

# A Cervical Cancer Community-Based Participatory Research Project in a Native American Community

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The Messengers for Health on the Apsáalooke Reservation project uses a community-based participatory research (CBPR) approach and lay health advisors (LHAs) to generate knowledge and awareness about cervical cancer prevention among community members in a culturally competent manner. Northern Plains Native Americans, of whom Apsáalooke women are a part, continue to be disproportionately affected by cervical cancer. This article examines quantitative and qualitative changes that occurred in the community since the inception of the Messengers for Health program. Paired sample *t* tests are used to evaluate the one-group pretest and posttest interviews of 83 Apsáalooke women in knowledge, comfort, and cancer awareness levels. Results reveal cervical cancer knowledge gains, gains in participants' comfort discussing cancer issues, and gains in awareness of cervical cancer and the Messengers program. Field notes, meeting minutes, and community perceptions are used to qualitatively evaluate the effectiveness of the Messengers program. Practice implications are discussed.

**Keywords:** *lay health advisors; cervical cancer; community-based participatory research; community health; Native Americans*

The Messengers for Health on the Apsáalooke Reservation project used a community-based participatory research (CBPR) and lay health advisor (LHA) approach to decrease cervical cancer screening barriers and increase knowledge of cervical cancer screening and prevention. Native American women, especially Northern Plains Native American women (of whom Apsáalooke women are a part), are disproportionately affected by cervical cancer. The age-adjusted cervical cancer mortality rate for Native American women is 4.0 per 100,000, whereas the all U.S. races rate is 2.9 per 100,000,

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a statistically significant difference (Espey, Paisano, & Cobb, 2005). The difference is found particularly in the northern plains and southwest regions. To address these health disparities in Montana and ascertain the feasibility of the Messengers for Health project, university and community partners began meeting in 1996. In 2001, funding was secured and the project commenced.

This article provides quantitative and qualitative evaluation results from the Messengers for Health project. Quantitative results are from pre- and posttest interviews of a random sample of women on the Apsáalooke Reservation that covered questions related to Pap test and cervical cancer knowledge; women's comfort levels discussing cancer among friends, family, and coworkers; and the frequency of women hearing about a cervical cancer screening test, information about cervical health, and information about Messengers for Health. Qualitative results are from field notes, meeting minutes, and staff and community perceptions.

The inclusion of quantitative and qualitative results provides a more complete view of change in the community and can strengthen the validity of findings compared to using one type of result (Rossi, Lipsey, & Freeman, 2004). It is recommended to combine contextual analysis with statistical results from one-group pretest–posttest designs (Bamberger, Rugh, & Mabry, 2006). In addition, when generalizable estimates of program effects—usually gathered quantitatively—are used to the exclusion of other types of indicators—usually gathered qualitatively—“they may be blind to some of the other, and possibly more effective, mechanisms triggered by the program” (Potvin, Gendron, Bilodeau, & Chabot, 2005, p. 593). The use of a CBPR approach provides contextualized findings of what happened during the Messengers program and the results of the program in the Apsáalooke community.

The Institutional Review Boards of Montana State University–Bozeman and the Indian Health Services (IHS) Billings Area Office approved this research. The IHS Billings Area Office, IHS Crow Service Unit, and Crow Nation Executive Administration allowed permission to publish this information.

## BACKGROUND

### CBPR in Indian Country

Native Americans—including members of the Apsáalooke community—have historically been used as research participants but have not been included in determining what is being researched or how the research process is executed (Sobeck, Chapleski, & Fisher, 2003). This lack of community inclusion and involvement in research has been cited as problematic, exploitative, unethical, and a possible “cause” of failed interventions (Mihesuah, 1993). To address such shortcomings in research methods and intervention in Indian country and to involve Native American communities in all aspects of the research process, researchers have started implementing a CBPR approach. From its inception, Messengers for Health also adopted a CBPR approach.

