

DOES LANGUAGE MODERATE THE INFLUENCE OF INFORMATION SCANNING AND SEEKING ON HPV KNOWLEDGE AND VACCINE AWARENESS AND INITIATION AMONG HISPANICS?

Objective: To examine whether language moderates associations between three communication variables: media use, information scanning (attending to and remembering information) and seeking (actively looking for information), and three HPV outcomes: knowledge, vaccine awareness and vaccine initiation among Hispanics.

Participants: Hispanic mothers of females aged 8–22 years (N=288) were surveyed.

Methods: Univariate and multivariate logistic regressions investigated associations between communication variables and HPV outcomes. To examine moderation by language, we compared main effects and interaction models using the likelihood ratio test.

Results: For English- and Spanish-speakers, Internet use was associated with more HPV knowledge and vaccine awareness, but not initiation. Scanning and seeking were associated with more knowledge, vaccine awareness, and initiation. Language moderated effects of scanning and seeking only on vaccine awareness. Spanish speakers who scanned for information were more likely to be aware of the vaccine than those who did not (80% vs 26%); Spanish speakers who sought information were also more likely to be aware (95% vs 55%). For English speakers, vaccine awareness did not differ between those who scanned and sought and those who did not.

Conclusions: Effects of information scanning and seeking on HPV vaccine awareness were much greater for Spanish than for English speakers. Providers, therefore, should not assume that Spanish-speaking mothers are already aware of the vaccine. Our findings call attention

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to heterogeneity within Hispanics which could be particularly important when examining health communication and cancer prevention behaviors. (*Ethn Dis.* 2013;23[1]:95–102)

Key Words: Human Papillomavirus Vaccines, HPV, Health Communication, Health Care Disparities, Adolescent, Hispanic Americans

INTRODUCTION

Hispanic women suffer disproportionately from cervical cancer. They have higher incidence and mortality rates and are diagnosed with later staged disease than non-Hispanic Whites.^{1–3} Use of the human papillomavirus (HPV) vaccine could reduce cervical cancer disparities among Hispanics.^{4–6} Current vaccine uptake among Hispanic adolescent females is suboptimal (56% initiate the series [≥ 1 dose] and only 30% complete all three doses).⁷

Parental knowledge about vaccines has been shown to be a correlate of vaccination in children and adolescents.^{8,9} Additionally, parents are primary decision makers for childhood immunization and most states require parental consent to administer vaccines to children under age 18.^{10,11} Since the release of the HPV vaccine in 2006, the knowledge gap regarding HPV infection and the vaccine has widened: Hispanics have less knowledge about both.^{12,13}

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Though knowledge alone is not sufficient to promote health behaviors like vaccination, knowledge can influence beliefs and attitudes¹⁴ that, in turn, increase intention to vaccinate.^{15,16} Moreover, knowledge gaps could intensify cervical cancer disparities if they lead to lower vaccination rates in populations that carry the highest HPV burden.¹⁷

Media can increase knowledge about emerging health innovations like the HPV vaccine. However, measuring media use alone gives an incomplete picture of how people acquire knowledge. Health communication researchers recommend measuring information scanning and seeking.¹⁸ Information scanning occurs during routine media use and includes specific health information that individuals choose to attend to and remember.¹⁸ Information seeking entails actively obtaining specific information outside the context of routine media use.¹⁸ Both have been shown to be associated with increased cancer knowledge and practice of cancer prevention behaviors.¹⁹

Among Hispanics, the impact of language heterogeneity on health communication is unclear. Though health-related content is available through a variety of Spanish language media channels, it can be somewhat different from that found in mainstream English channels.^{20,21} Previous studies show that Spanish-speaking Hispanics seek out health information less often than English-speaking Hispanics and non-Hispanic Whites.^{22,23} When Spanish speakers do look for health information,

We explored whether language moderated the effect of health communication variables on HPV outcomes.

they use the Internet less often.^{24,25} Little is known about whether differences exist between English- and Spanish-speaking Hispanics in media use, information scanning and seeking with regard to HPV vaccine outcomes.

