

Results of a Randomized Controlled Trial Testing the Efficacy of a Culturally Targeted and a Generic Video on Mammography Screening among Chinese-American Immigrants

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Abstract

Background: Research comparing the effects of culturally targeted and generic but linguistically appropriate intervention programs is limited. We conducted a randomized controlled trial comparing the efficacy of a culturally targeted video, a generic video, and a fact sheet (control) in promoting mammography screening among Chinese-American immigrants.

Methods: We randomized 664 Chinese-American women from the Washington, DC, and New York City areas who were older than 40 years and nonadherent to annual mammography screening guidelines to three study arms (each with ~221 women). The outcome was self-reported mammography screening 6 months post intervention. Measures of knowledge, Eastern cultural views, and health beliefs were administered before and after the intervention.

Results: The culturally targeted video, the generic video, and the fact sheet increased mammography use by 40.3%, 38.5%, and 31.1% from baseline, respectively. A significant intervention effect was observed only in one subgroup: The culturally targeted video significantly increased mammography screening among low-acclimated women over the fact sheet [OR, 1.70; 95% confidence interval (CI), 1.04–2.78]. Overall, women who obtained a mammogram during the follow-up period reported significantly fewer barriers to screening after intervention than those who had not obtained screening. Both of the video groups reported fewer barriers after intervention than the control group.

Conclusions: Both theoretically guided videos increased the likelihood of mammography use to a similar extent. Cultural targeting was only effective for low-acclimated women. Both videos reduced perceived barriers to screening and consequently increased screening behavior.

Impact: The results of this study provide empirical evidence on the efficacy of cultural targeting for minority immigrants. *Cancer Epidemiol Biomarkers Prev*; 21(11); 1923–32. ©2012 AACR.

Introduction

In the past decade, many interventions to promote evidence-based mammography screening have been

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tested in randomized trials (1–6). Because minority and immigrant women in the United States consistently underutilize mammography screening (7–10), researchers have endeavored to develop and evaluate interventions that address cultural groups' unique beliefs and attitudes about cancer screening and deliver messages in line with these characteristics (2, 11–14). These types of interventions are known as culturally sensitive, appropriate, tailored, or targeted programs (15–18).

While many culturally targeted programs use indigenous agents and/or native languages to deliver messages in concordance with the target audience's cultural background (13, 14, 19–23), there is limited evidence about whether cultural targeting is essential to promoting screening behavior among minority and immigrant populations.

To test the efficacy of a culturally targeted and a generic intervention on increasing mammography screening, we conducted a randomized controlled trial (RCT) in a

Chinese-American sample. We focused on Chinese-Americans because (i) the mammography screening rate for Chinese-American women—many of whom are immigrants (76%) and do not speak English fluently (~48%; ref. 24)—are lower than other ethnic groups (7, 10); (ii) our previous research has shown a relationship between Chinese-American women's mammography use and their knowledge, cultural beliefs, and access barriers (25, 26); and (iii) there are few effective mammography promotion programs targeting this growing population (27, 28).

We developed two theoretically guided videos: (i) a *culturally targeted video* and (ii) a *linguistically appropriate but non-targeted video* (hereafter referred to as the cultural video and the generic video). In our preliminary work, these videos were well accepted by Chinese immigrant women and led to increased screening intentions (14). In this article, we examine the efficacy of the cultural and generic videos in increasing Chinese-American immigrant women's mammography screening behavior relative to a control group that received a fact sheet. We hypothesized that both videos would increase Chinese women's mammography use compared with the control group, but that the cultural video would be more efficacious in promoting mammography screening than the generic video, especially among low-aculturated women.

Materials and Methods

Study design

This 3-arm RCT was approved by the Georgetown University Institutional Review Board (Washington, DC). We used a randomized block design to achieve homogeneous subgroups for analysis of intervention effects. We stratified our participants into 8 blocks by 3 factors: (i) English ability (high vs. low), (ii) past mammography use (never vs. ever screened), and (iii) study site (Washington DC vs. New York). Within each block, we randomly assigned participants to 1 of the 3 arms: (i) view the cultural video; (ii) view the generic video; or (iii) read a fact sheet (i.e., the print control).

Trained bilingual interviewers used a computer-assisted telephone interview (CATI) system to conduct baseline and 2 follow-up assessments. Participants were randomized immediately after they completed baseline assessment. Intervention materials were mailed to participants' homes within a week after randomization. Two to 4 weeks after materials were mailed, participants were called to confirm receipt and review of the materials. At that time, the first follow-up survey was administered to collect feedback on the materials and again measure key variables of knowledge, Eastern cultural views of health-care, and health beliefs since baseline (for process evaluation). Women who had not yet reviewed the materials were asked to do so before the follow-up interview. Results from the process evaluation indicated that all of our participants were able to recall content from key sections of the materials (14). The second follow-up assessment (outcome evaluation) was administered 6

months post intervention to measure mammography screening behavior. All participants were interviewed in Chinese (Mandarin and Cantonese) languages. Participants received gift cards totaling \$35, after completing 3 telephone assessments. As a retention strategy, we mailed 2 Chinese, non-cancer-related health newsletters (e.g., dementia) every 2.5 months post intervention.

