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ORIGINAL ARTICLE

The impact of a small-group mammography video discussion on promoting screening uptake among nonadherent Chinese American immigrant women: A randomized controlled trial

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Abstract

Background: The objective of this study was to evaluate the efficacy of an in-person, small-group mammography video discussion (SMVD) intervention on mammography uptake among nonadherent Chinese American immigrant women.

Methods: Women (N = 956) were randomized into either an SMVD group, where Chinese-speaking community health workers (CHWs) used an effective, culturally appropriate video to discuss mammography, or a video-only group, which viewed the cultural video sent by mail. Outcomes were mammography uptake at 6 months and 21 months postintervention.

Results: Women in both groups increased mammography uptake, and an outcome analysis revealed no group differences (adjusted odds ratio [AOR], 1.18; 95% confidence interval [CI], .68–2.06). Overall, 61.2% of the SMVD group and 55.3% of the video-only group had at least one mammogram during the 21-month follow-up period. When considering attendance to the SMVD, SMVD attendees had higher mammography uptake than the video-only group (AOR, 1.51; 95% CI, 1.19–1.92), and SMVD nonattendees had lower mammography uptake than the video-only group (AOR, .33; 95% CI, .22–.50).

Conclusions: Both intervention strategies were associated with increased mammography uptake. The authors observed that the increase in use was greater among women who participated in the SMVD session compared with those who viewed the cultural video only. Future research may explore a virtual SMVD intervention for higher session attendance and increased mammography uptake (ClinicalTrials.gov identifier NCT01292200).

KEYWORDS
breast cancer, Chinese American, community health workers, immigrant, mammography, randomized controlled trial, small-group mammography video intervention

INTRODUCTION

The breast cancer incidence rate of Chinese American women, the largest Asian subgroup,[1] have been rising at an annual percent change of 1.1% from 1988 to 2013, whereas the incidence rates have stabilized for other racial and ethnic groups in the United States.[2] Foreign-born Chinese American women have a greater than two-fold increased risk of breast cancer than their US-born counterparts after adjusting for covariates.[3] This may be attributed to factors that include population growth because of immigration (>70% of Asian American adults are immigrants), aging, and acculturation to Westernized lifestyles and diets.[4–7] Furthermore, Asian American immigrants are more likely to be diagnosed with breast cancer at a later stage than US-born Asian Americans, leading to higher breast cancer mortality.[8] Although the benefits and harms (e.g., overdiagnosis) of mammography screening for Chinese Americans are similar to those for non-Hispanic Whites,[9,10] Asian Americans, including Chinese, have the lowest use of mammography screening among all racial and ethnic groups.[11–13]

Culturally appropriate programs (e.g., community-based education, use of community health workers [CHWs]) can assist minority women in understanding and undertaking cancer screening.[14–16] Our prior research with Chinese immigrant women who were nonadherent to breast cancer screening recommendations found that a culturally appropriate Chinese-language video (hereafter referred to as a *cultural video*) based on the Health Belief Model[17] effectively increased their mammography uptake by 40%.[18] For non-English–speaking immigrants who have limited health care access, a more intensive intervention approach may be needed to fully address concerns among the women who remained reluctant to screen.

Therefore, we developed a small-group mammography video discussion (SMVD) intervention in which Chinese-speaking CHWs used the cultural video to discuss the importance of regular mammography to detect breast cancer early, to discuss the benefits and harms of mammography with peers, and to clarify misconceptions about screening.[19] Guided by social cognitive theory[20] and social network theories, the SMVD leverages Chinese immigrants' collectivist values and the cultural value of building community relationships.[21,22] Chinese-speaking CHWs are also cultural insiders and can serve as linkages to the community.[22] In this article, we report findings from a randomized controlled trial (RCT) examining whether, compared with viewing the cultural video only, (1) SMVD significantly increased mammography uptake at 6 months postintervention, and (2) SMVD promoted screening adherence at 21 months postintervention. To date, this is the first RCT to our knowledge combining an evidence-based cultural video with a CHW-led small-group discussion and is one of the few RCTs assessing mammography screening adherence among Chinese American immigrant women.

MATERIALS AND METHODS

Study design

We conducted a two-arm, multisite RCT in which enrolled participants were randomized into either the SMVD intervention arm or the cultural video-only arm (ClinicalTrials.gov identifier NCT01292200). The study was approved by the institutional review boards of Georgetown University, Temple University, and the University of California, Los Angeles. Figure 1 presents the design of this study in line with the Consolidated Standards of Reporting Trials.[23]

Sample

Eligible participants were (1) Chinese immigrant women aged 40 years or older who had (2) never had breast cancer, (3) had no mammogram in the past 2 years (including never screeners) and no mammogram scheduled within 6 months of enrollment, and (4) had not participated in our previous cultural video interventions.[18,19] Short-term visitors were excluded. In collaboration with 8 Asian American community-based organizations (CBOs) in Washington DC, Southern California, and New York City, trained CBO members recruited participants from community events and their social networks between July 1, 2010, and December 31, 2014. We assessed 1494 women for eligibility, and 956 eligible women were enrolled into the study (64.0% response rate; Figure 1). Of these, 767 women (80.2%) completed the 6-month postintervention evaluation, and 653 (68.3%) completed the 21-month postintervention evaluation.

