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HPV Vaccine Related Knowledge, Beliefs, Acceptability and Uptake among English Language Preferred and Spanish Language Preferred Latinas

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Abstract

Latinas compose almost 10% of the US population, and suffer the highest incidence and one of the highest mortality rates of cervical cancer. Human papillomavirus (HPV) vaccination can prevent most HPV infections that cause over 90% of cervical cancer. Unfortunately, there persist limited knowledge and low rates of HPV vaccination in Latinas. The current study compared the awareness, knowledge, beliefs, acceptability, uptake and 3-dose series completion of HPV vaccination between English preferred Latinas (EPL) and Spanish preferred Latinas (SPL) (ages 18–62), living in Southern California. More EPL (N=57) than SPL (N=150) reported significantly: 1) more HPV vaccine awareness and more knowledge of where to access the vaccine and additional vaccine information, and 2) greater endorsement of vaccine effectiveness and safety ($p<0.05$). Regardless of language preference, Latinas reporting knowledge of where to access the vaccine and additional information endorsed greater acceptability of the vaccine and more favorable beliefs regarding vaccine safety and effectiveness ($p<0.05$). In multivariate analyses, language and income predicted the outcomes of knowledge regarding accessing the vaccine and additional information. Only 15.6% of all eligible Latinas (N=45) initiated the HPV vaccine with 8.9% completion. Interventions seeking to improve HPV vaccination should address linguistic and socio-ecological differences within Latinas to enhance effectiveness.

Keywords

HPV vaccine; knowledge; beliefs; Latinas; language differences

Introduction

The President's Cancer Panel has declared that human papillomavirus (HPV) vaccination is a top public health priority (President's Cancer Panel, 2014). Unfortunately, dangerously low rates of uptake and completion of the 3-dose series HPV vaccination persist, especially in ethnic minority groups, including Latina women (Gerend, Zapata, & Reyes, 2013; Niccolai, Mehta, & Hadler, 2011). There are currently three vaccines available (bivalent, quadrivalent, and nine-valent) targeting the most virulent HPV strains. Vaccination is

delivered in a 3-dose series to females and males, 11 to 26 years of age, (Centers for Disease Control (CDC), 2016). The HPV vaccines are the most practical and effective methods to prevent an HPV infection that may later develop into cervical cancer or other types of cancers such as anal, vulvar, vaginal, penile, and oropharyngeal cancers (Gillison, Chaturvedi, & Lowy, 2008; Petrosky, 2015; President's Cancer Panel, 2014).

HPV vaccination is critical for all populations, and particularly urgent among Latinos, given that Latinas suffer from the highest incidence of cervical cancer and one of the highest mortality rates compared to other ethnic groups in the United States (CDC, 2015). This highly debilitating and lethal health disparity can be significantly reduced if more age eligible Latinos were appropriately vaccinated. Therefore, it is important that we examine factors associated with initiation and completion of the 3-dose series HPV vaccination.

Some factors that may contribute to the low rates of HPV vaccination among Latinas include limited awareness and knowledge about HPV or the HPV vaccine (Chan, Brown, Sepulveda, & Teran-Clayton, 2015), as well as beliefs, attitudes, and acceptability associated with the HPV vaccine (Ramirez, Jessop, Leader, & Crespo, 2014; Yeganeh, Curtis, & Kuo, 2010). Qualitative research has found that Latinas view improved knowledge and beliefs as essential for better HPV vaccination rates in the Latino community (Fernandez et al., 2014; Ramirez et al., 2014). Quantitative research examining Latinas among other ethnic groups has also found an association between knowledge, beliefs, attitudes, acceptability, and HPV vaccine uptake (Williams et al., 2013). Given the link between knowledge, beliefs, attitudes, and acceptability with HPV vaccine uptake, and given the diversity of Latinos, it is important to examine these variables in the context of different Latino subgroups.

Some studies have found self-reports of low levels of awareness and knowledge about HPV and the HPV vaccine in Latinos (Aragones, Genoff, Gonzalez, Shuk, & Gany, 2015; Fernandez, 2009; Kepka, Warner, Kinney, Spigarelli, & Mooney, 2015; Luque, Raychowdhury, & Weaver, 2012). Limited research has examined the variability of knowledge across different subgroups of Latinos, but has primarily compared Latinos with other ethnic groups (Watts, 2009). One study found that when adjusting for income, low acculturated Latinos were more likely than high acculturated Latinos to report inadequate information about the HPV vaccine (Kepka et al., 2015).

