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A Cancer Education-Plus-Navigation Intervention Implemented Within a Federally Qualified Health Center and Community-Based Settings

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Abstract
Despite the availability of effective cancer screening tests, Latinos are screened at lower rates than non-Hispanic Whites. We implemented and evaluated the effectiveness of an evidence-based community health worker (CHW) cancer education-plus-navigation intervention designed to increase cancer screening, knowledge of screening guidelines, and the benefit of early detection. The project included a community and clinic component and served a primarily Latino population. In collaboration with a federally qualified health center (FQHC) and three community-based organizations, bilingual/bicultural CHWs recruited men and women (not up-to-date with the cancer screening guidelines) from a FQHC and the community. Participants received education plus navigation and no-cost cancer screening tests. Together with the FQHC, we outlined eligibility criteria, project protocols, project implementation, and evaluation activities. With the community organizations, we outlined recruitment protocols—when to recruit, how to recruit, and connections with other organizations. CHWs enrolled 3045 men and women into the education-plus-navigation intervention. Overall, 71% received at least one cancer screening. Stratifying by gender, 72% of women received at least one cancer screening test whereas 63% of enrolled men received a test for colorectal cancer. Knowledge of screening guidelines and the belief in early detection also increased from baseline to follow-up. Our evidence-based education-plus-navigation intervention successfully reached large numbers of underserved men and women and yielded positive changes in cancer screening and knowledge of screening guidelines and the belief in early detection. The inclusion of a clinic and community component ensured success of the project.

Keywords Cancer screening · Federally qualified health center · Community-based settings · Community health workers · Early detection

Introduction

Cancer is the leading cause of death among Latinos in the USA [1]. Despite the availability of effective cancer screening tests, Latinos are screened at lower rates than non-Hispanic Whites. Recent data show that 77% of Hispanic women ages 21 to 65 had a Pap test within the past 3 years (vs. 83% of non-Hispanic Whites); 61% of Hispanic women ages 40+ had a mammogram within the past 2 years (vs. 65% of non-HispanicWhites); and 50% of Hispanic women and men ages 50+ had a colorectal cancer screening test (vs. 65% of non-Hispanic Whites) [1]. Not surprisingly, Latinos are often diagnosed at later stages of the disease.

Barriers to cancer screening often revolve around financial, structural, and personal matters [1]. Financial barriers include lack of health insurance, low income, and high rates of poverty [2]. Our previous research found that cost among Latino women was a major barrier to accessing cancer screening services [3]. Further, low education and knowledge of the US healthcare system, including language barriers, prevent Latinos from seeking cancer screening services. Legal status, years living in the USA, and cultural preferences can also affect cancer screening rates among Latinos [4].

Community health workers (CHWs) represent an evidence-based strategy to increase utilization of cancer screening services among minority populations [5]. CHWs

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are non-clinical public health workers who understand the community's needs and can provide culturally appropriate health education, advocacy services, outreach, and social support. CHWs can bridge the gap between the community and the healthcare system [3, 6, 7]. CHW-led intervention programs have demonstrated improved breast, cervical, and colorectal cancer screening, knowledge, and self-efficacy among the Latino population [3, 8–10].

Further, a recent systematic review of CHWs in federally qualified health centers (FQHC) found that CHW interventions have improved completion and timeliness of breast, cervical, and colorectal cancer screenings among minorities and disadvantaged population [11]. However, most CHW interventions based in FQHCs were conducted either in the clinic setting only or in the community through a partnership with FQHCs. Only a handful of FQHC-based CHW intervention programs have included both a community and clinic component. Also, almost all interventions with a community and clinic component have targeted breast cancer screening and none have focused on the Latino population [11].

Thus, we evaluate the effectiveness of an evidence-based CHW cancer education-plus-navigation intervention implemented within a FQHC and community-based settings, and that served a primarily Latino population.

Methods

In collaboration with a federally qualified health center (FQHC) and three community organizations, we implemented (from September 2012 to August 2015) a cancer education-plus-navigation intervention designed to increase knowledge and cancer screening for breast, cervical, and colorectal cancer. Together with the FQHC, we outlined eligibility criteria, project protocols, project implementation, and evaluation activities. With the community organizations, we outlined recruitment protocols—when to recruit, how to recruit, connections with other organizations, etc. At each site, CHWs had an office and computer, and the clinic-based CHW had access to patient records and the clinic scheduling system. The clinic-based CHW also had regular interaction with the dedicated program physician, case managers, and front office staff. The study was exempt from The University of Texas Health Science Center at San Antonio Institutional Review Board.

