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ORIGINAL PAPER

HPV Vaccine Awareness, Barriers, Intentions, and Uptake in Latina Women

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Abstract Latina women are at heightened risk of cervical cancer incidence and mortality. The human papillomavirus (HPV) is the principal cause of the majority of cervical cancer cases. A vaccine that protects against HPV was licensed in 2006. Eight years post-licensure, mixed research findings exist regarding the factors that predict vaccine uptake in Latinas. We conducted a population-based phone survey with a random sample of 296 Latinas living in a Midwestern U.S. City. Intention to vaccinate was significantly associated with health care provider recommendations, worry about side effects, knowing other parents have vaccinated, perceived severity of HPV, and worry that daughter may become sexually active following vaccination. Worry that daughter may become sexually active was the only factor related to vaccine uptake. Findings suggest that training providers to discuss the low risk of severe side effects, consequences of persistent HPV, and sexuality related concerns with Latino women may encourage vaccination.

Keywords HPV vaccine · Intention · Uptake · Latinas

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Introduction

Latina women are at increased risk of being diagnosed with cervical cancer compared to non-Latina white women [1]. Estimates of cervical cancer incidence indicate Latinas have a 14.2/100,000 rate compared to the 8.2/100,000 rate observed in non-Hispanic white women [2]. Furthermore, ethnic health disparities in access and uptake of screening and follow-up services place Latinas at increased risk of being diagnosed at an advanced stage of intraepithelial neoplasia or cancer and at increased risk of mortality [3, 4].

The human papillomavirus (HPV) is the most common sexually transmitted disease and the cause of the majority of cervical cancers [3]. Approximately 50 % of sexually active women will be infected with HPV at one point in their lives [5]. In 2006, the FDA licensed a vaccine that protects against two HPV types associated with 70 % of cervical cancer cases. The CDC recommends the vaccine for 11–12 year old males and females before they initiate sexual relations to maximize immunological protection [5].

To reduce ethnic disparities in cervical cancer it is necessary to target populations at high risk with prevention efforts [4]. Research on vaccination initiation conducted with national samples indicates that Latina girls aged 13–17 have an initiation rate of 60 % (Reiter, Gupta, and Brewer, in press) which is slightly higher than the rate for non-Hispanic white girls estimated at 57 % [6]. Unfortunately, 8 years post-vaccine licensure, vaccination rates have not reached the 70 % estimated rate needed to achieve herd immunity [7].

Research conducted with Latina women to understand factors associated with HPV vaccine uptake such as knowledge about HPV and the vaccine, attitudes, barriers, and intentions indicates that there is high intentions to vaccinate but considerable variability in uptake, knowledge

and attitudes by segments of the U.S. Latino population. For example, research has documented low knowledge about HPV and its link to cervical cancer [8–11] while other research suggests the opposite [12]. Similarly, recent research has found lower vaccination rates in more underserved Latinas and a greater concern about encouragement of early sexual initiation following vaccination in certain segments of the U.S. Latino population [13, 14]. These mixed findings underscore the need to conduct research with diverse segments of the U.S. Latino population [12, 13, 15] as the U.S. Latino population is heterogeneous regarding levels of income, educational attainment, and acculturation. For example, less acculturated Latinas are more likely to be less educated and of lower SES status than their more acculturated counterparts [16]. In fact, studies have begun to indicate that knowledge about HPV and the vaccine, for example, varies by acculturation status with more acculturated Latinas reporting more knowledge [15].

The purpose of this study is to contribute to the growing literature documenting factors associated with HPV vaccination uptake such as vaccination barriers, reasons for vaccination, intention to vaccinate, and vaccination uptake in a sample of Latinas living in Dane County, Wisconsin, a county characterized by rapid Latino population growth. The Latino community in Wisconsin is a fast-growing low-acculturated population that increased by 48 % during the last decade [17] becoming the largest minority population in the state (6 % of the State's population) [18].

Seventy percent of Latinos in Dane County are of Mexican descent. The remainder 30 % are from El Salvador, Nicaragua, Guatemala, Honduras, and Peru. Since the 1980s, immigrants experiencing political turmoil in Central America have steadily immigrated to Dane County.