Regarding HPV vaccine uptake, some research found that HPV vaccination differs in Latinos based on language preference and socio-economic status (Chando, Tiro, Harris, Kobrin, & Breen, 2013). Specifically, a study found that Latino parents who were Spanish language preferred and had a lower socio-economic status were less likely to vaccinate their children (Chando et al., 2013). Similarly, a different study found that high acculturated Latina mothers compared to low acculturated Latina mothers were more likely to report physician recommendation of the HPV vaccine, vaccine awareness, and to have daughters who had received the vaccine (Gerend et al., 2013).

The current study contributes to the limited research that examines awareness, knowledge, beliefs, and acceptability of HPV vaccination in the context of language preference among Latinas. The study also examines the association of knowledge with beliefs and

acceptability, as well as HPV 3-dose series vaccine initiation and completion for Latinas who were eligible (were between 11–26 years old when the first HPV vaccine was made available in 2006). Specifically, the current study compares English preferred Latinas (EPL) and Spanish preferred Latinas (SPL) on the variables noted above, including the association of knowledge with beliefs and acceptability, and examines demographic factors in addition to language as predictors of knowledge and acceptability.

Method

The current investigation is part of a larger study (with baseline data collected in 2011) aimed at understanding the impact of social media strategies (e.g., print, radio) on knowledge, beliefs, and practices related to cervical cancer prevention – including Pap testing and human papillomavirus (HPV) vaccination, in ethnic minority women living in Southern California. The current study focused on Latinas HPV vaccine awareness, knowledge, beliefs, acceptability, and uptake.

Participants

Women were included in the current study if they: 1) were between the ages of 18–62, and 2) self-identified as Latina. Women with any type of cancer diagnosis history were excluded because the medical characteristics (e.g. disease progression, prognosis) and perceptions (e.g. stigma, health care seeking behaviors) are significantly different for women who are cancer survivors. Additionally, women with other major medical conditions (e.g. stroke and degenerative illness) are likely to present with distinct medical and quality of life issues, and therefore were excluded.

Participants were recruited from health-fairs in the community and high schools within Southern California. The following strategies were used for recruitment: invitations were sent by high schools and community health networks, and active recruitment was conducted using invitation packets at community cultural and health events. The invitation packets contained information about the study, informed consent form, the study survey and a self-addressed stamped envelope. Baseline survey completion took about 35–45 minutes and study participants were provided with a \$20 gift card for their participation. The Institutional Review Board of the City of Hope National Medical Center approved the study. All participants signed an informed consent form in order to participate in the study.

Measures

We measured the following: awareness, knowledge, beliefs, acceptability, uptake and completion of 3-dose series HPV vaccination. All survey items were translated from English to Spanish by a native Spanish speaker who was a certified translator. We assessed awareness with the following items: “Have you ever heard of cervical cancer and HPV (Human Papillomavirus)?” “Have you ever heard of the HPV vaccine or shot to prevent cervical cancer?” Both items were rated on a dichotomous scale of “1=Yes” or “0=No”. A composite score was created for multivariate analyses, by summing up responses (maximum total score of 2). For knowledge, we assessed substantive knowledge of HPV with two items, and included two other items assessing knowledge of where to access information about the

HPV vaccine and also where to access HPV vaccination. The two HPV substantive knowledge items were: “Do you think you can get HPV through sexual contact?” “Do you think HPV can go away on its own without treatment?” These two items were rated on the following scale: “1=Yes”, “0=No”, “0=Don’t Know”. A composite score was created for multivariate analyses, by summing up responses (maximum total score of 2). The following items assessed knowledge of where to access information about HPV vaccine and where to access HPV vaccination, respectively: “Do you know where you can get more information about the HPV vaccine?” “Do you know where you can (or refer someone else) to get the HPV vaccine?” Both items were rated as “1=Yes” or “0=No”. A composite score was created for multivariate analyses, by summing up responses (maximum total score of 2).