This study examined associations between media use, HPV-specific information scanning and seeking and three HPV outcomes: knowledge, vaccine awareness and vaccine initiation among a sample of English- and Spanish-speaking Hispanic mothers. We explored whether language moderated the effect of health communication variables on HPV outcomes.

METHODS

Mothers or guardians of females aged 8–22 years were recruited between December 2008 and May 2010 from primary care clinics or community health fairs in the Dallas (Texas) area. To ascertain eligibility, women waiting for a clinic appointment or attending a health fair were asked if: a) they were a mother/guardian for a female aged 8–22 years, and b) they would like to complete a survey about the HPV vaccine. We chose this age range for daughters based on prior qualitative interviews, in which mothers of older daughters (aged 19–22 years) reported being involved in decisions about the HPV vaccine and other health issues.

Eligible participants provided informed consent and received a small incentive. A bilingual research assistant administered the survey only if the participant expressed difficulty reading, otherwise it was self-administered. This

study was approved by the institutional review board at the University of Texas Southwestern Medical Center. Analyses were limited to participants who self-identified as Hispanic/Latino ($N=288$).

Measures: HPV Outcomes, Communication Variables, Language Preference

Three outcomes were measured: HPV knowledge, vaccine awareness, and daughter's vaccine initiation status (≥ 1 dose). Five items assessed respondent knowledge of: 1) ever heard of HPV; 2) HPV causes cervical cancer; 3) HPV is a sexually transmitted infection; 4) HPV can go away without treatment; and 5) a woman can usually tell when she is infected with HPV (yes, no). The last item was reverse coded and the five items were combined into a dichotomous variable (more knowledge if answered 3+ items correctly vs less knowledge). Vaccine awareness was measured with one item, "before this survey, had you ever heard of the HPV shot/cervical cancer vaccine?" (yes, no). Participants reporting that their daughter had received at least one dose were coded as having initiated the HPV vaccine. If participants had more than one age-eligible daughter, they were asked to base answers on the adolescent whose age was closest to 12.

Participants also reported the amount of time (in hours) spent watching television and using the Internet on an average day. Information scanning was based on 12 items about how often participants noticed HPV vaccine information while using: magazines, newspapers, radio, books, Internet websites, and television programs. Responses were dichotomized as "never/almost never" and "occasionally/frequently/very often" and summed into a binary variable (scanned 1+ sources vs never scanned). Information seeking was measured with "Have you ever looked for information about HPV or the HPV vaccine from any source?" (yes/no).

Language preference was determined by the language the respondent chose for the survey administration. (Spanish, English).

We also measured maternal education (<high school [HS] diploma, HS diploma/GED, some college, college graduate or more), daughter's insurance status (uninsured, public, private), and recruitment site (clinic, community).

STATISTICS

We ran frequencies of all variables stratified by language and used the chi-square test for independence to evaluate differences between English- and Spanish-speakers on communication variables and HPV outcomes. Univariate logistic regression models tested associations for each HPV outcome with independent variables. Reference groups were assigned to response categories hypothesized to have less HPV knowledge, vaccine awareness, and initiation. Covariates with $P < .25$ in univariate analyses were retained for entry into multivariate logistic regression models.²⁶ Because recruitment site was highly correlated with maternal education and all communication variables, it was excluded from multivariate analyses. Mother's education level was associated with communication variables and HPV outcomes; we adjusted for it in all final models.

To test whether language moderated associations between communication variables and HPV outcomes, we ran multivariate logistic regression analyses twice— with and without an interaction term (interaction model vs main effects model). We used the likelihood ratio test (LRT) to compare fit between models; if the LRT chi-square distribution was $P < .05$, the interaction term was retained. Data were analyzed using STATA IC/11.0 (Statacorp, College Station, TX).