Methods

We conducted a cross-sectional population-based phone survey with a random sample of Latinas living in Dane County, Wisconsin between October of 2010 and February of 2011. A list consisting of 2,193 phone numbers and mailing addresses believed to be associated with Hispanic households was purchased from Survey Sampling International. Telephone numbers were the sampling unit and associated households were then screened for eligible sample members. A household was deemed eligible if there was at least one woman aged 18 or older who self-identified as Hispanic and self-reported being a resident of Dane County. During each call, interviewers determined whether or not a working residential telephone number had been reached. Each working number was then screened to verify it was associated with a household. Working numbers of residential households were then further screened to determine whether there was at least one household resident who was a Hispanic/Latino woman at least 18 years old. If there was more than one eligible person in the household, the respondent was randomly selected. Only the selected person could be interviewed and no substitutions were allowed. Approximately 22 % of telephone numbers were non-working numbers and 31 % were screened out as ineligible households. An advance letter was sent to random samples with a $2 bill pre-incentive. Households were called starting 3 days after the advance letter was sent. All respondents who completed an interview were sent a thank you letter with a $20 post-incentive. The response rate was 64.6 %.

Interviewers received over 20 h of training. Twenty-two interviewers were trained to administer the phone survey, four of which were bilingual. Initial call attempts were made in English. If during the initial call it was learned that Spanish was the preferred language and the interviewer was bilingual, the interview continued at the moment. If the interviewer was not bilingual, a call back time with a Spanish interviewer was scheduled. The University of Wisconsin's IRB approved the research protocol.

Survey Content

The content of the survey was informed by health behavior theory and a review of the literature on HPV vaccine acceptability in the U.S. The Health Belief Model (HBM) [19] suggests that beliefs about the severity of a disease, perceived threat of contracting such disease, perceived benefits and consequences of taking action to prevent such disease, and reminders or cues to preventive action encountered in the environment influence the enactment of health protective behavior. The theory of planned behavior (TPB) [20] complements the HBM by positing that norms (the opinions of significant others and the importance assigned to those opinions) are also important influences on people's enactment of self-protective behaviors. Moreover, barriers such as lack of health insurance and health care access will also influence action. Survey questions were originally developed in Spanish. Manuscript authors (who are fully English/Spanish bilingual and their first language is Spanish) and a community advisory board collaborated to develop survey questions. Survey questions were then refined based on pilot testing with 75 participants.

Survey questions assessed standard demographics such as age (years), educational attainment, country of birth, length of residency in the U.S., marital status, health insurance coverage during the last 12 months, access to a regular health care provider, and whether women had a daughter between 9 and 18 years of age. Language of preference (English vs. Spanish) was assessed with the

Marin and colleagues (1989) scale [21]. Response options for preferred language were 1 = "Only Spanish", 2 = "Spanish better than English", 3 = "Spanish and English Equally", 4 = "English better than Spanish", and 5 = "Only English". Awareness of HPV and the HPV vaccine was assessed by asking if they had heard about HPV and the HPV vaccine (1 = "Yes" and 2 = "No"). Perceived threat and severity was assessed by asking how common and how severe is HPV? (1 = "Not at All" to 5 = "Very Much"). Perceived benefit was assessed by asking how important the protection conferred by the vaccine would be to their decision to vaccinate? (1 = "Reason would Not be at All Important" to 5 = "Reason would be Extremely Important"). Perceived barriers were assessed by asking how much they worried that the vaccine may cause other health problems, that vaccination may encourage daughter to become sexually active, that they don't have enough information about HPV, and about cost (1 = "Not at All Worried" to 5 = "Extremely Worried"). Norms where assessed by asking how important it would be to their decision to vaccinate knowing that other parents have vaccinated their children (1 = "Reason would Not be at All Important" to 5 = "Reason would be Extremely Important"). Cues to action were assessed by asking how important it would be to their decision to vaccinate if their doctor recommended the vaccine and if their children's school required them to be vaccinated against HPV for school entry (1 = "Reason would Not be at All Important" to 5 = "Reason would be Extremely Important").

Intentions to vaccinate were assessed by asking all women, regardless of whether they had a daughter, to imagine they have a 9–18 year-old daughter who has not received the HPV vaccine and that their health care provider offered the vaccine. Then, women were asked: how likely is it that you would accept the HPV vaccine for your daughter? (1 = "Not at All Likely" to 5 = "Extremely Likely"). We assessed vaccination uptake only in women who reported having heard of the HPV vaccine and reported having one or more daughters between 9 and 18 years of age by asking them to self-report whether any of their daughters had been vaccinated against HPV. Response options were 1 = "No", 2 = "Yes", and 3 = "Don't Know".

