

Evaluation of a *Radionovela* to Promote HPV Vaccine Awareness and Knowledge Among Hispanic Parents

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Abstract Hispanic women have more than a 1.5-fold increased cervical cancer incidence and mortality compared to non-Hispanic white women in the United States. The Centers for Disease Control recommends the HPV vaccine for females at ages 11 and 12 years, though it is approved for females aged 9–26 to protect against the primary types of high-risk HPV (HPV-16 and HPV-18) that cause approximately 70% of cervical cancer cases. Few culturally-tailored Spanish HPV vaccine awareness programs have been developed. This study evaluates the efficacy of a Spanish *radionovela* as an educational tool. Rural Hispanic parents of daughters aged 9–17 (n = 88; 78 mothers and 10 fathers) were randomized to listen to the HPV vaccine *radionovela* or to another public service announcement. Participants completed a 30 min pretest posttest questionnaire. Parents who listened to the HPV

radionovela (intervention group) scored higher on six knowledge and belief items. They were more likely to confirm that HPV is a common infection (70% vs. 48%, $P = .002$), to deny that women are able to detect HPV (53% vs. 31%, $P = .003$), to know vaccine age recommendations (87% vs. 68%, $P = .003$), and to confirm multiple doses (48% vs. 26%, $P = .03$) than control group parents. The HPV vaccine *radionovela* improved HPV and HPV vaccine knowledge and attitudes. *Radionovela* health education may be an efficacious strategy to increase HPV vaccine awareness among Hispanic parents.

Keywords Rural Hispanic parents · HPV vaccine education · Cervical cancer prevention · Efficacy evaluation

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Introduction

In the United States (US), Hispanic women have a higher incidence of cervical cancer than non-Hispanic white women. According to the National Cancer Institute, the average age-adjusted incidence of cervical cancer for non-Hispanic white women was 7.1 per 100,000 per year in 2002–2006 while for Hispanic women, this rate was 12.7 per 100,000 [1]. One cause for this disparity is the under-utilization of Papanicolaou (Pap) testing for cervical cancer screening and later detection of cervical cancer in this group [2]. The human papillomavirus (HPV) vaccine first approved by the US Food and Drug Administration (FDA) in 2006 is purported as another avenue for the prevention of cervical cancer [3, 4].

Persistent high-risk HPV infections are the primary cause of cervical cancer [5]. In 2006, the FDA licensed Gardasil, the first HPV vaccine, for females aged 9–26 years. The

vaccine prevents precancerous cervical, vaginal, and vulvar lesions and 70% of cervical cancer cases due to two high-risk HPV types (HPV-16 and HPV-18) and protects against the primary types of low-risk HPV (HPV-6 and HPV-11) that cause 90% of genital warts [3]. In 2009, the FDA also licensed Cervarix, another HPV vaccine, to protect against high-risk HPV types 16 and 18 for females aged 10–25 years [4]. For these vaccines to be accepted by diverse risk groups, public education programs that use tailored evidence-based communication strategies to target high risk groups are thought to be essential [6].

Latino parents with lower levels of acculturation and limited English language proficiency may be less likely to receive and understand educational materials related to cervical cancer and HPV vaccination [7–9]. Few studies have investigated HPV and HPV vaccine knowledge and attitudes among Latino parents in the US. Previous studies demonstrate low levels of HPV and HPV vaccine awareness and knowledge among Latinos in various regions of the United States [10–12]. However, a number of studies have shown that, when the HPV vaccine is framed as a strategy to prevent cervical cancer, support for vaccine uptake is high among Latinas and Latino parents [10, 13, 14].

