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A Systematic Review of Promising Strategies of Faith-Based Cancer Education and Lifestyle Interventions Among Racial/Ethnic Minority Groups

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Abstract Church-based interventions have been used to reach racial/ethnic minorities. In order to develop effective programs, we conducted a comprehensive systematic review of faith-based cancer prevention studies (2005~2016) to examine characteristics and promising strategies. Combination terms "church or faith-based or religion," "intervention or program," and "cancer education or lifestyle" were used in searching the five major databases: CINAHL; ERIC; Health Technology Assessments; MEDLINE; and PsycInfo. A total of 20 studies met study criteria. CDC's Community Guide was used to analyze and review group interventions. Analyses were organized by two racial groups: African American (AA) and Latino/Hispanic American groups. Results showed most studies reviewed focused on breast cancer alone or in combination with other cancers. Studies of Latino/Hispanic groups targeted more on uninsured, Medicare, or Medicaid individuals, whereas AA studies generally did not include specific insurance criteria. The sample sizes of the AA studies were generally larger. The majority of these studies reviewed used pre-post, posttest only with control group, or quasi-experience designs. The Health Belief Model was the most commonly used theory in both groups. Community-based participatory research and empowerment/ecological frameworks were also used frequently in the Latino/Hispanic studies. Small media and group education were the top two most popular intervention strategies in both groups. Although one-on-one strategy was used in some Latino studies, neither group used reducing client out-of-pocket costs strategy. Client reminders could also be used more in both groups as well. Current review showed church-based cancer education programs were effective in changing knowledge, but not always screening utilization. Results show faith-based cancer educational interventions are promising. To maximize intervention impact, future studies might consider using stronger study designs, incorporating a variety of proven effective strategies, including those frequently used evidence-based strategies, as well as exploring promising strategies among specific target groups.

Keywords Faith-based cancer education · Systematic reviews · Racial / ethnic minority · Promising strategy · The community guide

Introduction

Cancer Disparities Among Racial/Ethnic Minority Groups

According to the World Health Organization, cancer is the second leading cause of death in the USA. The number of cancer deaths in the USA is projected to increase from 1.3 million to 2.1 million between 2012 and 2030 [1]. Breast and cervical cancers are the two most prevalent cancers in women, and colorectal cancer (CRC) is the third leading cause of cancer-related deaths in the USA among both men and women [1].

African Americans (AA) are the largest racial/ethnic minority group in the USA, second only to Hispanics. African Americans have the highest death and lowest survival rates of any racial/ethnic group in the USA for most cancers [2]. Inequities in work, wealth, education, housing, and overall

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standard of living, as well as social barriers to high-quality cancer prevention, early detection, and treatment services are major causes of these cancer disparities [1]. Hispanics are the largest and youngest minority group in the USA. Over the past decade, the Hispanic population grew 57%, more than four times the growth of the total US population [3, 4]. According to the US Census data, the Hispanic population is concentrated in the west (40%) and south (37%). Data also show that the lifetime cancer risk among both Hispanic men and women is about one in three. Asian Americans are the fastest growing racial/ethnic group in the USA, representing about 6.3% of the total US population [5]. Among the Asians [6] and Hispanics [7] groups, cancer has been the leading cause of mortality.

The Effectiveness of Cancer Screenings

The effectiveness of age-appropriate and gender-specific screenings for cancers has been clearly established [8]. Yet, the full potential of early detection through screening has not been realized, especially among some racial/ethnic minorities. Cancer screening rates, especially for breast, cervical, and colorectal cancers, were significantly lower among Asians compared to Whites and Blacks [9]. In addition, Hispanics were less likely to be screened for cervical and CRCs [9]. Despite similar screening rates among Whites and Blacks, cancer racial disparity is more significant in mortality and late-stage diagnosis among AA [10]. This could be attributed to differences in the quality of screening and follow-up after abnormal results [11, 12], as well as lower early stage survival rates among Blacks which may have some genetic influences [13].

The US Community Guide to Prevention Services systematically reviews evidence-based intervention strategies to improve the uptake of recommended cancer screening. Its Task Force identifies several effective cancer screening intervention strategies including the following: client reminders, small media, one-on-one education, group education, reduced client out-of-pocket cost interventions, and reduction of structural barriers [14]. Strong evidence supports sending program participants reminders (such as letters, postcards, e-mails, or phone messages) to increase screening rates for all three major cancers (breast, cervical, and colorectal cancers). Evidence also suggests that there is an added benefit to combining client reminders with other intervention strategies recommended by the Task Force to promote breast and colon cancer screenings. Small media, such as brochures, newsletters, or videos, can educate and motivate people to get screened for all three cancers. One-on-one education is often supported by small media or client reminders, can help highlight importance and benefits of regular screening for early detection, as well as address misconceptions or negative beliefs towards screening for all three cancers. Group education is less intimidating with opportunity of peer support, and reducing screening costs can increase mammogram screenings. For breast and colorectal cancer screening, strong evidence supports the benefits of removing structural barriers to screening by keeping flexible clinic hours, working in non-clinical settings such as mobile mammography vans, and offering on-site translations, transportation, patient navigators, or other administrative services [15]. In addition, dietary counseling might be incorporated into available services since data show that approximately one third of cancer cases in the USA could be prevented if people participated in recommended amounts of physical activity and consumed a healthy diet [1].