Power estimation

We estimated our sample size on the basis of contrasts of increased screening rates between the control (16%) and each video group (35% and 30% for the cultural and generic videos, respectively). These effect sizes were estimated on the basis of prior research using small media to promote cancer screening among American women including Chinese (29–31). Assuming a 2-sided 5% significance level and at least 80% power to detect a minimum 14% difference in screening rates between the video program and the control group, we needed approximately 670 participants at baseline after accounting for 18% attrition. We were not powered to compare the estimated 5% difference in screening rates between the 2 video groups owing to constrained resources. Figure 1 summarizes the study design and protocol.

Participants and setting

Eligible women self-identified as Chinese-American; were older than 40 years; lived in the Washington, DC, or New York City metropolitan areas; had no personal history of breast cancer; were nonadherent to the American Cancer Society (ACS) annual mammography screening guideline (32); and had no medical appointment for a mammogram within the 6 months following the enrollment period. Enrollment took place at community events from November 2006 to December 2009. The community outreach method has been described in previous reports (14, 25). Among 991 eligible women, 664 consenting women completed the baseline assessment and were randomized into the 3 arms (67% response rate). Of the 664, 578 (87%) completed the 6-month outcome assessment, but 7 who reported having a mammogram before intervention were excluded from the 578 for final analysis. Reasons for withdrawal are specified in Fig. 1.

Theoretical framework

The development of the 2 videos was guided by the Health Belief Model (HBM). Video messages corresponded to the 4 main HBM components (perceived susceptibility, perceived severity, perceived benefits, and perceived barriers) and the knowledge variable. Only the cultural video incorporated Chinese cultural beliefs. Specific examples of the script corresponding to the model components have been described in our previous report (14).

Intervention materials

Guided by our formative research (26), each of the 2 videos were created in DVD format, lasting about 18