Cancer prevention outreach efforts are most beneficial when they involve collaborations with community-based partners who can inform the relevancy and appropriateness of language and cultural-based aspects to produce culturally appropriate and linguistically tailored messages that include relevant and useful information [15]. *Novelas* (short stories) for television, radio, and print developed using Latino community involvement have been shown to be a culturally appropriate vehicle for health promotion messaging targeting Latino communities. *Novelas* are particularly effective for health promotion messages that target Spanish-speaking communities with low levels of literacy [16, 17]. In Chicago, a number of *radionovelas* have been produced by youth to improve the health of immigrant families. As a part of Robert Wood Johnson Foundation's New Routes to Community Health collaboration [18], these *novelas* use characters that community members can empathize with and share culturally-tailored information to promote health education and awareness. The success of *novelas* targeting Latino communities in the US may in part be due to the use of *novelas* as effective health promotion mechanisms in Mexico and Latin America [19, 20] and the popularity of *novelas* among US Latinos in general.

The development of a *radionovela* may be a useful strategy to increase awareness of and interest in HPV vaccination among Hispanic parents with lower levels of literacy and English language ability. To our knowledge, the current study is the first to investigate the efficacy of

messages delivered via a *radionovela* to improve HPV and HPV vaccine related knowledge and attitudes.

Method

Study Design and Population

From July to September 2009, Hispanic parents or guardians of daughters aged 9–17 were recruited at local community events to participate in an evaluation of the efficacy of HPV and HPV vaccine education messages included in a locally produced *radionovela*. This study took place in the Lower Yakima Valley of the state of Washington. Much of the Mexican–American population of Washington state is concentrated in Yakima County, the home of the Yakima Valley, where it constitutes almost 43% of the state's Hispanic population [21]. In the Lower Yakima Valley, a region that includes many small agricultural communities and has a population of about 62,000, the percentage of Mexican Americans is estimated at over 50% [21].

From August 2008 to July 2009, an HPV vaccine *radionovela* was produced in collaboration with a local public radio station, Radio KDNA. Radio KDNA is the oldest and largest Spanish-speaking community radio station in Washington, serving a five-county region focused on the Yakima Valley (south-central WA). It is housed in the Northwest Communities Education Center (NCEC) located in Granger, Washington. Started as a farm worker education and advocacy project, NCEC has literacy and ESL programs, GED certification classes, computer literacy programs, citizenship classes, and radio programming. Its radio shows are in Spanish and make frequent use of *radionovelas*.

To generate the themes for the HPV vaccine *radionovela*, researchers and local health educators carried out interviews and facilitated focus groups with Latino parents. Specifically, in-depth semi-structured elicitation interviews (EI) with Hispanic parents of daughters aged 9–14 ($n = 36$) were carried out in 2008 and 2009 in the Lower Yakima Valley that investigated knowledge, attitudes, and beliefs related to cervical cancer, HPV, and the HPV vaccine. They also investigated socio-cultural decision making processes, barriers, and facilitators of receiving HPV vaccination for their daughters. A number of specific themes arose from the elicitation interviews. First, parents demonstrated low levels of HPV and HPV vaccine knowledge. Parents expressed a range of concerns related to electing to have their daughter receive the vaccine. Furthermore, parents generally receive health information from a physician or nurse at local clinics and nearly all feel comfortable speaking with their nurse or physician about the HPV vaccine. These themes, along with others,

informed the development of four possible *radionovela* scenarios in the form of (short stories or mini-dramas comprised of photo pamphlet vignettes) to raise awareness of HPV and the HPV vaccine among Hispanic parents. Then, focus groups with Hispanic parents of daughters aged 9–14 ($n = 33$) held in early 2009 in the Lower Yakima Valley selected the two top *fotonovelas* to inform the development of the *radionovela*. Lastly, focus group participants also provided feedback on the produced *radionovela*.

Study participants consisted of a convenience sample of parents recruited at local health fairs and community events. They were screened for eligibility (i.e., over 21, able to speak and read Spanish, and have a female child aged 9–17) prior to consenting to the evaluation activity. Consenting participants were seated in a private section of a health information booth. The participant received an audio headset and was then randomized to one of the study arms, the HPV *radionovela* or a prostate cancer announcement. Following the evaluation activity, each subject received a \$10 gift card as compensation for their time.