We assessed beliefs specifically with three items: “Do you believe that the HPV vaccine can prevent HPV infection and cervical cancer?” “Do you believe that the HPV vaccine is safe?” “Does the HPV vaccine cost too much?” These three items were rated as “1=Yes”, “0=No”, or “0=Don’t Know”. A composite score was created for multivariate analyses, by summing up responses (maximum total score of 3).

Acceptability of the HPV vaccine was assessed with the following item: “Would you/have you ever recommended that a relative (e.g., children, cousins) or friend get the HPV vaccine or HPV shots?” This item was rated as “1=Yes” or “0=No”. The item of acceptability is different from previous acceptability measures in that it assesses whether participants would be okay with *someone close to them* getting the HPV vaccine, specifically would recommend the vaccine, as opposed to focusing only on their willingness to get the HPV vaccine *themselves* or only on having their *own children* get vaccinated. We make the assumption (albeit with acknowledgment of a limitation) that a recommendation/or potential recommendation of the vaccine to friends and family (which may have included their children, if they had eligible children), implies that participants would be “willing to vaccinate themselves or close others” (see review by Brewer & Fazekas, 2007, for discussion of “willingness to vaccinate” as an indicator of “HPV vaccine acceptability”).

For participants who were eligible (were between 11–26 years old when the first HPV vaccine was made available in 2006) to receive the HPV vaccine we assessed their HPV vaccine uptake and completion of the 3-dose series with the following items, respectively: “Have you ever received the HPV vaccine or HPV shots?” “If so, did you receive all three doses of the HPV vaccine?” These items were rated as “1=Yes”, “0=No”, or “0=Don’t Know”.

Data Analyses

Descriptive analyses were conducted to summarize the demographic characteristics (i.e., age, educational attainment, income, occupational status, and marital status) of the sample and compare these characteristics between EPL and SPL. Chi-squares were conducted to compare EPL and SPL on the variables of interest (HPV and HPV-vaccine-awareness, knowledge, and beliefs; and acceptability of HPV vaccine). In order to test more precisely for differences between EPL and SPL on the exact distinct items related to awareness, knowledge, and beliefs, we conducted chi-squares for each individual item separately as

opposed to the composite score of each construct. Chi-squares were also conducted to compare participants with and without knowledge (regarding a) access to HPV vaccine information and b) access to HPV vaccination) on their HPV vaccine beliefs and acceptability. We conducted these latter chi-squares separately for EPL and SPL. Multivariate logistic regression analyses examined whether the demographic variables (i.e., age, educational attainment, income, language preference), HPV and HPV vaccine awareness, and HPV and HPV vaccine knowledge (substantive knowledge, access knowledge), and HPV vaccine beliefs predicted HPV vaccine acceptability. For all multivariate analyses we used the composite scores for awareness, knowledge, and beliefs, in order to minimize the number of variables in the equations. Given past research finding acculturation differences in Latinos regarding having information about HPV vaccination (Kepka et al., 2015) and income differences in Latinos regarding access to HPV vaccination (Chando et al., 2013), we also conducted multivariate logistic regression analyses predicting the following two knowledge outcomes (access to information about HPV vaccination and access to HPV vaccination) by age, educational attainment, income, and language preference.

Results

Descriptive Information for Demographics

We assessed a total of 207 Latina participants on their awareness and knowledge of HPV, cervical cancer, and the HPV vaccine including their beliefs and acceptability of the HPV vaccine. Additionally, we assessed HPV vaccine uptake and completion of the 3 doses for a subgroup of vaccine eligible Latinas (**N=45**). Of the total sample, 150 were categorized as Spanish preferred Latinas (SPL) and 57 were categorized as English preferred Latinas (EPL). Language preference was determined by the language chosen to complete the survey. Their age ranged from 18 to 62 years, with a mean age of 42.3 years (SD= 11.8). EPL compared to SPL had greater educational attainment, reported a higher annual income, and were more likely to be employed (see Table 1). SPL had lower education with 65.2% having less than high school, while only 14.5% of EPL had less than high school. There were 16.1% EPL who had an annual income lower than \$15k, 39.3% with an annual income between \$15k and \$35k, and 44.6% with an annual income more than \$35k. There were 43.9% SPL who had an annual income lower than \$15k, 41.7% with an annual income between \$15k and \$35k, and 14.4% with an annual income more than \$35k. Regarding occupational status, 25% of EPL were homemakers, 23.2% had managerial/professional positions, 12.5% had technical/administrative positions, 17.9% had service positions, and 21.4% had “other” types of positions; while 66.7% of SPL were homemakers, 10.1% had managerial/professional positions, 4.1% had technical/administrative positions, 15% had service positions, and 4.1% had “other” types of positions. Both EPL and SPL reported a similar marital status. Specifically, 66.9% of the EPL were married while 67.8% of the SPL were married.