The CBPR framework involves the community at all levels throughout the research process and emphasizes “health promotion and disease prevention *with and for* the public rather than *on* the public” (Leung, Yen, & Minkler, 2004, p. 504). CBPR is often cited as the most appropriate method for conducting culturally competent research in Indian country. Individuals are more inclined to participate in research if they are involved

in determining research goals and methods (Christopher, 2005; Crazy Bull, 1997). Moreover, the use of collaborative or participatory research efforts is understood to be a key strategy in effectively reducing health disparities in underserved or marginalized communities (Horner et al., 2004).

### LHAs

In conjunction with using a CBPR approach, LHAs are becoming an increasingly popular and effective way of disseminating health information in underserved communities. LHAs are typically community members who are selected to receive and spread information on health issues that disproportionately affect their community. LHAs are chosen because they are trusted, respected members within their communities who are sought after for support and advice. Their effectiveness stems from their position in the community and their capacity to relay information in an accurate, sensitive, and respectful manner.

LHA programs have demonstrated effective outcomes in various health programs, including programs that increased sexually transmitted disease prevention behaviors (Thomas, Eng, Clark, Robinson, & Blumenthal, 1998), educated female Latina migrant farm workers about the need for prenatal care and well child care (Watkins et al., 1994), increased mammography screening rates among low-income African American women (Bishop, Earp, Eng, & Lynch, 2002), and decreased exposure to lead from mine waste among children from eight Native American tribes (Kegler & Malcoe, 2004; Kegler, Stern, Whitecrow-Ollis, & Malcoe, 2003).

Various approaches determine suitable community members for the role of an LHA. In this project, staff used a three-step community-based approach. The first step was to ascertain the qualities and characteristics an Apsáalooke woman would look for in an LHA and was done by asking, on a pretest survey, "What are the qualities and characteristics of a Crow woman whom you might turn to for advice and support about your health?" Responses included virtuous, knowledgeable, confidential, sincere, compassionate, understanding, and with integrity. Next, community members were asked in open community meetings to identify community women who had these attributes. There were 44 Apsáalooke women identified as potential LHAs. In the third step, the project coordinator individually contacted these women to see if they were interested in being *Messengers*, the term the project uses for LHAs. Many of the women felt honored that they were suggested for this role but were too busy to commit. Of the 44 women, 24 participated in the initial training (for information on training content and evaluation, see Watts, Christopher, Smith, & Knows His Gun McCormick, 2005). The Messengers, because they are community members, have a deep understanding of the distinctive cultural characteristics present in the Apsáalooke community and can therefore relay cervical cancer information in a culturally competent, effective style.

There were several methods used to ascertain that the Messengers understood and could communicate accurate health information. First, the majority of the Messengers were nominated by other community members as women who others turn to for support and advice and as women who would be able—with training—to provide cervical cancer education to other community members. A small number of women nominated themselves to be Messengers, and the project coordinator, who is from the community, determined their ability to carry out the responsibilities of a Messenger. Second, at the initial training, we conducted a pre-post training cervical health knowledge assessment. The training was done in two consecutive evenings. The assessment consisted of 22 items, and

the women answered yes, no, or don't know to each item. The assessment was given immediately before the first training session and immediately after the second training session. Example items included "The Pap test checks for cancer of the cervix," "Family history is a risk factor for cervical cancer (it is hereditary)," "There are things a woman can do to prevent cervical cancer," and "HPV is a major cause of cervical cancer." We measured internal consistency reliability using Cronbach's alpha, and the assessment tool at pretest was found to be acceptable with an alpha of .82. So that the Messengers would be comfortable completing the survey, we did not gather identifying information on the pre- and posttest and could not conduct a paired *t* test. A two-tailed one-sample *t* test showed a significant increase in scores from pretest ( $M = 13.2$ ,  $SD = 3.53$ ) to posttest ( $M = 19.1$ ,  $SD = 1.58$ ),  $t(20) = 17.12$ ,  $p < .000$ ). At posttest, Messengers correctly answered an average of 19 out of 22 items. Third, during the initial training, there was a section to prepare the Messengers for outreach. Project staff provided the women with information about cervical health and outreach, and they were given an opportunity to receive information, comprehend it, and then share it in one-on-one role-playing with another community member. This revealed if the women were capable of effectively relaying information to other community members. Project staff monitored the role-playing. Fourth, the project coordinator empowered the Messengers to feel comfortable providing one-on-one outreach and oral presentations by working closely with them in activities and outreach. She was able to observe them in action and provide assistance at health fairs, outreach booths, community workshops, and school presentations.