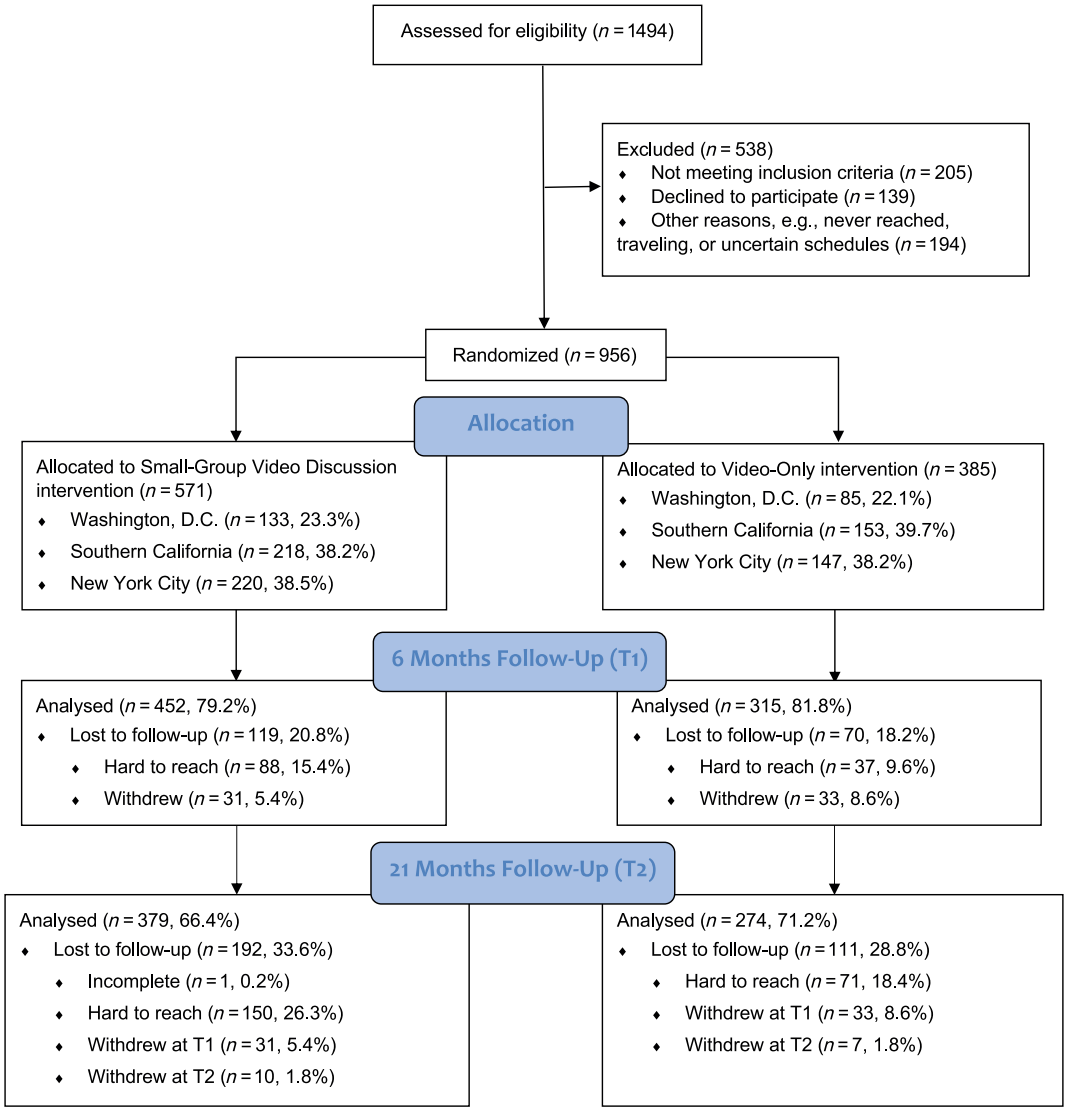

FIGURE 1 CONSORT flow diagram. Participants who did not withdraw from the study at any point were contacted at both T1 and T2 for outcome evaluation. CONSORT indicates Consolidated Standards of Reporting Trials; T1, 6 months postintervention; T2, 21 months postintervention.

Description of intervention

Video-only group

Participants were mailed a DVD of the cultural video and an information sheet about local free and low-cost screening. Details on the development of the 18-minute Chinese-language cultural video and its efficacy in addressing screening barriers and improving mammography uptake have been published.[24]

Small-group mammography video discussion

SMVD participants attended a one-time, in-person session where they watched the cultural video and then participated in a group discussion led by CHWs from collaborating CBOs. Details of the CHWs' training have been published.[25] During each SMVD session, CHWs who spoke Mandarin or Cantonese used scenarios and scientific information presented in the video to discuss participants' views on mammography screening and debunk misconceptions about screening. At the end of the SMVD, participants were given the cultural video (a DVD) and an information sheet on local free and low-cost screening. In total, 99 small-group sessions were held by 17 CHWs at community centers. Each SMVD was designed to have from 5 to 8 attendees, but the number of attendees ranged from 2 to 11 for various reasons (e.g., work or family demands). On average, each SMVD lasted 37 minutes (range, 14–66 minutes).

Data collection and measures

Participants completed three surveys over the phone at: (1) baseline, (2) 6 months postintervention (T1), and (3) 21 months postintervention (T2). Participants who did not withdraw from this study at any point were contacted at both T1 and T2 for outcome evaluation. The intervention materials adopted the American Cancer

Society's annual screening recommendations at the time the study was conducted.[26] The T2 outcome evaluation occurred 15 months after the T1 outcome evaluation (i.e., 21 months postintervention) to ensure that participants had sufficient time to complete their second mammogram.

The study outcomes were self-reported mammography uptake at T1 (i.e., "Have you had a mammogram in the last 6 months?") and T2 (i.e., "Have you had a mammogram in the past year?"; yes or no; unsure or don't know responses were recoded as missing values). Mammography adherence was defined by participants' mammography uptake at both T1 and T2 (i.e., receipt of two annual mammograms). We randomly selected 20% of participants who reported obtaining a mammogram at T1 for verification against their medical records and found 100% consistency.