Barriers Towards Cancer Screenings by Racial Groups

Barriers to cancer screening among racial/ethnic minorities are complex and include individual, sociocultural, and system-level factors. Some general barriers to cancer screenings included limited knowledge and awareness, embarrassment, lack of insurance, or lack of child care. However, some more specific cancer screening barriers such as fear related to the harms of screening, concerns of privacy, negative historical events or outcomes related to participation in research, mistrust of the healthcare system, and cancer fatalism are more dominant among African American groups. Additional commonly reported screening barriers among AAs also include lower literacy levels, belief in myths about cancer, doubt about screening benefits, community reticence, or information scarcity [16, 17]. Barriers towards cancer screening among Hispanic/Latinos are more cultural-related factors, including language, beliefs, values, and traditions, inadequate health insurance, and lower educational status [7]. Cancer fatalism, the belief that cancer is predetermined and beyond individual control, is a major screening barrier among racial minority groups [18]. Screening barriers among Hispanics and Asian Americans share some similarities, and are more related to the cultural difference or experiences in the USA, such as lack of culturally sensitive and linguistically appropriate programs to improve healthcare access, transportation issues, lack of health insurance or physician referrals, cancer-related stigma, and language barriers [19–21]. In order to improve screening participation, especially among racial/ethnic minorities, evidence-based and culturally appropriate interventions promoting behavior change are needed.

The Role of Churches on Cancer Screening and Education Among Racial Minority Groups

Studies have shown that community-based recruitment strategies such as church or faith-based can be successful to reach the hard-to-reach and underserved individuals such as recent immigrants and uninsured [22, 23] including effectively reaching Asian Americans [24].

Faith-based organizations have a unique position to deliver health and social services to the hard-to-reach communities including immigrant and ethnic minority groups [25–27]. Faith-based organizations can provide community social capital and network support for immigrants.

Many cancer prevention researchers have used churches as health intervention settings for cancer education or lifestyle change programs, including among African American [16, 28–34], Latino American [29, 35–39], and other minorities like Korean Americans [40] and Samoan Americans [41].

Given the promise of faith-based cancer screening programs and its ability to reach the hard-to-reach minority groups, the purpose of this review is to examine and synthesize evidence-based strategies used and lessons learned from existing effective faith-based cancer screening intervention programs among racial minority groups. CDC's Community Guide (CG) has been an essential resource for providing evidence-based findings and effective strategies on what works in public health and community preventive services and programs [42]. This review intends to specifically describe and identify key characteristics of effective approaches used based on CDC's Community Guide recommended strategies for tailored faith-based cancer screening intervention development, dissemination, and implementation. Our main research questions are as follows: (1) How are the recruitment strategies similar or different by racial ethnic groups among existing faith-based cancer prevention programs? (2) What recommended intervention strategies have been used based on the CDC's Community Guide among existing studies targeting different racial ethnic groups? And (3) How effective are the outcomes of these existing faith-based cancer prevention programs by racial groups? This review focuses on examining key intervention characteristics and strategies for future program adoption and implementation. Study results have implications for researchers and practitioners on using tailored strategies to recruit, deliver, and disseminate faith-based cancer preventive programs among different racial ethnic minority groups.

Methods

The combination key terms of "church or faith-based or religion," "intervention or program," and "cancer education or lifestyle" in abstracts were used in searching five major databases including CINAHL, ERIC, Health Technology Assessments, MEDLINE, and PsycINFO. Empirical intervention studies published between January 2005 and December 2016 were included for the purposes of this review. Original peer-reviewed research published in the specified time period containing the above search terms in the abstract were included. Additional relevant articles were also retrieved via examining the references of identified articles for this review.

Literature searches yielded 193 studies. Two reviewers examined abstracts of all retrieved journal articles using the above criteria to determine relevance for inclusion. Titles and abstracts of these studies were independently screened by two researchers. Those appeared to be descriptive studies or not focusing on cancer education or lifestyle change were excluded. A total of 45 full articles met the criteria and were retrieved for full article review. After carefully examining full text of these 45 articles along with their reference lists, articles which were determined not to be intervention studies or occurred in settings which were not faith-based were excluded. One additional article [43] was identified from the reference list [44]. A total of 20 articles met all study criteria and were downloaded into the EndNote database for our current review and analyses.

Results

Results of the current review was organized in the following sections: overview of the studies by race/ethnicity groups, cancer sites, and geographic region; recruitment; study designs; theories/models used; intervention strategies used based on CDC's Community Guide; and effectiveness of intervention outcomes.

A total of 20 cancer education or lifestyle intervention studies were reviewed. Existing published studies were mostly focused on two race/ethnicity groups: AA (8 articles) and Latino/Hispanic Americans (10 articles), one article targeted both African Americans and Latino/Hispanic Americans, thus were included in both groups in our analyses [29]. Current analyses were stratified by these two racial/ethnic groups. One study targeted Korean Americans and another examined Samoan Americans, which were analyzed separately. Tables 1 and 2 detail the characteristics of interventions and outcomes, and Tables 3 and 4 highlight the intervention strategies used in each study based on the recommendations from CDC's Community Guide. To reduce redundancy of information between main text and table, descriptive information of each study is available as supplemental materials upon request. For breast cancer, the CG recommends client reminders, small media, one-on-one education, group education, reduced client out-of-pocket cost interventions, and reducing structural barriers strategies as effective. For cervical cancer, the CG recommends client reminders, small media, and one-on-one education. For colorectal cancers, client reminders, small media, one-on-one education, and reducing structural barriers are recommended to be effective. There is not enough evidence to determine whether group education strategy is effective for increasing cervical or colorectal cancer screenings [15].