Participant Eligibility, Recruitment, and Data Collection

Eligible participants were men and women, primarily Latino: (1) aged 40–74 who had never had a mammogram or not had one in the past year, (2) aged 21–65 who had never had a Pap test or not had one in the past 5 years, or (3) aged 50–75 who had never had a stool blood test. Participants with any prior cancer diagnosis were excluded from the study. Screening guidelines for mammography were based on American Cancer Society guidelines in place from 2003 to 2015 [12], whereas guidelines for cervical and colorectal cancer screening were based on the US Preventive Services Task Force recommendations in place from 2012 to 2015 [13].

Two bilingual, bicultural female CHWs recruited men and women via community outreach and clinic in-reach. The CHWs recruited men and women from our three community partners and also reached out to other community groups (churches, the Mexican Consulate, community centers, Parent Teacher Associations, health fairs, and community workshops). CHWs distributed promotional posters and flyers and approached potential participants individually and in groups to briefly explain the program and assess eligibility. Eligible men and women were enrolled in the study and asked to complete two baseline surveys—knowledge, attitudes, and beliefs (KAB) and socio-demographics—and attend an education session on breast, cervical, or colorectal cancer. Men and women attending an educational session were asked to complete a follow-up KAB survey and given navigation support. Navigation support services included scheduling clinic appointments, reminder and follow-up calls before and after clinic appointments, assistance completing clinic paperwork, and help with transportation and other barriers. Eligible men and women received no-cost cancer screening tests, and screening data was collected from medical records.

Education-Plus-Navigation Intervention

The education-plus-navigation intervention was based on the Health Belief Model (HBM) and refined based on our pilot study [3]. Educational sessions were conducted at sites convenient for participants (with consent by host organizations) or at the FQHC. We developed tabletop bilingual flipcharts for each of the three cancers and each with English and Spanish versions. The flipcharts had visual content for participants on one side and narrative content for CHWs on the other side. CHWs delivered the intervention in small classroom settings with participants seated around the tabletop flipcharts. The curriculum featured culturally relevant pictures and graphics to establish a connection between the information and Latino participants. Sessions also included large, colorful, visual, and tactile posters and models—obtained from Health Edco (http://www.healthedco.com)—outlining the anatomy of the breast, cervix, and colon. Time was allotted for participants to ask questions and for sharing personal stories and experiences and discussing misconceptions. Navigation services included scheduling participants for medical appointments, assisting with barriers, and providing reminders. The clinic-based CHW had access to the clinic's

scheduling system. To ensure participants recruited from community outreach efforts also had access to clinic appointments, the clinic-based CHW provided the community-based CHWs with available appointment dates and times. Women who missed appointments were re-scheduled at least two more times. The clinic-based CHW also sent a clinic-endorsed letter as a reminder and called patients. She also attended scheduled clinic days to ensure women had help with filling out paperwork. Eligible participants received no-cost mammograms, Pap smears, stool blood tests, and colonoscopies. All participants had an initial clinic visit with a primary care provider who referred them for a mammogram, colonoscopy or handed them a stool blood test kit.

CHW Training Both CHWs had a CHW certificate from a local community college and were certified by the State of Texas. Additionally, the CHWs attended a 2-week training at the start of the project and yearly booster sessions. The trainings consisted of reviewing project protocols, such as participant recruitment, administration of surveys, and data entry. CHWs also learned about breast, cervical, and colon cancer risk factors, screening tests and screening guidelines. CHWs practiced giving educational sessions and role-played recruiting and administering surveys. CHWs attended monthly team meetings to review study protocols, discuss recruitment and enrollment, track project implementation, and problem solve challenges. CHWs also checked in twice per week (on Mondays and Fridays) with the project coordinator to discuss weekly goals and activities. Additionally, the clinic-based CHW attended the FQHCs new employee training and regular clinic staff meetings. The project coordinator periodically attended CHW education sessions to ensure fidelity to implementation.

Measures

Our primary outcome was receipt of at least one cancer screening test (i.e., mammogram, Pap smear, stool blood test, or colonoscopy) as listed in the participant's medical records. Secondary outcomes were knowledge of screening guidelines (i.e., age to start screening and frequency of screening) and beliefs regarding early detection. Demographic data were collected at baseline and included age, income, education, employment, country of birth, and health insurance.