We assessed participants' demographic characteristics, regular sources of care, receipt of a physician recommendation for mammography in the past 2 years, and health status. Participants' high and low acculturation to American culture was categorized by their mean scores on a validated 11-item, 5-point Likert scale.[27]

Sample size and power calculation

The statistical power estimation addressed the nested clustering design by accounting for the likelihood that participants within each SMVD session would be positively correlated in terms of the intraclass correlation coefficient (ICC).[28] Assuming a conservative ICC of .05 (based on prior research[29]) and a two-sided test with an alpha of .05, the study sample of 956 at baseline was powered to detect a 12-percentage-point difference in screening rates between groups. The sample size of 956 also accounted for attrition rates of 15% at T1 and 20% at T2 based on our prior research.[18] Participants were stratified by study site, acculturation (high vs. low), and mammography use (ever vs. never) and were randomly assigned into one of two groups in a 10:7 ratio: (1) SMVD ($n = 571$) or (2) cultural video ($n = 385$). We randomized more women to the SMVD group than to the cultural video-only group after addressing the ICC of .05.[30]

Statistical analyses

This longitudinal RCT had missing responses across T1 and T2. We examined two analytic methods of addressing the missing data: (1) conventional intention-to-treat (ITT) analysis, in which missing data were imputed ($N = 956$); and (2) generalized linear mixed modeling (GLMM) using available data from participants who responded to either the T1 or T2 outcome evaluations, without ad-hoc imputation of longitudinal missing data ($N = 770$; hereafter referred to as *partial case analysis*).[31] Simulation studies have demonstrated that mixed model analysis like GLMM without ad hoc imputation always provides equal or more power compared with approaches using conventional methods of imputing missing values (e.g., multiple imputation) and is the recommended analytic approach for longitudinal trials with missing data.[31] Results from the ITT and partial case analyses produced slightly different estimates because of different sample sizes, but the estimates in both models did not reach statistical significance. Therefore, we reported the results from the partial case analysis in this article. The GLMM approach was also used to analyze data from participants who completed both the T1 and T2 outcome evaluations ($N = 650$; hereafter referred to as *complete case analysis*).[32]

We performed propensity weighting analysis following growing evidence that propensity scores can address imbalances in realized randomizations for RCTs, analogous to covariance adjustment.[33,34] To obtain propensity weights, we use generalized boosted modeling.[35] Each participant's propensity weight was incorporated into the logit models to adjust for the analysis of the intervention effect. We observed that more participants who were lost to follow-up were from the Washington DC site and did not have a college degree, a regular physician, or health insurance. These demographic factors were addressed in the propensity weighting and controlled for in the multivariate analysis.

Descriptive statistics using *t* tests or χ^2 tests were run on sample characteristics and to compare group differences at baseline. We examined the main intervention effect between the SMVD group ($n = 571$) and the video-only group ($n = 385$) on mammography uptake at T1 and T2 by GLMM with a logit link type for the binary outcome. The random effects regarding the 17 CHWs and 99 SMVD sessions were controlled for in the model.

A proportion of SMVD participants ($n = 98$; 17.2% of 571) did not attend the SMVD session and were not exposed to the cultural video (hereafter referred to as *SMVD nonattendees*). We used the same GLMM approach to examine the impact of exposure to the SMVD intervention on mammography uptake at T1 and T2 between: (1) SMVD attendees ($n = 473$), (2) SMVD nonattendees ($n = 98$), and (3) the video-only group ($n = 385$). This analysis, which was not planned in the initial protocol, was conducted after noting that a considerable number of participants did not attend the SMVD sessions. The proportion of mammography uptake in each of the three groups at T1 and T2 was reported both as a crude screening proportion and as an adjusted proportion that controlled for covariates. To examine whether there was an interaction between the three intervention groups and time, we estimated proportional contrasts between the groups at each time point based on the GLMM models using the marginal command in STATA (StataCorp Inc.). Data analyses were performed using STATA SE 17.

RESULTS

Sample characteristics

At baseline, 22.8% of participants were from Washington DC, 38.8% were from Southern California, and 38.4% were from New York City. On average, participants were aged 58.6 years, 69.4% were married/coupled, and 65.3% had lived in the United States for 10 or more

years (Table 1). Overall, 61% of the sample had ever had a mammogram, and 39% had never been screened.

Proportions of mammography uptake and adherence at T1 and T2

At T1, the crude proportion of patient-reported mammography uptake was 38.7% for the SMVD group (n = 452) and 35.6% for the video-only group (n = 315). At T2, the crude proportion of mammography uptake was 48.3% for the SMVD group (n = 379) and 43.8% for the video-only group (n = 274). According to screening outcome data from both T1 and T2 (N = 650; SMVD group, n = 377; video-only group, n = 273), participants' adherence to annual screening recommendations was suboptimal. Only 21.1% (n = 137) of the 650 participants reported receipt of annual mammography screening at both T1 and T2. On average, 58.8% (n = 453) of the 770 participants obtained at least one mammogram by the end of this RCT.

Multivariate analysis of intervention outcomes: SMVD versus video-only groups

Results from the partial case analysis (Table 2) showed that, controlling for study time point, the SMVD group had 18% greater odds of mammography uptake compared with the video-only group (adjusted odds ratio [AOR], 1.18; 95% confidence interval [CI], .68–2.06). Controlling for group assignment, participants at T2 had 69% greater odds of mammography uptake compared with participants at T1 (AOR, 1.69; 95% CI, .45–6.39). However, these group differences were not statistically significant. There was no significant interaction effect between treatment group and time. Results from the complete case analysis also indicated no significant group differences (see Table 2).