Comparison of EPL and SPL on Variables

We compared EPL to SPL on the HPV and HPV-vaccine-awareness, knowledge, and beliefs; and acceptability of HPV vaccine (see Table 2). EPL and SPL significantly differed on: an

awareness item (“heard of HPV vaccine to prevent cervical cancer”); two knowledge items (“know where to go for more information about the HPV vaccine” and “know where to get/or get referred to receive the HPV vaccine”); and a belief item (“believe the HPV vaccine can prevent HPV infection or cervical cancer”). Participants regardless of language reported high awareness of cervical cancer and HPV (EPL - 85.5%; SPL - 83.1%). Although, EPL and SPL did not differ from each other on awareness of cervical cancer or HPV, they did differ significantly from each other on HPV vaccine awareness. Specifically, a significantly greater proportion of EPL (70.2%) heard of the HPV vaccine than SPL (52.4%), $\chi^2 (1, N=204) = 5.317, p = 0.021$. A significantly greater proportion of EPL (64.8%) reported knowledge of where to obtain more information compared to SPL (23.6%), $\chi^2 (1, N=202) = 29.608, p = 0.000$. Also, a significantly greater proportion of EPL (61.1%) reported knowledge of where to obtain the HPV vaccine compared to SPL (21.5%), $\chi^2 (1, N=203) = 28.604, p = 0.000$. Also, a significantly greater proportion of SPL (45.3%) responded “do not know” if they believed that the HPV vaccine can prevent HPV infection or risk of CCA compared to EPL (28.1%), $\chi^2 (2, N=205) = 9.756, p = 0.008$. Although EPL and SPL did not significantly differ from each other on the following belief items: “belief that the HPV vaccine is safe” or “belief that the HPV vaccine costs too much”, a relatively high proportion of women from both groups marked “do not know” as a response to each of these items. Specifically, of the EPL, 45.6% and 86.0% marked “do not know” for “belief that the HPV vaccine is safe” and for “belief that the HPV vaccine costs too much”, respectively. Similarly, for the SPL, 53.3% and 82.0% marked “do not know” for the same belief items, respectively.

EPL and SPL subgroups differed significantly from each other on the knowledge items regarding where to get more information about the HPV vaccine and where to get the HPV vaccine. Therefore, we examined whether these knowledge items were associated with HPV-related belief and HPV vaccine acceptability, separately for EPL and SPL.

Analyses of Association of Knowledge with Beliefs and Acceptability for EPL

A significantly greater proportion of Latinas with “knowledge of where to get information” (71.4%) reported a “belief that the HPV vaccine can prevent HPV infection and risk of cervical cancer” than women with “no knowledge of where to get information” (31.6%), $\chi^2 (2, N=54) = 8.190, p = 0.017$. A significantly greater proportion of women with “knowledge of where to get the HPV vaccine” (72.7%) reported a “belief that the HPV vaccine can prevent HPV infection and risk of cervical cancer” than women with “no knowledge of where to get the HPV vaccine” (38.1%), $\chi^2 (2, N=54) = 6.743, p = 0.034$.

Although only marginally significant, a greater proportion of women with “knowledge of where to get information” (48.6%) reported a “belief that the HPV vaccine is safe” than women with “no knowledge of where to get information” (15.8%), $\chi^2 (2, N=54) = 5.712, p = 0.058$. A significantly greater proportion of women with “no knowledge of where to get the HPV vaccine” (28.6%) reported that they “did not believe that the HPV vaccine is safe” than women with “knowledge of where to get the HPV vaccine” (6.1%), $\chi^2 (2, N=54) = 6.412, p = 0.041$.

Possessing knowledge of where to get information or get the HPV vaccine was not associated with the belief that the HPV vaccine is too expensive.