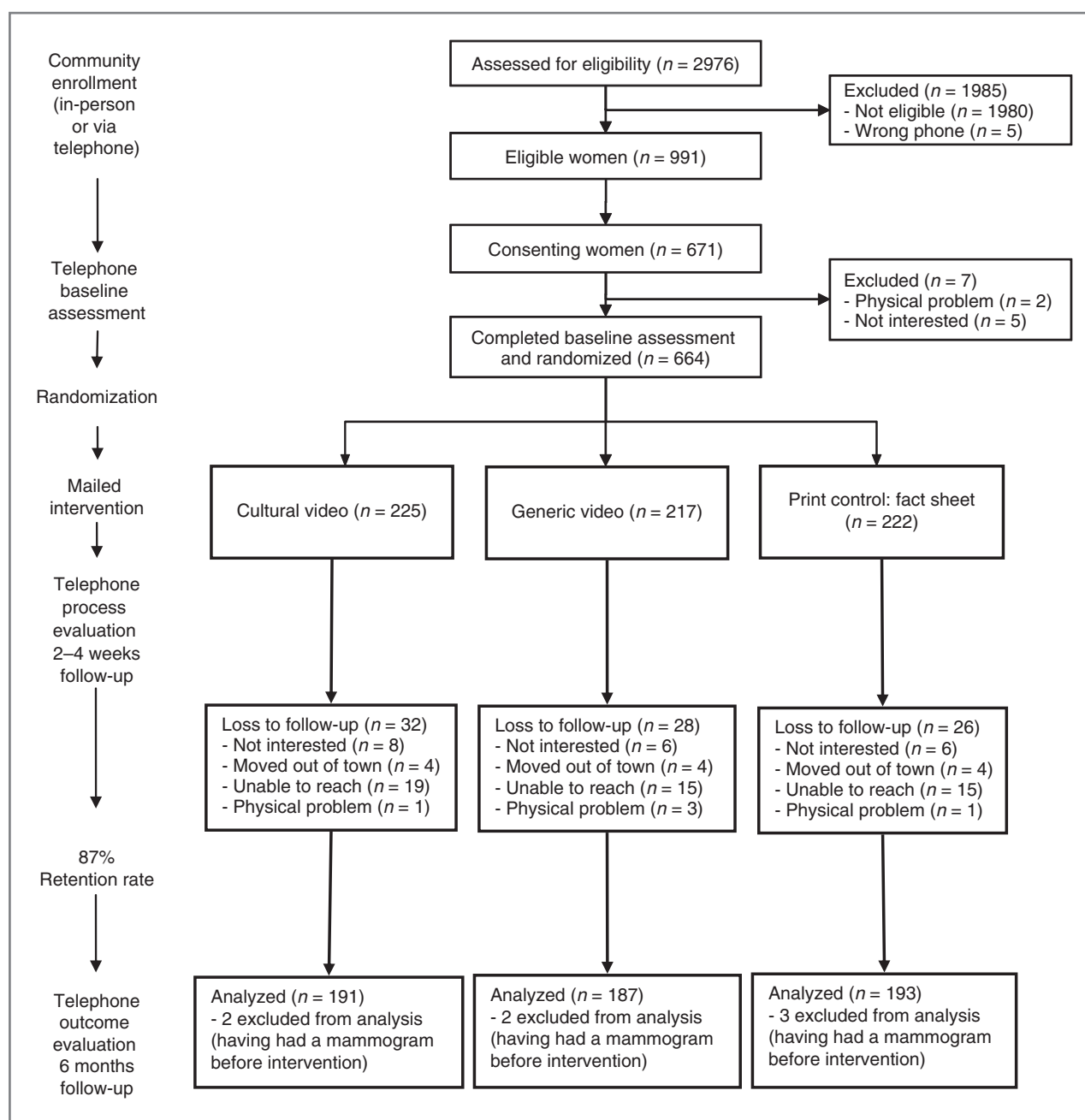


Figure 1. Study flowchart and protocol.

minutes, and included 2 segments: (i) a soap opera style production and (ii) a female physician's recommendations. Detailed description of the video content is available in our prior publication (14). We briefly describe the videos below.

Culturally targeted video. This video depicts a Chinese 5-year breast cancer survivor who is celebrating her 50th birthday with friends. The video is designed to debunk Chinese women's culturally based beliefs about breast cancer and attitudes toward regular mammo-

grams. For instance, Chinese women who believe that breast cancer is fatal may alter their views after learning that patients with breast cancer can survive and feel well if breast cancer is detected early and treated. Chinese women who stress self-care and perceive themselves to be at extremely low risk for breast cancer may adopt a more accurate risk perception after learning that the survivor in the story also had no family history and had a very healthy lifestyle before her diagnosis. After the soap opera style story, a female Chinese physician provides Asian breast

cancer incidence data for different age groups and explains that radiation from mammography does not harm the body. She uses a breast model to explain the difference between the size of lumps found during breast self-examination and mammography. The video was developed in Mandarin, dubbed in Cantonese, and included Chinese and English subtitles.

Generic video. The generic video targets common issues on mammography use across different racial/ethnic groups, including knowledge, beliefs (e.g., fatalism), perceived barriers to care, and perceived risk for breast cancer (33–43). The soap opera component shows African-American, Hispanic, Caucasian, Chinese, Korean, and Filipino women chatting about their breast health during their office lunch break. A non-Asian female physician delivers messages similar to those in the cultural video, except she presents breast cancer incidence data pertinent to the general population. The physician and all actors speak English. The video is dubbed in Mandarin and Cantonese and includes Chinese and English subtitles. According to our process evaluation of the 2 videos (14), they are equally acceptable among our target population.

Control condition—Fact sheet. Women in the control group were mailed a Chinese breast cancer fact sheet. The 2-sided, color-printed sheet included concise information about the development of breast cancer, Asian women's risk for breast cancer, breast cancer symptoms, and ACS breast cancer screening guidelines.

Information about local low-cost and free mammography screening programs was included in the 2 videos and printed materials.

Measures

Outcome measure. The main outcome measure was self-reported receipt of mammography screening in the 6 months post intervention. Screening was not verified by medical records; however, women were asked where and when they obtained mammograms and the name of the referring physician. In the intention-to-treat analysis, women who did not participate in the 6-month outcome assessment were coded as nonscreening. Our main predictor for the outcome analysis was group assignment.

Key variables. We used previously validated instruments to measure theoretical constructs of knowledge, Eastern cultural views of healthcare, and 4 HBM components at baseline and 2 to 4 weeks of follow-up (14).

Knowledge about breast cancer and screening was measured with 10 questions on a yes/no/don't know scale (e.g., "Breast cancer only occurs when women have a family history."; ref. 25). A correct response was scored as 1 and an incorrect or "don't know" response was scored as 0. The overall knowledge scores ranged from 0 to 10.

