

Increasing Pap Smear Utilization among Samoan Women: Results from a Community Based Participatory Randomized Trial

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Abstract: Background. We tested the effectiveness of a theory-guided, culturally tailored cervical cancer education program designed to increase Pap smear use among Samoan women residing in the U.S. Territory of American Samoa. **Methods.** We used a two-group, pretest-posttest design. The sample comprised 398 Samoan women age 20 and older recruited from Samoan churches. Women in the intervention group received a culturally tailored cervical cancer education program in three weekly sessions. The primary outcome was self-reported receipt of a Pap smear. **Results.** Overall, there was a significant intervention effect, with intervention compared with control group women twice (adjusted odds ratio = 2.0, 95% confidence interval = 1.3–3.2, $p < .01$) as likely to self-report Pap smear use at the posttest. **Conclusions.** The findings support the efficacy of the multifaceted, theory-guided, culturally tailored community-based participatory cervical cancer education program for Samoan women in effecting positive changes in Pap smear use and cervical cancer related knowledge and attitudes.

Key words: Pacific Islander, Samoan, minority, women's health, cancer, cervix, cervical, Papanicolaou, Pap smear, education program, intervention, randomized trial, disparities, knowledge, attitude, practice, screening, prevention and control, early detection, health behavior framework, empowerment pedagogy, Freirian pedagogy, community-based participatory research.

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Age-adjusted incidence and mortality rates for cervical cancer have reduced dramatically in large part due to effective screening with Papanicolaou (Pap) smear¹ and treatment of precursor lesions and cervical neoplasia.² The advances in cervical cancer screening and early detection have made this cancer relatively uncommon in the U.S. While overall cervical cancer incidence and mortality rates from cervical cancer have declined,³ there are still disparities in cervical cancer screening and early detection and age-adjusted incidence and mortality based on race/ethnicity, socioeconomic status, and country of origin.⁴⁻¹⁰ Cervical cancer incidence and mortality rates in the U.S. have tended to increase among foreign-born women.¹⁰

Regular Pap smear to screen for cervical cancer is the mainstay of cervical cancer prevention.¹¹ However, although overall Pap smear use is relatively high, recent trends suggest a decline in Pap smear rates.¹² National survey data indicate that more than three-fourths (78%) of women aged 18 and older had obtained a Pap smear exam within the past three years, with 79% of non-Hispanic White, 80% of Black, and 74% of Hispanic women reporting that they had obtained a Pap smear.¹² National data on Pap smear screening rates among Pacific Islander women are not available. Minorities and new immigrants reported a lower rate of obtaining Pap smears.¹³⁻¹⁵ A regional survey among Samoan women, the indigenous people of the U.S. Territory of American Samoa, documented an alarmingly low rate of Pap smear use. The study documented only 46% of age-eligible Samoan women self-reporting that they had obtained a Pap smear within the past three years.¹⁶ Samoan women residing in Hawaii (53.8%) were most likely to report obtaining a Pap smear, followed by Samoan women residing in Los Angeles (48.8%) and the U.S. Territory of American Samoa (32.2%).¹⁶ These rates were substantially lower than the screening rates reported for other racial/ethnic minority groups.¹²⁻¹⁵

Cervical cancer is not an uncommon cancer among Samoan women. Samoan women have a higher site-specific incidence of cervical cancer than non-Hispanic White women¹⁷ and Hawaiian women,¹⁸ with cervical cancer accounting for 7.2% and 8.2% of all cancers diagnosed among Samoan women in Los Angeles and Hawaii, respectively. In addition, Samoan women are more likely than others to receive a cancer diagnosis (all cancers combined) at an earlier age and at a later stage of the disease.¹⁸

For Samoan and other Pacific Islander women to meet the *Healthy People 2010* cervical cancer objectives (e.g., decrease mortality rate to 2.0 per 100,000 and to have 80% of Pacific Islander women receive a Pap smear),¹⁹ it is imperative to disseminate evidence-based cervical cancer screening and early detection education programs. However, despite the higher site-specific incidence of cervical cancer in Samoan women and low Pap smear rates, there are no theory-guided cervical cancer education programs implemented and tested for their efficacy to enhance age- and risk-appropriate Pap smear use among these women. We present results of a community-based participatory intervention trial testing the effectiveness of a theory-guided, culturally tailored cervical cancer education program designed to increase Pap smear use among Samoan women residing in the U.S. Territory of American Samoa.



Methods

The National Office of Samoan Affairs (NOSA, a community-based service organization based in Los Angeles; community partner) and the University of California–Irvine (UC Irvine; academic partner) participated in this community-academic collaborative effort. Community-based participatory research (CBPR) principles^{20–22} guided every phase of the intervention trial. We conducted the project between December 1999 and November 2000. The Institutional Review Board of the University of California–Irvine approved the research protocol. The women signed written informed consent prior to participating in the study.

NOSA–UC Irvine CBPR collaboration. Prior to the research reported herein, NOSA and UC Irvine had collaborated for about seven years on a series of research studies on the cancer control needs of Samoans residing in the U.S. Territory of American Samoa, Hawaii, and the U.S. mainland. These studies were based on an action plan formulated by the Samoan political and religious leaders, traditional kinship-based chiefs, and the directors of community based organizations (CBOs) in the U.S. mainland and Hawaii. The action plan called for the collection of baseline information on various aspects of the cancer controls needs of Samoans. The initial series of studies addressed important components of the community-identified action plan.^{16–18,23–25} Based on the findings of these studies, the Territory’s Senate and House representatives passed a unanimous resolution (subsequently endorsed by the religious leaders and traditional chiefs) that underscored the need for appropriate cancer control and prevention educational programs. The intervention trial reported herein resulted directly from the resolution and community-identified needs. Since the community was instrumental in conceiving the project, there was strong community support and participation in all other phases of the research.