A significantly greater proportion of women with “knowledge of where to get information” (54.3%) reported “recommending the vaccine” than women with “no knowledge of where to get information” (21.1%), χ^2 (1, N=54) = 5.562, $p = 0.018$. A significantly greater proportion of women with “knowledge of where to get the HPV vaccine” (56.3%) reported “recommending the vaccine” than women with “no knowledge of where to get the HPV vaccine” (23.8%), χ^2 (1, N=53) = 5.432, $p = 0.020$.

Analyses of Association of Knowledge with Beliefs and Acceptability for SPL

A marginally greater proportion of women with “no knowledge of where to get information” (51.4%) reported “they did not know if they believed the HPV vaccine can prevent HPV infection and risk of cervical cancer” than women with “knowledge of where to get information” (28.6%), χ^2 (2, N=146) = 5.601, $p = 0.061$. A significantly greater proportion of women with “no knowledge of where to get the HPV vaccine” (51.3%) reported “they did not know if the HPV vaccine can prevent HPV infection and risk of cervical cancer” than women with “knowledge of where to get the HPV vaccine” (25.0%), χ^2 (2, N=147) = 7.026, $p = 0.030$.

A significantly greater proportion of women with “no knowledge of where to get information” (62.2%) reported “they did not know if they believed the HPV vaccine is safe” than women with “knowledge of where to get information” (30.3%), χ^2 (2, N=144) = 13.751, $p = 0.001$. A significantly greater proportion of women with “no knowledge of where to get the HPV vaccine” (63.2%) reported that they “did not know if they believed the HPV vaccine is safe” than women with “knowledge of where to get the HPV vaccine” (22.6%), χ^2 (2, N=145) = 18.426, $p = 0.000$.

A significantly greater proportion of women with “no knowledge of where to get information” (87.6%) reported “they did not know if they believed the HPV vaccine cost too much” than women with “knowledge of where to get information” (64.7%), χ^2 (2, N=147) = 11.170, $p = 0.004$. A significantly greater proportion of women with “no knowledge of where to get the HPV vaccine” (87.9%) reported “they did not know if they believed the HPV vaccine cost too much” than women with “knowledge of where to get information” (62.5%), χ^2 (2, N=148) = 13.040, $p = 0.001$.

A significantly greater proportion of women with “knowledge of where to get information” (54.3%) reported “recommending the vaccine” than women with “no knowledge of where to get information” (34.2%), χ^2 (1, N=146) = 4.495, $p = 0.034$. A marginally greater proportion of women with “knowledge of where to get the HPV vaccine” (53.1%) reported “recommending the vaccine” than women with “no knowledge of where to get the HPV vaccine” (35.7%), χ^2 (1, N=147) = 3.199, $p = 0.074$.

Initiation and Completion of 3-dose HPV vaccine series for EPL and SPL

For the women who were eligible for HPV vaccination, we conducted analyses on vaccine uptake and 3-dose series completion. We included women under the “eligible” category if

they were < 27 years of age when the vaccine became available. We conducted the analysis for the total sample of Latinas and separately for EPL and SPL. In general, very few women reported uptake and completion of the three doses of the HPV vaccine. Of the total 45 eligible women, only 15.6% (7/45) said that they initiated the vaccine, 77.8% (35/45) said that they had not received the vaccine, and 6.7% (3/45) did not know. Even fewer reported receiving all three doses, only 8.9% (4/45). When conducting the analysis separately by language group, we found that EPL generally reported more uptake of the HPV vaccine than SPL. Specifically, of the EPL 26.1% (6/23) reported that they received the HPV vaccine and 17.4% (4/23) reported they received the three doses, while of the SPL 4.8% (1/21) reported to have received the HPV vaccine and none reported to have received the three doses.