Eastern cultural views of healthcare were assessed by 2 subscales: fatalism and self-care were adapted from the Chinese Cultural Views of Healthcare scale and reliable at 0.82 and 0.73, respectively (44). The 9-item fatalism (e.g., I cannot control my destiny) and 4-item self-care (e.g., I

don't visit doctors if I'm not feeling sick) scales were found to predict Chinese-Americans' cancer screening behaviors in previous studies (25, 45). Because Chinese fatalism refers to various concepts such as luck, karma, and a law of nature and is different from the Western God concept (46, 47), we described fatalism as a cultural construct. Responses to all items ranged from 1 = *strongly disagree* to 5 = *strongly agree*. High mean scores on the sum of the 2-scale scores indicate higher Eastern cultural views.

Health Beliefs were measured with 4 validated subscales: perceived susceptibility, severity, benefits, and barriers from the Chinese Mammogram Screening Beliefs Questionnaire (48). The subscales were reliable in a range from 0.52 to 0.82 in our study sample. The range of response options to all 33 items was 1 = *strongly disagree* to 5 = *strongly agree*. High mean scores indicate higher health beliefs for each particular construct.

Covariates. We assessed demographic characteristics (i.e., age, education, marital status, annual income, employment, English ability, and years of U.S. residency) and medical access factors (i.e., health insurance, a regular doctor, and a doctor recommendation for screening) at baseline. We assessed English ability in reading, listening, speaking, and writing with a 4-item scale (49), which was reliable at 0.97 in multiple Chinese-American populations (14, 26). Self-rating of all 4 aspects as "good" or "very good" was considered as having good English ability.

Acculturation was dichotomized on the basis of English ability and years of U.S. residency (26, 49–52). Participants who had good English ability and resided in the U.S. for more than 10 years were categorized as highly acculturated. All others were categorized as low-acculturated.

Data analysis

We first evaluated baseline differences between study arms with respect to demographic characteristics, medical access factors, and key variables to assess the balance across study arms. Next, we examined the main intervention effect using logistic regression including 2 models: (i) using intention-to-treat analysis ($N = 664$) and (ii) analyzing a reduced model that included only women who completed the 6-month outcome assessment ($N = 571$). Model 2 excluded 7 women who reported receipt of a mammogram after the baseline interview but before the intervention. We ran the standard (maximum likelihood estimates) and Bayesian approaches to obtain treatment-effect parameters. The 2 approaches generated similar estimates. We reported the Bayesian estimates because research has shown that Bayesian estimates using the Markov Chain Monte Carlo (MCMC) algorithm are generally superior to the maximum likelihood estimates (53), which include having higher coefficient stability, minimizing standard error, and simple interpretation of credible interval). Using the 571 women, we conducted the same modeling approach to examine screening differences by subgroups of interest (i.e., acculturation level and past

Table 1. Sample characteristics by study group at baseline

	Women randomized after baseline interview (N = 664)				Women who completed follow-up survey (N = 571) ^a			
	Cultural video (n = 225)	Generic video (n = 217)	Control group (n = 222)	P	Cultural video (n = 191)	Generic video (n = 187)	Control group (n = 193)	P
Categorical variables	n (%)	n (%)	n (%)	P	n (%)	n (%)	n (%)	P
College-educated	130 (57.8)	127 (58.5)	126 (56.8)	0.93	116 (60.7)	112 (59.9)	113 (58.6)	0.91
Married	168 (74.7)	164 (75.6)	173 (77.9)	0.71	145 (75.9)	145 (77.5)	153 (79.3)	0.73
Annual income ≤ \$20,000	101 (51.5)	97 (50.3)	101 (50.2)	0.96	80 (47.1)	80 (47.3)	85 (48.9)	0.94
Employed	124 (55.1)	116 (53.7)	116 (52.2)	0.83	102 (53.4)	99 (53.2)	97 (50.3)	0.79
≤10 y U.S. residency	103 (45.8)	98 (45.2)	94 (42.3)	0.74	81 (42.4)	79 (42.3)	82 (42.5)	0.99
Poor English proficiency	146 (64.9)	141 (65.0)	147 (66.2)	0.95	120 (62.8)	120 (64.2)	125 (64.8)	0.92
Insured	137 (60.9)	129 (59.4)	126 (56.8)	0.67	121 (63.4)	112 (59.9)	113 (58.6)	0.61
Had doctor recommendation	95 (42.4)	92 (42.6)	97 (43.7)	0.96	89 (46.6)	78 (41.9)	83 (43.0)	0.63
Ever screened ^b	95 (65.3)	92 (67.3)	97 (64.4)	0.81	89 (66.5)	78 (69.0)	83 (65.3)	0.74
Continuous variables	n Mean (SD)	n Mean (SD)	n Mean (SD)	P	n Mean (SD)	n Mean (SD)	n Mean (SD)	P
Age (40.5–86)	225 56.03 (10.80)	217 55.23 (10.45)	222 56.01 (11.32)	0.68	191 56.20 (10.65)	187 55.10 (10.14)	193 56.16 (11.43)	0.53
Knowledge (score: 1–10)	224 7.65 (1.66)	217 7.71 (1.67)	222 7.73 (1.45)	0.83	191 7.68 (1.62)	187 7.75 (1.64)	193 7.79 (1.40)	0.78
Eastern cultural views (score: 13–65)	225 35.15 (6.39)	217 35.00 (6.33)	222 35.08 (6.16)	0.97	190 35.11 (6.25)	187 34.60 (5.72)	193 35.11 (6.32)	0.64
Perceived susceptibility (score: 3–15)	225 10.27 (2.06)	217 10.67 (1.92)	222 10.22 (2.06)	0.04 ^c	191 10.24 (2.02)	187 10.71 (1.93)	193 10.28 (2.05)	0.04 ^c
Perceived severity (score: 5–25)	225 19.20 (2.36)	217 19.80 (2.34)	222 19.30 (2.33)	0.02 ^c	191 19.16 (2.37)	187 19.77 (2.40)	193 19.36 (2.33)	0.04 ^c
Perceived benefits (score: 6–30)	225 24.59 (2.06)	216 24.91 (2.23)	222 24.52 (2.50)	0.16	191 24.64 (2.03)	187 24.97 (2.29)	193 24.53 (2.62)	0.16
Perceived barriers (score: 19–95)	225 50.60 (8.32)	217 49.34 (8.96)	222 50.63 (8.78)	0.21	191 50.13 (8.36)	186 48.98 (8.91)	193 50.48 (8.99)	0.22

