



Systematic Review of Mammography Screening Educational Interventions for Hispanic Women in the United States

John S. Luque¹ · Ayaba Logan² · Grace Soulen² · Kent E. Armeson^{2,3} · Danielle M. Garrett⁴ · Caroline B. Davila² · Marvella E. Ford^{2,3}

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Abstract

In the United States (U.S.), Hispanics experience breast cancer disparities. Breast cancer is the leading cause of cancer-related death among Hispanic women, and Hispanic women receive mammography screening at lower rates than some other ethnic groups. This low rate of screening mammography is associated with increased risk for possible late-stage diagnosis and lower survival rates. Educational interventions could play a role in increasing screening mammography rates among Hispanic women. This systematic review synthesized the current literature on educational interventions to increase mammography screening among Hispanic women. The review included studies published between May 2003 and September 2017 with experimental and quasi-experimental interventions to increase mammography screening among Hispanics in the U.S. Five studies out of an initial 269 studies met inclusion criteria for the review. All studies employed an interpersonal intervention strategy with community health workers, or promotoras, to deliver the mammography screening intervention. For each study, odds ratios (OR) were calculated to estimate intervention effectiveness based on similar follow-up time periods. The study ORs resulted in a narrow range between 1.02 and 2.18, indicating a low to moderate intervention effect for these types of interpersonal cancer education interventions. The summary OR for the random effects model was 1.67 (CI 1.24–2.26). Hispanics exhibit lower levels of adherence to screening mammography than non-Hispanic whites. Interpersonal cancer education interventions such as the use of promotoras may help to mediate the impact of barriers to receiving a mammogram such as low health literacy, deficits in knowledge about the benefits of screening, and low awareness of the availability of screening services.

Keywords Breast cancer · Cancer screening · Mammography · Promotora · Hispanics/Latinos

Introduction

In the United States (U.S.), breast cancer is the leading cause of cancer-related death among Hispanic women, who receive guideline-adherent mammography screening at lower rates than non-Hispanic white women (61.6 vs. 64.4%) [1]. These

screening differences may lead to increased risk for possible late-stage diagnosis and lower survival rates for Hispanic women. While Hispanic women have lower breast cancer incidence and mortality rates than non-Hispanic whites and African Americans in the U.S., they experience lower 5-year survival rates, which is associated with more late-stage diagnosis, lower access to quality treatment, and certain neighborhood characteristics [2, 3]. These outcomes are a direct result of lower rates of mammography screening in this population. The American Cancer Society reported a lower percentage of breast cancers were diagnosed at a local stage in Hispanic women than in non-Hispanic white women (57 vs. 65%), possibly due to lower rates of screening or delayed follow-up of abnormal screening results [4].

While many Hispanics are U.S.-born, foreign-born Hispanics encounter additional challenges to access affordable health care, since a disproportionate number of immigrants are uninsured and experience disjointed health care services [5, 6]. As Hispanic immigrants become acculturated

✉ John S. Luque
john.luque@fam.u.edu

¹ Institute of Public Health, Science Research Center, Florida A&M University, 1515 South MLK Blvd. Suite 207B, Tallahassee, FL 32307, USA

² Department of Public Health Sciences, Medical University of South Carolina, Charleston, SC, USA

³ Hollings Cancer Center, Medical University of South Carolina, Charleston, SC, USA