Multivariate Logistic Regression Analyses

Results of the multivariate logistic regression analyses are presented in Table 3. For the outcome of “HPV vaccine acceptability”, the following variables were significant predictors: vaccine awareness, vaccine beliefs, and vaccine access knowledge. Specifically, women who reported more vaccine awareness were significantly more likely to report vaccine acceptability (OR 1.97, 95% CI 1.10–3.52), $p = .023$. Also, women who reported more favorable HPV vaccine beliefs (including effectiveness of HPV vaccine to prevention HPV related infections and cervical cancer and safety) were significantly more likely to report vaccine acceptability (OR 2.03, 95% CI 1.37–3.01), $p = .000$. Women who reported more knowledge related to access were marginally more likely to report vaccine acceptability (OR 1.61, 95% CI 1.03–2.49), $p = .053$. For the outcomes of “knowledge regarding accessing HPV vaccine information” and “knowledge regarding accessing HPV vaccination” the variables of language and income were significant predictors. EPL were significantly more likely than SPL to report knowledge of where to access HPV vaccine information (OR 4.27, 95% CI 1.82–9.98), $p = .001$. Latinas with a lower income were significantly less likely to report knowledge of where to access HPV vaccine information (OR .25, 95% CI .07–.94), $p = .040$. Also, EPL were more likely than SPL to report knowledge of where to access HPV vaccination (OR 3.88, 95% CI 1.63–9.25), $p = .002$. Latinas with a lower income were marginally less likely to report knowledge of where to access HPV vaccination (OR .29, 95% CI .08–1.04), $p = .058$. Multivariate analyses were not conducted predicting HPV vaccine uptake due to inadequate power, given the small sample size of HPV vaccine eligible women and particularly the small sample of women who reported to have received the vaccine.

Discussion

The results showed that there were differences between EPL and SPL on HPV vaccine knowledge, beliefs, and acceptability and uptake. Although all Latinas regardless of language reported a high awareness of cervical cancer and HPV, EPL reported significantly more awareness of the HPV vaccine than SPL. Similar findings have been reported—high acculturated Latinas reported more awareness or knowledge about HPV vaccination than low acculturated Latinas (Gillison et al., 2008; Kepka et al., 2015). EPL and SPL also differed on the two variables related to knowledge about access; EPL had greater knowledge of where to access more information about the HPV vaccine and where to access HPV

vaccination. SPL compared to ELP were more likely to report that they were unsure about the effectiveness of the HPV vaccine to prevent HPV infection and cervical cancer risk. Latinas who noted greater knowledge of where to access the HPV vaccine and more vaccine information, regardless of language preference, reported more favorable beliefs and acceptability of HPV vaccine.

It is urgent to attend to HPV vaccination uptake and completion for Latinas given their significant disparities in incidence and mortality related to HPV infections and cervical cancer (CDC, 2015). It is also important to examine factors potentially associated with uptake and completion of the three doses of HPV vaccination, such as awareness, knowledge, beliefs and acceptability. Given the diversity within Latinas it is important that differences among Latina subgroups on uptake and completion and associated factors are also examined.

Given that EPL and SPL differed on income and educational levels we conducted multivariate analyses to test whether language preference predicted the two knowledge access outcomes when in the equation with income and educational levels. The analyses showed that EPL had greater knowledge about accessing HPV vaccine information and accessing actual vaccination, even when in the multivariate equation with the predictors of income and educational levels. In addition to language, income was also predictive of knowledge regarding access to HPV vaccine information and HPV vaccination. Specifically, lower income Latinas significantly reported less knowledge of where to access information and marginally reported less knowledge of where to access vaccination.

The findings from the multivariate analyses are different from the findings of research by Chando and colleagues (2013) who found that income and not language predicted HPV vaccination. Although in the current study we found that income was important as well in influencing the relevant outcomes, language remained a significant predictor as well. The different findings may have resulted from the fact that Chando and colleagues included HPV vaccine uptake as the outcome, while in the current study we only predicted knowledge and acceptability of HPV vaccination. The findings speak overall to the importance of language, in health information and services with Latina immigrants and other groups who are not proficient in English. These findings also highlight the need for linguistically and culturally appropriate (i.e., more Spanish language) interventions or healthcare systems that make HPV vaccination and information more accessible to all. The fact that a lower income was also predictive of having inadequate health information and knowledge about where to access the HPV vaccine, should encourage interventions that also target communication and resources to low income Latinas.

EPL also differed significantly from SPL on one of the belief items, specifically, the belief that HPV vaccine can prevent HPV infection or cervical cancer risk. More SPL compared to EPL noted that they did not know if they believed that the HPV vaccine prevented HPV infection or cervical cancer risk. EPL and SPL did not differ from each other on the other belief items but a relatively high proportion of women from both subgroups (about 80% for each subgroup) reported not knowing if they believed that the HPV vaccine is safe or whether it is too expensive. This high percentage of Latina women, regardless of language,

not knowing what they believed about the safety and cost of the HPV vaccine, calls for more interventions in both English and Spanish that assure Latinas that the vaccine is safe and also provide them information about the cost, insurance coverage, and options for free or low cost vaccination.