### **Intervention**

The principal investigator (PI) and project coordinator met in 1996, while both were doing some work for the state health department. Over time, relationships were built, and the project coordinator stated an interest in having a cancer project in the community. The PI promised herself and other university staff to work in partnership with the community in all phases of the work by, for example, holding community meetings, having all project meetings open to the public, sharing all data, coanalyzing data with community members, keeping control of grant activities and grant direction with the community, and collaborating with local entities. Community members closely watched the project and saw that project staff kept their word. They stated that this directly affected project results.

During the intervention, Messengers provided cervical cancer education and general health education directly to women and indirectly to men (e.g., via family members, newspaper articles, and project information available to all members of the community). The Messengers received education from project staff and guest lecturers during monthly meetings and yearly retreats. Process evaluation information from the Messengers showed that there were multiple ways they passed information to women in the community, including through interactions that took place during the Messengers' daily activities. Messengers reported discussing health issues with other women at locations including at their own homes (via telephone and personal visits), other people's homes, church, the sweat lodge, powwows, and work. Community locations at which Messengers visited women included the post office, tribal offices, groceries stores, other stores, sporting events, and the local swimming pool. Messengers also participated in women's health fairs and outreach booths and held group presentations at churches, beading groups, Little Big Horn College, the IHS hospital and clinics, and schools.

## QUANTITATIVE METHOD

### Sample and Procedure

A one-group pretest–posttest design was used to assess quantitative changes in knowledge, comfort, and awareness surrounding Pap tests and cervical cancer from 2002 prior to the LHA intervention to 2005, when the posttest survey was completed. Participants were randomly selected from the Apsáalooke tribal roll, which includes all enrolled members of the tribe. For the pretest in 2002, 101 women were interviewed. For the posttest in 2005, 83 of the same women were interviewed (for more information on the pretest sample and survey, see Smith, Christopher, & Knows His Gun McCormick, 2004). From the 101 women interviewed for the pretest, 4 women passed away, 10 women moved off the reservation for work, school, or family reasons, 2 women refused interviews because of time constraints, and 2 women were unable to complete posttest interviews because of extended hospitalizations and poor health.

University and community partners worked in concert to develop a culturally appropriate survey and interviewer training manual (Christopher, Burhansstipanov, & Knows His Gun McCormick, 2005; Christopher, Knows His Gun McCormick, Smith, & Christopher, 2005). Pretest and posttest interviews were conducted by Apsáalooke women who ranged in age from their early 20s to late 50s. Interviewers asked sensitive questions related to cervical cancer; therefore, only women conducted interviews. Interviewers attended training sessions at Little Big Horn Tribal College, a 2-year college located on the reservation. Training sessions were conducted to ensure interviews were completed in a culturally competent and uniform manner.

### Measures

*Pap Test Knowledge.* The first set of questions asked women if they agreed, disagreed, or didn't know if women needed Pap tests in nine situations. These questions came from the Alaska Native Women's Health Project survey, and there are no extant data on question reliability or validity. For this study, we summed the scores of the nine questions. A Cronbach's alpha of .71 suggested the grouping was reliable. Scores ranged from 1 to 9, with a score of 9 indicating all questions were answered correctly.