NOTE: The χ^2 and ANOVA tests were conducted to compare group difference with respect to categorical and continuous variables at baseline, respectively. The range of scores was provided only for the continuous variables. Higher mean scores mean higher knowledge, Eastern cultural views, perceived susceptibility, severity, benefits, and barriers.

Abbreviation: SD, standard deviation.

^aThe 571 women did not include the 7 women who reported having obtained a mammogram before intervention.

^bWomen who ever had a mammogram had their most recent mammogram more than 1 year before enrollment.

^c $P < 0.05$.

mammography use). We also conducted 6 linear regression models to examine whether women who obtained a mammogram had higher knowledge, lower Eastern cultural views, and more positive attitudes to screening post intervention after adjusting for group assignment. The models included interaction terms between group assignment and screening outcomes. In all analyses, we controlled for baseline differences for all tested models, if there were any. The Bayesian logistic regression was estimated using MLwiN Version 2.13 software (54), and the linear regression models were run using SAS version 9.2.

Results

Participants in the 3 groups did not differ in demographics, health access, and key variables, except that the generic video group's mean scores on perceived susceptibility and severity at baseline were significantly higher than the cultural video and control groups (see Table 1). The overall sample had averaged 13.58 years of U.S. residency. Approximately 64% of them had poor English ability. The majority of our 571 participants (71.2%) were low-acculturated and about one third (33%) had never had a mammogram. Never screened women were more likely than ever screened women to be low-acculturated (84.1% vs. 65.2%, respectively, $P < 0.0001$).

Efficacy of the videos on increasing mammography screening behavior

Results from Bayesian logistic regression, both from the intention-to-treat models and from the reduced models, showed that neither the cultural nor the generic video significantly increased mammography use among Chinese immigrant women as compared with the fact sheet (see Table 2) after adjusting for potential confounders. Because we did not know the screening outcome among women lost to follow-up, we examined the intervention effects among the subgroups of interest on the basis of the 571 women. Figure 2 describes the crude proportions of the 571 women in the 3 arms of the study and among subgroups of interest.

In subgroup analyses (see Table 3), the cultural video led to a significantly greater increase in mammography use over the control group among low-acculturated women, but not among high-acculturated women. The generic video was not associated with increased mammography (as compared with the control group) for either the low- or high-acculturation groups. Among the subgroup of women who had never had a mammogram, neither intervention led to a statistically significant increase in the odds of obtaining a mammogram compared with the print control. Although not significant, the cultural video did lead to an 81% increase in the odds of

Table 2. Video intervention effects on self-reported receipt of mammography screening behavior at 6 months post intervention among Chinese immigrant women