Multivariate analysis of exposure to the SMVD intervention versus video only

The crude and adjusted (for covariates) screening proportions for the SMVD attendees, SMVD non-attendees, and video-only group are listed in Table S1. Results from the partial case analysis indicated that, regardless of time point, SMVD attendees had a greater likelihood of obtaining a mammogram than those in the video-only group (AOR, 1.51; 95% CI, 1.19–1.92), whereas SMVD nonattendees had a lower likelihood of getting a mammogram compared with the video-only group (AOR, .33; 95% CI, .22–.50). The overall screening proportion at T2 was higher compared with that at T1 (AOR, 1.61; 95% CI, 1.27–2.05), controlling for the treatment groups. Finally, there was a significant interaction between SMVD nonattendees and the assessment time point (AOR, 4.85; 95% CI, 2.79–8.41). The complete case analysis produced similar results (Table 3).

The proportion of mammography uptake among SMVD attendees at T1 was 9 percentage points higher than that in the video-only group (proportional contrast, .09; 95% CI, .04–.13). At T1, the proportions of mammography uptake among the SMVD attendees and the video-only group were 26 and 18 percentage points higher than among SMVD nonattendees (proportional contrast, .26 [95% CI, .21–.32] and .18 [95% CI, .12–.24], respectively). However, at T2, the proportion of mammography uptake among the video-only group was 10 percentage points lower compared with the that among SMVD nonattendees (proportional contrast, −.10; 95% CI, −.19, −.02). The group differences in mammography uptake at T2 between SMVD attendees and nonattendees and between SMVD attendees and the video-only group were not statistically significant. The complete case analysis produced similar results (see Table S2).

DISCUSSION

This study found that both the SMVD and video-only interventions were associated with increased mammography uptake among nonadherent Chinese immigrant women. At 6 months postintervention (T1), the SMVD was more effective than the cultural video, but only for women who attended the SMVD session. At 21 months postintervention (T2), a greater number of SMVD nonattendees obtained a mammogram compared with the video-only group. In addition, only a small proportion of Chinese women in both intervention groups adhered to the annual mammography screening guidelines.

The SMVD increased Chinese immigrant women's mammography uptake at both outcome assessment time points relative to those women who viewed the cultural video only. These results confirm our prediction that training CHWs to engage Chinese women in a discussion about scientific information and culturally relevant concerns regarding mammography promotes mammography screening, consistent with prior research on the effect of CHW-led education in cancer screening among minority populations.[36] Different from CHW-led interventions that typically present educational content in a didactic format,[37,38] the SMVD equips CHWs with an evidence-based and culturally sound educational tool in the form of a video to facilitate in-depth discussions about Chinese women's positive and negative views of mammography screening. Research shows strong evidence that information presented in narrative formats are more effective and engaging compared with didactic formats and improves screening attitudes.[39] This may explain why both the SMVD group and the video-only group were motivated to be screened compared with the SMVD nonattendees. We decided not to mail the cultural video to SMVD nonattendees; otherwise, they would be equivalent to the video-only group. Our findings suggest that trained CHWs, who are often trusted and credible sources of information, can provide effective peer support and reinforce messages in the video to debunk misconceptions about breast cancer and screening (e.g., radiation from mammography increases breast cancer risk), integrate cultural health beliefs (e.g., stressing self-care) into

TABLE 1 Baseline characteristics of Chinese immigrant women in the small-group mammography video discussion (SMVD) group and the video-only group.

Characteristic	No. (%)			
	Overall, $N = 956$	SMVD group, $n = 571$	Video-only group, $n = 385$	p[a]
Age, years				
Mean ± SD	58.6 ± 9.8	58.6 ± 9.7	58.6 ± 10.1	.97
<60	574 (60.0)	336 (58.8)	238 (61.8)	.36
≥60	382 (40.0)	235 (41.2)	147 (38.2)	
Marital status				
Married/coupled	663 (69.4)	389 (68.1)	274 (71.2)	.31
Not married[b]	291 (30.4)	181 (31.7)	110 (28.6)	
Education level				
Graduated from college	287 (30.0)	169 (29.6)	118 (30.6)	.47
High school and two-year college	451 (47.2)	264 (46.2)	187 (48.6)	
Middle school or less	218 (22.8)	138 (24.2)	80 (20.8)	
Household income per year				
≥$20,000	300 (31.4)	180 (31.5)	120 (31.2)	.93
<$20,000	578 (60.5)	345 (60.4)	233 (60.5)	
Employment status				
Employed	531 (55.5)	309 (54.1)	222 (57.7)	.41
Not employed	424 (44.4)	261 (45.7)	163 (42.3)	
General health				
Good, very good, or excellent	532 (55.6)	307 (53.8)	225 (58.4)	.16
Poor or fair	416 (43.5)	259 (45.4)	157 (40.8)	
Insurance				
Yes	539 (56.4)	314 (55.0)	225 (58.4)	.29
No	417 (43.6)	257 (45.0)	160 (41.6)	
Regular physician/nurse				
Yes	496 (51.9)	279 (48.9)	217 (56.4)	.03
No	458 (47.9)	290 (50.8)	168 (43.6)	
Ever received mammogram				
Yes	583 (61.0)	349 (61.1)	234 (60.8)	.92
No	373 (39.0)	222 (38.9)	151 (39.2)	
Received mammogram recommendation from physician in the past 2 years				
Yes	360 (37.7)	203 (35.6)	157 (40.8)	.10
No	591 (61.8)	365 (63.9)	226 (58.7)	
US residency, years				
≥10	624 (65.3)	368 (64.4)	256 (66.5)	.48
<10	331 (34.6)	203 (35.6)	128 (33.2)	
Locale				
Washington DC	218 (22.8)	133 (23.3)	85 (22.1)	.86
Southern California	371 (38.8)	218 (38.2)	153 (39.7)	
New York City	367 (38.4)	220 (38.5)	147 (38.2)	

TABLE 1 (Continued)

Characteristic	No. (%) Overall, $N = 956$	SMVD group, $n = 571$	Video-only group, $n = 385$	p[a]
Acculturation				
Mean ± SD, score range 1–5	2.6 ± .5	2.6 ± .5	2.6 ± .5	.98

Note: Some variables did not add up to the full sample size due to missing values.