In general, having the knowledge of where to access the HPV vaccine and where to access more information showed an association with more favorable beliefs and acceptability of the HPV vaccine, for both EPL and SPL. A greater proportion of EPL women reporting knowledge of where to access the HPV vaccine and where to access more information compared to women that reported no knowledge, indicated a belief that the HPV vaccine is effective and safe, and were more likely to recommend the vaccine. For SPL, a greater proportion of women with no knowledge of where to access the HPV vaccine or where to access more information reported not knowing what they believed regarding the effectiveness, safety, and cost of the HPV vaccine. Additionally, a greater proportion of SPL who had knowledge on either of the two items also reported greater HPV vaccine acceptability. Interestingly, the specific response of “*not knowing* what they believed” regarding effectiveness, safety, and cost was associated with the two access knowledge items only for SPL. Also, knowledge regarding either of the two items was associated with belief of HPV vaccine cost only for SPL.

Most women who were eligible for HPV vaccination, regardless of language preference, did not initiate nor complete the 3-dose series. About 20% of all eligible women initiated vaccination and 9% completed all 3-doses. When comparing EPL to SPL we found that EPL reported more initiation and completion of HPV vaccination, yet the proportions of EPL initiating and completing were still significantly low.

Limitations

Our study has some limitations that should be noted. Our sample of EPL was much smaller than the sample of SPL. Although we did find several significant differences between the language subgroups the unequal sizes of the two subgroups should caution interpretation of the results. Additionally, the small population of vaccine eligible Latinas and even smaller number of Latinas who reported receiving vaccination restricted the analyses examining vaccine uptake. The measures used were single items created for the current study based on the literature in order to assess knowledge, beliefs, and acceptability. The single items did not provide the comprehensive assessment of each of these constructs as would have been provided by using validated scales of these constructs. Also, the items measuring beliefs used “yes/no/don’t know” options which may have been a limitation given that other studies in the literature utilize Likert-type responses. The measure of HPV vaccine acceptability was assessed by asking the question of “recommendation of the HPV vaccine to family and friends” as this question is more broadly applicable to all including women without age eligible children. However, we recognize that this item is not a direct measure of “willingness to vaccinate” which is more commonly used as a measure of vaccine acceptability and thus is a limitation.

Conclusion

Our current study found that critical factors associated with HPV vaccination, such as awareness, knowledge, beliefs, and acceptability may be subject to influence by language or other socio-cultural factors associated with language. For example, language along with income predicted knowledge of where to access HPV vaccine information and vaccination services. Latinas who were Spanish preferred and also Latinas with a lower income were more likely to indicate less knowledge about accessing information and services. Improving knowledge regarding appropriate health information and vaccine services will improve beliefs and acceptability of HPV vaccination and the enhancement of this knowledge, is especially critical for SPL and lower income Latinas. Subgroup differences whether in language or other socio-cultural factors challenge us to think carefully about how to develop and implement interventions most suitable for a particular subgroup.

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Table 1

Demographic characteristics for total sample and by language preference group

Variable	Total sample (N = 207)	EPL (N = 57)	SPL (N = 150)
Mean age	42.3 (SD = 11.8)	38.0 (SD = 13.9)	44.1 (SD = 10.4)
Highest education			
< High school	96 (50.3%)	8 (14.5%)	88 (65.2%)
High school	35 (18.3%)	17 (30.9%)	17 (12.6%)
> High school and	42 (22.0%)	20 (36.4%)	22 (16.3%)
<College = or > College	18 (9.4%)	10 (18.2%)	8 (5.9%)
Income			
< \$15 K	70 (35.7%)	9 (16.1%)	61 (43.9%)
\$15–\$35 K	80 (40.8%)	22 (39.3%)	58 (41.7%)
>\$35–\$60 K	30 (15.3%)	17 (30.3%)	12 (8.7%)
>\$60 K	16 (8.2%)	8 (14.3%)	8 (5.7%)
Occupation			
Homemaker	112 (54.6%)	14 (25.0%)	98 (66.7%)
Managerial/professional	29 (14.2%)	13 (23.2%)	15 (10.1%)
Tech/admin/sales	16 (7.8%)	7 (12.5%)	6 (4.1%)
Service/operator/factory worker	41 (20.0%)	10 (17.9%)	22 (15.0%)
Other	7 (3.4%)	12 (21.4%)	6 (4.1%)