RESULTS

Of the 288 Hispanic mothers interviewed, 31% spoke English and 69%

Table 1. Characteristics of mothers/guardians of females aged 8–22 years, Dallas, TX 2008–2010 (N=288)

	English-speaking (n=88)	Spanish-speaking (n=200)	χ^2 value	P
	%	%		
Sociodemographics				
Recruitment site				
Clinic	61.4	94.0	48.50	<.001
Community	38.6	6.0		
Mother's age^a				
21–30	8.8	12.6	12.33	.006
31–40	40.0	57.1		
41–50	40.0	26.3		
Over 50	11.3	4.0		
Mother's education^b				
Less than HS diploma	13.6	60.4	77.65	<.001
HS diploma/GED	30.7	27.9		
Some college	31.8	8.6		
College graduate or more	23.9	3.1		
Daughter's age^c				
8–11	15.9	54.5	39.98	<.001
12–14	30.7	22.0		
15–18	35.2	16.0		
19–22	18.2	7.5		
Daughter's health insurance^d				
Uninsured	14.8	12.1	123.79	<.001
Public	29.6	85.9		
Private/Military	55.7	2.0		
HPV outcomes				
Knowledge				
More (≥ 3 items correct)	70.5	60.0	3.14	.076
Less (≤ 2 items correct)	29.6	40.5		
Vaccine awareness				
Aware	85.2	63.5	13.77	<.001
Not aware	14.8	36.5		
Vaccine initiation				
Yes	14.8	21.0	1.53	.216
No	85.2	79.0		
Health communication variables				
Daily television use				
0 hours	1.14	9.5	7.44	.059
<2 hours	26.1	21.0		
2 – <4 hours	48.9	50.0		
4+ hours	23.9	19.5		
Daily Internet use				
0 hours	15.9	72.5	92.82	<.001
<2 hours	25.0	14.5		
2 – <4 hours	31.8	10.5		
4+ hours	27.3	2.5		
Information scanning, ever	90.9	69.0	15.94	<.001
Information seeking, yes	36.4	19.5	9.36	.002

^a 10 participants missing data on age.

^b 3 participants missing data on education.

^c If mother reported >1 daughter aged 8–22 years (n=94), she was categorized based on daughter whose age was closest to 12 years.

^d 1 participant missing data on daughter's health insurance.

preferred Spanish. Compared with English speakers, Spanish speakers were more likely to be younger, recruited at a clinic, and have less education (Table 1); their daughters were more likely to have public insurance. No differences were found for HPV knowledge or vaccine initiation; however, vaccine awareness was higher among English speakers (85.2% vs 63.5%). English speakers reported more television and Internet use, HPV information scanning (90.9% vs 69%), and seeking (36.4% vs 19.5%) than Spanish-speakers.

Health Communication Variables and HPV Outcomes

With regard to *media use*, television use was not associated with any HPV outcome (Table 2). Internet use was associated with more HPV knowledge and vaccine awareness, but not with initiation. *Scanning* for HPV information was associated with more knowledge (OR = 4.16, 95% CI = 2.36 - 7.34), vaccine awareness (OR = 10.33, 95% CI = 5.59–19.10) and initiation (OR = 2.54, 95% CI = 1.09–5.91). Similarly, *seeking* HPV information was associated with more knowledge (OR = 2.25, 95% CI = 1.23–4.14), vaccine awareness (OR = 6.33, 95% CI = 2.62–15.26) and initiation (OR = 4.58, 95% CI = 2.46–8.55). Vaccine awareness was also associated with speaking English, more education, and daughter having private insurance.

Language as Moderator of Health Communication Variables on HPV Outcomes

Concerning *media use*, language did not moderate the effect of television or Internet use on any HPV outcome. The same patterns of association found in univariate analyses were significant in multivariate analyses (data not shown).