⁴ University of South Carolina, Columbia, SC, USA

to the U.S., their cancer screening rates will likely more closely approximate the rates of the general population [4]. Some differences have been identified between cancer statistics for Hispanic immigrants compared to U.S.-born Hispanics. For example, in two separate surveillance studies, foreign-born Hispanic women were more likely to be diagnosed with late-stage cervical cancer compared to U.S.-born Hispanic women [7, 8]. When examining differences in screening mammography between Hispanic subgroups, Cuban American women (52%) have lower screening participation rates than Puerto Rican (65%) and Mexican American (61%) women, possibly due to differences in health care access or rates of insurance by geographical area [1, 4]. National survey studies have reported that for women with public health insurance, Mexican American women had lower screening participation rates compared to other Hispanic subgroups [9]. However, despite these demographic differences, insurance coverage is the most significant factor differentiating groups by screening rates in all U.S. population groups. Among Hispanic women ages 40 years or older, 62% of insured women had a mammogram within the past year compared to 38% of the uninsured [1]. The barriers to timely screening reported by Hispanic women include structural barriers, such as lack of health insurance, costs and transportation, and other barriers including language translation, low health literacy, childcare, clinic hours, and time off work [10, 11]. Current breast cancer screening rates demonstrate that continued efforts are necessary to increase mammography screening among U.S. Hispanics, and consequently, additional scientific studies testing mammography screening interventions focusing on this population continue to be published.

In 2009, the U.S. Preventive Services Task Force (USPSTF) updated its breast cancer screening guidelines to recommend biennial mammography screening for women between 50 and 74 years and shared decision-making for women between 40 and 49 years to include individual preferences [12, 13]. These recommendations differ slightly from those of the American Cancer Society, which recommends that women between 40 and 44 years make individual decisions about annual screening, and then begin annual screening from 45 to 54 years, switching to biennial mammograms starting at 55 years. Despite changes in guidelines, some providers continue to recommend annual mammography screening beginning at 40 [14].

There have been several systematic reviews published in the last 15 years on interventions to increase mammography screening among racial and ethnic minority women [15–19]. The most relevant systematic review to the current study was published in 2010 by Corcoran et al. and examined mammography screening interventions for U.S. Hispanic women [15]. Nine studies published before February 2009 met the inclusion criteria for the review. The review indicated some heterogeneity between studies in terms of intervention components,

but most interventions employed interpersonal outreach strategies using a community health worker (or *promotora* in Spanish) and were conducted in either California or Texas, states with large Hispanic populations. Six of the nine studies employed quasi-experimental designs, and many of the studies did not report randomization procedures. The review also identified study variability in follow-up time periods to test intervention effects and reported that the longer the follow-up time period, the more likely the studies were to detect a weaker effect, or odds ratio (OR), of the intervention they were testing. The combined OR for the random effects model was 1.39, indicating a low effect size, and is consistent with other systematic reviews of similar interventions to increase mammography screening [16, 20].

The review by Corcoran et al. also noted that all included intervention studies featured both a cultural and an educational component using the *promotora* model [15]. This is an important feature of these types of interventions because sociocultural deterrents to mammography screening have been identified as being predictors of lower screening participation among low-income, Hispanic women [21]. *Promotoras* address cultural factors and work to reduce structural barriers to health services and resources for their clients [22]. A prior review of community health worker interventions to increase mammography screening reported an intervention effect, especially in urban settings and programs where community health workers were matched on race or ethnicity with study participants [20]. However, the most effective type of intervention study included in the review by Corcoran et al. offered free mammograms [23]. This finding suggests that programs which eliminate the financial barriers to screening might be most effective when combined with educational outreach.

The purpose of this systematic review was to identify and assess the rigor of recent effectiveness studies to test mammography screening educational interventions focused on U.S. Hispanic women. There have been very few systematic reviews on this topic focused on Hispanics [24]. This review reports the combined results of recent studies—published since May 2003—and highlights unique features of current intervention strategies with diverse populations of U.S. Hispanic women.

Methods

Search Criteria and Study Selection

The inclusion criteria were the following items:

1. Studies had to employ one of the following study designs: randomized controlled trial, case-control trial, quasi-experimental study, or prospective study with historical

controls. Control groups used in the study design could not also be some other type of intervention intended to increase mammography screening.

2. Studies with the goal of increasing mammography screening in U.S. Hispanic populations. At least 50% or more of the study sample had to be Hispanic. If there were multiple population groups included in the sample, results for mammography screening outcomes had to be reported separately for Hispanic participants.
3. Peer-reviewed studies that were published in scientific journals.