	Intention-to-treat model among all randomized women (N = 664)		Women who completed 6-month follow-up survey (N = 571) ^a	
	Parameter (SE)	OR (95% CI)	Parameter (SE)	OR (95% CI)
Intercept	-1.08 (0.72)	0.34 (0.08–1.40)	-0.79 (0.16)	0.46 ^c (0.33–0.62)
Culturally targeted video (vs. control)	0.31 (0.20)	1.37 (0.92–2.04)	0.40 (0.22)	1.49 ^d (0.97–2.28)
Generic video (vs. control)	0.26 (0.21)	1.30 (0.87–1.96)	0.32 (0.22)	1.37 (0.89–2.11)
Baseline perceived susceptibility ^b	-0.004 (0.04)	1.00 (0.92–1.08)	-0.01 (0.05)	0.99 (0.90–1.08)
Baseline perceived severity ^b	0.01 (0.04)	1.01 (0.94–1.09)	0.01 (0.04)	1.01 (0.93–1.08)

NOTE: All the logistic regression models were adjusted for baseline perceived susceptibility and severity because these 2 baseline scores were significantly different between groups.

Abbreviations: CI, confidence interval; SE, standard error.

^aParticipants who obtained a mammogram before the start of intervention ($n = 7$) were eliminated from this analysis.

^bGrand mean centered.

^c $P < 0.001$.

^d $P = 0.07$.

obtaining a mammogram compared with the print control—an effect that might be meaningful if validated in a larger sample.

Association of key variables with screening outcomes

Results from the linear regression models (Table 4) indicated that only post intervention mean scores on perceived barriers were significantly and negatively associated with Chinese women's mammography screening behavior ($P = 0.0003$) after controlling for group assignment. In other words, women who had obtained a mammogram by the 6 months post intervention had a significantly lower post intervention mean score on perceived barriers (adjusted mean = 40.35, SD = 6.38) than those who had not obtained (adjusted mean = 43, SD = 6.37). In addition, both the cultural and generic video groups reported significantly fewer perceived barriers at follow-up (adjusted mean = 47.34, SD = 7.49 and adjusted mean = 46.59, SD = 7.51, respectively) than the control group (adjusted mean = 49.10, SD = 7.47, both $P < 0.05$).

Discussion

The results of this study provide empirical evidence on the efficacy of cultural targeting for minority immigrants. Our findings suggest that, overall, cultural targeting may not be needed to increase mammography screening among Chinese immigrants. Compared with the print condition, neither of the videos was superior to promoting mammography use among Chinese immigrants; however, a culturally targeted approach seems to be more efficacious in increasing screening among immigrants at the lowest acculturation level. The actual receipt of mammography screening was likely related to women's reduced perception of screening barriers after intervention.

Our finding that the generic video and culturally targeted video increased mammography screening to a similar extent refutes the argument that cultural targeting of interventions is essential for minority and immigrant populations. This could be because the 2 videos contained similar information and both addressed common beliefs and attitudes. The culturally targeted video only added a few components that were culturally

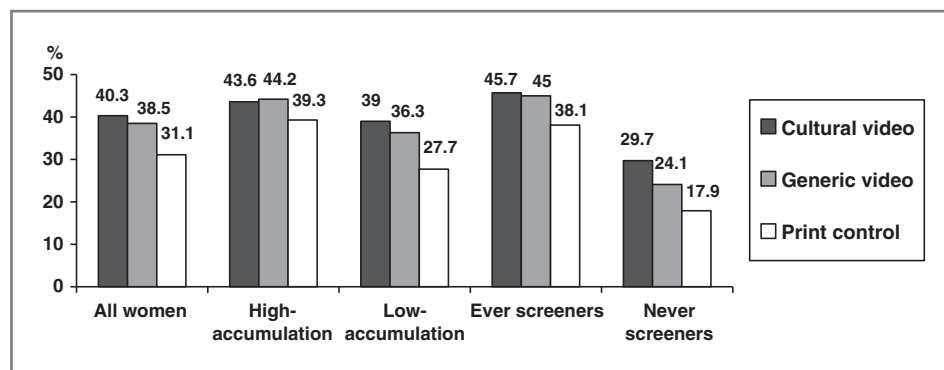


Figure 2. Increased percentage points of self-reported mammography screening behavior at 6 months after intervention by the 571 women and by subgroups.

Table 3. Video intervention effects by subgroups of women who self-reported receipt of mammography screening behavior at 6 months post intervention ($N = 571$)