African American Four studies focused on breast cancer screenings [28, 29, 32, 33], one focused on both breast cancer

Table 1 (AA) Study design, theory/construct, interventions, and results/outcome

Author (year)	Study design	Theory/construct	Intervention	Outcomes/results
Hall, C. P. et al. (2005)[1]	Posttest only, control group design	HBM, self-efficacy	IG: part 1—large group instruction using a slide show and videos Part 2—small group session present information on BSE and demonstrated BSE CG: did not receive neither education	Outcomes: knowledge Results: the IG's mean scores were significantly higher than the CG's on the BCK test and the susceptibility scale of the BCSBS; the IG also scored significantly higher than the CG on the confidence scale of the BCSBS
Darnell, J. S et al. (2006)[2]	Prospective, observational study	HBM	IG: standard breast educational curriculum (both in English and Spanish, 2 h, 6-month intervention period), health fairs, informal group sessions, church bulletin announcements, pulpit announcements, testimonials from cancer survivors, and reminder cards	Outcomes: bivariate associations of variables, mammography utilization, and factors associated with it Results: Screening rates: 72% for AA women and 41% for Latinos. The knowledge does not have effect on mammography utilization for both For AA: Passive participation appears to be more important than active participation. Messages delivered by the church pastor and printed in the church bulletins, breast cancer educational programs and informal group discussions were the most effective For Latinos: None of the hypothesized knowledge or participation variables was found to be significant Comfort speaking English was found to be the strongest predictor of mammography use
Matthews, Alicia K et al. (2006)[3]	Qualitative evaluation	"Train the trainer" model	IG: standard educational activities and variable educational and outreach activities either in person or by telephone, 6 months	Outcomes: role of the church in promoting health, awareness of breast and cervical cancer activities, education/curriculum effectiveness, facilitators and barriers to cancer screening, and recommendations for improving the intervention program Results: role of church in health promotion is important; educational sessions and church activities were useful in increasing awareness about breast and cervical cancer, and also reinforced early detection; personal testimonies are an effective cue to action; hearing risk factors from AA women helped to change attitudes; knowledge of breast improved with hands-on education; REACH program motivated women to get screened for the first time; regular screeners have positive attitudes about screening and fewer barriers; social stigma may be a barrier to screening
Holt, C. L. et al. (2009)[4]	Pre-post randomized controlled trial	Social cognitive theory; HBM.	IG: an educational session led by a CHA from each church, using printed materials	Outcomes: knowledge, beliefs, perceived barriers to screening, stage of decision making, accessibility, and reactions to the intervention Results: the spiritually based intervention appeared to be more effective in areas such as knowledge, and men read more of their materials in the spiritually based group than in the non-spiritual group
Emerson, J. S et al. (2009)[5]	Quasi-experimental, delayed-control (cross-over) design with	HBM	IG: 10-min video, then the physician provided detailed information about PSA and digital screening techniques, stages of prostate cancer, and treatment options	Outcomes: prostate cancer screening rates, intervention-related increases Results: during the study period, 99 new cases had completed prostate cancer screening

Table 1 (continued)

Author (year)	Study design	Theory/construct	Intervention	Outcomes/results
	randomization at the church-level			Both the level of knowledge and level of perceived risk by the end of the study impacted significantly Older age (b = .08, p < .01, Exp (B) = 1.09) and having insurance of any type (b = 3.20, p < .01, Exp (B) = 24.65) were significant predictors of getting screenings The number of medical problems, being married, social support, and beliefs regarding the benefits at the end of the study did not significantly increase the odds of getting screened
Austin-Valere et al. (2010)[6]	One group pretest-posttest pre-experimental study	HBM; help-seeking model; HSU	IG: breast cancer education program: a 2-h PowerPoint presentation, followed by a posttest questionnaire	Outcomes: the breast cancer screening scale, the breast cancer fear and mistrust of the medical community inventory, the breast cancer knowledge test, the breast cancer fatalism scale, multi-group ethnic identity measure revised (MEIM-R), and help-seeking behavior scale Results: There was a strong correlation: between BSE barrier and help-seeking (r = −424, N = 62, p = .001), between BSE benefits and BSE confidence (r = .67, N = 62, p = .000.), between perception of susceptibility scale (r = .531, N = 62, p = .000) and the BSE barrier scale (r = .272, N = 62, p = .032) The Breast Cancer Fatalism scale, Breast Cancer Fear scale, BSE Barrier scale, and the Health Motivation scale had statistically significantly relationships to the Help-seeking scale
Tussing-Humphreys, L. (2013)[7]	Quasi-experimental design	Psychosocial constructs	IG: education sessions, a binder containing the lessons, healthy recipes, and other nutrition, chronic disease prevention, handouts, newsletters (lifestyle related) CG: newsletters pertaining to colds and influenza, food safety, and minimizing stress	Outcomes: dietary, physical activity, anthropometric, and clinical measures Results: Retention rates: CG vs. IG (85 vs. 84%) Diet quality components improved significantly in both groups Aerobic and strength/flexibility physical activity indicators significant increases in IG only Intervention participation level and vehicle ownership were significant positive predictors of change for several diet quality components
Frazier, Linda M. (2014)[7]	A pretest/posttest one group study design	CHBMS	IG: viewed an education video in church	Outcomes: Champion Health Belief Model Scales (CHBMS), demographic form Results: No significant change in perceived susceptibility. Participants having significantly lower perceptions of seriousness of breast cancer at posttest than at pretest (p = .01) Participants reported significantly higher perceived benefits of SBE (p = .03) and mammography (p = .05) at the posttest No significant changes over time in confidence in performing SBE, health motivation, and barriers to SBE and barriers to mammography