Radionovela Arm and Control Arm

Each participant was randomized to listen to either the *radionovela* or to the control radio programming using a randomized numerical table generated using Excel 2003 (Microsoft Corporation, Redmond, WA). The *radionovela* audio segment included about 5 min of typical Spanish radio programming (e.g. news, music, and talk show), the HPV *radionovela* which was also 5 min in length, and then another 3 min of typical Spanish radio programming. The *radionovela* was embedded within typical Spanish radio programming to simulate a more realistic experience of turning on the radio and listening to everyday programming for a brief period of time. The *radionovela* included a story about a young girl who learns of the HPV vaccine from a friend at school. She talks to her mother about the vaccine. Her mother talks to a friend who is a nurse, the young girl's father, and to a doctor about her interest and concerns related to the vaccine. After receiving consent from both her parents, the young girl receives the vaccine from a local health clinic. The *radionovela* addresses facts about cervical cancer, HPV, and the HPV vaccine, concerns about the HPV vaccine, and decision making activities related to vaccine uptake.

The control arm included the same 5 min of Spanish radio programming prior to the control message and then included the same Spanish radio programming as the *radionovela* arm following the control message. In place of the *radionovela*, the control message included a public service announcement related to prostate cancer prevention that was also produced by the same public radio station.

The brief announcement encouraged age appropriate men to speak to their physicians about the digital rectal exam. This control format was used to best investigate the impact of study participation apart from the impact of listening to the HPV *radionovela* on changes in pretest and posttest responses.

Participant Survey

After each participant was randomized to the intervention or control arm, they received a headset and MP3 player. The study coordinator started each MP3 player for the participant and confirmed that the participant could hear the instructions clearly. All surveys, instructions, and radio programming were in Spanish language and administered using an audio format. The audio recording described instructions for completing the survey and then stated each question and response options for the pretest. Participants checked their responses on a printed survey. Then, the radio programming was played, which included either the *radionovela* or the control announcement. Following the radio segment, posttest instructions, questions, and response options were provided by the audio recording. Participants checked their responses on a printed survey. The participant survey included pretest and posttest sections that were nearly identical. These related to cervical cancer, HPV, HPV vaccine knowledge, interest, attitudes, decision making, and intention to receive the HPV vaccine. The posttest also included a short series of questions related to demographic characteristics and level of acculturation that occurred at the end of the posttest. The pretest and posttest surveys were designed for participants with low levels of literacy [22]. All questions and response options were read aloud and each response option was color coded so that the participant could select the response based on the color of the answer. For example, a question could state, “have you heard of cervical cancer?” “Mark ‘yes’ in blue, ‘not sure’ in black, or ‘no’ in red.” The entire assessment activity took about 30 min to complete.

The short acculturation scale (SAS) developed by Marin et al. [23] was used to assess each participant's degree of acculturation. This scale specifically investigates level of language acculturation which has shown to also correlate highly with respondents' generation, length of residence in the US among foreign-born individuals, and age at arrival to the US. The SAS includes four items, including the language that the participant reads and speaks, speaks at home, uses to currently think, and uses to speak with friends.

Statistical Analysis

A research assistant recorded all participant responses in a database. Data were then double checked for accuracy by

the lead investigator against the hard copies of the pretest posttest surveys. First, descriptive statistics for respondent characteristics by intervention group were compared. The chi-square test (categorical data) and the *t*-test (continuous data) were used to compare differences in participant demographic characteristics by intervention group. Then, the McNemar chi-square test was used to investigate improvement and/or change from pretest to posttest in the intervention and control group. Next, generalized estimation equations (GEE) were specified to assess group by time differences. Lastly, a sensitivity analysis was carried out to explore the extent to which effects differed for more and less acculturated parents in relation to self-efficacy and vaccine uptake and likelihood of vaccine uptake. STATA 10.0 was used to conduct all statistical analyses (College Station, Texas).

Ethics Approval

This study was approved by the Fred Hutchinson Cancer Research Center's Institutional Review Board on June 18, 2008, IR# 6728.

Results

Demographic Characteristics of Participants

Ninety participants were randomized to either the intervention or control condition to complete the evaluation activity. Two of these individuals were excluded from the analytic sample because they did not meet the inclusion criterion of having a daughter between the ages of 9–17. Of the 88 participants included in the analyses (78 women; 10 men), 46 were in the intervention arm and 42 were in the control arm. Using the chi-square test (categorical data) and the *t*-test (continuous data) no differences in demographic characteristics were found by intervention group (Table 1).