	High acculturation ($n = 163$)		Low acculturation ($n = 408$)		Ever screeners ($n = 382$)		Never screeners ($n = 189$)	
	Parameter (SE)	OR (95% CI)	Parameter (SE)	OR (95% CI)	Parameter (SE)	OR (95% CI)	Parameter (SE)	OR (95% CI)
Intercept	-0.42 (0.27)	0.66 (0.38-1.12)	-0.98 (0.19)	0.37 (0.26-0.54)	-0.47 (0.19)	0.63 (0.43-0.90)	-1.57 (0.33)	0.21 (0.11-0.40)
Culturally targeted video (vs. control)	0.21 (0.39)	1.23 (0.57-2.65)	0.53 (0.25)	1.70^b (1.04-2.78)	0.32 (0.26)	1.37 (0.83-2.28)	0.60 (0.43)	1.81 (0.78-4.21)
Generic video (vs. control)	0.17 (0.40)	1.19 (0.54-2.60)	0.42 (0.25)	1.52 (0.93-2.49)	0.25 (0.26)	1.29 (0.77-2.14)	0.39 (0.46)	1.48 (0.60-3.65)
Baseline perceived susceptibility ^a	-0.01 (0.08)	0.99 (0.85-1.16)	-0.02 (0.06)	0.98 (0.87-1.09)	-0.04 (0.05)	0.96 (0.87-1.07)	0.06 (0.09)	1.06 (0.89-1.27)
Baseline perceived severity ^a	0.03 (0.07)	1.03 (0.90-1.17)	-0.01 (0.05)	0.99 (0.90-1.08)	0.06 (0.05)	1.07 (0.98-1.16)	-0.19 (0.09)	0.83 (0.70-0.98)

NOTE: All the logistic regression models were adjusted for baseline perceived susceptibility and severity because these 2 baseline scores were significantly different between groups. Participants who obtained a mammogram before the start of intervention ($n = 7$) were eliminated from this analysis.

Abbreviation: CI, confidence interval.

^aGrand mean centered.

^b $P < 0.05$.

specific for Chinese-American women (14). Previous research has suggested that a culturally sensitive program can be effective in promoting mammography screening only when the intervention program also

addresses informational and behavioral barriers (55). In our prior research, the generic video reduced Chinese women's perception of fatalism and self-care to a similar extent as the cultural video (14). It should be noted that

Table 4. Associations of post intervention knowledge, Eastern cultural views, and HBM constructs with screening outcomes controlling for group assignment: fixed model results from linear regression models ($N = 571$)

Independent variables	Dependent variables: post intervention scale scores					
	Knowledge Beta (SE)	Eastern cultural views Beta (SE)	Perceived susceptibility Beta (SE)	Perceived severity Beta (SE)	Perceived benefits Beta (SE)	Perceived barriers Beta (SE)
Intercept	7.66 ^a (0.40)	30.84 ^a (2.24)	6.26 ^a (0.62)	12.81 ^a (0.71)	21.88 ^a (0.69)	45.72 ^a (2.50)
Culturally targeted video (vs. control group)	0.33 (0.18)	-1.17 (0.98)	-0.13 (0.27)	-0.03 (0.31)	0.17 (0.30)	-0.55 (1.09)
Generic video (vs. control group)	0.25 (0.18)	-0.25 (0.99)	0.12 (0.28)	0.17 (0.31)	0.68 ^b (0.31)	-0.90 (1.11)
Mammography use: yes (vs. no)	0.11 (0.16)	-1.56 (0.88)	0.43 (0.25)	-0.14 (0.28)	-0.03 (0.27)	-3.56^c (0.99)
Baseline perceived susceptibility	0.04 (0.02)	-0.35 ^b (0.12)	0.39 ^a (0.03)	-0.03 (0.04)	-0.00 (0.04)	-0.35 ^b (0.14)
Baseline perceived severity	0.03 (0.02)	0.20 (0.10)	0.03 (0.03)	0.33 ^a (0.03)	0.13 ^a (0.03)	-0.07 (0.12)
Cultural video × mammography use	-0.02 (0.22)	-0.71 (1.22)	-0.51 (0.34)	-0.05 (0.38)	-0.24 (0.37)	0.95 (1.36)
Generic video × mammography use	-0.26 (0.22)	1.62 (1.23)	-0.32 (0.34)	-0.04 (0.39)	0.06 (0.38)	1.78 (1.38)

NOTE: Group differences in perceived susceptibility and severity at baseline were controlled for in the linear regression analyses.

^a $P < 0.0001$.

^b $P < 0.05$.

^c $P < 0.001$.

the generic video is linguistically appropriate and has a multiethnic cast that includes Asians, so it is relatively easy for Chinese immigrants to understand the messages, identify with the story, and increase their knowledge and positive attitudes toward mammography (14). This might explain why the two videos have led to comparable screening outcomes.

The video interventions were not significantly different in screening outcomes from the fact sheet because the latter had a much larger-than-expected effect. For ethical reasons, we decided to provide information to women in the control group. As noted in Fig. 2, the fact sheet motivated highly acculturated or ever screened women to a greater extent (~38%) than low-accultured (28%) or never screened women (18%). The intervention materials plus the 3 telephone interviews might have prompted women to obtain mammograms, particularly those with prior screening experience. However, the 3 telephone interviews were administered to all participants and were held constant for evaluating the intervention effects. Given that our video programs did not directly resolve access barriers (e.g., providing patient navigators or free mammograms), and approximately 71% of our participants were low-accultured and often meet greater challenges to accessing care, it is not surprising that the overall impact of the video programs relative to the print control are varied by subgroups.