Abbreviations: *BCK test* Breast Cancer Knowledge Test, *BCSBS* Breast Cancer Screening Belief Scales, *CBPR* Community-Based Participatory Research, *CHA* trained community health advisor, *CHBMS* Champion Health Belief Model Scales, *HBM* health belief model, *HSU* Health Service Utilization model, *HSU* health service utilization, *SBE* self-breast examination

Table 2 (Latino America and other races) Study design, theory/construct, interventions, and results/outcome

Author (year)	Study design	Theory/construct	Intervention	Results/outcome, statistical model
Welsh, Adrienne L et al. (2005)[1]	Quasi-experimental design	CBPR framework, HBM.	IG: PSI: 209 churches in Colorado, deliver by pulpit, church bulletin or both; PI: 4 churches in the Denver area, deliver by person	Outcomes: mammogram rates Results: Screening rates: Latinos: PI—baseline (25%) vs. follow-up (30%), $p = .30$; PSI—baseline (45%) vs. follow-up (43%), $p = .27$. NLWs: PI—baseline (32%) vs. follow-up (38%), $p = .40$; PSI—baseline (41%) vs. follow-up (44%), $p = .02$*. No significant disparities among Latinos and NLWs PI had a marginally greater impact than PSI in increasing mammogram use among Latinos (GEE, $p = .07$) Statistical model: GEE model
Darnell, J. S et al. (2006)[2]	Prospective, observational study	HBM	IG: standard breast educational curriculum (both in English and Spanish, 2 h, 6-month intervention period), health fairs, informal group sessions, church bulletin announcements, pulpit announcements, testimonials from cancer survivors, and reminder cards	Outcomes: mammography utilization, and factors associated with mammography utilization Results: Screening rates: 72% for AA women and 41% for Latinos. The knowledge does not have effect on mammography utilization for either AA women or Latinos For AA: Passive participation appears to be more important than active participation. Messages delivered by the church pastor and printed in the church bulletins, breast cancer educational programs, and informal group discussions were the most effective For Latinos: None of the hypothesized knowledge or participation variables was found to be significant Comfort speaking English was found to be the strongest predictor of mammography use
Lopez et al. (2006)[3]	Two-group pre/post design	HBM	IG: culturally tailored cancer prevention intervention that focused on health education and cancer screening for cancer prevention	Outcomes: pretest cancer prevention knowledge, pretest cancer screening behaviors, Intervention effect, and intervention effect Results: Cancer-related knowledge was related to greater program attendance Higher levels of acculturation were more likely to have had a clinical breast exam Higher levels of pretest cancer prevention knowledge, being younger, and having a lower fear of cancer were predictive of having a posttest Pap smear Pretest mammography screening and pretest cancer prevention knowledge predicted mammography screening
Hall, C. P et al. (2007)[4]		HBM		Outcomes: Breast Cancer Knowledge Test (BCK) and Breast Cancer Screening Belief Scales (BCSBS)

Table 2 (continued)

Author (year)	Study design	Theory/construct	Intervention	Results/outcome, statistical model
	An experimental posttest-only, control group design		IG: a multifaceted, culturally sensitive, and linguistically appropriate breast cancer education program via printed materials and media CG: a program on nutrition	Results: BCK test: EG > CG (mean 12.92 > 10.53, $p < .05$ BCSBS: the CG scored significantly higher than the EG on the barriers to mammography scale ($p < .05$)
Sauaia, Angela et al. (2007)[5]	Quasi-experiment design	CBPR framework;	IG: printed |intervention via mail culturally tailored education), PI via deliver breast-health education messages personally	Outcomes: mammogram rates Results: Both printed intervention and promotora intervention, nonsignificant change in mammogram rate from baseline to follow-up PI had a significantly higher increase in biennial mammograms than the printed intervention ($p = .03$) after adjusting for age, income, urban setting, disability, and insurance type
Luque, John S et al. (2011)[6]	Retrospective study	Descriptive study	n/a	Outcomes: screening adherence Results: Women residing in the USA for more than 5 years were significantly more likely to adhere with cervical cancer screening recommendations compared with women who have resided in the USA for 5 years or less ($p = .05$) Married women were more likely to be adherent than unmarried women ($p = .02$)
Allen, Jennifer D et al. (2014)[7]	One group pre-/post-evaluation design	Socio-ecological framework (draws its theoretical underpinnings from the Integrative Model of Behavioral Prediction)	IG: client reminders, one-to-one education, group education, dissemination of health messages via small media and pastor sermons and reduction of structural barriers to screening via provider referral, mobile health vans, and assistance with applications for state-based insurance	Outcomes: intervention feasibility, intervention feasibility, intervention feasibility, adherence to screening guidelines Results: Two thirds (67%) reported talking with the PN or PHAs about health issues Participation in small group education sessions was highest (72%), with health fairs (61%) and goal setting (50%) also being popular activities
Colon-Otero et al. (2014)[8]	Pre-post design	HBM	IG: two phases: Phase 1: advertising campaign. Used print and radio, emphasized increasing the consumption of fruits and vegetables Phase 2: seminars at Hispanic churches	Outcomes: awareness, screening program participation Results: Awareness: willing to make changes in their diets increased from 25% (16/63) to 63% (41/65) still no p value Screening Program Participation: Duval County increased from 17% (31/180) to 24% (51/221) – In all seven counties in the study, screening increase from 14% (50/370) to 19% (63/331)
Schwingel, A. et al. (2015)[9]	Study 1: mixed-methods approach Study 2: quasi-experimental design	Study 1: Social Ecological Model (SEM), Study 2: HBM	Study 1: n/a Study 2: PI individually interview along with corresponding materials	Study 1: family and faith play an important role in adopting healthier lifestyle behaviors Study 2: obtained spiritual support through the religious content led to changes in behavior Participants in IG were less likely to drop out Intergenerational activities failed to succeed