The exclusion criteria were the following items:

1. Studies that were literature reviews or case studies.
2. Studies that did not include a comparison group.
3. Studies that did not measure a mammography screening outcome, such as studies which only measured intention to receive screening, were excluded.
4. Studies that did not include greater than 50% Hispanic participant sample or did not report outcomes for Hispanic participants separately.
5. Studies conducted outside of the U. S.

A search of bibliographic databases (Scopus, PubMed, and EBSCO-Host) was first performed by a research librarian from the beginning date of the databases up until March 30, 2017. The search was executed using the following search terms: (Hispanic OR Latino OR Latina) AND (women OR woman OR female) AND (breast cancer OR mammogram OR mammography OR breast neoplasm OR breast abnormality OR breast screening) AND (intervention OR program). Following the database search, 269 articles were initially identified. Two independent reviewers performed a title and abstract screening using the inclusion and exclusion criteria and identified 12 articles for a full text review (Fig. 1). This review focused on studies published after the May 2003 revision to the American Cancer Society screening guidelines in which the breast self-exam became optional, providing updated findings since the previous review by Corcoran et al. [15]. The literature search was updated through September 30, 2017, using the PubMed and Scopus databases, resulting in one additional article that met the inclusion criteria. After the full text review, five articles met the inclusion criteria for full article abstraction. Some common reasons for exclusion were the study did not provide a mammography screening intervention, there was no mammogram receipt data reported (e.g., only intention to screen was measured), there was no comparison group, and either the study did not have a 50% or greater sample of Hispanic participants or did not separately report outcomes for Hispanic participants.

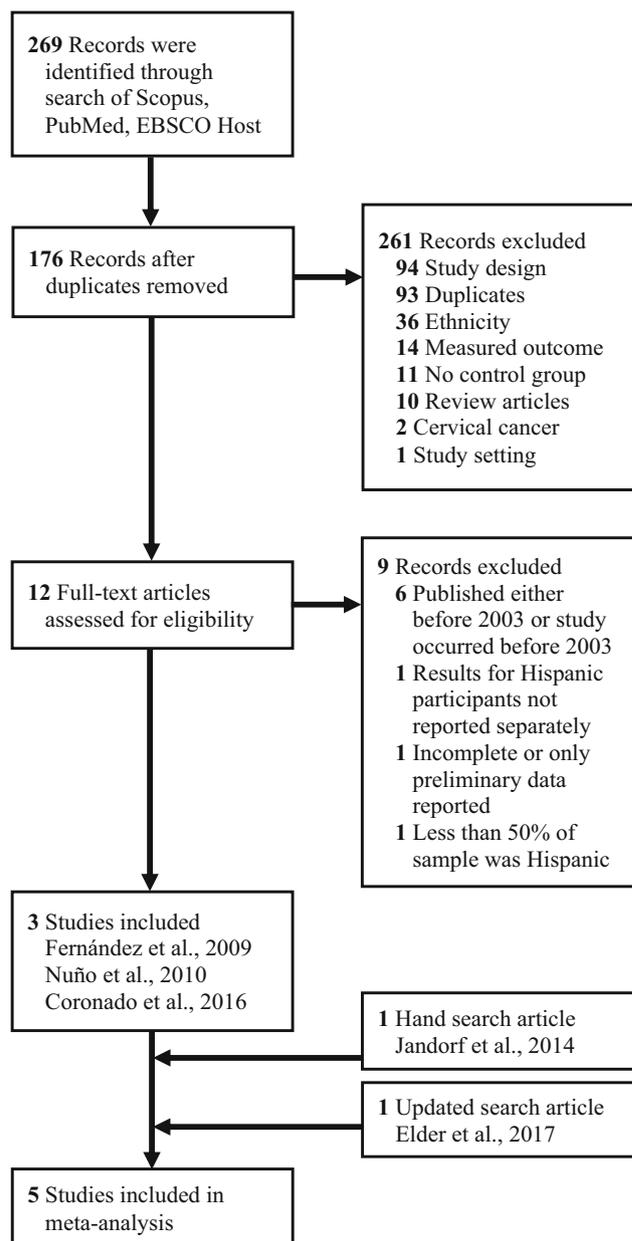


Fig. 1 PRISMA diagram of study selection

Study Coding

The study used a data abstraction form adapted from Wells et al. [20] which included study design, intervention and control group descriptions, intervention components, recruitment method, randomization procedures, demographic information for participants, geographic location of study, follow-up time period, baseline and follow-up screening adherence numbers and percentages by study arm, study attrition, and study limitations. Two reviewers collected information from each article on the data abstraction forms and resolved any differences. One study did not report mammography screening outcomes