Table 1 Demographic characteristics of study participants (N = 296)

	N	%
Marital status		
Single/never married	43	14.5
Married	174	58.8
Living with partner	42	14.2
Divorced or separated	28	9.5
Widowed	9	3.0
Education		
Less than high school	110	37.1
High school graduate	104	35.1
College graduate	55	18.6
Postgraduate studies	25	8.4
Don't know	2	.7
Health insurance last 12 months		
All of the time	172	58.1
Some of the time	47	15.9
Never	77	26.0
Regular health care provider		
Yes	228	77.0
No	67	22.6
Don't know	1	.3
Born in the USA		
Yes	60	20.3
No	234	79.1
Refused to answer	2	.7
Preferred language		
Only Spanish	72	24.3
Spanish better than English	111	37.5
Spanish and English equally	64	21.6
English better than Spanish	36	12.2
Only English	13	4.4
Ever heard of HPV		
Yes	218	73.6
No	78	26.4
Ever heard of the HPV vaccine[a]		
Yes	164	55.4
No	53	17.9
Don't know	1	.3

[a] Among those who ever heard of HPV

Participants

Participants were 296 Latina women with a mean age of 39.02 years ($SD = 6.90$). Table 1 presents other demographic characteristics. As Table 1 indicates, approximately 58 % of participants reported to be married, 72 % had less than high school or high school education only. Approximately 77 % indicated they had a regular health care provider who they saw regularly and 58 % indicated they had uninterrupted health care insurance coverage during the last 12 months. Regarding country of birth, 79 % indicated they were born in a country other than the U.S. The mean score for language acculturation was 2.13 ($SD = 1.20$). Approximately 84 % of respondents indicated they prefer to speak Spanish over English or Spanish only. Approximately 17 % of participants (n = 50) indicated they had a daughter between 9 and 18 years of age of which, 49 % indicated they had vaccinated their daughter against HPV.

Analyses

We computed descriptive statistics to characterize the sample including means and frequencies. To elucidate factors associated with vaccination intentions, we computed a hierarchical linear regression equation for all women who reported being aware of HPV and the vaccine. For this analysis, we included only women who did not report having a daughter between 9 and 18 years of age (n = 246). We regressed intentions on demographic characteristics (education, health insurance coverage, access to a health care provider, and language acculturation), perceived HPV threat and severity, benefits, barriers, norms, and cues to action. All variables were entered simultaneously and no variables were grouped together.

To elucidate factors associated with uptake, we conducted a logistic regression analysis by regressing uptake on demographic characteristics (education, health insurance coverage, access to a health care provider, and language acculturation), perceived HPV threat and severity, benefits, barriers, norms, and cues to action. All variables were entered simultaneously and no variables were grouped together. The analysis on uptake, was conducted only with women who reported having a daughter between 9 and 18 years of age (n = 50).

Results

The majority of women (73 %) indicated they had heard of HPV. Among these, 75 % indicated they had heard about the HPV vaccine, of which, 41 % indicated they were 'extremely likely' to accept the vaccine. All women who reported having a daughter reported having heard of the HPV vaccine. Only one mother reported not knowing whether she had vaccinated her daughter against HPV. For the purposes of analyses, we classified this 'don't know' response as missing.

Table 2 presents the results of the hierarchical linear regression analysis on intentions to vaccinate. As Table 2 shows, worry that the HPV vaccine will cause other health problems [$\beta = -.26$, $p < .001$, 95 % CI (−.33, −.11)], perceived threat of contracting HPV [$\beta = .17$, $p < .01$, 95 % CI (.06, .45)], worry that daughter may become sexually active as a result of vaccination [$\beta = -.16$, $p < .05$, 95 % CI (−.23, −.02)], a health care provider's recommendation [$\beta = .35$, $p < .001$, 95 % CI (.34, .78)], and knowing other parents have vaccinated [$\beta = .23$, $p < .01$, 95 % CI (.09, .33)], emerged as significant predictors of intentions to vaccinate ($R^2 = .39$).

Table 3 presents the results of the logistic regression analysis on vaccination uptake (only women who reported having a daughter). As Table 3 shows, worry that daughter may become sexually active as a result of vaccination was the only factor associated with uptake ($R^2 = .35$).

Table 2 Factors associated with vaccination intentions

Step variable	*B*	SE B	*β*	$R^2\Delta$
Important health care provider recommends	.56	.11	.35***	.20***
Worry HPV vaccine causes health problems	−.22	.05	−.26***	.08***
Important to know other parents have vaccinated	.21	.06	.23**	.05**
How severe is HPV infection	.25	.09	.17**	.02*
Worry daughter will become sexually active	−.12	.05	−.16*	.02*

R^2 change represents the amount of variance accounted for at each step of the equation. Other statistics summarize data at the final step of the equation. *** $p < .001$, ** $p < .01$, * $p < .05$. Data is for all participants who reported having heard about the HPV vaccine

Table 3 Factors associated with vaccination uptake

Variable	*B*	SE	*OR*	95 % CI	Wald statistic	*p*
Worry daughter will become sexually active	−.53	.22	.58	.39,.90	5.91	.01