Language moderated the effect of *information scanning* on vaccine awareness but not on initiation or knowledge (Table 3). Among Spanish-speakers, scanners were more likely to be aware

Table 2. Univariate logistic regressions of health communication and sociodemographic variables on HPV outcomes (N=288)*

	HPV Outcomes					
	Knowledge		Vaccine Awareness		Vaccine Initiation	
	OR	95% CI	OR	95% CI	OR	95% CI
Health communication						
Television use						
0 hours (<i>referent</i>)	1.00	-	1.00	-	1.00	-
<2 hours	1.31	.48–3.60	1.08	.39–2.96	1.64	.33–8.18
2 – <4 hours	1.39	.54–3.57	2.52	.97–6.59	2.19	.48–10.00
4+ hours	1.64	.58–4.59	2.69	.93–7.80	3.00	.62–14.47
Internet use						
0 hours (<i>referent</i>)	1.00	-	1.00	-	1.00	-
<2 hours	1.57	.81–3.05	5.46	2.20–13.54	.82	.36–1.85
2 – <4 hours	3.50	1.59–7.69	5.22	2.10–12.97	.75	.32–1.74
4+ hours	1.29	.57–2.90	2.29	.92–5.67	.80	.28–2.24
Information scanning						
Did not scan (<i>referent</i>)	1.00	-	1.00	-	1.00	-
Did scan	4.16	2.36–7.34	10.33	5.59–19.10	2.54	1.09–5.91
Information seeking						
Did not seek (<i>referent</i>)	1.00	-	1.00	-	1.00	-
Did seek	2.25	1.23–4.14	6.33	2.62–15.26	4.58	2.46–8.55
Sociodemographics						
Mother's language						
Spanish (<i>referent</i>)	1.00	-	1.00	-	1.00	-
English	1.62	.95–2.78	3.32	1.72–6.39	.65	.33–1.29
Recruitment site						
Community (<i>referent</i>)	1.00	-	1.00	-	1.00	-
Clinic	.48	.23–.99	.44	.20–.99	1.38	.58–3.27
Mother's education						
Less than HS (<i>referent</i>)	1.00	-	1.00	-	1.00	-
HS/GED	1.50	.85–2.64	2.40	1.29–4.46	1.24	.64–2.40
Some college	2.02	.97–4.19	4.70	1.86–11.89	.71	.29–1.76
College graduate or more	3.61	1.29–10.10	4.16	1.36–12.72	.15	.02–1.14
Daughter's Insurance						
Uninsured (<i>referent</i>)	1.00	-	1.00	-	1.00	-
Public	.95	.46–1.96	1.62	.79–3.32	3.16	.93–10.80
Private/military	1.54	.63–3.77	5.97	2.05–17.40	2.32	.58–9.23

* Bolded values are significant at $P < .05$.

of the vaccine than non-scanners (79.7% versus 25.8%; Figure 1). This pattern was not seen for English speakers: vaccine awareness was similar between scanners and non-scanners (86.3% and 75%, respectively).

Similarly, language moderated the effect of *information seeking* on vaccine awareness but not on initiation or knowledge (Table 3). Among Spanish speakers, 95% of those who sought information were aware of the vaccine

compared with 55% of those who did not seek and were aware (Figure 1). Again, this pattern was not seen for English speakers: vaccine awareness was similar for seekers and non-seekers (87.5% and 83.9%, respectively).

DISCUSSION

To our knowledge, our study is the first to examine associations between

health communication variables (media use, HPV information scanning and seeking) and HPV outcomes related to knowledge, vaccine awareness and initiation in a sample of English- and Spanish-speaking Hispanic mothers. In regard to HPV outcomes, English speakers had moderately higher HPV knowledge than Spanish speakers, although we found no corresponding difference in vaccine initiation. Most of our participants were recruited at

Table 3. Multivariate logistic regressions^a examining whether language moderated the effect of health communication variables on HPV outcomes (N=288)