Among the 88 participants, 32% ($n = 28$) reported that their daughter had already received the HPV vaccine—33% in the intervention group ($n = 15$) and 31% in the control group ($n = 13$) ($P = .34$). Furthermore, about 56% of participants ($n = 48$) had already heard about the HPV vaccine from a radio or television program or announcement prior to this study, 56% in the intervention group ($n = 25$) and 56% in the control group ($n = 23$) ($P = .55$) (data are not shown).

HPV and HPV Vaccine Knowledge and Awareness

When we examined changes in pretest and posttest responses to HPV awareness and knowledge questions, we

found participants in the intervention group improved on seven of nine knowledge and awareness questions (Table 2). Intervention participants showed improvements in having heard of HPV ($P = .046$), knowing HPV causes cervical cancer ($P = .005$), and knowing that HPV is a common infection ($P < .001$). Furthermore, on the posttest, intervention participants demonstrated improvements in knowing the age recommendations for the vaccine ($P < .001$) and confirming that medical plans and coupons provide coverage for the vaccine ($P = .007$). Lastly, on the posttest, intervention participants demonstrated improvement in correctly identifying that a woman is not usually able to detect HPV infection in herself ($P = .005$) and that there is more than one injection for the HPV vaccine ($P = .008$).

We examined the improvements shown in the intervention group on the posttest to changes between pretest and posttest responses among the control group on awareness and knowledge using GEE, intervention participants demonstrated higher levels of improvement on five items (Table 2). Compared to the control arm, participants in the intervention arm demonstrated greater improvement in knowing that HPV is a common infection ($P = .002$), in denying that a woman is able to detect HPV infection in herself ($P = .003$) and in confirming that there is more than one injection for the HPV vaccine ($P = .03$). Compared to the control arm, participants in the intervention arm demonstrated improvements in confirming the age recommendations for the vaccine ($P = .003$) and in confirming that most medical plans and medical coupons cover the cost of the HPV vaccine ($P = .04$).

HPV and HPV Vaccine Beliefs and Decision Making Factors

When we examined changes in pretest and posttest responses to HPV vaccine beliefs and decision making questions, we found that participants in the intervention group improved on two of ten questions related to beliefs and decision making factors (Table 3). Intervention participants showed improvement in believing that their daughter is not too young to receive the vaccine ($P = .01$) and were also more likely to confirm that their daughter's other parent would want their daughter to receive the vaccine ($P = .007$).

Self-Efficacy and Vaccine Uptake

When we examined self-efficacy to receive the HPV vaccine for one's daughter and perceived likelihood of receiving the HPV vaccine for one's daughter in the upcoming year, we did not find any statistically significant differences between the intervention and control arms.

Table 1 Demographic characteristics of participants

	Total (n = 88)	Intervention (n = 46)	Control (n = 42)
<i>Age</i>			
Mean age (SD)	39.9 (SD: 8.8)	39.6 (SD: 8.6)	40.2 (SD: 9.18)
Age range (n)	22–62 (80)	22–62 (40)	22–60 (40)
<i>Gender (n)</i>			
Female	78	83% (38)	95% (40)
<i>Age of daughters^a (n)</i>			
Ages 9–10	40% (34)	29% (13)	51% (21)
Ages 11–12	34% (29)	36% (16)	32% (13)
Ages 13–14	27% (23)	29% (13)	24% (10)
Ages 15–17	38% (33)	36% (16)	42% (17)
<i>Married or living as married (n)</i>			
Yes	72% (62)	73% (33)	71% (29)
<i>Married or living as married to parent of daughter(s) (n)</i>			
Yes	70% (59)	72% (31)	68% (28)
<i>Income (n)</i>			
Less than \$20,000	51% (43)	48% (21)	54% (22)
\$20,000–\$35,000	26% (22)	25% (11)	27% (11)
\$35,000 or more	24% (20)	27% (12)	20% (8)
<i>Years of education</i>			
Mean years of education (SD)	9.4 (SD: 4.4)	9.4 (SD: 4.1)	9.5 (SD: 4.9)
Range (n)	0–16 (75)	1–16 (41)	0–16 (34)
<i>Country of birth (n)</i>			
United states	28% (24)	22% (10)	34% (14)
Mexico	72% (62)	78% (35)	66% (27)
<i>Average years in US</i>			
Mean years (SD)	19.2 (SD: 10.4)	20.3 (SD: 9.86)	18.2 (SD: 10.9)
Range (n)	1–50 (54)	1–47 (29)	2–50 (25)
<i>Parents' country of birth (n)</i>			
United States	13% (11)	11% (5)	16% (6)
Mexico	87% (71)	89% (39)	84% (32)
<i>Short Acculturation Scale (n)</i>			
High language acculturation	41% (36)	41% (19)	40% (17)
Low language acculturation	59% (52)	59% (27)	60% (25)