The project constituted a Community Advisory Committee (CAC), chaired by a community member, and comprising traditional kinship-based chiefs, religious and political leaders, a Samoan health care professional, a representative each from the Dept. of Health and the Lyndon Baines Johnson Tropical Medical Center (the only hospital in the U.S. Territory of American Samoa), and the community (co-author PHL) and academic (primary author SIM) partners. The CAC was responsible for providing overall leadership and guidance to the project. Since the intervention trial focused on cervical cancer education, the project’s “community” comprised Samoan women, who were integrally involved in and actively contributed towards the project’s overall success. They participated in the project as co-Principal Investigator (co-PI), chair of the CAC, members of the CAC, cultural and linguistic experts, translators, recruiters of potential study sites, recruiters of eligible women for the study, interviewers, health educators, trainers, data managers, and administrators.

Participation in the project afforded numerous benefits to the community and academic partners. First, there was seamless integration of the community and academic partners’ knowledge and expertise in their respective fields. The community partner shared expertise in areas including Samoan cultural and social norms (e.g., traditional and religious), Samoan language, conducting field research in the U.S. Territory of American Samoa, and collaboration with local entities in the U.S. Territory of

American Samoa (e.g., health department, hospital, religious leaders, and traditional and village chiefs). The academic partner shared expertise in the study design (e.g., issues of sample, sampling, study sites, randomization), cervical cancer education (cervical cancer, Pap smear), data collection instruments, training of data collectors and data managers, training of the health educators, and data management. Second, there were several opportunities for mutually beneficial learning and cross-training for the community and academic partners. Third, the mutually beneficial learning, training, and active participation on the project enhanced the capacity of the community for future field research. Fourth, the community, which views itself as marginalized, was empowered due to their leadership roles in the project and involvement at all levels of decision-making, implementation, and administration.

The project co-PIs defined equity in roles and responsibilities for the community and academic partner. The community partner (co-author PHL) was primarily responsible for hiring the project personnel (study and site coordinators, interviewers, data entry personnel, health educators, cultural and linguistic experts, and translators); constituting the CAC; identifying potential study sites (i.e., the churches); networking and coordinating with the religious leadership for implementation of the study; translating project-related materials; collecting the data; and, ensuring cultural sensitivity during the study's implementation. The academic partner (primary author SIM) was primarily responsible for refining the study procedures and protocols; training project personnel (interviewers, health educators, data entry personnel, coordinators); development of the study materials (surveys, educational programs); defining and implementing the sampling strategy; analyzing the data; and providing technical assistance. Project personnel worked jointly on most project-related activities to ensure the study's scientific integrity and maintain the community's cultural and traditional norms. The community and academic partners were jointly responsible for report writing and dissemination of the study findings.

Community-academic collaborative efforts provide an excellent model for successful social intervention; however, they easily get mired in conflicts that can jeopardize a project. Based on our (authors SIM and PHL) collective experiences of prior collaborative research, we instituted a conflict resolution mechanism. Central to the mechanism was the goal of ensuring scientific integrity of the project and maintaining cultural sensitivity of the target community. Within this mechanism, we discussed and reached consensus on actual (unlike perceived) expectations from the two institutions and made detailed work-plans with accompanying activities, timelines, and personnel responsible for implementation and supervision of the activities. The academic partner (primary author SIM) had primary responsibility to mediate and resolve problems that had a direct bearing on the scientific integrity of the project. These problems could arise due to the inappropriate implementation of the study design, sample selection, data collection, and data management activities. The community partner (co-author PHL) had primary responsibility to mediate and resolve problems between the collaborating entity and the target community (i.e., Samoans and Samoan women) and conflicts that were mainly due to insensitivities towards cultural and traditional customs of the target community or project personnel. In the event of an intractable problem, the partners had the option, although never utilized, to approach the CAC for a resolution.

Study design, setting, and participants. The study was a controlled intervention trial using two parallel groups (intervention and control), with randomization of the study locations and the study sites (i.e., Samoan churches in each study location). The study locations comprised the eastern and western districts (as defined by the Territorial administration) of the main island of Tutuila (where more than 98% of the approximately 65,000 residents of the Territory reside) in the U.S. Territory of American Samoa. We randomly assigned the eastern and western districts, respectively, as the control and intervention locations.

Samoan-speaking churches constituted the study sites. We stratified (on congregation size and denominational category) and randomly selected 26 Samoan churches (13 churches in each study location) for the study. We included in the study all women in a selected church who met the inclusion criteria and consented to participate in the intervention trial. Eligibility criteria (all were self-reported) were Samoan ancestry (any part), residence in the U.S. Territory of American Samoa, age 20 years and older, no self-reported history of obtaining a Pap smear within two years prior to the study, no history of cervical cancer, no history of hysterectomy, and plans to stay in the Territory for the duration of the study (about six months).