*Cervical Cancer Knowledge.* The second set of questions asked women if they agreed or disagreed with five statements about cervical cancer. The first statement came from a cervical cancer prevention project for Native American women in North Carolina (Bell et al., 1999). The remaining statements were based on questions used by other surveys. All questions were adapted for use in this study; therefore, there is no extant reliability or validity information. For this study, we summed the scores of the five questions to yield a total cervical cancer knowledge score (pretest Cronbach's  $\alpha = .60$ ).

*Comfort Discussing Cancer Issues.* Six questions were asked to determine the participant's comfort level in discussing cancer issues with others. These questions included "If you were to need cancer tests or treatment, are there people you could talk to about your feelings and concerns?" and "If you had cancer would you talk to your friends about it?" All six questions were analyzed as an aggregate to determine if women's comfort levels discussing cancer had increased from pre- to posttest. These questions came from the Labor International Union of North America Health Survey

Instrument (Laborers' Health and Safety Fund, n.d.), and the researchers have been unable to find any information on the reliability and validity of these questions. A Cronbach's alpha score of .72 revealed internal consistency of the summed scores for use in this study.

*Awareness.* Women were asked if they had ever heard of a test that could be done to check for cervical cancer. In addition, two questions were used to ascertain cervical cancer awareness in the community. The first question asked women if they had heard anything about cervical health in the past year. The second question asked women if they had heard about the Messengers for Health program.

### **Data Analysis**

Data were cleaned, coded, and entered using SPSS for Windows. All data were entered twice for verification purposes. Next, univariate analyses were conducted to examine frequency distributions and to examine data for errors in data entry or outliers, which were checked against the interview schedule to ensure accuracy. To compare pretest and posttest differences in demographic characteristics, we ran cross-tabulations and chi-square analyses for discrete data and paired-sample *t* tests for continuous data. Finally, we ran a series of one-tailed paired *t* tests to examine changes in scores from the pretest to the posttest.

## **QUANTITATIVE RESULTS**

### **Description of Interview Participants**

Table 1 shows demographic characteristics of the sample. Statistical data presented below compares responses from women who participated in both the pretest and the posttest. Overall, the mean age of participants was 41 years, with a range from 21 to 77. The majority were high school graduates (83.0%), with 56.1% having attended at least some college or technical school training. More than half (68.7%) of the participants were employed and, of those, 91.2% worked full-time. In analyses comparing demographic data from the pretest to posttest, the only variable that was significantly different was the total number of children living in the home, which decreased from a mean of 2.3 ( $SD = 1.4$ ) at the pretest to a mean of 1.9 ( $SD = 1.5$ ) at the posttest,  $t(80) = 3.5, p < .001$ .

### **Pap Test and Cervical Cancer Knowledge, Comfort, and Awareness**

To determine if there was a change in Pap test and cervical cancer knowledge scores from the pre- to posttest, we analyzed two knowledge indices (see Table 2). First, examining total Pap test knowledge scores, we found no significant increase in knowledge scores from the pre- to posttest when all participants were included in the analyses. To explore the possibility of a ceiling effect, we eliminated those who scored a 9 on the pretest. Results of this subset of participants revealed a statistically significant increase in knowledge from the pretest ( $M = 7.2, SD = 1.1$ ) to the posttest ( $M = 7.8, SD = 1.6$ ),  $t(31) = -2.00, p < .05$ . Second, we examined total cervical cancer knowledge scores and found