Chi-square or *t*-test carried out when appropriate to test for differences between the intervention and control group by demographic characteristics

^a Categories for age of daughters are not mutually exclusive

However, when analyses were stratified by level of acculturation, less acculturated parents in the intervention arm improved from pretest to posttest in relation to self-efficacy for vaccine uptake ($P = .045$) while less acculturated parents in the control group did not significantly improve.

Discussion

To the best of our knowledge, this study is the first to evaluate the efficacy of a culturally tailored Spanish *radionovela* aimed at improving HPV and HPV vaccine awareness, knowledge, and interest among rural Hispanic parents of Mexican descent using an innovative assessment strategy appropriate for low literacy levels. The findings

from this study indicate that a *radionovela* is an efficacious strategy to increase rural Hispanic parent knowledge of HPV and the HPV vaccine. Our data showed that a *novela* health education program may also lessen parent concerns related to HPV vaccine uptake for their daughters. *Novelas* represent a culturally tailored mechanism to convey HPV and HPV vaccine information in a meaningful style that may significantly raise cervical cancer, HPV, and HPV vaccine awareness and interest among Hispanic parents.

Overall, in this study, Hispanic parents demonstrate overwhelmingly high interest in learning more about the HPV vaccine. Furthermore, nearly all of the participants expressed that they would like to speak about the HPV vaccine with their daughter’s health care clinician at their next appointment. However, among parents who had not

Table 2 Results: HPV and HPV vaccine knowledge and awareness

Questions (response)	Pretest		Posttest		McNemar's test (pretest versus posttest) <i>P</i> -value	GEE (intervention versus control) <i>P</i> -value
	%	N	%	N		
<i>Awareness</i>						
Have you heard of cervical cancer? (Yes)						0.52
Intervention	80	36	89	41	0.16	
Control	85	35	95	39	0.046	
Have you heard of HPV? HPV is the human papillomavirus. HPV is not the same as HIV. (Yes)						0.12
Intervention	54	25	72	33	0.046	
Control	62	26	62	26	1.00	
Have you heard of the cervical cancer vaccine, also known as the HPV vaccine or Gardasil? (Yes)						0.15
Intervention	65	30	80	37	0.07	
Control	67	28	67	28	1.00	
<i>Knowledge</i>						
HPV is able to cause cervical cancer. (Yes)						0.12
Intervention	44	20	70	32	0.005	
Control	38	16	46	19	0.37	
HPV is a common infection. Most women are infected with HPV at some point in their lives. (True)						0.002
Intervention	37	17	70	32	<.001	
Control	46	19	48	20	1.00	
Usually a woman is able to detect HPV in herself. (False)						0.003
Intervention	28	13	53	24	0.005	
Control	39	16	31	13	0.32	
The vaccine is recommended for girls at ages 11 and 12, but can also be given between the ages of 9–26. (True)						0.003
Intervention	46	21	87	39	<.001	
Control	63	26	68	28	0.53	
There is only one injection for the HPV vaccine. (False)						0.03
Intervention	26	12	48	22	0.008	
Control	29	12	26	11	0.74	
Most medical plans and medical coupons cover the cost of the HPV vaccine. (True)						0.04
Intervention	59	27	78	36	0.007	
Control	59	24	60	25	0.71	