Table 2

Differences in HPV and HPV vaccine awareness, knowledge, beliefs, acceptability, uptake, and 3-dose series completion by language preference group

HPV and HPV vaccine item	ELP (N=57) Total said "Yes" (%)	SLP (N=150) Total said "Yes" (%)	χ^2
Awareness of cervical cancer/HPV	47 (82.5%)	123 (82%)	.162
Awareness of HPV vaccine	40 (70.2%)	77 (52.4%)	5.317*
Knowledge-can get HPV thru sexual contact	33 (57.9%)	79 (52.7%)	.152
Knowledge-HPV can go away on its own without treatment	4 (7%)	8 (5.3%)	1.378
Knowledge-where to access HPV vaccine information	35 (64.8%)	35 (23.6%)	29.608**
Knowledge-where to access HPV vaccination	33 (61.1%)	32 (21.5%)	28.604**
Beliefs-HPV vaccine can prevent HPV infection	32 (56.1%); Don't know=28.1%	74 (49.3%); Don't know=45.3%	9.756**
Beliefs-HPV vaccine is safe	21 (36.8%); Don't know=45.6%	49 (32.7%); Don't know=53.3%	1.337
Beliefs-HPV vaccine cost too much	2 (3.5%); Don't know=86%	16 (10.7%); Don't know=82%	2.773
Acceptability-Recommend HPV vaccine to friends or family	23 (40.4%)	58 (38.7%)	.060
Uptake-Have received HPV vaccine	6 (26.1%)	1 (4.8%)	—
Completion-Have completed HPV vaccine 3-dose series	(17.5%)	0	—

ELP English language preference, *SLP* Spanish language preference

*
p < .05,

**
p < .01

Table 3

Multivariate Logistic Regression-Predictors of HPV vaccine knowledge and acceptability

	OR (95% CI)		
	Knowledge-Accessing HPV vaccine information	Knowledge-Accessing HPV vaccination	Acceptability
Age			
18–29	7.65 (.462–126.43)	6.44 (.366–113.35)	.769 (.037–16.11)
30–39	4.59 (.274–76.73)	2.42 (.133–43.90)	1.71 (.081–35.94)
40–54	4.36 (.280–67.81)	3.36 (.202–55.77)	1.67 (.086–32.52)
55–64	4.49 (.265–76.23)	4.33 (.238–78.80)	1.16 (.054–24.86)
65 ⁺	1	1	1
Education			
<HS	.883 (.234–3.34)	1.24 (.313–4.93)	2.16 (.485–9.65)
HS/GED	.989 (.255–3.84)	1.20 (.296–4.82)	1.59 (.349–7.22)
>HS <College	1.24 (.355–4.34)	2.32 (.647–8.31)	1.28 (.313–5.25)
>College Income	1	1	1
<\$15k	.359 (.090–1.43)	.317 (.079–1.28)	.995 (.241–4.11)
\$15k–\$35k	.253 (.068–.938) [*]	.287 (.079–1.04) ⁺	1.28 (.347–4.72)
\$35–\$60k	.269 (.064–1.13) ⁺	.394 (.097–1.61)	.588 (.136–2.54)
>\$60k	1	1	1
Language	4.27 (1.82–9.98) ^{**}	3.99 (1.68–9.48) ^{**}	1.13 (.434–2.94)
HPV vaccine awareness	–	–	1.97 (1.10–3.52) [*]
HPV vaccine beliefs	–	–	2.03 (1.37–3.01) ^{**}
HPV vaccine access knowledge	–	–	1.53 (.994–2.35) ⁺
HPV vaccine substantive knowledge	–	–	1.04 (.558–1.95)

OR odds ratio, CI confidence interval, 1 reference group

⁺ $p < .10$,^{*} $p < .05$,^{**} $p < .01$