Table 1. Description of Interview Participants for Pretest and Posttest

Demographic Characteristics	Pretest (2002) <sup>a</sup>		Posttest (2005) <sup>b</sup>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Age in years	37.7	13.2	41.0	11.8****
Household size				
Number of adults in household	2.5	0.9	2.4	1.0
Number of children in household	2.4	1.4	1.9	1.5****
	<i>n</i>	%	<i>n</i>	%
Education level				
Less than high school degree	20	19.8	14	17.1
High school graduate or GED	27	26.7	22	26.8
Some college or tech school	43	42.6	36	43.9
College graduate or higher	11	10.9	10	12.2
Employment status				
Employed (% yes)	58	57.4	57	68.7
Working full-time (% yes)	47	81.0	52	91.2
Working part-time (% yes)	11	19.0	5	8.8
Income				
Less than \$10,000	36	37.5	31	40.2
\$10,000 to \$19,999	23	24.0	13	16.9
\$20,000 to \$29,999	20	20.8	19	24.7
\$30,000 to \$39,999	6	6.2	6	7.8
\$40,000 or more	11	11.5	8	10.4

a.  $n = 101$ .

b.  $n = 83$ .

\*\* $p < .05$ . \*\*\* $p < .01$ . \*\*\*\* $p < .001$ .

a statistically significant increase in knowledge from pre- to posttest,  $t(82) = -2.05, p < .05$ . Examining the individual knowledge items revealed a statistically significant increase in knowledge on two out of the five items.

Next, we examined  $t$  test results from questions related to women's comfort discussing cancer issues (see Table 2). Findings revealed a statistically significant increase in scores from the pre- to posttest,  $t(81) = -2.23, p < .05$ . All six questions showed an increase in the valid percentage of yes responses from pretest to posttest.

Finally, we examined participant awareness of cervical cancer (see Table 2). Women were asked if they had ever heard of a test that could be done to check for cervical cancer. A comparison of pre- and posttest scores revealed that significantly more women in the posttest reported that they had heard of a test that can check for cervical cancer,  $t(82) = -2.59, p < .01$ . The valid percentage of women who responded yes to having heard about this test increased from 67.3% at the pretest to 79.5% at the posttest. There were two questions that asked about cervical cancer awareness in the community. The first question asked women if they had heard anything about cervical health in the past year. A statistically significant increase was present from pretest to posttest,  $t(78) = -3.67, p < .001$ . The second question asked women if they had heard about the Messengers for Health program. A statistically significant increase was present from pretest to posttest,  $t(43) = -10.13, p < .001$ .

Table 2. Knowledge, Comfort, and Awareness Scores Between Pretest and Posttest

Study Variables	Pretest		Posttest	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Total Pap test knowledge score	8.30	1.1	8.19	1.3
Women who take birth control pills	0.95	0.2	0.96	0.2
Women who have stopped having babies	0.95	0.2	0.96	0.2
Women who haven't had sex for 6 months or longer	0.83	0.4	0.86	0.4
Women who can't get pregnant	0.95	0.2	0.92	0.3
Women who have never been pregnant	0.92	0.3	0.90	0.3
Women who have unusual discharge or bleeding from the vagina	0.99	0.1	1.00	0.0
Women who take female hormones	0.88	0.3	0.89	0.3
Women who have had a hysterectomy and their cervix was NOT removed	0.91	0.3	0.82	0.4**
Women who have not received a written reminder for Pap test	0.94	0.2	0.90	0.3
Total cervical cancer knowledge score	3.72	1.2	4.01	1.0**
Cervical cancer can be found early with a Pap test	0.96	0.2	1.00	0.0**
A woman is more likely to get cervical cancer if she began having sex at an early age	0.45	0.5	0.56	0.5*
A woman is more likely to get cervical cancer if she has had many sexual partners over her lifetime	0.64	0.5	0.93	0.3
If cervical cancer is found early it can be cured	0.93	0.3	0.98	0.2*
There are things a woman can do to prevent or control cervical cancer	0.77	0.4	0.86	0.3**
Total comfort discussing cancer score	3.62	1.5	4.04	1.5**
If you were to need cancer tests or treatments, are there people you could talk to about your feelings and concerns?	0.91	0.3	0.87	0.3
If you had cancer, would you want to know?	0.97	0.2	0.96	0.2
If you had cancer, would you talk to your family about it?	0.93	0.3	0.86	0.4**
If you had cancer, would you talk to your friends about it?	0.57	0.5	0.65	0.5
Would you talk to people you work with about it?	0.35	0.5	0.40	0.5
Would you tell your employer?	0.65	0.5	0.79	0.4**
Awareness of cervical cancer				
Have you ever heard of a test that can be done to check for cervical cancer?	0.64	0.5	0.80	0.4***
In the past year, have you heard, seen, or read anything about cervical health?	0.28	0.5	0.52	0.5*****
Have you heard about a program called Messengers for Health?	0.14	0.3	0.84	0.4*****