Data is for mothers who reported having heard about the HPV vaccine and having a daughter ($N = 50$)

Discussion

The aim of our study was to identify factors associated with HPV vaccination intentions and uptake among Latina women, with the ultimate goal of elucidating potential intervention targets to promote the HPV vaccine in a population at heightened risk of cervical cancer incidence and mortality. Prior research on HPV vaccine acceptance with U.S. Latinas has shown that uptake, knowledge and attitudes vary considerably depending on which segments of the U.S. Latino population are sampled. Our results indicate a high level of HPV awareness as 73 % of women indicated they had heard about HPV. However, only 75 % of women who reported knowing about HPV reported knowing about the existence of the HPV vaccine. Unfortunately, only 41 % of those who knew about HPV and the existence of the vaccine, indicated they were 'extremely likely' to accept the vaccine for hypothetical daughters. In addition, only half of women who had daughters had vaccinated.

Our findings support the role of cues to action as potential intervention targets to promote HPV vaccine acceptance. In particular, our findings indicate that among

the significant predictors of vaccination intentions were a provider's recommendation. This findings is consistent with research findings in the general U.S. population suggesting the importance of a provider's recommendation [22]. Interestingly, in our study, having health insurance and a regular health care provider did not emerge as significant predictors of vaccination intentions. Recent research using spatial analysis to examine the association between high risk neighborhoods and their proximity to safety-net clinics offering HPV vaccination services indicates that having geographically accessible services does not predict HPV vaccine uptake [23] possibly suggesting that access to health care services is not a strong motivator of acceptance.

Our findings also indicate that norms, in the form of knowing other parents who have vaccinated, was significantly associated with intentions to vaccinate. The importance of norms on motivating vaccination in Latinas has been previously observed in a different sample [24]. These findings further underscore the importance of a provider's recommendation because as more parents decide to vaccinate their children based on these recommendations, perceived social norms regarding parental behavior among the Latino community may change and contribute to further increase vaccine uptake. In addition, social network interventions to promote HPV vaccination among Latinas may be particularly effective. Social network interventions to promote prevention for other sexually transmitted infections among Latinas have shown promise [25, 26].

Our findings also indicate that personal beliefs about vaccine safety were inversely associated with vaccination intentions. Regarding worries about vaccine safety, the controversy that has shrouded the HPV vaccine since it's introduction in the U.S. [27, 28] has created undue public concern about it's safety [29]. Our study suggests that safety concerns continued 5 years after vaccine licensure. Furthermore, the personal beliefs about the severity of contracting HPV was also inversely associated with vaccination intentions. We argue that the time may be ripe to develop decision-aid interventions to promote informed decision-making and hence, the active consideration of benefits (reduced risk of contracting a severe disease) and risks of vaccination (very low rates that an adverse outcome may occur following vaccination) to increase vaccination uptake before ethnic disparities in cervical cancer rates exacerbate [30]. Decision aid interventions may also facilitate providers' recommendations if they are implemented before the clinical encounter.

A particularly interesting finding is that concern that daughter may become sexually active after vaccination was significantly associated with intentions and importantly, uptake. To our knowledge only two published studies conducted with Latinas have found similar results [14, 32]. It is important to note that little research on vaccination uptake has been conducted with primarily Spanish speaking Latinas [31]. Our findings indicate that the impact of sexuality-related concerns should be researched further as this has strong implications for educational interventions. For example, research indicates that health care providers feel reluctant to discuss sexuality-related issues with parents [33]. Hence, behavioral interventions to train health care providers to discuss sexuality-related issues with parents may reduce discomfort on behalf of providers and increase vaccination recommendation effectiveness.

Our study has several limitations including the cross-sectional nature of our survey which precludes causality statements and assessing vaccination intentions for hypothetical daughters. However, studying HPV awareness and vaccination intentions in Latina women in general is important as they can benefit from catch-up vaccination. Currently, catch-up vaccination is recommended for any woman or men who has not reached the age of 26. Furthermore, Latina women knowledgeable about HPV and the vaccine and with positive attitudes toward vaccination can disseminate information among their social network. Our findings with women who reported having a daughter should be taken with caution as our sample size was small. Findings should be replicated with a larger sample.

Vaccination efforts need to be scaled up in high risk populations especially those characterized by a fast growing birth rate, such as Latinos. Otherwise, disparities in cervical cancer and other HPV-related cancers will continue challenging the U.S. health care system. In addition, interventions should be designed to encourage uptake of this primary prevention technology before ethnic disparities in cervical cancer exacerbate. Our findings point to potential avenues for interventions such as intervening with providers to increase their recommendation of the HPV vaccine while discussing safety and effectiveness rates and interventions that rely on social network methodologies.

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