Theoretical frameworks. The Health Behavior Framework^{26–28} (HBF) and Freire's empowerment pedagogy^{29,30} guided the study. The HBF represents a synthesis of some of the major formulations in the area of adherence and health behavior and behavior change. Several cancer control studies^{28,31,32} have used the framework to understand health behavior. According to this framework, individual and health care system factors and environmental and personal barriers jointly determine health behaviors. With respect to Samoan women, social standing, traditional and experientially determined cultural beliefs, and educational, interpersonal, and financial resources would influence their relevant past and current health practices (including preventative health practices), awareness of the biomedical phenomena underlying health and disease (as opposed to traditional Samoan concepts, see Mishra et al.³³), health beliefs, and individual and/or group norms regarding health and disease. We designed the cervical cancer education program to influence the mutable individual level factors, such as knowledge, doctor-patient communications, perceptions of disease susceptibility and severity, cultural beliefs, and self-efficacy. We postulated that the education program would influence knowledge, beliefs, norms, and efficacy within the broader influences of health system factors over which the women have less control. The positive health behavior (receipt of a Pap smear, in this study) would reflect a complex decision-making process for each woman.

The Freirian empowerment pedagogy provides a model for adult education and it defines attributes of an ideal education environment, the mode of effective education and nurturance of new behavioral skills, and the incorporation of social and cultural norms and beliefs within the educational context. The pedagogy is based on the problem-posing learning method and involves an interactive rather than a didactic model of learning. There is extensive open dialogue, active participation, and group involvement (key community-based participatory research (CBPR) components^{20–22}), which allows the learners to become more personally involved in the subject of interest and yielding an increased likelihood of application of the new knowledge in everyday

life. In this pedagogy, learners are encouraged to appraise critically and to internalize new information they receive. This pedagogy is appropriate for Samoans since they have an oral tradition that values collective decision-making, experiential education, trust building, and interpersonal interactions.

Cervical cancer education program (the *intervention*). The cervical cancer education program consisted of three parts: specially developed English- and Samoan language cervical cancer education booklets (available upon request from the corresponding author); skill building and behavioral exercises; and interactive group discussion sessions. We developed the cervical cancer education booklets to address limitations (identified through focus groups conducted among Samoans) in the readability, comprehension, acceptability, and cultural appropriateness of standard cervical cancer education materials. The education booklets and the skill building and behavioral exercises necessary to model and role-play new behaviors supplemented the interactive group discussion sessions.

We tailored the education program's contents and implementation culturally. The cervical cancer educational booklets featured content in both Samoan and English, a specially developed medical lexicon of medical terms not found in the Samoan language (e.g., cervix, douche, vagina, vaginal cream), Samoan women as models in the booklets, and the booklet artwork comprising Samoan flora and fauna. The booklet's contents addressed myths and beliefs commonly harbored by Samoan women regarding cervical cancer risk factors (e.g., risk of developing cervical cancer is higher if: there is poor vaginal hygiene, one has sex during menstruation, one received hits or bruises in the vaginal area), signs and symptoms, treatment options, and survival. Lastly, the booklet presented the content in culturally appropriate and acceptable language, giving due deference to the religious and traditional sentiments of the target audience when describing sensitive information about the female anatomy and sex-related risk factors for cervical cancer. Samoan female health educators delivered the education program. The health educators conducted the education sessions in Samoan; used appropriate terms and phrases to convey sensitive information while respecting culturally- and religiously-constructed norms; used terms and phrases that were familiar to the women; formally recognized the participants based on positions in the church or religious hierarchy and/or kinship-based traditional titles; and, engaged the women in role play and skill building exercises (again mindful of cultural and religious sentiments).

The intervention was designed around three modules, corresponding to three sessions, which operationalized the Freirian pedagogy and its problem-posing method of education.³⁴ Before the first session, the educator distributed the cervical cancer educational booklets. During each session, the educator posed questions to encourage discussion and critical understanding on various topics relevant to cervical cancer control, including cancer and its impact on people's lives, the cervix and its function, etiology and risk factors for cervical cancer, specific beliefs harbored by Samoan women regarding cancer etiology and risk factors, signs and symptoms of cervical cancer, exams for screening and early detection of cervical cancer, patterns of care for cervical cancer, discussion of cervical cancer with health care professionals, and the development of an action plan to obtain a Pap smear. After a thorough discussion on a specific topic or a set of related topics, the educator instructed the women to review appropriate sections



from the cervical cancer educational booklet, thus reinforcing positive information. The educator also used role-play to practice effective doctor-patient communications and teaching tools (e.g., model of cervix and Pap smear kit) to complement the interactive discussions. Through these methods the educator guided the group members to recognize cervical cancer as their problem and to come up with appropriate solutions for controlling cervical cancer individually and collectively (as a group and/or community). Through the judicious use of the interactive discussions, active participation of all the women, role-play, and teaching tools, the educator molded the education intervention's content and process to the specific needs, characteristics, levels of formal education, and cervical cancer awareness of the women.

The first module (Cervical Cancer: Myths and Facts) focused on procedural rules of the sessions to institute group dynamics and initiate the interactive and empowerment pedagogy. The women developed their own groups' procedural rules, which generally included agreement to respect all points of view, maintain confidentiality about the discussion topics outside the group, avoid interruptions, avoid dominance of the discussion by one or two women, and provide constructive input. In addition, the session focused on general information on cancer (including cervical cancer). The women began to gain an understanding of important HBF constructs, such as knowledge and perceived susceptibility and severity. By discussing knowledge and by learning myths and facts, the women critically appraised or re-appraised their knowledge about cancer in general and cervical cancer in particular. The women also established (individually and as a group) a baseline knowledge and efficacy against which they could assess the extent to which they already had taken command of the problem of cervical cancer control. The second module (Cervical Cancer Risk Factors and Symptoms) focused on learning about risk factors and symptoms of cervical cancer and how cervical cancer could be detected in the early stages. This session focused on ways in which the women were in control of their health, and on learning about risk factors and symptoms of cervical cancer. The third module (Pap Smear and Follow-up) focused on what a Pap smear is and how it is carried out; obtaining access to Pap smears in the community; role play on how to request a Pap smear; and the importance of following up on abnormal findings. The women also role-played communicating with health care professionals. The women designed a plan of action for cervical cancer screening in relation to the information presented, another step designed to elevate their own expectations of themselves.