	HPV Outcomes					
	Knowledge ^b		Vaccine Awareness ^c		Vaccine Initiation ^b	
	OR	95% CI	OR	95% CI	OR	95% CI
Information scanning						
Scanning						
Did not scan (<i>referent</i>)	1.00	-	1.00	-	1.00	-
Did scan	3.94	2.17–7.14	11.4	5.52–23.85	2.81	1.18–6.68
Mother's language						
Spanish (<i>referent</i>)	1.00	-	1.00	-	1.00	-
English	1.46	.59–2.07	6.91	1.19–40.20	.83	.39–1.80
Scanning X language						
Did not scan/Spanish-speaking (<i>referent</i>)			1.00	-		
Did not scan/English-speaking (<i>referent</i>)			1.00	-		
Did scan/Spanish-speaking (<i>referent</i>)			1.00	-		
Did scan/English-speaking			.15	.02–1.02		
Information seeking						
Likelihood ratio test <i>P</i>	.424		.017		.304	
	OR	95% CI	OR	95% CI	OR	95% CI
Seeking HPV information						
Did not seek (<i>referent</i>)	1.00		1.00		1.00	
Did seek	2.08	1.11–3.88	13.18	3.04–57.09	5.34	2.72–10.40
Mother's language						
Spanish (<i>referent</i>)	1.00		1.00		1.00	
English	1.10	.59–2.07	2.61	1.09–6.22	.83	.39–1.80
Seeking X language						
Did not seek/Spanish speaking (<i>referent</i>)			1.00	-		
Did not seek/English speaking (<i>referent</i>)			1.00	-		
Did seek/Spanish speaking (<i>referent</i>)			1.00	-		
Did seek/English speaking			.10	.01–.71		
Likelihood ratio test <i>P</i>	.559		.040		.584	

^a All models are adjusted for maternal education; bolded values are significant at $P < .05$.

^b Main effects model reported.

^c Interaction model reported.

primary care clinics and thus, had access to health care and the vaccine. Our findings correspond with a study of Californian Hispanics in which Spanish language was not associated with vaccine initiation when multivariate models accounted for health care access.²⁷

Not surprisingly, we found that English speakers spent more time using television and the Internet than Spanish speakers. English speakers were also more likely to scan for and seek out HPV information. These differences in communication by language remained even when adjusting for education and are congruent with other studies.^{22,28,29} As

hypothesized, scanning and seeking were associated with more HPV knowledge, higher vaccine awareness, and greater vaccine initiation. Language moderated the effect of scanning and seeking on vaccine awareness only. Our findings underscore the diversity among the rapidly growing Hispanic population and emphasize the need to parse communication differences in Hispanic subgroups in order to ensure that disease prevention messages reach everyone.

One explanation for differences in health communication by language is that Spanish speakers generally have less access to electronic media,^{25,30,31} and thus, have fewer opportunities to attend

to or seek out health information. A recent national survey of Hispanics documented this “digital divide” finding that 87% of English speakers go online but only 35% of Spanish speakers do.³¹ When they look for health information, Spanish speakers report less confidence in their information seeking abilities than English speakers.²² These differences could lead to disparities in HPV outcomes for populations that experience disproportionate cervical cancer risk.

Though increased exposure to the Internet did not appear to increase HPV knowledge or prompt vaccination, access to media remains important because it