separately for women aged 40 years and older, so the study authors were contacted to collect adherence data by study arm.

Analysis

The purpose of the statistical analysis was to combine the reported results from each study and calculate an overall summary OR estimate for the odds of receiving a mammography during the follow-up period in the intervention groups relative to the control groups. Study heterogeneity was assessed via Cochran's Q statistic, with $p < 0.05$ indicating a random model should be used to account for study heterogeneity [25]. The Higgin's I^2 index, a quantitative measure of the degree of inconsistency among studies, was also calculated [26]. This index is a measure of the percent of overall variation attributable to study-to-study heterogeneity. Fixed models used the Mantel-Haenszel method and random models followed the DerSimonian-Laird method for calculating OR summary estimates and 95% CIs [27, 28]. Summary estimates were calculated for all five studies together at their follow-up times of 6 months ($n = 1$), 8 months ($n = 1$), and 12 months ($n = 3$), and again for only the three studies with the 12-month follow-up. Potential publication bias was assessed using funnel plots. Formal hypothesis tests were not conducted to assess publication bias as this is not a recommended practice with less than ten studies [29]. In the forest plot, the size of the plotting symbol for a given study is proportional to the weight of that study in that particular analysis.

Results

Using the inclusion criteria for this review, seven studies were initially identified; however, after full text review, two of these studies were removed because the samples did not include over 50% Hispanic participants or did not report results separately for Hispanic women, leaving a final sample of five studies [30–34]. Three studies employed experimental designs with random samples, and two studies used quasi-experimental designs, randomized by study site (Table 1). Four of the studies included foreign-born Mexican women or Mexican American women, and one study included women from Puerto Rico and Latin American countries other than Mexico. Most of the studies only included women over 40 or 50 years, but one study included women ages 18 years and older since the study was also examining cervical cancer screening outcomes.

For intervention delivery method, all five studies employed promotora-led cancer education. Three of the five studies used one-on-one education, two studies used group education, and one study combined individual and group education. Only one study combined the community-based intervention with a clinic-based approach, providing free access to a

mammography van (Table 2). In terms of geography, one of the five identified studies was conducted in California, and another study was conducted along the U.S.-Mexico border in California, New Mexico, and Texas. Another study had three study sites (Arkansas, New York City, and Buffalo, New York). Two other studies were conducted in Washington State and Arizona. For intervention community sites, one study was church-based, three studies were home-based, and one study combined community, church- and home-based settings.

Included studies did not focus exclusively on breast cancer prevention. Three studies provided education on both breast and cervical cancer screening. One study delivered education on breast, cervical, colorectal, and skin cancer. Control groups were varied and included usual care, breast and cervical cancer screening reminders, physical activity groups, and diabetes education groups. Only one study focused exclusively on mammography screening. There was some variability in follow-up time periods for the mammography screening outcome. Two studies used a 12-month follow-up, and one study used both 12- and 24-month follow-up time periods. One study employed a 6-month follow-up, and one study used both a 2- and 8-month follow-up time period.

Included studies were also evaluated for methodological quality. There were three experimental studies which used random allocation procedures to recruit participants, but the two other studies only randomized community sites. Wide variability in attrition rates between studies was evident at follow-up, ranging from 1 to 41% (Table 3). One study explained the high attrition rate was a factor of working with a mobile population [32]. Another potential limitation is that two studies only included women who were not up-to-date with screening so screening outcomes could only be studied at follow-up. Therefore, for the other three studies, it was possible to measure the change in ORs from baseline to follow-up, which would be a more realistic estimate of the intervention effect in real-world conditions. When only considering studies with baseline screening measures *not* equal to zero, the OR for the Elder et al. study was 2.6 (CI 0.84–2.18); for the Nuño et al. study, it was 1.6 (CI 1.28–1.98); and for the Jandorf et al. study, it was 1.5 (0.66–1.02) (data not shown) [31, 33, 34].