NOTE:  $n = 83$ .\* $p < .10$ . \*\* $p < .05$ . \*\*\* $p < .01$ . \*\*\*\* $p < .001$ .

## QUALITATIVE METHOD

Community and university partner experiences, field notes, and meeting minutes from Advisory Board and Messenger meetings were used to assess qualitative changes in the community because of the intervention. As one evaluation expert stated,

It is usually essential to incorporate a far wider range of data [than solely quantitative data] into good evaluations, including expert judgment, perceptions, subjective experiences, and any number of aspects of the evaluation that are best assessed using qualitative methods. (Davidson, 2005, pp. 91-92)

Throughout the project, the Advisory Board met weekly, monthly, or bimonthly depending on activity levels. Messengers met monthly. In addition, project staff received unsolicited feedback from community members regarding the effectiveness and need for Messengers for Health. Most of this information was provided to the project coordinator, who is Apsáalooke, speaks the Crow language, lives and works in the community, and is a coauthor of this article.

## QUALITATIVE RESULTS

Project partners believed that the evidence—both qualitative and quantitative—of impact from the Messengers for Health program is because of the use of a CBPR approach and five messages that we continually gave to the community. First, we said that we recognized community history, including research that had already been conducted in the community. Second, we said that the project would directly benefit the community. Third, we said that the community and academic partners would work together on all phases of the work. Fourth, we said that we would keep the community informed on the progress of the project. And fifth, we said that we would do all that we could to indefinitely continue the program. These assurances are often developed in the context of research agreements, and for us they came about organically—some from community partners, some from academic partners, and all based on past experience. According to the project coordinator, community members listened to the words of project staff and then stepped back and watched the staff's actions. Over time, community members saw that the staff's words and actions harmonized. The trust and relationships built through this process resulted in community acceptance of the project, increased numbers of community members directly involved in the project, increased discussions about cervical cancer and health, increased women's health appointments, invitations to start more programs and to continue this program, and increased community and university partner capacity.

The quantitative findings showed a significant increase in women hearing about Messengers for Health from pre- to posttest and, the qualitative findings provide detail about what women have heard about the program and how the community has reacted to the program. Community members and Apsáalooke project staff stated that Messengers for Health has been more widely accepted than any previous reservation-based research or health project. An example of community acceptance occurred at the 2005 Crow Fair, for which the Messenger project was invited to enter a float in the parade, and the float received a first place prize. The Crow Fair is considered to be the most important social event of the year for the Apsáalooke people and has been a part of the culture for more than 100 years. Project staff were told that the award was less because of the float itself and was more a gesture of respect from the community and a show of appreciation for the work the project has done. Acceptance is also revealed as project staff and Messengers are frequently invited to participate in other community events such as Tribal Health events and school career fairs.

Another show of community acceptance is that the number of community partners has greatly increased as more community members want to be involved in the project.

The conference room is packed at our monthly meetings, and cancer survivors are now coming forth to share their personal stories and bring encouragement, hope, and strength to others. In addition, we have received multiple requests to serve on our Advisory Board and offers to be involved in the project by, for example, assisting Messengers at booths and community presentations.