Abbreviation: SD, standard deviation.

[a]*T* tests and χ^2 tests were used to compare pairs of groups with respect to continuous and categorical variables at baseline, respectively.

[b]Not married was defined as never married, divorced, widowed, or separated. Respondents who were a member of a married or unmarried couple were defined as married/coupled.

TABLE 2 Adjusted odds ratios of mammography uptake between the small-group mammography video discussion (SMVD) group and the video-only group.

	Partial case analysis, $n = 770$[a]				Complete case analysis, $n = 650$[b]			
	AOR[c]	SE	p	95% CI	AOR	SE	p	95% CI
SMVD group (Ref = video-only group)	1.18	.34	.56	.68–2.06	1.11	.29	.68	.67–1.84
Time 2 (Ref = T1)	1.69	1.15	.44	.45–6.39	1.56	.97	.48	.46–5.31
Interaction: Group × time	.93	.28	.79	.52–1.66	.99	.30	.98	.56–1.78
Intercept	.46	.44	.42	.07–3.01	.50	.46	.45	.08–3.06

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; Ref, reference group; SE, standard error; T1, 6 months postintervention; T2, 21 months postintervention.

[a]Partial case analysis: General linear mixed modeling using data from participants responding to either T1 or T2 outcome evaluations ($n = 770$).

[b]Complete case analysis: General linear mixed modeling using data from participants responding to both T1 or T2 outcome evaluations ($n = 650$).

[c]AOR comparing group differences in mammography uptake. Results of these models were adjusted for covariates (age, years in the U.S., education, employment status, income level, number of people supported by household income, insurance status, presence of a regular doctor/nurse, acculturation score, previous mammography uptake, and study site) based on propensity weighting.

TABLE 3 Adjusted odds ratios of mammography uptake between the small-group mammography video discussion (SMVD) attendees, SMVD nonattendees, and the video-only group.

	Partial case analysis, $n = 770$[a]				Complete case analysis, $n = 650$[b]			
	AOR[c]	SE	p	95% CI	AOR	SE	p	95% CI
SMVD attendees (Ref = video only)	1.51	.18	.001	1.19–1.92	1.40	.18	.01	1.08–1.80
SMVD nonattendees (Ref = video only)	.33	.07	< .001	.22–.50	.23	.06	< .001	.14–.40
Time 2 (Ref = T1)	1.61	.20	< .001	1.27–2.05	1.50	.19	.001	1.18–1.92
Interaction: Group × time								
Interaction: SMVD attendees × time	.79	.13	.16	.57–1.10	.85	.14	.33	.61–1.18
Interaction: SMVD nonattendees × time	4.85	1.36	< .001	2.79–8.41	6.61	2.15	< .001	3.49–12.50
Intercept	.46	.04	< .001	.39–.55	.50	.05	< .001	.42–.61

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; Ref, reference group; SE, standard error; T1, 6 months postintervention; T2, 21 months postintervention.

[a]Partial case analysis: General linear mixed modeling using data from participants responding to either T1 or T2 outcome evaluations ($n = 770$).

[b]Complete case analysis: General linear mixed modeling using data from participants responding to both T1 or T2 outcome evaluations ($n = 650$).

[c]Adjusted for covariates based on propensity weighting.

regular check-ups, and provide problem-solving strategies to overcome screening barriers (e.g., no insurance).[22,40,41]

Approximately 17% of Chinese women in the SMVD group did not attend the SMVD session and thus did not receive any intervention. Consequently, SMVD nonattendees had very low mammography uptake (17.1%) at 6 months postintervention. Note that this study was conducted before the coronavirus disease 2019 pandemic, making it feasible to attend an in-person SMVD. We observed that SMVD

nonattendees were significantly more likely to be older or employed than SMVD attendees and video-only participants (data not shown). Being older with less mobility or being occupied with work might explain nonattendance to the SMVD.

Interestingly, at 21 months postintervention, a higher proportion of SMVD nonattendees reported receiving a mammogram than those in the video-only group. This unexpected finding may be related to our multiple contacts throughout the study, such as repeated calls to invite them to attend an SMVD session and to participate in surveys. It is notable that, by 6 months postintervention, nonattendees had not been screened for breast cancer for more than 3 years; hence, our multiple contacts may have heightened their sense of urgency to undergo screening at 21 months postintervention. Previous research has shown that frequent study contacts serve as reminders for screening, leading to increased mammography uptake.[42] However, it is important to note that, at 21 months postintervention, we were only able to reach 23.4% of the SMVD nonattendees, in contrast to 75.5% of the SMVD attendees and 71.2% of the video-only group. Therefore, this finding should be interpreted with caution because of the limited sample size and potential attrition bias.