Two health educators (a Samoan nurse from the health department and a health sciences faculty member from the American Samoa Community College) delivered the cervical cancer education intervention. The educators were recruited based on their visibility in the community, interests in health education, and professional qualifications. The educators received intensive training over five days (about 20 hours) on various aspects of the education intervention. The training curriculum included (a) education in the intervention program's content (based on the cervical cancer booklet), and how to role-play, build skill-sets, and use models for effective teaching; (b) training in the interactive delivery of the education program and problem-posing learning techniques; and (c) training in initiating and facilitating effective interactive group discussions.

Measures. We designed the pretest and posttest survey questionnaires to operationalize constructs of the HBF. The questionnaires assessed socio-demographic characteristics



(pretest only), cervical cancer knowledge and attitudes, and Pap smear knowledge and utilization practices. The socio-demographic items included questions on age, place of birth, ethnic identity, marital status, household income, education level, and employment status. Cervical cancer knowledge and attitudes were measured by items that inquired about knowledge of risk factors; cervical cancer-related beliefs; culture-specific beliefs about cervical cancer etiology, prevention, and treatment; perceived efficacy of Pap smears to screen for cervical cancer; perceived susceptibility to and severity of cervical cancer; and the effects of cervical cancer on relationships and career. We developed the questionnaires in English, translated them into Samoan, and subsequently back-translated them into English, using standard procedures.³⁵ The surveys were validated by community reviewers and pilot-tested on randomly selected Samoan women.

We operationalized the HBF constructs by constructing measures from the questionnaire items. The majority of the questions were scaled with an index score of 1–4, with 1 = *strongly disagree* and 4 = *strongly agree* (and 9 = *do not know*). We compiled knowledge and attitude items into scale scores, which reflect the mean of the summed values across each item in the scale. We dichotomized (median-split) the scales for the descriptive analyses. The primary outcome under consideration was self-reported receipt of a Pap smear during the approximately six months between the pretest and posttest surveys as reported on the posttest survey. The primary outcome was based on the response to the question, “Since the last time we interviewed you, have you had a Pap smear?” The secondary outcomes of interest included the impact of the education program in effecting positive changes in knowledge, attitudes, and other psychosocial factors that may preclude preventive health practices.

Data collection. Samoan women interviewers conducted eligibility screening interviews and administered the pretest and posttest surveys in person. The interviewers received about 10 hours of training in the proper conduct of interviews, administration of the screening/eligibility determination questionnaire, and administration of the pretest and posttest questionnaires. The interviewers screened, recruited, and obtained consent from eligible women at the selected study sites (i.e., the Samoan churches). Next, the interviewers administered the pretest questionnaire, which took about 20 minutes. Approximately six months after the pretest survey, the interviewers administered the posttest survey, which took about 15 minutes. The pretest and posttest surveys were administered at the study sites. The interviewers were blind to the study group status. All interviewees received a token of \$5 for each completed survey.

Education program implementation. Between the pretest and posttest surveys, women in the intervention group participated in the educational program over three weekly educational sessions. The intervention group churches served as the education sites, with women participating in the educational sessions at the churches from which they were recruited. Each educational session lasted approximately two hours. Women participating in the educational sessions received a token payment of \$5 for each session they attended. To implement the cervical cancer education program, we constituted 20 groups with 8 to 14 women per group. Women in the control group received the cervical cancer education booklets after the posttest surveys.

Analysis. We conducted univariate and multivariate analyses to determine the effects of the education program on self-reported receipt of a Pap smear by women in



the intervention group. We used multivariate logistic regression to examine whether involvement in the education program predicted greater utilization of Pap smears, controlling for confounding factors; additionally, for each covariate, we calculated the adjusted relative risk of utilization of a Pap smear. While all of the adjusted relative risks of the covariates differed from the unadjusted relative risk, none of them differed by more than 10% from the unadjusted relative risk. Some of the potential confounders and/or effect modifiers (as identified in other studies) include age,³⁶ household income,³⁶ level of education,^{37,38} marital status,³⁹ and baseline knowledge about cervical cancer and Pap smears.³⁹ Therefore, we tested the association of these factors with either the exposure (i.e., the distribution among the intervention and control groups) and/or the outcome (i.e., obtaining a Pap smear). We used the Breslow-Day homogeneity test to check for effect modification and the Mantel-Hantzel test to check for confounding. There was no effect modification among the covariates (i.e., age, marital status, household income, and history of Pap smears). To assess pretest-to-posttest changes within the intervention and control groups, we used the McNemar's test. To assess pretest-to-posttest differences between the intervention and control groups, we used a generalized estimating equation model of repeated measures.

Results

Sample. The study sample comprised 416 eligible women recruited from the 26 Samoan churches in the two study locations. The majority (96%, $n=398$) of these women completed both the pretest and posttest assessments and formed the panel for the analysis. The pretest-to-posttest attrition was largely due to women leaving the study site (six and 10 women, respectively, from the intervention and control groups), and two control group women being too ill to continue participation. The women constituting the study panel did not differ significantly from those lost to follow-up on the socio-demographic variables (data not shown).