Table 2 (continued)

Author (year)	Study design	Theory/construct	Intervention	Results/outcome, statistical model
Obulaney, P.A. et al. (2016)[10]	Quasi-experimental, pre- and posttest design	HBM	IG: brochure and handout, preventative measurement and video, Q and A session	Outcomes: knowledge and vaccination intent Results: Significant knowledge improvement ($p < .0001$) and change in mother's intent ($p < .0029$) Intent increased from 56 to 81% HPV vaccine rate increased from 5.4 to 18%
Ma, Grace X et al. (2009)[11]	Quasi-experimental study design	CBPR framework; HBM; SCT	IG: received small group CRC education in Korean; CG: received small group education on general healthy	Outcomes: post-intervention knowledge changes, health beliefs and barriers (pre- and post-), and post-intervention screening behavior Results: Screening rates increase: IG (13.1 to 77.4%, ($p < .001$); CG (9.6 to 10.8%, N.S.) Significant improvement in HBM psychosocial components that include items of perceived susceptibility, severity, perceived screening benefits, barriers, cues to action, and self-efficacy
Mishra, Shiraz I et al. (2009)[12]	Controlled intervention trial using two parallel groups (intervention and control)	Health Behavior Framework (HBF) and Freire's empowerment pedagogy guided the study	IG: educational sessions, including three parts: cancer education booklets; skill building and behavioral exercises; and interactive group discussion sessions CG: received the cervical cancer education booklets after the posttest surveys	Outcomes: Pap smear use, knowledge attitudes, and psychosocial factors Results: Pap smear screening at posttest IG/CG (adjusted OR = 2.0; 95% CI = [1.3, 3.2]; $p < .01$)

Abbreviations: *BCK test* Breast Cancer Knowledge Test, *BCSBS* Breast Cancer Screening Belief Scale, *PI promotora* intervention, *PSI* printed statewide intervention, *PN* patient navigator, *HBM* Health Belief Model, *SCT* Social Cognitive Theory, *CBPR* Community-Based Participatory Research, *HBF* Health Behavior Framework, *PHAs* peer health advisors, *N.S.* nonsignificant, *NLWs* Non-Latinos Whites, *IG* intervention group, *CG* control group

Table 3 (AA) Interventions recommended by CDC Community Guide

Recommended intervention Author (year)	Client reminders	Small media	Group education	One-on-one education	Reducing client out-of-pocket costs	Reducing structural barriers
Hall, C. P. et al. (2005)[1]	N	Y	Y	N	N	N
Darnell, J. S et al. (2006)[2]	Y	Y	Y	N	N	N
Matthews, Alicia K et al. (2006)[3]	Y	Y	Y	N	N	N
Holt, C. L. et al. (2009)[4]	–	Y*	Y*	–	–	–
Emerson, J. S et al. (2009)[5]	–	Y*	Y*	–	–	–
Austin-Valere, et al. (2010)[6]	N	Y	Y	N	N	N
Tussing-Humphreys, L. (2013)[7]	N	Y*	Y*	N	N	N
Frazier, Lind a M. (2014)[7]	N	Y	N	N	N	N

CDC guideline recommends six interventions for breast cancer including the following: client reminders, small media, group education, one-on-one education, reducing client out-of-pocket costs, and reducing structural barriers. CDC guideline recommends three interventions for cervical cancer including the following: client reminders, small media, one-on-one education. CDC guideline recommends four interventions for colorectal cancer including the following: client reminders, small media, one-on-one education, and reducing structural barriers

– CDC do not give recommended intervention guideline to prostate cancer, $Y^{\#}$ not recommended by guideline but used in the article, *Y** the intervention does not include in the CDC guideline but include in the article, *Y* used that intervention, *N* not used that intervention

and cervical cancers [30], two on prostate cancer [31, 34], and one on lifestyle intervention [45]. All studies mainly targeted primarily age of 40 years and older adults. The majority of the studies were conducted in the southern USA.

Latino/Hispanic American and Other Races Five studies focused on breast cancer [29, 35–37, 39], two studies focused on cervical cancer [46, 47], one on breast, cervical, and colorectal cancers [38], one on cancer in general cancers [43], and one on lifestyle [48]. The majority of the studies also targeted age 40 years and older females, or age 18 years old and above in the multiple cancer study. The geographic locations of the studies were nationwide including east and west, as well as southern states. However, on average, the sample size of AA group was larger than Latino/Hispanic American group in most studies.

The Korean American study (n = 193) was conducted in southern California and focused on colorectal cancers [40]. The Samoan American study (n = 398) was conducted in the US territory of American Samoa and focused on cervical cancer [41].