Our results demonstrated that only 21.1% of participants were adherent to the recommended annual mammography screening guidelines. The low adherence rate may be explained by three reasons. First, mammography screening guidelines were updated during the study from annual mammography screening among women aged 40 years and older to biennial mammography screening among women aged 50–74 years.[43] If participants had followed the new guidelines and had undergone a mammogram at 6 months postintervention, they were less likely to undergo another mammogram during the 15-month interval between the two follow-up time points. Second, all women enrolled in this study had not had a mammogram for more than 2 years and likely already faced significant barriers to screening.[9] Participants in each group reported multiple reasons for not undergoing screening, such as absence of symptoms, lack of urgency, limited health care access, not wanting to be screened, and/or lack of insurance. Although our intervention materials addressed these conceptual and practical issues (e.g., emphasizing the importance of regular screening to detect early breast cancer, which does not show symptoms, providing local free mammography screening program information), immigrants and minorities with low socioeconomic status encounter additional challenges in accessing health care services.[44,45] For instance, many immigrant Chinese with limited English proficiency may face challenges in navigating the English-dominant free mammography programs to schedule an appointment. These challenges, in turn, decrease their adherence to recommended routine care. Furthermore, about 44% of the participants did not have health insurance. When women encounter difficulties in navigating the health care system, particularly when they do not experience any symptoms and may not fully understand the benefits of early detection through mammography screening, their motivation for regular mammography screening can be diminished, resulting in low adherence to screening guidelines.

Both our SMVD intervention and our video-only intervention were delivered as a one-time event without additional booster sessions, mirroring real-world practice. Research has demonstrated that more intensive CHW-led interventions, such as interventions with multiple components, were associated with increases in mammography screening.[38,46] Future research may investigate whether implementing a more intensive SMVD intervention with multiple sessions through an online platform will increase attendance rates and enhance the intervention's effectiveness. Nevertheless, the SMVD participation rate of 83% in our study is high compared with participation rates in other community-based interventions, which have ranged from 50% to 81%.[47,48] This suggests that the implementation of our culturally relevant SMVD intervention was well received and beneficial in increasing screening uptake in this population.

Limitations

This study had several limitations. First, our outcome analyses were unable to control for variations in the performance of the 17 trained CHWs across 99 SMVD sessions. In our qualitative evaluation of the CHW training,[25] their performance might have been affected by real-life circumstances (e.g., emergencies at work or at home, personal reasons, or feeling unwell on the discussion date) as well as participants' engagement during the discussion. These real-life events are not quantifiable to be meaningfully controlled for in the analyses. Second, the outcome analyses did not control for group-level factors (e.g., group size and length of discussion) because the current evaluation of the SMVD focused on its effect on screening uptake at the patient level. Third, we were not able to reach >75% of the SMVD nonattendees at the 21-month outcome evaluation, and there were some significant demographic differences (see Statistical analyses, above) between those who were lost to follow-up and those who were not. Although the demographic differences were addressed by propensity weights and controlled for in the analyses, there is potential attrition bias that should be taken into account when interpreting these findings. Despite these limitations, the findings of this study demonstrate the efficacy of a novel video and CHW-led intervention in increasing mammography uptake among nonadherent Chinese women.

Conclusion

This study describes two effective interventions to overcome cancer screening disparities experienced by Chinese immigrants. Watching the cultural video alone, which can be disseminated by mail or through mobile and online platforms, increased mammography uptake. The SMVD intervention used the effects of the cultural video to implement socially interactive health education at the community level. This study demonstrates the feasibility of engaging CBOs in scientific research and the capacity of CHWs to convert scientific information from the video into educational messages that promote screening behavior. The SMVD and video-intervention approaches can be easily applied to other health topics, thus further augmenting public health endeavors to reduce racial and ethnic disparities in access to health care resources and health outcomes.

AUTHOR CONTRIBUTIONS

Naomi Q. P. Tan: Writing–original draft, writing–review and editing, data curation, and visualization. **Grace X. Ma**: Methodology, funding acquisition, writing–review and editing, investigation, conceptualization, supervision, resources, and project administration. **Annette E. Maxwell**: Methodology, funding acquisition, writing–review and editing, investigation, supervision, conceptualization, project administration, and resources. **Roger L. Brown**: Writing–review and editing, formal analysis, visualization, conceptualization, methodology, data curation, and investigation. **Kathy Zhou**: Writing–review and editing, methodology, and investigation. **Alice Loh**: Writing–review and editing, methodology, and investigation. **Lucy Young**: Writing–review and editing, methodology, and investigation. **Robert J. Volk**: Writing–review and editing. **Qian Lu**: Writing–review and editing. **Judy Huei-Yu Wang**: Conceptualization, investigation, funding acquisition, writing–original draft, writing–review and editing, methodology, supervision, resources, project administration, data curation, and visualization.

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CONFLICT OF INTEREST STATEMENT

The authors disclosed no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author, Judy Huei-Yu Wang, upon reasonable request.