Statistical Analyses

This study hypothesized that participants attending the education-plus-navigation intervention would increase their knowledge of screening guidelines, the benefits of early detection, and report receipt of at least one cancer screening test. We used descriptive statistics to compare participants who received the intervention versus those who did not receive the intervention. Differences between the two groups were evaluated using Fisher's exact test for categorical variables and Wilcoxon's rank-sum test for continuous variables. To assess improved knowledge of screening guidelines and the belief in early detection from pre- to post-intervention, we used McNemar's test. The impact of the intervention on cancer screening was assessed by calculating the percentage of participants screened for breast, cervical, and colorectal cancer. Specifically, we calculated the percentage of women who received either a mammogram or Pap smear and the percentage of men and women who received a stool blood test or colonoscopy. We also conducted multiple logistic regression modeling adjusting for socio-demographic characteristics (i.e., age, US vs. non U.S. born, health insurance, marital status, employment, income, education) to assess the association between receipt of the education-plus-navigation intervention and receipt of at least one screening test. All statistical tests were conducted at a two-sided significance level of 0.05 using R software (Version 3.5.0).

Results

CHWs assessed 4548 men and women for eligibility and enrolled 3045 into the education-plus-navigation intervention (see Fig. 1). Those not enrolled did not meet the eligibility criteria ($n = 1457$) or refused ($n = 47$). Of the 3045 eligible men and women, 84% ($n = 2557$) received the education-plus-navigation intervention.

Demographic Characteristics Table 1 displays socio-demographic characteristics of eligible men and women ($N = 3045$) by whether or not they attended the education-plus-navigation intervention. Participants were mostly Latino (95%), female (89%), and had a mean age of 49.8 years (SD = 9.3). Sixty-five percent were born outside the USA and have lived in the US for 19.5 years (SD = 11). Less than half (45%) were married, 46% were employed full- or part-time, 95% had a household income of $\leq$ $30 K, 63% had less than a high school education, and 92% were uninsured. Except for education, there were no significant differences in socio-demographic characteristics between the two groups (those who attended the education-plus-navigation intervention and those who did not). We saw the same results when we stratified by gender (data not shown), with the exception of US born (for women). Analysis revealed that a lower percentage of U.S. born women (38.6%) received the intervention compared to non-US born women (44.4%).

Knowledge of Screening Guidelines Among eligible women who received the intervention (attended the educational