To calculate ORs for each study, 12-month follow-up periods were used for three studies [30, 31, 34]. For the Jandorf et al. study, the 8-month follow-up period data were used, and for the Fernandez et al. study, 6-month follow-up period data were used [32, 33]. For the meta-analysis results, the combined ORs resulted in a narrow range between 1.02 and 2.18, indicating a low to medium intervention effect. The forest plot displays the individual study ORs and the combined OR for all studies (Fig. 2). There was little difference between the combined OR for the fixed effect model (1.63; CI 1.35–1.96) and the random effects model (1.67; CI 1.24–2.26),

Table 1 Design and sampling information for included studies

Study	Design, intervention, and control conditions	Sampling recruitment	Demographic information on sample
Coronado et al. 2016[30]	Experimental; intervention (random sample): $n = 278$; control (random sample, usual care): $n = 261$	Women who had not obtained a mammogram in the previous 2 years were recruited from 1 of 4 clinics in Sea Mar Community Health Centers.	Hispanic women ages 42–74, 92% Spanish-speaking, 81% Mexican-born, majority lived in U.S. for 10+ years, 74% uninsured.
Elder et al. 2017[31]	Experimental; intervention (random sample, physical activity group): $n = 217$; control (random sample, cancer screening group) $n = 219^*$	16 Catholic churches with large Latino populations were randomized to either cancer screening or physical activity interventions.	Churchgoing Hispanic women, 68% 40–65, 58% household income < \$2000/month, 55% < high school completed, 77% married, 66% employed, 91% born in Mexico, 68% low acculturation, 83% overweight/obese, 48% had health insurance.
Fernandez et al. 2009[32]	Quasi-experimental; intervention (two communities): $n = 207$; control (two communities): $n = 257$	Sample was identified using EPI Sampling Quadrants Scheme. Each colonia was divided into 4 quadrants followed by door-to-door recruitment. If more than 1 woman in a household was eligible, the woman with most recent birthdate was selected. After baseline survey, only women with no mammogram in the past year participated in the intervention trial.	Hispanic farmworker women, low-income, non-adherent to breast and cervical cancer screening guidelines, 50+, (48% 50–59), no prior or current cancer diagnosis.
Jandorf et al. 2014[33]	Quasi-experimental; intervention (group-based LHA intervention): $n = 1179$; control (diabetes prevention program): $n = 789$	Program sites recruited and randomized in cluster-randomized study. Sites included community, faith-based, and private homes.	Hispanic women and men, country of origin (36.4% Mexico, 25% Puerto Rico, 14.7% South and Central America, 12.4% other, 11.6% born in U.S.). Overall sample had Hispanic women 18+, and mammogram receipt was only measured for subset of women 40+.
Nuño et al. 2011[34]	Experimental; intervention (random sample, promotora group education): $n = 183$; control (random sample, usual care): $n = 188$	Participants selected from census tracts with majority (> 50%) Hispanic population. Homes were assigned numbers and randomly selected to identify study participants.	Post-menopausal Hispanic women 50+ (75% 50–65) residing in rural counties along the U.S.-Mexico border. Majority were Mexican-born, Spanish-speaking, and had less than an elementary school education.