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REFERENCES

1. Budiman A, Ruiz NG. *Asian Americans are the fastest-growing racial or ethnic group in the U.S.* Pew Research Center; 2021. Accessed October 29, 2023. https://www.pewresearch.org/fact-tank/2021/04/09/asian-americans-are-the-fastest-growing-racial-or-ethnic-group-in-the-u-s/
2. Torre LA, Sauer AMG, Chen MS Jr, Kagawa-Singer M, Jemal A, Siegel RL. Cancer statistics for Asian Americans, Native Hawaiians, and Pacific Islanders, 2016: converging incidence in males and females. *CA Cancer J Clin*. 2016;66(3):182-202. doi:10.3322/caac.21335
3. John EM, Koo J, Ingles SA, Kurian AW, Hines LM. Changes in breast cancer risk and risk factor profiles among U.S.-born and immigrant Asian American women residing in the San Francisco Bay Area. *Cancer Epidemiol Biomarkers Prev*. 2023;32(5):666-677. doi:10.1158/1055-9965.Epi-22-1128
4. Ziegler RG, Hoover RN, Pike MC, et al. Migration patterns and breast cancer risk in Asian-American women. *J Natl Cancer Inst*. 1993;85(22):1819-1827. doi:10.1093/jnci/85.22.1819
5. Gomez SL, Quach T, Horn-Ross PL, et al. Hidden breast cancer disparities in Asian women: disaggregating incidence rates by ethnicity and migrant status. *Am J Public Health*. 2010;100(S1):S125-S131. doi:10.2105/AJPH.2009.163931
6. Morey BN, Gee GC, von Ehrenstein OS, et al. Higher breast cancer risk among immigrant Asian American women than among US-born Asian American women. *Prev Chron Dis*. 2019;16:E20. doi:10.5888/pcd16.180221
7. Gomez SL, Yao S, Kushi LH, Kurian AW. Is breast cancer in Asian and Asian American women a different disease? *J Natl Cancer Inst*. 2019;111(12):1243-1244. doi:10.1093/jnci/djz091
8. Gomez SL, Clarke CA, Shema SJ, Chang ET, Keegan TH, Glaser SL. Disparities in breast cancer survival among Asian women by ethnicity and immigrant status: a population-based study. *Am J Public Health*. 2010;100(5):861-869. doi:10.2105/AJPH.2009.176651
9. Kerlikowske K, Creasman J, Leung JW, Smith-Bindman R, Ernster VL. Differences in screening mammography outcomes among White, Chinese, and Filipino women. *Arch Intern Med*. 2005;165(16):1862-1868. doi:10.1001/archinte.165.16.1862
10. Paranjpe A, Zheng C, Chagpar AB. Disparities in breast cancer screening between Caucasian and Asian American women. *J Surg Res*. 2022;277:110-115. doi:10.1016/j.jss.2022.03.032
11. Jang MK, Chung DW, Hamlish T, et al. Factors influencing mammography uptake following a screening intervention among Asian American women: a systematic review. *J Immigr Minor Health*. 2021;23(6):1293-1304. doi:10.1007/s10903-021-01172-0
12. American Cancer Society (ACS). *Cancer Prevention and Early Detection Facts and Figures 2023–2024*. ACS; 2024. Accessed October 30, 2023. https://www.cancer.org/research/cancer-facts-statistics/cancer-prevention-early-detection.html
13. Lei F, Lee E. Cancer screening rates among Asian Americans: a cross-sectional secondary data analysis study. *Cancer Control*. 2023;30:10732748231202462. doi:10.1177/10732748231202462
14. Zhang X, Li P, Guo P, et al. Culturally tailored intervention to promote mammography screening practice among Chinese American women: a systematic review. *J Cancer Educ*. 2020;35(6):1052-1060. doi:10.1007/s13187-020-01730-4
15. Lee-Lin F, Nguyen T, Pedhiwala N, Dieckmann N, Menon U. A breast health educational program for Chinese-American women: 3- to 12-month postintervention effect. *Am J Health Promot*. 2015;29(3):173-181. doi:10.4278/ajhp.130228-QUAN-91
16. Terpstra J, Coleman KJ, Simon G, Nebeker C. The role of community health workers (CHWs) in health promotion research: ethical challenges and practical solutions. *Health Promot Pract*. 2011;12(1):86-93. doi:10.1177/1524839908330809
17. Rosenstock IM. Historical origins of the health belief model. *Health Educ Monogr*. 1974;2(4):328-335. doi:10.1177/109019817400200403
18. Wang JH, Schwartz MD, Brown RL, et al. Results of a randomized controlled trial testing the efficacy of a culturally targeted and a generic video on mammography screening among Chinese-American immigrants. *Cancer Epidemiol Biomarkers Prev*. 2012;21(11):1923-1932. doi:10.1158/1055-9965.EPI-12-0821