Bold values represent *P*-values < .05

already received the vaccine for their daughter, after listening to the *radionovela*, only 61% of participants in the intervention arm expressed that it was very probable that they would receive the HPV vaccine for their daughters in the upcoming 12 months. Other factors need to be further explored that may influence HPV vaccine uptake among Hispanic parents who are less confident that they will receive the vaccine for their daughters in the near future. These factors include clinician-patient communication, access to resources that provide financial coverage for the vaccine, and parental beliefs and attitudes related to HPV, cervical cancer, and the HPV vaccine.

A few studies using cross-sectional data have demonstrated that parents with higher levels of HPV and HPV vaccine knowledge are more likely to have already received the HPV vaccine for their daughter(s) [24, 25] or are more likely to support vaccine uptake among their daughters [26, 27]. However, cross-sectional data limits our ability to know if heightened vaccine knowledge leads to vaccine uptake. Importantly, these studies have included very few or no US Hispanic parents. More research is needed to investigate HPV knowledge-based factors related to HPV vaccine uptake among Hispanic parents in the United States. As previously noted, past studies have demonstrated that

Table 3 Results: HPV and HPV vaccine beliefs and decision making factors

Questions (response)	Pretest		Posttest		McNemar's test (pretest versus posttest) P-value	GEE (intervention versus control) P-value
	%	N	%	N		
<i>Beliefs</i>						
If my daughter receives the vaccine, it is more likely that she will think it is okay to have sexual relations. (Disagree)						0.92
Intervention	67	30	57	26	0.1	
Control	57	24	46	19	0.21	
My daughter is too young to receive the HPV vaccine. (Disagree)						0.18
Intervention	41	19	61	28	0.01	
Control	34	14	41	16	0.41	
It is important to protect my daughter from cervical cancer. (Agree)						0.49
Intervention	93	42	98	45	0.16	
Control	98	41	98	40	1.00	
<i>Decision making factors</i>						
I would talk to my daughter's other parent before I make a decision to give my daughter the HPV vaccine. (Agree)						0.47
Intervention	91	42	96	44	0.32	
Control	91	38	91	38	1.00	
I think that my daughter's other parent would want her to receive the vaccine. (Agree)						0.26
Intervention	74	34	93	42	0.007	
Control	83	34	91	38	0.26	
I am interested in learning more about the vaccine. (Agree)						ns ^b
Intervention	91	42	96	43	0.17	
Control	93	38	100	42	0.08	
I am able to talk to my daughter's doctor or nurse about the vaccine. (Agree)						ns ^b
Intervention	93	42	100	46	0.08	
Control	95	38	91	38	0.16	
In our appointment I will talk to my daughter's doctor or nurse about the vaccine. (Agree)						0.99
Intervention	96	43	98	44	0.32	
Control	95	39	98	41	0.56	
<i>Self-efficacy and vaccine uptake</i>						
If you wanted to receive the HPV vaccine for your daughter, how sure are you that you could do it? (Very Sure)						0.72
Intervention	74	33	84	38	0.06	
Control	61	25	78	32	0.008	
Among parents with low acculturation						0.24
Intervention	73	19	89	23	0.045	
Control	54	13	63	15	0.16	
Among parents with high acculturation						ns ^b
Intervention	74	14	79	15	0.56	
Control	71	12	100	17	0.03	
<i>Likelihood of vaccine uptake</i>						
How likely is it that your daughter will receive the vaccine in the next 12 months? ^a (Very Probable)						0.58
Intervention	54	20	61	22	0.26	
Control	63	22	67	24	0.56	

Table 3 continued

Questions (response)	Pretest		Posttest		McNemar's test (pretest versus posttest) <i>P</i> -value	GEE (intervention versus control) <i>P</i> -value
	%	N	%	N		
Among parents with low acculturation						0.71
Intervention	60	12	70	14	0.32	
Control	63	22	66	23	0.56	
Among parents with high acculturation						0.57
Intervention	44	7	50	8	0.56	
Control	73	11	73	11	1.0	

Bold values represent *P*-values < .05

^a Excluded parents who already received the vaccine for child

^b Not significant (*NS*)—GEE model unable to converge due to lack of variability in responses

Hispanic parents and Latinas who are informed of the HPV vaccine are supportive of HPV vaccine uptake [11]. Furthermore, one study demonstrated that Latina mothers noted lack of information as an important reason to not support HPV vaccine uptake for their daughters [10].