Sample characteristics at the pretest. With a few exceptions, the distribution of women on key socio-demographic and HBF constructs was comparable for the two study groups (Table 1). The distribution of women was comparable on indicators such as place of birth, language preference (Samoan or English), ethnic identification, employment status, level of education, household income, knowledge about cervical cancer-related risk factors, culture-specific beliefs regarding cervical cancer, perceptions of severity, need for social support to obtain a Pap smear, having concerns about screening, and self-efficacy. However, proportionally more women in the control group than in the intervention group were likely to be younger and single, and to self-report ever having had a Pap smear.

Exposure to the education program. Although we scheduled all the women in the intervention group for education sessions, six women left the study area prior to their first one. Of the remaining 201 intervention group women, 55.7% ($n=112$) participated in all three education sessions and an additional 27.4% ($n=55$) participated in two out of the three education sessions. Twenty one women (10.4%) participated in one education session and 13 women did not attend any education session.

Effectiveness of intervention on primary outcome—Pap smear use. At the posttest,



Table 1.
BASELINE SOCIO-DEMOGRAPHIC CHARACTERISTICS,
AND CULTURAL AND PSYCHOSOCIAL FACTORS
BY STUDY GROUP (N=398)

Characteristics	Study group			χ ² P-value
	Total (N=398)	Intervention (N=201)	Control (N=197)	
<i>Mean age in years (range)</i>	43 (20–80)	44 (20–80)	42 (20–74)	
<i>Age group</i>				
20–39 (%)	167 (42.0)	74 (36.8)	93 (47.2)	0.04
40 and over (%)	231 (58.0)	127 (63.2)	104 (52.8)	
<i>Place of birth</i>				
American Samoa (%)	191 (48.1)	88 (44.0)	103 (52.3)	0.24
Western Samoa (%)	192 (48.4)	105 (52.5)	87 (44.2)	
Other (%)	14 (3.5)	7 (3.5)	7 (3.6)	
<i>Language preference</i>				
More Samoan than English (%)	341 (85.7)	169 (84.1)	172 (87.3)	0.36
More English than Samoan (%)	57 (14.3)	32 (15.9)	25 (12.7)	
<i>Ethnic identity</i>				
More traditional (%)	271 (68.1)	135 (67.2)	136 (69.0)	0.69
Less traditional (%)	127 (31.9)	66 (32.8)	61 (31.0)	
<i>Employment status</i>				
In the workforce (%)	258 (64.8)	124 (61.7)	134 (68.0)	0.19
Not in the workforce (%)	140 (35.2)	77 (38.3)	63 (32.0)	
<i>Level of education</i>				
Below high school (%)	44 (11.1)	21 (10.5)	23 (11.7)	0.44
High school (%)	229 (57.5)	108 (53.7)	121 (61.4)	
Above high school (%)	112 (28.1)	61 (30.4)	51 (25.9)	
<i>Marital status</i>				
Currently married (%)	280 (70.4)	154 (76.6)	126 (64.0)	0.01
Not married (%)	117 (29.4)	47 (23.4)	70 (35.5)	
<i>Household income in \$</i>				
Under 10,000 (%)	177 (44.5)	80 (39.8)	97 (49.2)	0.08
10,000 or above (%)	193 (48.5)	105 (52.2)	88 (44.7)	
<i>Ever had Pap smear</i>				
Yes (%)	261 (65.6)	121 (60.2)	140 (71.1)	0.01
No (%)	135 (33.9)	80 (39.8)	55 (27.9)	
<i>Knowledge about risk factors</i>				
Higher knowledge (%)	96 (24.1)	47 (23.4)	49 (24.9)	0.73
Lower knowledge (%)	302 (75.9)	154 (76.6)	148 (75.1)	
<i>Culture-specific beliefs</i>				
Greater endorsement (%)	127 (32.1)	71 (35.7)	56 (28.4)	0.12
Lesser endorsement (%)	269 (67.9)	128 (64.3)	141 (71.6)	

(Continued on p. 95)



Table 1. (continued)

Characteristics	Study group			χ^2 P-value
	Total (N=398)	Intervention (N=201)	Control (N=197)	
<i>Perceived severity</i>				
Very likely (%)	99 (25.0)	43 (21.6)	56 (28.4)	0.12
Not or somewhat likely (%)	297 (75.0)	156 (78.4)	141 (71.6)	
<i>Need for support to get a Pap smear</i>				
Greater need (%)	208 (52.8)	102 (51.3)	106 (54.4)	0.54
Lesser need (%)	186 (47.2)	97 (48.7)	89 (45.6)	
<i>Screening concerns</i>				
Higher degree (%)	158 (39.9)	76 (38.2)	82 (41.6)	0.49
Lower degree (%)	238 (60.1)	123 (61.8)	115 (58.4)	
<i>Self-efficacy</i>				
Higher degree (%)	180 (45.2)	97 (48.3)	83 (42.1)	0.22
Lower degree (%)	218 (54.8)	104 (51.7)	114 (57.9)	

120 women (30.2%) self-reported obtaining a Pap smear between the pretest and posttest surveys. Women in the intervention group (61.7%, $n=74$, $p<.01$) compared with those in the control group (38.3%, $n=46$) were significantly more likely to self-report having obtained a Pap smear. Multivariate logistic regression analysis (see Table 2) revealed that women in the intervention group had two times higher odds of having obtained a Pap smear by the posttest compared with women in the control group (adjusted odds ratio [OR] = 2.0, 95% confidence interval [CI] = 1.3–3.2, $p<.01$). Additional significant predictors (as measured at the pretest or baseline) of self-reporting having received a Pap smear by the posttest included being 40 years and older, household income of \$10,000 or above, and having more concerns about the screening exam. In addition, women who were single and those with greater endorsement of culture-specific beliefs were significantly less likely to self-report at the posttest having obtained a Pap smear between the pretest and posttest surveys.