*Elder used a two-group randomized trial, with physical activity as the primary intervention group and cancer screening as the attention-control group

Table 2 Intervention overview of included studies

Study	Name of program	Description of program	Geographic location of program	Location of program	Duration of program	Follow-up
Coronado et al. 2016[30]	<i>¡Fortaleza Latina!</i> (Latina strength)	Combined patient- and clinic-level intervention on mammography screening participation among Hispanics receiving care at safety net health center. Promotora-led motivational interview program of home visits and follow-up telephone calls (patient-level) and additional mammography services delivered by mobile mammography unit (clinic-level).	Washington State, King, Snohomish, and Skagit counties	Community-wide and clinic-based	August 2012–August 2014	12 months
Elder et al. 2017[31]	<i>Fe en Acción</i> (faith in action)	Promotoras provided NCI and ACS handouts to cancer screening condition participants. Promotoras led 6-week class series at churches on prevention, breast cancer, cervical cancer, HPV, colorectal cancer, skin cancer, and rights and responsibilities of patients. Promotoras accompanied participants to cancer screening appointments as needed. Cancer screening classes were advertised in church bulletin and church announcements. Promotoras gave information on local clinics and services. Framework used was social ecological model.	San Diego, California	Community-wide	2011–2014	12 months
Fernandez et al. 2009[32]	<i>Cultivando la Salud</i> (cultivating health)	Lay health worker/promotora program using a tool box of materials was delivered in 1-on-1 session at the participant's home. Tool box contained bilingual breast and cervical cancer education including a video, flipchart, breast models, pamphlets, and a teaching guide. There was a 2-week follow-up phone call for additional assistance.	2 communities along U.S.-Mexico border (New Mexico and Texas), 2 communities in Central Valley of California	Community-wide	2004–2005	6 months
Jandorf et al. 2014[33]	<i>Esperanza y Vida</i> (hope and life)	Hispanic breast cancer survivors and lay health advisors in group intervention educated women about screening guidelines and obtaining age-appropriate screening. A total of 180 education programs were delivered. Programs were delivered to community, faith-based, and home-based locations.	Arkansas, New York City, and Buffalo, New York	Community-wide	August 2007–December 2009	2 and 8 months
Niño et al. 2011[34]	<i>Entre Amigas</i> (between friends)	Promotora program based on earlier program called <i>Compañeros de Salud</i> . A program consisted of a 2-h group session presented	Yuma County (border county in SW Arizona)	Community-wide	2002–2005	12 and 24 months

Table 2 (continued)

Study	Name of program	Description of program	Geographic location of program	Location of program	Duration of program	Follow-up
		by trained promotora focusing on breast and cervical cancer prevention. Topics included general information about breast and cervical cancer, description and explanation of cancer screening, role of diet in cancer prevention, self-esteem, and description of community resources. Intervention administered in participants' homes in small groups of 3–12 women. Women attended 1 educational class and refresher class 1 year later. Theoretical framework was Social Cognitive Theory.				

although the CI was slightly wider for the random effects model. The significant results ($p = 0.04$) from the test of the study-to-study heterogeneity and the moderate to high I^2 value of 60% indicate that the random model estimates are preferred over the fixed effect model. No systematic evidence of publication bias was apparent in the funnel plot, though no definitive conclusions can be drawn from this given the small number of studies. Figure 2 provides detailed information on the screening proportions by study arm, and the ORs for each of the included studies with corresponding 95% CIs.

Discussion

This meta-analysis reports combined findings from five rigorously designed intervention trials testing the effectiveness of mammography screening educational interventions using outcome data from a total of 2343 participants. The combined OR for the random effects model was 1.67, which is slightly higher than the combined OR from the prior review by Corcoran et al. of 1.39, but similarly reveals a low intervention effect [15]. However, the current review presents a more non-biased estimate of the effectiveness of these types of interpersonal cancer education interventions because in contrast to prior reviews, the majority of the included studies in this meta-analysis were randomized controlled trials (RCT) that implemented rigorous study procedures such as randomly allocating participants to intervention and control groups, maintaining high participant retention, and recruiting large sample sizes.

According to the meta-analysis reported in *The Community Guide*, multicomponent interventions promoting mammography screening in either community or clinic settings increased screening by 6.1 percentage points, thereby producing greater effects by combining strategies [35]. The recommendation is that multicomponent interventions (combining at least two strategies within the subcategories of increasing community demand, increasing community access, and increasing provider delivery) are effective for increasing mammography screening, with medical translation especially important for immigrant populations. While the OR for the current review was slightly larger than the Corcoran et al. review, the updated findings present further evidence for the effectiveness of these types of interpersonal interventions in Hispanic communities.