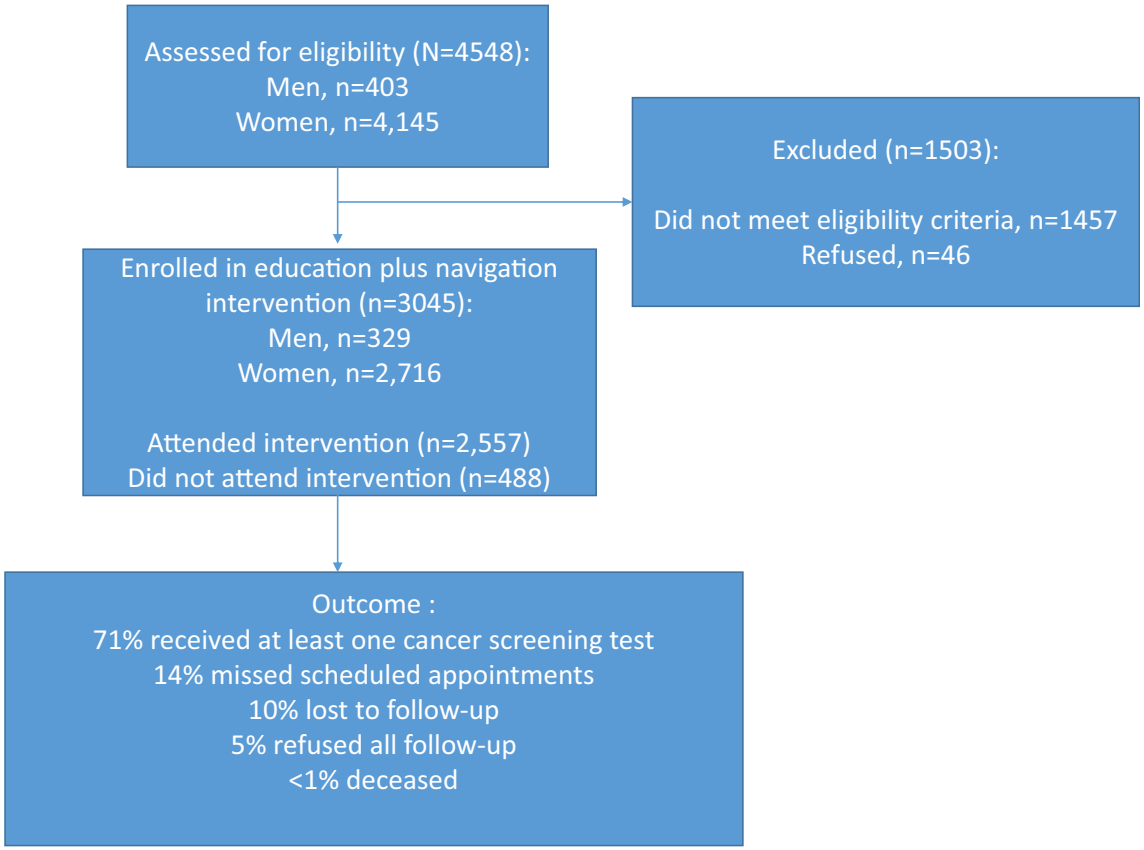

Fig. 1 Study flowchart

session for which they were eligible) and completed both pre- and post-test surveys (Table 2), we observed statistically significant changes from pre- to post-test on knowledge of age to start screening for breast (57% vs. 97%, $p < .001$), cervical (23% vs. 82%, $p < .001$), and colorectal cancer (29% vs. 91%). Knowledge of frequency of screening (among women) also increased significantly from pre- to post-test for breast (74% vs. 91%, $p < .001$), cervical (4% vs. 62%, $p < .001$), and colorectal cancer (56% vs. 95%, $p < .001$). For men who attended a colorectal cancer education session and completed both pre- and post-test surveys (Table 3), we also saw significant increases from pre-test to post-test for age to begin screening (39% vs. 93%, $p < .001$) and frequency of screening (51% vs. 93%), $p < .001$).

Beliefs/Attitudes Regarding Early Detection Among eligible men and women who received the intervention and completed both pre- and post-test surveys, beliefs/attitudes also changed significantly from pre- to post-test (Table 4). At post-test, 98.7% compared to 92% at pre-test agreed that getting checked for cancer helps find cancer when it is easier to treat ($p < .001$). Similarly, 98.4% at post-test compared to 92.7% at pre-test agreed that cancer is an illness that when detected early can be cured ($p < .001$). Also, a significantly greater proportion of men and women at post-test vs. pre-test disagreed with the following statements: "There is not much you can do to lower your chances of getting cancer" (90.4% vs. 49.7%, respectively) and "When I think of cancer, I automatically think of death" (672.% vs. 22.7%, respectively). Stratified analysis by gender revealed no significant differences between men and women on any of the beliefs/attitudes questions.

Receipt of Cancer Screening Tests Overall, 71% ($n = 2158$) of men and women who enrolled in the education-plus-navigation intervention received at least one cancer screening test. Stratifying by gender, we found that 72% ($n = 1950$) of women received at least one cancer screening test whereas 63% ($n = 208$) of enrolled men received a test for colorectal cancer. Of the remaining enrolled men and women, 10% ($n = 304$) were lost to follow-up, 14% ($n = 420$) missed their scheduled appointments, 5% ($n = 239$) refused follow-up, and less than 1% ($n = 2$) were deceased. After adjusting for socio-demographic characteristics (age, country of birth, health insurance, marital status, employment, income, education, and language), women who received the education-plus-navigation intervention had higher odds of receiving a mammogram or Pap smear test (odds ratio (OR) = 3.79, 95% confidence interval (CI) = 2.95, 4.88) compared to women who did not receive the intervention. Among men and women

Table 1 Demographic characteristics of enrollees by receipt of education-plus-navigation intervention ($N = 3045$)