Effectiveness of intervention on secondary outcomes—pretest-to-posttest changes in knowledge, attitudes, and psychosocial factors. Table 3 presents data on within and between group (intervention and control) changes between the pretest and posttest surveys on knowledge, attitudes, and psychosocial factors. Within the intervention group, from pretest-to-posttest, there were significant *positive changes* in knowledge about cervical cancer risk factors (+15.2%, $p=.01$) and perceptions of severity of cervical cancer (+10.6%, $p=.01$), and there was a significant *negative change* in the perceived need for social support for obtaining a Pap screen (−10.1%, $p<.03$). Within the control group, from pretest-to-posttest, there was a significant *positive change* in perceptions of self-efficacy (+10.2%, $p<.05$). Pretest-to-posttest, the only significant difference between the intervention and control groups was the mean knowledge score

Table 2.
SELF-REPORTED RECEIPT OF PAP SMEAR
AT POSTTEST BY BASELINE FACTORS (N= 120)

Characteristics	N	OR	CI	P-value
<i>Study group</i>				
Control	46	1.0		
Intervention	74	2.0	1.3–3.2	0.004
<i>Age group (years)</i>				
20–39	40	1.0		
40 and over	80	1.7	1.1–2.6	0.03
<i>Marital status</i>				
Currently married	94	1.0		
Currently single	26	0.6	0.3–0.9	0.03
<i>Household income (\$)</i>				
Under 10,000	43	1.0		
10,000 or above	70	1.8	1.1–2.8	0.01
<i>Culture-specific beliefs</i>				
Lesser endorsement	90	1.0		
Greater endorsement	29	0.6	0.4–0.9	0.03
<i>Screening concerns</i>				
Lesser degree	61	1.0		
Higher degree	59	1.7	1.1–2.6	0.02

OR = odds ratio
 CI = confidence interval

(data not shown). The change in mean knowledge scale score was significantly higher in the intervention group than in the control group (0.44 vs. 0.04, $p < .05$).

Discussion

To the best of our knowledge, this is one of the first community-based participatory intervention trials that tested the effectiveness of a theory-guided, culturally tailored cervical cancer education program for Samoan women. The findings present evidence that Samoan women involved in the education program were twice as likely as women not involved in the education program to report obtaining a Pap smear after being involved in the education program. In addition, involvement in the education program also resulted in positive gains in cervical cancer-related knowledge about risk factors, signs and symptoms, and preventive measures.

Several factors could explain the efficacy of the cervical cancer education program in effecting positive changes in both self-reported Pap smear use and cervical cancer-related knowledge. The CBPR principles guided the conceptualization, design, and



Table 3.**PRETEST-TO-POSTTEST WITHIN AND BETWEEN GROUP CHANGES IN KNOWLEDGE, ATTITUDES, AND PSYCHOSOCIAL FACTORS**

Characteristics	Study group				
	Intervention		Control		P-value**
	Change (%)	P-value*	Change (%)	P-value*	
Knowledge about risk factors	15.2	0.01	1.4	0.49	0.15
Culture-specific beliefs	3.5	0.39	9.6	0.02	0.25
Control over recovery	4.5	0.31	6.7	0.15	0.75
Perceived severity	10.6	0.01	2.5	0.54	0.16
Need social support to obtain a Pap smear	-10.1	0.03	-4.1	0.35	0.32
Screening concerns	2.5	0.58	-8.1	0.09	0.12
Self-efficacy	1.0	0.82	10.2	0.02	0.14

*Test of significance based on McNemar's test of pretest-to-posttest within-group changes based on dichotomized index

**Test of significance based on Generalized Estimating Equations model of repeated measures

implementation of the study. Of paramount importance was the involvement of Samoans in every facet of the study. In addition, we culturally tailored the education program by using culturally and linguistically appropriate materials, education delivery format, and educators. Trained Samoan health educators delivered the education program. Moreover, the materials used for the discussion were specially developed education booklets written in Samoan. These booklets addressed cervical cancer myths and facts as identified by Samoan women in our prior studies.^{16,23,25} The demonstration with a Pap smear kit and the practical discussion on how the exam is performed may have alleviated fear and embarrassment about the procedure. Furthermore, the role play and skill-building exercises for effective doctor-patient communications and interactions may have demystified the screening exam and provided the women with specific questions to ask their health care professionals. Equally important, the Freirian empowerment pedagogy, with its emphasis on interactive discussions and consensus-building, is close to the Samoan traditional discourse and decision making process—thus facilitating learning and development of action plans to obtain a Pap smear. Lastly, we selected the women from churches: the group-based dynamics and positive reinforcement inherent in peer groups should not be underestimated. It is quite possible that either the church ministers' wives or leaders of the women's groups in the churches reinforced the education program's emphasis on positive behavior change.