19. Maxwell AE, Wang JH, Young L, et al. Pilot test of a peer-led small-group video intervention to promote mammography screening among Chinese American immigrants. *Health Promot Pract*. 2011;12(6):887-899. doi:10.1177/1524839909355550
20. Bandura A. Social cognitive theory of mass communication. In: Bryant J, Oliver MB, eds. *Media Effects*. Routledge; 2009:110-140. doi:10.4324/9780203877111
21. Tsai W, Zhang L, Park JS, Tan YL, Kwon SC. The importance of community and culture for the recruitment, engagement, and retention of Chinese American immigrants in health interventions. *Transl Behav Med*. 2021;11(9):1682-1690. doi:10.1093/tbm/ibab053
22. Heaney CA, Israel BA. Social networks and social support. In: Glanz K, Rimer BK, Viswanath K, eds. *Health Behavior and Health Education: Theory, Research, and Practice*. Jossey-Bass; 2008:189-210.
23. Schulz KF, Altman DG, Moher D. CONSORT 2010 statement: updated guidelines for reporting parallel group randomised trials. *J Pharmacol Pharmacother*. 2010;1(2):100-107. doi:10.4103/0976-500X.72352
24. Wang JH, Liang W, Schwartz MD, Lee MM, Kreling B, Mandelblatt JS. Development and evaluation of a culturally tailored educational video: changing breast cancer–related behaviors in Chinese women. *Health Educ Behav*. 2008;35(6):806-820. doi:10.1177/1090198106296768
25. Gu J, Maxwell AE, Ma GX, et al. Evaluating the training of Chinese-speaking community health workers to implement a small-group intervention promoting mammography. *J Cancer Educ*. 2019;34(4):705-711. doi:10.1007/s13187-018-1361-5
26. American Cancer Society (ACS). *American Cancer Society Responds to Changes to USPSTF Mammography Guidelines*. ACS; 2009. Accessed March 29, 2024. https://pressroom.cancer.org/releases?item=201
27. Tsai JL, Ying YW, Lee PA. The meaning of "being Chinese" and "being American" variation among Chinese American young adults. *J Cross Cult Psychol*. 2000;31(3):302-332. doi:10.1177/0022022100031003002
28. Bauer DJ, Sterba SK, Hallfors DD. Evaluating group-based interventions when control participants are ungrouped. *Multivariate Behav Res*. 2008;43(2):210-236. doi:10.1080/00273170802034810
29. Maxwell AE, Bastani R, Vida P, Warda US. Results of a randomized trial to increase breast and cervical cancer screening among Filipino American women. *Prev Med*. 2003;37(2):102-109. doi:10.1016/s0091-7435(03)00088-4
30. Dumville JC, Hahn S, Miles JNB, Torgerson DJ. The use of unequal randomisation ratios in clinical trials: a review. *Contemp Clin Trials*. 2006;27(1):1-12. doi:10.1016/j.cct.2005.08.003
31. Chakraborty H, Gu H. *A Mixed Model Approach for Intent-to-Treat Analysis in Longitudinal Clinical Trials with Missing Values*. RTI Press; 2009. Accessed October 29, 2023. https://www.rti.org/sites/default/files/resources/mr-0009-0904-chakraborty.pdf
32. Tripepi G, Chesnaye NC, Dekker FW, Zoccali C, Jager KJ. Intention to treat and per protocol analysis in clinical trials. *Nephrology*. 2020;25(7):513-517. doi:10.1111/nep.13709
33. Zeng S, Li F, Wang R, Li F. Propensity score weighting for covariate adjustment in randomized clinical trials. *Stat Med*. 2021;40(4):842-858. doi:10.1002/sim.8805
34. Loux T, Huang Y. The uses of propensity scores in randomized controlled trials. *Observational Studies*. 2023;9(1):77-85. doi:10.1353/obs.2023.0007
35. McCaffrey DF, Griffin BA, Almirall D, Slaughter ME, Ramchand R, Burgette LF. A tutorial on propensity score estimation for multiple treatments using generalized boosted models. *Stat Med*. 2013;32(19):3388-3414. doi:10.1002/sim.5753
36. Roland KB, Milliken EL, Rohan EA, et al. Use of community health workers and patient navigators to improve cancer outcomes among patients served by federally qualified health centers: a systematic literature review. *Health Equity*. 2017;1(1):61-76. doi:10.1089/heq.2017.0001
37. Ursua RA, Aguilar DE, Wyatt LC, et al. A community health worker intervention to improve blood pressure among Filipino Americans with hypertension: a randomized controlled trial. *Prev Med Rep*. 2018;11:42-48. doi:10.1016/j.pmedr.2018.05.002
38. Wells KJ, Luque JS, Miladinovic B, et al. Do community health worker interventions improve rates of screening mammography in the United States? A systematic review. *Cancer Epidemiol Biomarkers Prev*. 2011;20(8):1580-1598. doi:10.1158/1055-9965.EPI-11-0276
39. Borrayo EA, Rosales M, Gonzalez P. Entertainment-education narrative versus nonnarrative interventions to educate and motivate Latinas to engage in mammography screening. *Health Educ Behav*. 2017;44(3):394-402. doi:10.1177/1090198116665624
40. Kim K, Choi JS, Choi E, et al. Effects of community-based health worker interventions to improve chronic disease management and care among vulnerable populations: a systematic review. *Am J Public Health*. 2016;106(4):e3-e28. doi:10.2105/AJPH.2015.302987
41. Herman AA. Community health workers and integrated primary health care teams in the 21st century. *J Ambul Care Manage*. 2011;34(4):354-361. doi:10.1097/JAC.0b013e31822cbcd0
42. Wagner TH. The effectiveness of mailed patient reminders on mammography screening: a meta-analysis. *Am J Prev Med*. 1998;14(1):64-70. doi:10.1016/S0749-3797(97)00003-2
43. U.S. Preventive Services Task Force (USPSTF). *Breast Cancer: Screening*. USPSTF; 2009. Accessed October 7, 2023. https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/breast-cancer-screening-2009
44. Kim KE, Chandrasekar E, Lam HY. Socio-demographic factors and cancer screening among foreign-born Chinese, Cambodian and Vietnamese women. *Race Soc Probl*. 2014;6(1):4-14. doi:10.1007/s12552-014-9119-0
45. Miller BC, Bowers JM, Payne JB, Moyer A. Barriers to mammography screening among racial and ethnic minority women. *Soc Sci Med*. 2019;239:112494. doi:10.1016/j.socscimed.2019.112494
46. Adams LB, Richmond J, Watson SN, et al. Community health worker training curricula and intervention outcomes in African American and Latinx communities: a systematic review. *Health Educ Behav*. 2021;48(4):516-531. doi:10.1177/1090198120959326
47. Skoro-Kondza L, Tai SS, Gadelrab R, Drincevic D, Greenhalgh T. Community based yoga classes for type 2 diabetes: an exploratory randomised controlled trial. *BMC Health Serv Res*. 2009;9(1):33. doi:10.1186/1472-6963-9-33
48. McNeely ML, Suderman K, Yurick JL, et al. Feasibility of implementing cancer-specific community-based exercise programming: a multi-centre randomized trial. *Cancers (Basel)*. 2022;14(11):2737. doi:10.3390/cancers14112737

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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