Our trial is the first of which we are aware that shows the impact of cultural targeting on screening behavior by women's acculturation level. The results support our hypothesis that cultural targeting is more important for low-accultured women. Recently immigrated women and those with limited English ability often find assimilation into the U.S. cultural environment to be challenging (56). Hence, low-accultured women may find it easier to relate to the cultural video, which had Chinese cultural features and an all-Chinese cast than to the generic video. Motivation theorists state that when people can relate to an event, their level of involvement increases, which subsequently facilitates learning and outcomes (57). In contrast, highly acculturated Chinese women are immersed in American culture; consequently, they might be less sensitive to the contextual differences between the 2 video programs (e.g., the setting and the actors' ethnic backgrounds). We found that all of our materials were equally useful in motivating highly acculturated or ever screened women to obtain a mammogram. A few intervention trials among Asians and Pacific Islanders reported similar results where culturally targeted programs significantly increased mammography use only among new immigrants and never screened women (21, 58). Note that most of our Chinese participants who had never had a mammogram (84%) were low-accultured. In short, because the cultural video was not less effective for more acculturated and was more effective for the less acculturated, there seems to be no downside of using it with all Chinese-speaking women to promote their overall mammography screening rates.

Consistent with prior studies among multiple ethnic groups (4, 6, 20, 21), our study showed that health theory-guided interventions have a positive impact on mammography use among Chinese immigrant women who are nonadherent to mammography screening guidelines. However, with respect to the HBM constructs, our results showed that only perceived barriers significantly explained the actual receipt of mammography screening. In all study arms, Chinese women who perceived fewer access barriers to screening and were less concerned about discomfort and inconvenience related to obtaining a mammogram were more likely to obtain a mammogram during the follow-up period. Our research has shown that both of our videos significantly reduced women's perceptions of barriers to mammography and increased their knowledge and acceptance of Western views of care (14). However, our current results did not suggest that postintervention scores on knowledge and culturally based views explained mammography use as expected. It is understandable that conceptual changes may not lead to a behavioral change when practical barriers persist. Our results imply that providing educational information may trigger efforts to overcome practical barriers and consequently obtain a mammogram.

The major caveat of this study is that the screening outcome is based on self-reports. Future intervention trials in this underserved immigrant population should verify self-report data with medical records to confirm current findings. Second, participants were enrolled through community settings, which is advantageous for recruiting those who are hard to reach and have no access to clinical care (59). In addition, we had a narrow range of acculturation levels among our immigrant women who were drawn from two Chinese-populated metropolitan areas and were all Chinese speaking. Both of these facts are limiting the generalization of our results. Third, this study was not able to examine whether the two videos have long-term behavioral effects on our target population.

Very few intervention studies found significant effects in increasing mammography screening among Chinese-American populations (27). This RCT specifically targeted nonadherent Chinese women and has novel results to inform future intervention research on this growing immigrant group. Our DVD tools are low cost, easily disseminated, and can be readily incorporated into community workshops and clinical settings. A pilot study showed that using the culturally targeted video in community workshops was likely to augment the video effects in this target group (28). Findings from this study suggest that making intervention programs culturally appropriate is useful for targeting a specific cultural group. On the other hand, intervention programs that can address common barriers for multiethnic populations and are linguistically adaptable also have the potential to efficiently promote overall cancer screening behaviors. This is a new and important finding, given the growing diversity of the U.S. society and limited resources to

develop different programs for each of the many ethnic groups.

Disclosure of Potential Conflicts of Interest

No potential conflicts of interest were disclosed.

Authors' Contributions

Conception and design: J.H. Wang, M.D. Shwartz, A.E. Maxwell, J.S. Mandelblatt

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Acquisition of data (provided animals, acquired and managed patients, provided facilities, etc.): J.H. Wang

Analysis and interpretation of data (e.g., statistical analysis, biostatistics, computational analysis): J.H. Wang, M.D. Shwartz, R.L. Brown, A.E. Maxwell, M.M. Lee, J.S. Mandelblatt

Writing, review, and/or revision of the manuscript: J.H. Wang, M.D. Shwartz, A.E. Maxwell, M.M. Lee, I.F. Adams, J.S. Mandelblatt

Administrative, technical, or material support (i.e., reporting or organizing data, constructing databases): J.H. Wang
Study supervision: J.H. Wang, J.S. Mandelblatt

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