts to eliminate health disparities, including obesity disparities, that have a disproportionately negative impact on these groups.^{3,14} These HECs enabled the HSC Program to be implemented in culturally sensitive ways; that is, it was implemented in ways that enabled participants to feel that their culture was respected and in ways that enabled them to feel comfortable and respected and trusting of the research process. For example, some intervention sessions were conducted in Spanish and were offered at times that were convenient for the participants and HECs; the intervention implementation resources/tools (e.g., the Health-Smart DVD and the Health-Smart Behavior Resource Guides) were also available in Spanish; and food labels used to teach participants how to read and understand food labels were taken from foods that Hispanics commonly buy.

Another strength of this study is that the research procedures were culturally sensitive. For example, the research procedures were implemented by the Church Leader HECs; the Pastor HECs were actively involved in participant recruitment and in publicly recognizing the Church Leader HECs and the participants in the HSC Program; and the assessments used to collect pre-intervention data and post-intervention data were all available in Spanish and English.

This study has important implications for future research. One of these implications is that university-community partnership research similar to the present study is justified given the findings in the present study that the investigated HSC Program had some positive impacts on the health behaviors and health outcomes of the Hispanics who participated in this program.

However, future testing of the HSC Program with Hispanics should include randomly selected participants from among several Hispanic churches. Furthermore, the churches should be randomly assigned to the intervention group or the waitlist control group. This future research should also include large samples of participants that have fairly equal numbers of males and females. Strategies identified by study participants should also be used to increase participant retention in the intervention and waitlist control groups.

Another implication of the present study is that with the appropriate training, lay church members like the Hispanic Church Leader HECs in this study can implement programs similar to the HSC Program and can collect biometric and paper-pencil research data. Additionally, with the appropriate training, these lay individuals can be unaffiliated investigators—a status that most university institutional review boards require of community members who collect research data. It is important that these trainings include individually observed practice sessions and available individual consultation when implementing intervention and research activities on which the trainings focused. Such training can occur in university-community partnerships such as in the implementation of the present study.

The present study is particularly important in that it is one of few studies in which Hispanic church members have been empowered to be health promotion researchers and have empowered their peer church members with strategies that increased their healthy eating and physical activity—behaviors linked to reducing and preventing obesity. Because the HSC Program was shown to be an effective venue for such health empowerment, further research to test the impact of this program is needed. Such research may evidence the HSC Program to be a culturally sensitive, practical program for promoting health behaviors that can promote overall health and reduce and prevent obesity—a health problem that plagues Hispanic communities.

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Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article. **AJLM**

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