A previous meta-analysis by Wells et al. reported on the effectiveness of community health worker interventions to increase mammography screening for diverse populations with a risk ratio of 1.07, with larger effects identified for RCTs compared to quasi-experimental studies [20]. Another meta-analysis by Han et al. pooled results from 23 intervention studies to promote mammography screening among ethnic minority women and reported an effect size (Cohen's d) of 0.078, indicating a 8% increase in screening favoring

Table 3 Methodological quality of included studies

Study	Allocation methods	Attrition	Other potential limitations
Coronado et al. 2016[30]	Random allocation met	Low attrition (< 1%)	Mammography van locations differed by clinic site and affected mammography completion rates. Study was underpowered to examine clinic-level effects or moderators.
Elder et al. 2017[31]	Random allocation met	Not reported	Self-report for cancer screening outcomes. Cluster effects of churches not explained thoroughly. Small sample size of comparison group.
Fernandez et al. 2009[32]	Random allocation unmet	High attrition (37% in intervention arm; 31% in control arm)	Screening records only located for 58.3% of women in mammography cohort. Potential for nonresponse bias by different response rates across sites. Loss to follow-up was 33.1%. There was differential attrition between study arms. Limited generalizability of results since study was conducted in the rural U.S.-Mexico border region.
Jandorf et al. 2014[33]	Random allocation unclear	High attrition in 8-month follow-up (41%) compared to 2-month follow-up (24%)	Bias from self-reported screening exams. Potential bias in use of medical record review, particularly for medically underserved individuals. Different study sites (New York compared to Arkansas) make comparisons between study sites difficult because of different compositions of Hispanic subgroups (e.g., Mexican compared to Puerto Rican women).
Nuño et al. 2011[34]	Random allocation met	Low attrition (4% in intervention arm; 3% in control arm)	One third of mammograms reported were self-reported only. Possible contamination between study groups. Limited generalizability of results since study was conducted in the rural U.S.-Mexico border region.

interventions, but a smaller effect size of 0.036 for Hispanic participants [16]. While it is recommended to report pooled results of meta-analyses of interventions with dichotomous outcomes as ORs instead of as effect sizes, the combined evidence from the current meta-analysis and previous meta-analyses supports the use of promotora interventions as an effective strategy for increasing mammography screening in Hispanic women [36]. However, since the current review only identified five studies published since 2003, more trials which employ rigorous study designs will need to be conducted to further evaluate both community- and clinic-based interventions for improving mammography screening among an increasingly socioeconomically and ethnically diverse

population of U.S. Hispanic women. Since most of the interventions focused on increasing community demand through either one-on-one or group education, there need to be more studies conducted to increase community access by reducing barriers such as administrative constraints and reducing clients’ out-of-pocket costs. For participants who are not fluent in English, scheduling screening appointments and understanding the costs of procedures based on one’s insurance status, language can be a significant barrier.

According to one systematic review, barriers to mammography screening are significant hurdles for Hispanic women to overcome [24]. The consistent barrier across studies was socioeconomic, but cultural and social barriers were variable and

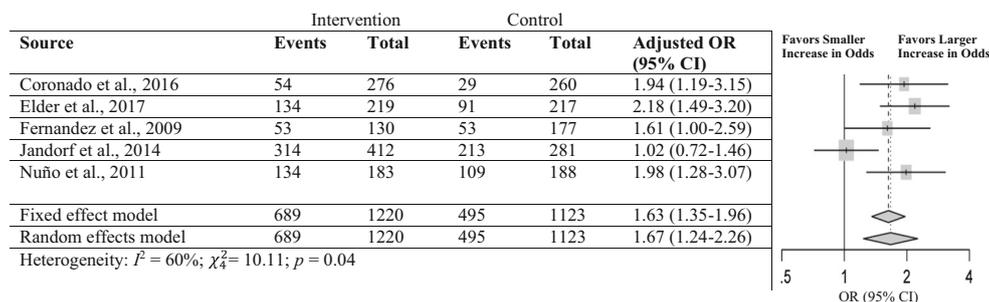


Fig. 2 Meta-analysis of adjusted odds of mammography screening interventions at follow-up. The size of each study’s plotting symbol (gray box) is proportional to the study’s weight in the random effects model. Higgins I^2 value, and the chi-square statistic and p value for