A significant finding from the quantitative data that was reinforced in the qualitative findings is a change over time in speaking about culturally proscribed topics and words. As mentioned above, at posttest women had an increased comfort level in discussing cancer issues compared to pretest. Qualitative findings show that women are speaking other words, such as *Pap test* and *cervix*, more now than before the project. The Apsáalooke pride themselves on being modest, and speaking certain words such as *cancer* or *cervix* has traditionally been considered taboo. The word *cancer* historically has had a negative connotation; there is no word for cancer in the Apsáalooke language, and *cancer* is translated into the Apsáalooke language as *a dreadful, awful disease*. Modesty can also keep women from discussing and getting Pap tests. Project staff now stress that modesty and tradition are good qualities and that, to be a healthy nation, it is okay to talk about these topics and is not shameful to receive Pap tests.

When the Messengers first started going into the community, they and the project coordinator would set up booths at clinics and around the community and typically scheduled three to five Pap test appointments in a day. More recently, Messengers and the project coordinator scheduled an average of 15 women for Pap test appointments in a day (these numbers are rough estimates and are based on project staff's best memory). Messengers and project staff also reported that women in the community recognize their role as Messengers and ask them to schedule their Pap test appointments. The increase in the number of women asking for Pap tests may illustrate the quantitative finding that more women are aware that cervical cancer can be found early with a Pap test, that there is a test to check for cervical cancer, and that there are things that women can do to prevent or control cervical cancer.

Another qualitative finding is increased university and community partner capacity. Advisory Board members discussed an increased ability to work through the research process and an increased interest in developing additional research projects based on community-identified needs. One need is a men's health program. There has never been a men's health program on this reservation, and community members are now engaged in the process of getting a program started. The PI has had male community members (including those she has never met) who know about the Messenger program approach her about helping them start a male program. This is also significant because there are cultural mores about talking across genders about personal issues. Through the process of working with the project, university partners have increased their capacity for conducting true partnership research as they have deepened their understanding of what it means to partner with a community.

## DISCUSSION

The Messengers for Health study had multiple statistically significant quantitative outcomes, including increased knowledge about cervical cancer and Pap tests and women's increased comfort discussing cancer issues. Women also reported being more aware of cervical cancer. The qualitative findings provide context, support, and additional outcome results for this intervention. The strength of both the qualitative and quantitative findings

benefits this evaluation (Bamberger et al., 2006). Many reports of public health interventions fall short because they “ignore a substantial part of the dynamic and social nature of public health programs, i.e., their capacity to adapt, innovate, and propose pertinent, effective, and transformative actions in response to local dilemmas” (Potvin et al., 2005, p. 594).

A local dilemma for this project included the negative history among the community, researchers, and government officials (Hoxie, 1995; Medicine Crow, 1992). Project staff and community members believe that the positive results of this study were directly due to the use of a CBPR approach, such as building on community strengths, equitably involving all partners in all phases of research, promoting colearning and empowerment, and disseminating findings to all partners (Israel, Schulz, Parker, & Becker, 1998). This was the best method for overcoming the results of negative history. The project has changed public perceptions of research and researchers, opening the door for other projects that use respectful and culturally competent research approaches. The project also has increased community and researcher capacity for conducting true partnership research. The project has received further funding and, in addition to the Messenger intervention, is currently working with the IHS to provide high-quality health care to all community members.

## LIMITATIONS

Although this study offers new insights into the processes of knowledge and awareness change among Apsáalooke women using a CBPR and LHA approach, it is not without limitations. First, because this study employed a nonexperimental one-group pretest–posttest design, we are limited in our ability to unequivocally conclude that our CBPR and LHA intervention caused changes in knowledge and awareness on the reservation. However, a one-group pretest–posttest design used in conjunction with qualitative methods can be an effective way to make inferences about potential changes that take place in a population because of an intervention. The qualitative findings provide contextual information on changes resulting from the project and are consistent with our quantitative findings.