While the mean knowledge scale scores were significantly higher for the intervention group (mean=3.33) than for the control group (mean=2.94), there were no significant between-group differences on individual knowledge items that constituted the knowledge scale. This could have been due to an inadequate number of cervical cancer education sessions. There was no educational review or reinforcement session after the three education sessions, and we administered the posttest survey five months after the education sessions had ended. A previous intervention study among Latinas using a similarly designed cancer education program had a greater number and frequency of education sessions, as well as a shorter time from pretest to posttest.⁴⁰ Despite the lack of a reinforcement education session during the approximately five-month period between the end of the education intervention and the posttest survey, the women in the intervention group appeared to have retained the information learned during the education program, as indicated by the significantly higher mean knowledge scale scores at the posttest.

Women who were currently single (as opposed to currently married) had lower odds of having obtained a Pap smear by the posttest. This has been seen previously among members of other ethnic groups.³⁹ Married individuals are known to utilize health care more than single individuals.⁴¹ Married women are also more likely to have children in the health care system, and therefore to have more opportunities to obtain health care for themselves. Another factor that may explain this finding is that in the U.S. Territory of American Samoa, Pap smears are provided to women during their regular prenatal visits but are less likely to be available for regular preventive care.

The study has several strengths. We based our study design, methods, education program, and implementation strategies on prior research among Samoan women^{16,25} and specifically developed and culturally tailored the education program to address gaps in knowledge and practice as identified by Samoan women. Moreover, for a prospective study, we lost very few women to attrition—only 18 out of 416 eligible women. The loss to attrition was due to women leaving the U.S. Territory of American Samoa (n=16) or being too ill to be re-interviewed at the posttest (n=2). Lastly, the findings reported here are consistent with other studies in terms of the effect of age, socioeconomic status, and marital status on Pap smear use. There are also some limitations of this study. There is no information on who declined to participate in the study, which could have resulted in selection bias. The questionnaire did not include questions on sexual activity, one of the major risk factors of developing cervical cancer. The data on utilization of Pap smear at the posttest are self-reported and could be inaccurate. Lastly, the data presented herein were collected in 1999–2000 and may not reflect current cervical cancer-related knowledge, beliefs, and Pap smear use. This caveat, however, should not detract from the strong evidence supporting the effectiveness of the educational program.

Future research should consider testing the efficacy of this educational program among Samoan women residing in Hawaii and the U.S. mainland. Such research would provide insights into the effects of migration, acculturation, varying environments, cultures, attitudes, and social trends on the efficacy of the cervical cancer education program. In addition, it would be important to validate the utilization of Pap smears through medical chart audits. Research about sexual activity among Samoans would



also help establish baseline knowledge in an effort to prevent high-risk activity, which contributes to the development of cervical cancer. Extending the education sessions and/or providing more reinforcement of knowledge may help Samoans further retain knowledge and thus increase Pap smear utilization.

In conclusion, findings from this study suggest that a multifaceted, theoretically-guided, culturally tailored cervical cancer education intervention can improve Pap smear use among Samoan women and effect positive changes in knowledge and attitudes.

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Notes

1. Solomon D, Breen N, McNeel T. Cervical cancer screening rates in the United States and the potential impact of implementation of screening guidelines. *CA Cancer J Clin*. 2007 Mar–Apr;57(2):105–11.
2. Trimble EL, Harlan LC, Gius D, et al. Patterns of care for women with cervical cancer in the United States. *Cancer*. 2008 Aug 15;113(4):743–9.
3. National Cancer Institute. SEER Stat Fact Sheets—cancer of the cervix uteri. Bethesda, MD: National Cancer Institute, 2008. Available at: <http://seer.cancer.gov/statfacts/html/cervix.html>.
4. Downs LS, Smith JS, Scarinci I, et al. The disparity of cervical cancer in diverse populations. *Gynecol Oncol*. 2008 May;109(2 Suppl):S22–30.
5. Espey DK, Wu XC, Swan J, et al. Annual report to the nation on the status of cancer, 1975–2004, featuring cancer in American Indians and Alaska Natives. *Cancer*. 2007 Nov 15;110(10):2119–52.
6. Garner EI. Cervical cancer: disparities in screening, treatment, and survival. *Cancer Epidemiol Biomarkers Prev*. 2003 Mar;12(3):242s–247s.
7. Johnson CE, Mues KE, Mayne SL, et al. Cervical cancer screening among immigrants and ethnic minorities: a systematic review using the Health Belief Model. *J Low Genit Tract Dis*. 2008 Jul;12(3):232–41.
8. McDougall JA, Madeleine MM, Daling JR, et al. Racial and ethnic disparities in cervical cancer incidence rates in the United States, 1992–2003. *Cancer Causes Control*. 2007 Dec;18(10):1175–86. Epub 2007 Sep 6.
9. Tsui J, Saraiya M, Thompson T, et al. Cervical cancer screening among foreign-born women by birthplace and duration in the United States. *J Womens Health (Larchmt)*. 2007 Dec;16(10):1447–57.