	Did not receive intervention ($n = 488$) *n* (%)	Received intervention ($n = 2557$) *n* (%)	Total *N* (%)	*p* value
Age				0.93[a]
N	485	2554	3039	
Mean (SD)	49.79 (9.5)	49.84 (9.2)	49.83 (9.3)	
Gender				0.18[b]
Female	444 (90.9)	2272 (88.9)	2716 (89.2)	
Male	44 (9.1)	285 (11.1)	329 (10.8)	
Total	488	2557	3045	
US born				0.53[b]
No	324 (66.4)	1658 (64.8)	1982 (65.1)	
Yes	164 (33.6)	899 (35.2)	1063 (34.9)	
Total	488	2557	3045	
Years lived in the USA (if foreign-born)				0.24
N	192	1418	1610	1
Mean (SD)	20.43 (11)	19.36 (11)	19.49 (11)	
Married				0.27[b]
No	204 (52.6)	1328 (55.7)	1532 (55.3)	
Yes	184 (47.4)	1056 (44.3)	1240 (44.7)	
Total	388	2384	2772	
Hispanic/Latino descent				0.03[b]
No	13 (2.7)	125 (4.9)	138 (4.6)	
Yes	466 (97.3)	2407 (95.1)	2873 (95.4)	
Total	479	2532	3011	
Education				0.04[b]
High school and less	337 (87.8)	1992 (83.6)	2329 (84.2)	
More than high school	47 (12.2)	390 (16.4)	437 (15.8)	
Total	384	2382	2766	
Health insurance				0.62[b]
No	357 (92.5)	2190 (91.6)	2547 (91.7)	
Yes	29 (7.5)	202 (8.4)	231 (8.3)	
Total	386	2392	2778	
Annual household income				0.36[b]
≤ $30,000	350 (94.3)	2250 (95.4)	2600 (95.2)	
> $30,000	21 (5.7)	109 (4.6)	130 (4.8)	
Total	371	2359	2730	
Employed (full-time/part-time)				0.55[b]
No	217 (55.8)	1300 (54.1)	1517 (54.3)	
Yes	172 (44.2)	1105 (45.9)	1277 (45.7)	
Total	389	2405	2794	
Receipt of at least one cancer screening test				< 0.001[b]
No	275 (56.4)	622 (24.3)	897 (29.5)	
Yes	213 (43.6)	1935 (75.7)	2148 (70.5)	
Total	488	2557	3045	

*P value < 0.05

[a] Wilcoxon's rank-sum test

[b] Fisher's exact test

eligible for colorectal cancer screening, those who received the intervention had higher odds of receiving a colorectal cancer screening test compared to those who did not receive the intervention (OR = 6.0, CI 4.07, 8.96). However, women had lower odds (OR = .40; CI 0.3, .53) of receiving a colorectal cancer screening test compared to men.

Table 2 Knowledge of screening guidelines among enrolled women who received the education-plus-navigation intervention and completed both pre- and post-surveys

Question (correct answer)	Pre *n* (%)	Post *n* (%)	*p* value[a]
1. Start mammogram at age 40+, *n* = 659	373 (56.6)	639 (97)	< 0.001
2. Have mammogram every year, *n* = 659	487 (73.9)	599 (91)	< 0.001
3. Start Pap test at age 21–29 years, *n* = 108	25 (23.1)	88 (81.5)	< 0.001
4. Have Pap test every 2 to 3 years, *n* = 126	5 (4)	78 (62)	< 0.001
5. Start having stool blood tests at age 50+, *n* = 442	126 (28.5)	401 (90.7)	< 0.001
6. Have stool blood test every year, *n* = 442	247 (55.9)	419 (94.8)	< 0.001

[a] McNemar test for testing the difference between pre- and post-proportion of correct answers

Discussion

Our study adds and extends to the existing literature on cancer prevention that finds that navigation by CHWs increases cancer screening and follow-up [9, 14–17]. Our evidence-based education-plus-navigation intervention, implemented within a FQHC and community-based settings, successfully reached large numbers of underserved Latino men and women and yielded positive changes in cancer screening and knowledge of screening guidelines and the belief in early detection. The inclusion of both a clinic and community component ensured success of the project. The three community-based organizations considered our formal partners provided support in terms of office space, access to their clientele, and served as liaisons to other community groups. This expanded our reach in the community and people trusted us. Additionally, the two CHWs were instrumental in recruiting additional organizations via their own personal contacts and knowledge of key community groups. A critical piece of this intervention was the integration of a CHW into the medical team. This gave the clinic-based CHW the ability to directly schedule appointments for participants, thereby eliminating the scheduling barrier. In addition, because the clinic- and community-based CHWs were in close communication, the community-based CHW would go into the community with a certain number of available clinic appointments that she could offer to men and women when recruiting them from the community. Thus, the community-based CHW was able to more readily connect community participants to the clinic, especially those who did not already have an established health care provider.