A one-group design was used in this study for several reasons. First, it was not possible to implement a randomized control trial (RCT) at the reservation level because university and community partners had been developing relationships and building project capacity for several years prior to writing the grant. RCTs are not always feasible or desirable in a CBPR context (Israel et al., 2005; Viswanathan et al., 2004). Information gathered in the treatment and control reservations would not have been equivalent, as trust was built only in the Apsáalooke reservation and people answered surveys with assurances that information would be directly used to help people’s health. Second, a control group reservation was not used because the control reservation would not benefit from this research and would only be used for the benefit of the researchers. As Deloria (1969) stated, “Compilation of useless knowledge ‘for knowledge’s sake’ should be utterly rejected by the Indian people” (p. 94). An RCT at the individual level was not feasible because this was a reservation-wide intervention that took place in a reservation that is highly intermingled. Community partners stated that contamination would have been ensured. This research design posed substantial threats to internal validity; however, many of the potential threats were addressed and minimized.

Another limitation is that cervical cancer knowledge scores on the pretest were higher than expected, with many questions answered correctly 90% of the time or higher. This created a ceiling effect, which did not allow much room for improvement in the posttest. High pretest knowledge scores were also present in other similar cervical cancer studies that asked the same or comparable questions; however, they were not as high as the scores indicated in this study (Dignan et al., 1996; Lanier, Kelly, & Berner, 1999).

This study was also limited in its ability to control for several threats to internal validity, including history and mortality. History is a threat to internal validity that is not controlled with this study design and would have been a concern if other cervical cancer information were circulating throughout the community during the time of the intervention. To mitigate problems with history, project staff examined weekly newspapers on the reservation for information on cervical cancer and Pap tests. No other cervical cancer interventions were mentioned during the Messengers intervention. Moreover, the project coordinator, who is on-site on the reservation, was vigilant about the circulation of other cervical cancer information around the community. She found no mention of cervical cancer-related issues except for an HPV vaccine commercial that was aired starting in 2006 (after the survey was completed). Mortality was another potential threat to internal validity, as 18 women were unable to complete the posttest for various reasons. However, demographic comparisons between the pretest and the posttest participants revealed few significant differences and suggested that mortality was not a valid threat to internal validity. Future researchers may employ delayed intervention designs to solve many of these limitations; however, this requires vast amounts of time and effort for partners from two communities and the academic researchers.

## IMPLICATIONS FOR PRACTICE

The quantitative and qualitative evaluation of the Messengers for Health program provides some evidence that using LHAs and a CBPR approach to address cervical cancer education on a Native American reservation can be an effective tool. Although we cannot say that it was the CBPR approach that caused the outcomes—as this may be an impossible task (Viswanathan et al., 2004)—community members involved in the project are strongly supportive of this idea. The use of LHAs in this project shows that LHAs can be used not only to educate a community on a specific health issue but also to increase community comfort levels with discussing a health issue that was once taboo to discuss.

Viswanathan and colleagues (2004) stated that when done properly, CBPR should benefit community and university partners alike. This has definitely been the case for the university partners involved in this project. Native staff members and community members encouraged non-Native staff to become involved in the Apsáalooke community by reading historical and current information and talking with community members about tribal history and culture, by participating in cultural and social events such as the Crow Fair, powwows, basketball games, and the sweat lodge, and by always being open to questions and encouraging more listening than talking. Changes university partners have witnessed in themselves seem innumerable and ineffable. We better know the importance of being sincere and honest about our intentions and that actions are more important than words. We learned new ways of doing research, new ways of being partners, and the importance of working from a place of respect for the community, for individuals, and for the culture. These changes would not have happened if we

had not been using a CBPR approach, and we are thankful for the opportunities for growth that we have been given. For the sake of public health programs and public health practitioners and researchers, we encourage those working cross-culturally and those using a CBPR approach to participate deeply in the communities in which they work and to employ both quantitative and qualitative evaluation methods to gain an enhanced understanding of program effects.

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