10. Seeff LC, McKenna MT. Cervical cancer mortality among foreign-born women living in the United States, 1985 to 1996. *Cancer Detect Prev.* 2003;27(3):203–8.
11. U.S. Preventive Services Task Force. Screening for cervical cancer: summary of recommendations. Rockville, MD: Agency for Healthcare Research and Quality, 2003. Available at: <http://www.ahcpr.gov/clinic/uspstf/uspstf/uspstf.htm>.
12. National Cancer Institute. Cancer trends progress report—2007 update. Bethesda, MD: National Cancer Institute, 2007. Available at: <http://progressreport.cancer.gov>.
13. Bazargan M, Bazargan SH, Farooq M, et al. Correlates of cervical cancer screening among underserved Hispanic and African-American women. *Prev Med.* 2004 Sep; 39(3):465–73.
14. De Alba I, Ngo-Metzger Q, Sweningson JM, et al. Pap smear use in California: are we closing the racial/ethnic gap? *Prev Med.* 2005 Jun;40(6):747–55.
15. Green EH, Freund KM, Posner MA, et al. Pap smear rates among Haitian immigrant women in eastern Massachusetts. *Public Health Rep.* 2005 Mar–Apr;120(2):133–9.
16. Mishra SI, Luce-Aoelua PH, Hubbell FA. Predictors of Papanicolaou smear use among American Samoan women. *J Gen Intern Med.* 2001 May;16(5):320–4.
17. Mishra SI, Luce-Aoelua P, Wilkens LR, et al. Cancer among American-Samoans: site-specific incidence in California and Hawaii. *Int J Epidemiol.* 1996 Aug;25(4): 713–21.
18. Mishra SI, Luce-Aoelua PH, Wilkens LR. Cancer among indigenous populations. The experience of American Samoans. *Cancer.* 1996 Oct 1;78(7 Suppl):1553–7.
19. U.S. Department of Health and Human Services. Healthy People 2010 (conference edition, vol. 1 and vol. 2). Washington, DC: U.S. Department of Health and Human Services, 2000. Available at: http://www.eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/16/5b/7c.pdf.
20. Israel BA, Schulz AJ, Parker EA, et al. Critical issues in developing and following community based participatory research principles. In: Minkler M, Wallerstein N, eds. *Community-based participatory research for health*. San Francisco, CA: Jossey-Bass, 2003.
21. Israel BA, Schulz AJ, Parker EA, et al. Review of community-based research: assessing partnership approaches to improve public health. *Annu Rev Public Health.* 1998; 19:173–202.
22. Minkler M, Wallerstein N, eds. *Community-based participatory research for health*. San Francisco, CA: Jossey-Bass, 2002.
23. Mishra SI, Aoelua PL, Hubbell FA. Knowledge of and attitudes about cancer among American Samoans. *Cancer Detect Prev.* 2000;24(2):186–95.
24. Mishra SI, Luce PH, Hubbell FA. Breast cancer screening among American Samoan women. *Prev Med.* 2001 Jul;33(1):9–17.
25. Mishra SI, Luce-Aoelua PH, Hubbell FA. Identifying the cancer control needs of American Samoans. *Asian Am Pac Isl J Health.* 1998 Summer;6(2):277–85.
26. Bastani R, Maxwell AE, Bradford C, et al. Tailored risk notification for women with a family history of breast cancer. *Prev Med.* 1999 Nov;29(5):355–64.
27. Curry SJ, Emmons KM. Theoretical models for predicting and improving compliance with breast cancer screening. *Ann Behav Med.* 1994;16(4):302–16.
28. Maxwell AE, Bastani R, Vida P, et al. Results of a randomized trial to increase breast and cervical cancer screening among Filipino American women. *Prev Med.* 2003 Aug;37(2):102–9.

29. Freire P. Education as cultural action: an introduction. In: Colonnese LM, ed. *Conscientization for liberation*. Washington, DC: Division of Latin Studies, U.S. Catholic Conference, 1971.
30. Freire P. Cultural action and conscientization. *Harv Educ Rev*. 1970;40(3):452-77.
31. Bastani R, Marcus AC, Maxwell AE, et al. Evaluation of an intervention to increase mammography screening in Los Angeles. *Prev Med*. 1994 Jan;23(1):83-90.
32. Mishra SI, Bastani R, Crespi CM, et al. Results of a randomized trial to increase mammogram usage among Samoan women. *Cancer Epidemiol Biomarkers Prev*. 2007 Dec;16(12):2594-604.
33. Mishra SI, Hess J, Luce PH. Predictors of indigenous healer use among Samoans. *Altern Ther Health Med*. 2003 Nov-Dec;9(6):64-9.
34. Freire P. Creating alternative research methods: learning to do it by doing it. In: Hall BL, Gillette A, Tandon R, eds. *Creating knowledge: a monology?* New Delhi, India: Society for Participatory Research in Asia, 1982; 29-37.
35. Hendricson WD, Russell IJ, Prihoda TJ, et al. An approach to developing a valid Spanish language translation of a health-status questionnaire. *Med Care*. 1989 Oct; 27(10):959-66.
36. Yi JK. Factors associated with cervical cancer screening behavior among Vietnamese women. *J Community Health*. 1994 Jun;19(3):189-200.
37. McPhee SJ, Bird JA, Davis T, et al. Barriers to breast and cervical cancer screening among Vietnamese-American women. *Am J Prev Med*. 1997 May-Jun;13(3):205-13.
38. McPhee SJ, Stewart S, Brock KC, et al. Factors associated with breast and cervical cancer screening practices among Vietnamese American women. *Cancer Detect Prev*. 1997;21(6):510-21.
39. Schulmeister L, Lifsey DS. Cervical cancer screening knowledge, behaviors, and beliefs of Vietnamese women. *Oncol Nurs Forum*. 1999 Jun;26(5):879-87.
40. Mishra SI, Chavez LR, Magana JR, et al. Improving breast cancer control among Latinas: evaluation of a theory-based educational program. *Health Educ Behav*. 1998 Oct;25(5):653-70.
41. Joung IM, van der Meer JB, Mackenbach JP. Marital status and health care utilization. *Int J Epidemiol*. 1995 Jun;24(3):569-75.

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