Nonetheless, the study was not without challenges. Although 71% of enrolled men and women received at least one cancer screening test, we had large numbers of enrolled participants who missed one or more clinic appointments or were lost to follow-up. Per clinic protocol, CHWs could reschedule missed appointments up to three times by phone. CHWs made three attempts to reach participants by phone and mail. Among those who missed appointments, 79 individuals attended their first appointment and failed to keep their follow-up mammography appointment or return their stool blood test. Participants with wrong/disconnected phone numbers or no answer were considered lost to follow-up. From our pilot study [3], we learned that our population was sometimes reluctant to provide us with correct contact information and would often tell us they had no intention of getting a screening test despite attending our intervention. Thus, we were not surprised by our findings. Our data also showed that non-US born women (compared to U.S. born) were more likely to attend the education-plus-navigation intervention. We suspect that US born women were more familiar with the health care system in San Antonio and may have needed (or believed they needed) less support and navigation. Indeed, a recent review found that Latino immigrants are more likely to lack familiarity with the US health care [18]. Our program, therefore, may have been more appealing and helpful to non-US born women.

There are limitations to consider in this study. First, we cannot make causal inferences about the effect of the program on outcomes as there was no randomized comparison group. However, the project was funded as a prevention grant. Second, our study was conducted within one health center and a specific population, thus our success may not generalize to other settings or communities. Third, we were not able to identify a male community health worker to assist with

Table 3 Knowledge of screening guidelines among enrolled men who received the education-plus-navigation intervention and completed both pre- and post-surveys, *N* = 142

Question (correct answer)	Pre *n* (%)	Post *n* (%)	*p* value[a]
1. Start having stool blood tests at ≥ 50 years	55 (38.7)	132 (93)	< 0.001
2. Have stool blood test every year	72 (50.7)	132 (93)	< 0.001

[a] McNemar test for testing the difference between pre- and post-proportion of correct answers

Table 4 Belief in early detection among enrolled men and women who received the education-plus-navigation intervention and completed both pre- and post-KAB survey

Question (correct answer)	Pre *n* (%)	Post *n* (%)	*P* value
Getting checked regularly for cancer helps find cancer when it is easy to treat (agree), *n* = 1492	1373 (92)	1472(98.7)	< 0.001[a]
Cancer is an illness that when detected early can typically be cured (agree), *n* = 1491	1382 (92.7)	1467 (98.4)	< 0.001[a]
There is not much you can do to lower your chances of getting cancer (disagree), *n* = 1488	740 (49.7)	1345 (90.4)	< 0.001[b]
When I think of cancer, I automatically think of death (disagree), *n* = 1492	338 (22.7)	1003 (67.2)	< 0.001[b]

[a] McNemar test for testing the difference between pre- and post-proportion of agree

[b] McNemar test for testing the difference between pre- and post-proportion of disagree

recruitment, which may explain why only 11% of enrolled participants were male. However, difficulty finding a male CHW was not unique to our study [19]. Further, there is not much research exploring gender match between participants and CHWs. Recent data found that only for women, sex of the CHW was important when discussing issues of maternal/child health and sexual dysfunction [20, 21].

Despite these limitations, our study has several strengths. Most notably, the intervention was conducted in both a clinic and community settings. The advantage of such collaborative interventions often means that CHWs have access to the patient electronic health records, direct contact with providers, and are integrated with the medical teams [11]. In our case, this also meant that the community-based CHW was able to go into the community with available clinic appointment slots. Also, we streamlined the mammography and colonoscopy referral processes to ensure greater patient follow-up. Prior to the intervention, patients referred for a mammogram or colonoscopy were told to expect a call from the third party provider. We revised protocols to include having clinic staff call the mammography diagnostic center to make an appointment on-the-spot and created a referral form for patients requiring a colonoscopy that included contact information for the colonoscopy center. Lastly, our outcome data is based on medical records.

Our education-plus-navigation intervention delivered by bilingual/bicultural community health workers was successful in reaching a vulnerable population with low cancer screening rates. Further, our study highlights the importance of not only providing instrumental support [22] but integrating CHWs into the delivery of health care [23, 24]. Future research should evaluate these programs in randomized trials and explore the feasibility and effectiveness of matching CHW and participant sex, as well as identifying effective ways of engaging men in colorectal cancer screening.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflicts of interest.

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