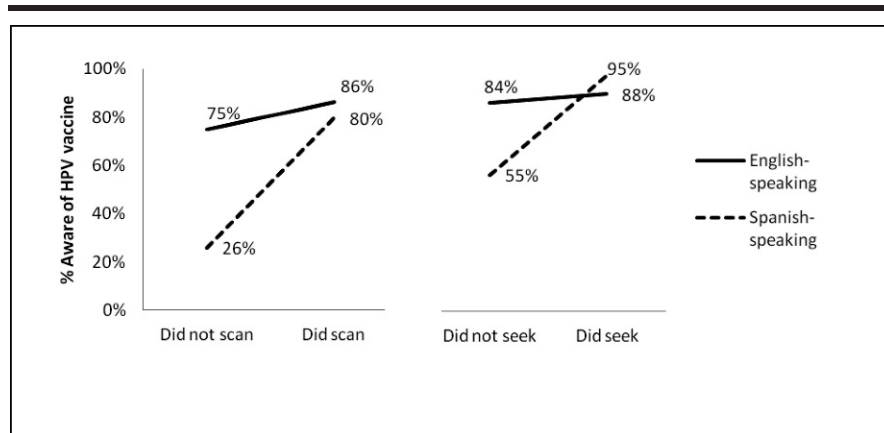


Fig 1. Interaction of mother's language on information scanning and HPV vaccine awareness

provides the initial opportunity to scan for or seek out HPV information. We found that scanners and seekers reported more vaccine awareness, consistent with other studies that found scanning and seeking to be associated with healthy lifestyle choices and cancer screening.¹⁹

Although information scanning and seeking were associated with vaccine initiation for the entire sample, many mothers (81%) had not vaccinated their daughters. This suggests that factors beyond scanning and seeking are influencing mothers' decisions. HPV vaccine acceptability studies among Hispanics found parents to be concerned about: not knowing enough, side effects, and the vaccine encouraging sexual activity.^{13,32,33} Future studies should measure

health communication variables and these concerns to test decision-making mechanisms among Hispanics.

With regard to vaccine awareness, we found an interaction with language such that the effects of scanning and seeking were much greater for Spanish speakers. These disparities in vaccine awareness by language could be attenuated if health care providers, when interacting with Spanish speakers, do not assume that mothers already know about the vaccine. Reviewing vaccination status at all visits – not just well-child visits – could provide additional opportunities for discussion and vaccine initiation.³⁴ Additionally, informed vaccine decision-making requires that providers elicit information from parents regarding vaccine knowledge and concerns to effectively address those concerns.³⁵

It is unclear why language only moderated the effect of seeking on vaccine awareness and not other HPV outcomes. As interventions to facilitate information scanning and seeking emerge, future studies should monitor the interaction between language and information seeking to see if this effect disappears. Future studies should also explore if similar trends in scanning and seeking exist for other groups with sizeable sub-populations who do not speak English. Such information could be important when

designing interventions for Vietnamese Americans who have lower cervical cancer screening rates and higher incidence rates than Whites.³⁶

This study has several limitations. First, we only collected data on use of television and Internet. Future studies among Hispanics should measure additional channels; radio, in particular, is an important information source for Spanish speakers.^{28,37} Second, because no studies have compared content of HPV vaccine coverage in English- vs Spanish-language media, we do not know if equal opportunities for HPV information scanning and seeking existed for both groups. Third, we did not have sufficient power to examine if there were differences in information scanning and seeking by media channels used. Future studies that stratify by channel could provide valuable insight on which channels reach the most English and Spanish speakers. Fourth, given the number of individuals at health fairs and in clinic waiting rooms, it was difficult for research assistants to track the number of women approached, number of women eligible, and number who agreed to participate; this limits our ability to assess generalizability. Also, we recruited mothers of girls aged 8–22 years while most HPV vaccine studies limit data collection to parents of 8–18 year olds^{38,39}; sensitivity analyses restricting the sample to mothers of younger daughters did not change our findings. Finally, because our sample was drawn from a single county and was cross-sectional, it may not reflect Hispanic populations elsewhere.

Because Hispanics suffer disproportionately from cervical cancer, it is imperative that information about HPV and the vaccine reach this population. Despite health educators' increased use of media channels for disseminating information, messages are still not reaching Hispanics; Spanish speakers are particularly vulnerable.³⁰ Our study calls attention to heterogeneity within Hispanics when examining health communication and cancer prevention behaviors.

In regard to HPV outcomes, English speakers had moderately higher HPV knowledge than Spanish speakers, although we found no corresponding difference in vaccine initiation.

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- Design and concept of study:* Stevens, Caughy, Craddock Lee, Tiro
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