Table 4 (Latino/Hispanic American) interventions recommended by CDC Community Guide

Recommended intervention Author (year)	Client reminders	Small media	Group education	One-on-one education	Reducing client out-of-pocket costs	Reducing structural barriers
Welsh, Adrienne L et al. (2005)[1]	N	Y	N	Y	N	N
Darnell, J. S et al. (2006)[2]	Y	Y	Y	N	N	N
Lopez et al. (2006)[3]	n/a	n/a	n/a	n/a	n/a	n/a
Hall, C. P et al. (2007)[4]	N	Y	Y	N	N	N
Sauaia, Angela et al. (2007)[5]	N	Y	N	Y	N	N
Luque, John S et al. (2011)[6]	n/a	n/a	n/a	n/a	n/a	n/a
Allen, Jennifer D et al. (2014)[7]	Y	Y	Y	Y	N	Y
Colon-Otero et al. (2014)[8]	N	Y	Y	N	N	N
Schwingel, A. et al. (2015)[9]	N	Y*	N	Y*	N	N
Obulaney, P.A. et al. (2016)[10]	N	Y	Y	N	N	N
Ma, Grace X et al. (2009)[11]	N	N	$Y^{\#}$	N	_	N
Mishra, Shiraz I et al. (2009)[12]	N	Y	$Y^{\#}$	N	_	_

CDC guideline recommends six interventions for breast cancer including the following: client reminders, small media, group education, one-on-one education, reducing client out-of-pocket costs, and reducing structural barriers. CDC guideline recommends three interventions for cervical cancer including the following: client reminders, small media, one-on-one education. CDC guideline recommends four interventions for colorectal cancer including the following: client reminders, small media, one-on-one education, and reducing structural barriers

– CDC do not give recommended intervention guideline to prostate cancer, $Y^{\#}$ not recommended by guideline but used in the article, *Y** the intervention does not include in the CDC guideline but include in the article, *Y* used that intervention, *N* not used that intervention

Participant Recruitment

African American Most study coordinators were identified and recruited by pastors of the churches. They are either pastors themselves or lay health coordinators/advocates. Study participants were mostly identified or recruited from churches' adult attendees, mainly 40 years and older. English skills were common criteria for recruitment among AA studies [30, 32, 33]. Most studies did not have an insurance requirement. Only two studies required participants to be free of cancer history [32, 33]. The lifestyle intervention study required participants not to be pregnant at the beginning of the study [45].

Latino/Hispanic American and Other Races Study coordinators were often recruited from people who have more health knowledge like *promotora* [35, 37, 48], nursing faculty members [36], or lay health advisors [38]. All study participants were identified or recruited from church attendees. Studies of the Latino group focused more on Medicaid or Medicare Fee-For-Services (FFS) population [35, 37]. Most of the Latino studies did not have an English language proficiency requirement primarily because intervention programs were language and culture tailored. Both AA and Latino/Hispanic American groups and other races commonly used age, gender, and geographic locations near the study sites as eligibility criteria for recruitment.

Study Design

African American A variety of study designs have been used. Only one study in the current review used controlled randomized trial [34]. Two studies used quasi-experimental designs [31, 45], two used pretest/posttest one group study designs [32, 33], one used posttest only, control group design [28], and one study used qualitative evaluation or exploratory study [30].

Latino/Hispanic American and Other Races Five studies used quasi-experimental design [35, 37, 40, 47, 48] including the Korean American study. Two studies used a single group pre-post study design [38, 39] and one used posttest only, control group design [36]. The Samoan American study was the only one that used a controlled randomized trial design [41]. Two studies did not specify study design [29, 46].

Theories/Models Used

African American Health belief model (HBM) is the most widely used [28, 29, 31, 32], and often used together with other theories or models like social cognitive theory (SCT), help-seeking model, or Health Service Utilization (HSU) model. The one qualitative evaluation study used "train the trainer" model [30].

HBM advocates the importance of health perceptions and expectations beyond knowledge alone. Health beliefs (perceived benefits, barriers, severity, susceptibility) are values one holds which influence actions and preventive health behaviors to protect own health. Cues to action, via either internal or external motivators, also can affect health behaviors [31]. SCT notes the power of vicarious learning, learning through observing others, on behavioral change. Individuals can learn by observing a model performing a behavior and the outcome of that behavior, then they remember the sequence of events and use it to guide their subsequent behaviors [49]. Help-seeking model refers to people often attempt to seek help for a personal problem by following a series foreseeable, goal-directed steps. These steps can lead them to the solutions [50]. HSU model classifies behavioral influencing factors into three categories: predisposing factors (e.g., personal factors), enabling factors (e.g., socioeconomic status), and needs factors (e.g., perceived serious of a certain symptom) [51]. Finally, "train the trainer" model promotes experienced intervention staff to show a less-experienced church member how to deliver educational activities [30].

Latino/Hispanic American and Other Races HBM is also used widely among *Latino/Hispanic American* and other races studies ($n = 8$), and often in combination with other models or frameworks. For example, the Korean church and the Medicaid Latino women studies both combined HBM and Community-Based Participatory Research (CBPR) framework in their breast cancer interventions [35, 40]. The Latino lifestyle intervention used HBM with the Social Ecological Model [48]. CBPR framework was also used in another breast cancer screening education program [37]. Socio-ecological framework was also used in Allen's multiple cancer prevention study [38]. The Samoan study used Health Behavior Framework (HBF) and Freire's empowerment pedagogy to guide their study [41].