Cochran’s Q test are shown. The odds ratios for each study are adjusted for study specific factors and may include adjustments for demographic, socioeconomic, psychosocial, or other baseline characteristics

specific to different Hispanic ethnicities and geographical factors. For example, Hispanic women who have lived in the U.S. longer, spoke English, had a regular doctor, and had a higher level of health literacy were more likely to have received mammography screening than other Hispanic women without these characteristics. Much of the published literature on Hispanics and breast cancer screening has been conducted with low-income, un- or underinsured, Mexican or Mexican American women [15]. The five articles identified in the current meta-analysis were primarily conducted with Mexican American or Mexican immigrant women and two were conducted in the U.S.-Mexico border region, a unique geographical area not generalizable to other metropolitan areas of the U.S. where many vulnerable and uninsured Hispanics live [37]. More studies on socioeconomically diverse Hispanic participants are needed, especially in other regions (outside of California and Texas) experiencing rapid growth in their Hispanic populations.

In terms of the content of the cancer education activities and appropriate community intervention sites, another systematic review recommended that culturally tailored interventions (e.g., cancer education in group settings) for mammography screening were effective for Spanish-language dominant and low-aculturated Hispanic women [18]. In the current meta-analysis, all five studies produced an intervention effect through promotora-led cancer education classes primarily delivered in either an individual's home or a trusted faith-based location. There have been fewer studies conducted in other types of community sites such as community resource centers or employment training facilities. The study with the greatest intervention effect was church-based, reflecting the importance of culture and faith in the Hispanic community, as well as increased trust in information received at culturally valued institutions. However, more studies should be conducted in alternative community sites to determine if such interventions would be more cost-effective when delivered in settings other than participants' homes and be acceptable to participants [38].

Limitations

One limitation of this review is that it was confined to searchable published literature in bibliographic databases. Other types of literature, such as doctoral dissertations, government reports, or gray literature were not included in this review. Another limitation is because of the small number of studies identified; it was not possible to test the effectiveness of different intervention components in the promotora-led interventions. The interventions included in this review used many similar strategies to encourage mammography screening such as group classes in the community, home visits, follow-up telephone calls, and Cancer 101 level curricula. Only the study by Coronado et al. listed the services of a mobile

mammography van as part of the intervention component. However, this particular study had the lowest proportion of participants (20%) receiving a mammogram at follow-up compared to the other four studies. Study limitations reported in some of the included studies listed relying on self-report for screening outcomes, different attrition rates by study arms, possible contamination between study arms, and limited generalizability based on unique geographical characteristics, such as the U.S.-Mexico border region. Therefore, because of the small number of studies included, future reviews should include a larger number of studies and be better positioned to test the effectiveness of specific components of multicomponent interventions.

Conclusions

This review has demonstrated that rigorously designed community-based studies employing promotoras who use motivational interviewing techniques can be successfully implemented in Hispanic communities and produce positive mammography screening outcomes. Future studies need to examine the financial sustainability of these types of cancer education intervention programs, taking into account different health care systems. The eventual adoption of promotora-led educational interventions as a routine part of mammography screening outreach will lead to improved cancer outcomes for Hispanic patients. The results of this study suggest that a 12-month follow-up period to measure screening adherence should be recommended as a standard outcome metric for study designs and used in future systematic reviews of mammography screening intervention studies.

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Compliance with Ethical Standards

Disclaimer The content presented is solely the responsibility of the authors and does not necessarily represent the official views of the National Cancer Institute.

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