An additional factor that may impact the influence of a culturally tailored health education tool, such as a *radionovela*, on Hispanic parent self-efficacy for vaccine uptake and likelihood of vaccine uptake may be level of acculturation. Acculturation is most commonly defined as the process by which immigrants adopt the attitudes, customs, values, beliefs and behavioral practices of a new culture [28]. Parents with lower levels of acculturation may be impacted more strongly by a *radionovela* intervention because it may be more culturally familiar than other health education methods. In this study, among the parents with low levels of acculturation who had not already received the vaccine for their daughter, the parents in the *radionovela* intervention group demonstrated a significant improvement from pretest to posttest in self-efficacy for vaccine uptake. However, this improvement was not statistically greater than the improvement from pretest to posttest in the control group of parents with a low level of acculturation. This may be due to the small sample size of this subgroup ($n = 52$).

The study results should be viewed in light of important limitations. Our study was carried out with a convenience sample of participants who attended community events in rural Washington. These individuals may be more interested in health information than parents who do not visit health information booths at community events. However, because this study randomized participants and utilized a pretest–posttest design to examine the impact of the messages delivered in the *radionovela*, we are confident that the *radionovela* can improve level of HPV and HPV vaccine knowledge among those who listen to the *novela*. A larger sample may have allowed for improved detection of differences from pretest to posttest responses between the intervention and control group arms.

Furthermore, this study only assessed the efficacy of the messages included in the *radionovela*, not the widespread impact of the *novela* on raising awareness of HPV and the HPV vaccine among the community at large and on actual HPV vaccine uptake. This efficacy evaluation is a necessary step prior to engaging in a population wide evaluation of the *radionovela*. If the *radionovela* did not have an impact in a controlled environment, it would likely fail if disseminated broadly. Studies that investigate the population level impact of health promotion *novelas* on cervical cancer, HPV, and HPV vaccine awareness, knowledge, interest, attitudes, and vaccine uptake are needed. A population level evaluation could include a random household survey of Hispanic parents within the service area of the radio station before and after the airing of the *radionovela* over an extended period of time. The survey could assess changes in participant HPV vaccine knowledge, beliefs, and attitudes, and their intention to vaccinate an eligible daughter before and after the airing of the *radionovela*. It could confirm whether or not parents heard the *radionovela* during the time that it was aired and how the exposure to the *radionovela* related to their knowledge, beliefs, and intention to vaccinate their young daughters. A third survey could be conducted 6 months after the second survey and the final airing of the *radionovela* to confirm if daughters had begun and possibly completed the HPV vaccine series or not. Challenges to the enactment of a population are the high costs, time, and other potential confounding factors.

Lastly, more investigation is needed on the importance of message style on message reception among US Hispanics. The *novela* style appears to be a strong strategy to reach this target group, yet comparative effectiveness studies of various other HPV vaccine promotion and uptake strategies such as a standard public service announcement, print materials, and communications with a medical provider should be pursued.

In conclusion, a targeted HPV vaccine promotion intervention increased HPV and HPV vaccine awareness

and knowledge and improved related attitudes and intentions among rural Hispanic parents of Mexican descent. Use of culturally-tailored strategies has strong potential for improving HPV vaccine uptake among US Latinas, one of the ethnic groups at high risk for cervical cancer incidence and mortality in the United States. The use of Spanish-language culturally tailored and community produced *radionovelas* can be an important health promotion strategy for encouraging high levels of HPV vaccine uptake among age appropriate US Latina girls and women in the years to come.

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