Intervention Characteristics and Evidence-Based Strategies Used

African American The review of cancer education program among AA found that standard program or curriculum is often used [29, 30]. Small media via printed materials such as bulletin announcements and booklet, PowerPoint, or videos were used in all studies. Specifically, video was among the most often used strategy to deliver cancer education messages [28, 31, 33]. Small group education intervention strategy was also widely used in combination with the small media strategy [28–32, 34, 45]. On the other hand, client reminders, either by cards or phones, were used in only two studies [29, 30]. Other evidence-based strategies recommended CDC's Community Guide such as one-on-one education, reducing client out-of-pocket costs, and reducing structural barriers

were not found in studies included in our current review. Small media and group education were the top two commonly used intervention strategies among church-based AA programs (Table 3).

Latino/Hispanic American and Other Races Among Latino/Hispanic American group, six studies used small media via printed materials such as bulletins, cards, booklets, PowerPoint, or videos, which was also the most often used evidence-based strategy, followed by group education [29, 35–39]. Four studies used one-on-one education together with small media interventions [35, 37, 38, 45]. Client reminders were used in two studies [29, 39]. Reducing structural barriers via provider referral, mobile health vans, and assistance with applications for state-based insurance was only used in one church-based intervention, and was used together with other intervention strategies including client reminders, small media, one-to-one outreach and group education [38]. Similar to AA group, small media and group education were also the top two most widely used strategies. However, one-on-one education via *promotora* was used often along with small media and group education among interventions targeting Latinos, as opposed to AA studies where no one-on-one strategy was used.

Group education was the only evidence-based strategy used in the Korean Americans colorectal cancer screening intervention [40] and the result showed effectiveness even CDC community guideline has not found sufficient evidence to recommend group education for CRC screening interventions. Although group education was also not identified as a recommended evidence-based strategy for cervical cancer screening, the Samoan study used both small media and group education to promote Pap smear utilization and showed significant outcomes.

Cancer Education or Lifestyle Intervention Outcome

African American Five studies found that faith-based cancer education can significantly improve cancer knowledge [28, 30, 31, 33, 34]. Among these, some further showed increased perceived prostate cancer risk [31], self-efficacy towards performing breast self-exam compared to comparison group [28], and self-efficacy for informed decision making on prostate cancer screenings [35]. Evidence also indicated that higher education and income were associated with greater confidence in ability to do self breast exam and lower barriers to mammography [33]. One study used a 10-min video followed by doctor providing educational information was effective on further improving prostate cancer screening utilization. This study showed that 99 new cases had completed prostate cancer screening during the study period, and older age and having insurance were significant predictors of getting needed prostate cancer screenings [31]. Messages from pastors and church bulletin announcements were found to be the most significant predictors of mammography use among the AA group [29]. AAs who reported hearing, seeing, or reading about cancer educational information at their churches four or more times were 15 times more likely to report mammography use within the past year than were those who encountered information only once [29]. The qualitative train-the-trainer study found that personal testimonies and using AA women to deliver cancer information helped change attitudes, and was an effective cue to action, but social stigma may be a barrier to screening [30]. A study focused on culturally sensitive breast cancer help-seeking behavior among AA women show that fatalism, fear, BSE barriers, and the motivation were significant factors on help-seeking behaviors [32]. The lifestyle intervention study indicated that engagement in educational sessions and vehicle access were significant positive predictors of diet behavior changes [45].

Latino/Hispanic American and Other Races Among Latino/Hispanic Americans, a few studies showed that cancer education can improve cancer knowledge [36, 38, 47]. One culturally sensitive and linguistically appropriate education program among Hispanic women showed that women in the experimental group had higher knowledge scores on breast cancer screenings (breast self-exam, mammography, etc.) compared with the control group (means of 12.92 vs. 10.53; $p < .05$) [36]. Another study compared a *promotora* intervention (PI) delivered in person versus printed statewide intervention (PSI) which was culturally tailored among Latinos, and found that PI had a marginally greater impact on increasing mammogram use among Latinos than the PSI group [35]. Comfort speaking English was the strongest predictor of mammography use among Latinos [29]. The multiple cancer screening study among Latinos used multiple intervention strategies showed that two thirds (67%) participants reported talking with the navigators about health issues after intervention. One cervical cancer study which target mother/daughter dyads found that cancer education significantly improved HPV and cervical cancer prevention knowledge ($p < .0001$) and changed mother's intent (from 56 to 81%, $p < .0029$), and daughters HPV vaccine rate increased from 5.4 to 18% [47].

Lifestyle intervention study among Spanish-speaking churches has found significant increased change of dietary behaviors as well as screening participation [39]. Spiritual support from church and the religious content might have played significant roles [48]. Current review showed that all Latino church cancer education programs addressed language and cultural barriers via culturally sensitive and language appropriate interventions, either through printed materials, seminars at churches, or information delivered via *promotora*.

The colorectal cancer intervention among Korean Americans showed that experimental group with small group intervention had increased screening rates (13.1 vs. 77.4%),

comparing with a control group which did not show significant differences on screening rates (9.6 vs. 10.8%) [40]. The Samoan cervical cancer intervention found that culturally tailored interactive group discussion sessions, supplemented by educational booklets, also significantly increased Pap screenings (OR = 2.0; 95% CI = [1.3, 3.2]; $p < .01$) [41].

Discussion

The current review updated faith-based cancer screening education and lifestyle intervention studies by race/ethnicity groups. Results show most studies reviewed focused on breast cancer alone or breast cancer in combination with other cancers. The sample sizes of the AA studies were generally larger. Majority of these studies reviewed used single group pre-post, posttest only with control group, or quasi-experience designs. Health Belief Model was the most commonly used theory in both groups. In most studies among African American, coordinators were identified and recruited by pastors of the churches. Study coordinators among Latino/Hispanic American and other races were often recruited from people who have more health knowledge such as *promotora* [35, 37, 48], nursing faculty members [36] or Health Advisors [38]. Most AA studies did not have insurance criteria for recruitment although some required English skills, whereas the Latino studies mostly targeted among Medicaid or Medicare population and did not have English language skill criteria for inclusion [35, 37]. Small media and group education were the top two most popular intervention strategies in both AA and Latino groups. Although one-on-one strategy was used in some Latino studies, it was not the case among AA studies. Only one Latino study used reduce structure barriers strategy, and client reminders could also be used more in both groups.

The current review showed that most cancer education was effective to increase cancer knowledge and beliefs among AA group, but not always on screening utilization. On the other hand, studies reviewed targeting Latinos or other races seem to show more effectiveness on screening utilizations or other behavioral outcomes (talking to navigators about health issues or changed diet behaviors). Tailored interventions addressing cultural barriers may have played a significant role.

This review finds that the trend of published church-based intervention studies varied greatly by target group, time period, topic focus, and location. The number of studies on church or faith-based interventions for cancer screening promotion among race and/or ethnic minorities especially the Hispanics/Latinos has significantly increased over time and particularly in the recent years (2005~2016). An earlier faith-based review studies examined African American groups but focused more on general health promotion, instead of cancer screening specifically. Mark J. DeHaven (2004) conducted a systematic review of 53 general health programs conducted between 1990 and 2000 among faith-based organizations, and they concluded that faith-based programs can improve health outcomes. However, only 18.9% of the programs reviewed were focused on cancer specifically. In addition, majority of the programs reviewed targeted AA (41.5%), only 7.5% targeted Hispanic, with the rest targeted either low income groups or not specified [52]. In our review, a little more proportion of the studies targeted Hispanic/Latino (52%) than AA (38%). Our review showed that church-based cancer screening study among Hispanic has increased rapidly in recent years.

Our review found that most of the existing faith-based intervention programs were directed towards African American populations and Latino/Hispanic Americans. This finding was not surprising. Historically, Black churches have played a unique role in the African American community and central to many cultural and social activities [53], so do the significant role Catholic churches play among Latino/Hispanic Americans [54, 55]. However, our review also showed that very few faith-based cancer screening interventions has been published among Asian or Pacific Islanders Americans. Only two studies in our current review targeted this group, Korean Americans and Samoan Americans. In a recent study conducted by PEW, data show that 36% of Asian Americans attend worship services weekly or more, and the 31% of Chinese Americans identify themselves as Christians as the largest religious affiliation group [56]. More church-based health intervention studies are recommended to target Asian American communities.

The Latino studies focused more on the uninsured or under-insured low income groups, with no English language skill requirement. This is likely due to most of the Latino church-based interventions were culturally sensitive and linguistically tailored. In addition, Latino/Hispanic immigrants are more likely to be uninsured or under-insured, which may lead to higher likelihood of forgoing or postponing preventive care, and skip recommended tests or treatments than those with insurance coverage [57]. On the other hand, AA studies do not normally have insurance criteria, but several required English skills for study participation. English skills were required to ensure understanding of cancer education program related information. However, this requirement might result exclusion of low or no literacy AA groups in the intervention studies. Future interventions might be needed to be developed to better deliver education among the low/no literacy minority groups.

Our review showed solid evidence that one-on-one education, either by telephone or in person, and often conducted by *promotora*, can improve screenings in Hispanic/Latino groups [35, 37, 38] or live a healthier lifestyle [48]. One-on-one education strategy was only used among Latino/Hispanic Americans in the existing studies reviewed. This may be due to the language barriers and this type of intervention can help better establish personal relationships, facilitate communication, and

address additional cultural barriers. It may also because the smaller sample sizes in the Latino studies made this strategy more feasible among Latino /Hispanic churches.

Limitation

Our review is limited to the publication bias, as well as other risk of bias commonly exists in systematic review studies including selective reporting within studies and/or incomplete retrieval of identified research and reporting bias [19].

Recommendation

Current review shows that faith-based cancer education or lifestyle programs can lead to positive effects. Small media and group education were the top two most popular intervention strategies in both AA and Latino groups. Although one-on-one strategy was used and showed effectiveness in some Latino studies, it was not used among any AA studies. Only one Latino study reviewed used reduce structure barriers strategy, and client reminders could also be used more in both groups as well for future studies.

This is the first review that focuses on cancer education or lifestyle intervention in church settings and examined the effectiveness of behavioral outcomes by race/ethnicity groups. Current review showed existing church-based interventions mostly used single group pre-post design, posttest only and control design, or quasi-experience designs, with very few used control randomized trials. Future church-based studies are recommended to use stronger designs to further document the effectiveness of intervention outcomes.

Our review showed promising effectiveness of church intervention in reaching racial/ethnic minorities, and demonstrated promising effectiveness on cancer knowledge, beliefs, and screening utilizations. We recommend more studies utilize church settings to reach the hard to reach group, including the fastest growing minority but under-researched Asian American groups. CDC's Community Guide recommended evidence-based strategies such as client reminders, one-on-one education, reducing client out-of-pocket costs, and reducing structural barriers among cancer screening in church setting need to be further studied, as many of these were under-utilized in existing church-based intervention programs. Current review provides updates and trends on church-based cancer education interventions targeting racial/ethnic groups, and has implications on designing evidence-based and cultural-tailored faith-based health interventions to close racial/ethnicity cancer disparity gaps in the future.

Compliance with Ethical Standards

Conflict of Interest The authors declare they have no conflict of interest.

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