HHS Public Access

Author manuscript

J Health Dispar Res Pract. Author manuscript; available in PMC 2018 October 01.

Published in final edited form as:

J Health Dispar Res Pract. 2017 ; 10(3): 1–18.

Examining differences in HPV awareness and knowledge and HPV vaccine awareness and acceptability between U.S. Hispanic and island Puerto Rican women

Daisy Y. Morales-Campos and
University of Texas at Austin, Latino Research Initiative

Robin C. Vanderpool
University of Kentucky, College of Public Health

Abstract

Background—In 2015, only 42% of Puerto Rican (PR) girls aged 13–17 and 44% of U.S. Hispanic girls aged 13–17 were vaccinated with all three Human Papillomavirus (HPV) vaccine doses; These percentages were far lower than the Healthy People 2020 goal of 80% of girls aged 13–15 the *Healthy People 2020* goal of 80%. The purpose of this study was to examine potential differences in HPV awareness and knowledge and HPV vaccine awareness and acceptability between a population-based sample of U.S. Hispanic and island Puerto Rican women.

Methods—We restricted our analyses to female respondents from the Health Information National Trends Survey (HINTS) 2007 (n=375; U.S. Hispanic) and HINTS Puerto Rico 2009 (n=417; PR). Using the Wald chi-square test, we assessed if there were significant differences in HPV awareness and knowledge and HPV vaccine awareness and acceptability between U.S. Hispanic and island PR women. We then utilized logistic or multinomial regression to control for covariates on significant outcomes.

Results—Both groups of Hispanic women were highly knowledgeable that HPV causes cancer (89.2% in both samples) and that HPV is a sexually transmitted infection (78.1% [U.S. Hispanics] and 84.7% [PR]). Less than 10% of both groups recognized that HPV can clear on its own without treatment. Island PR women had significantly higher HPV vaccine awareness (66.9% vs. 61.0%; Wald X^2 F(1, 97) = 16.03, $p < .001$) and were more accepting of the HPV vaccine for a real or hypothetical daughter, compared to U.S. Hispanic women (74.8% vs. 56.1%; Wald X^2 F(2, 96) = 7.18, $p < .001$). However, after controlling for sociodemographic variables and survey group, there was no longer a difference between the two groups of women and HPV vaccine awareness (AOR = .53; 95% CI = .23, 1.24). Moreover, after controlled analysis, island PR women were significantly less likely to have their hypothetical daughter get the HPV vaccine, compared to U.S. Hispanic women (AOR = 0.26; 95% CI = .08, .81).

Conclusions—Future research focused on factors contributing to differences and similarities in HPV knowledge and awareness and HPV vaccine awareness and acceptability between these two

**Corresponding Author: Daisy Y. Morales-Campos; University of Texas at Austin; 210 W. 24th Street; GWB 2.238, F9200; Austin, TX 78712; moralescampos@austin.utexas.edu.

groups of Hispanic women is warranted. Findings may assist in developing health education programs and media to promote HPV vaccination among both groups.

Keywords

Human Papillomavirus Vaccination; Hispanic Americans; Puerto Ricans; Immunization; Female

INTRODUCTION

Cancer is the leading cause of death among Hispanics in the United States (U.S.) (American Cancer Society, 2012), and the second leading cause of mortality in Puerto Rico (PR) (Figueroa-Vallés et al., 2012). Data from the National Cancer Institute (NCI) indicate that U.S. Hispanic women have higher 5-year (2009–2013) cervical cancer incidence (9.4 vs. 7.5/100,000) and mortality (2.6 vs. 2.3/100,000) rates than non-Hispanic white women (Howlader et al., 2014), signifying apparent health disparities between these two population groups. PR Central Cancer Registry 2006–2010 data indicate that Puerto Rican women have similar disparities in cervical cancer incidence (11.8 vs. 9.9) and mortality (2.6 vs. 2.7) when compared to U.S. Hispanic women (Figueroa-Vallés, et al., 2012). Prevention of cervical cancer is possible through the use of three vaccines (i.e., Cervarix [bivalent], Gardasil 4 [quadrivalent], and Gardasil 9 [nonavalent]), which protect against the oncogenic strains of human papillomavirus (HPV) that cause the majority of all HPV-related cancer cases, including cervical cancer (Petrosky, et al., 2015). HPV vaccination is recommended for females aged 9–26 and males aged 9–21, though most vaccination efforts primarily focus on 11- and 12- year-old adolescents (Petrosky et al., 2015). Currently, the U.S. Vaccines for Children (VFC) program (Centers for Disease Control and Prevention, 2012) provides vaccination for children who are low-income and uninsured. Provisions of the Affordable Care Act (U.S. Department of Health and Human Services, 2014), as well as PR state law (Ortiz et al., 2012), also require health insurers to cover the HPV vaccine for girls aged 11–18 years. However, despite clinical guidance and widespread availability of the vaccine, not all Hispanic girls in the U.S. and PR receive this cancer prevention vaccine. Two-thirds of (66%) U.S. Hispanic girls received ≥1 dose of the vaccine in 2015 (Centers for Disease Control and Prevention, 2015a), and even fewer received all three doses (44%) (Centers for Disease Control and Prevention, 2015b). In 2015, only about three out every four (77%) Puerto Rican girls received ≥1 dose of the vaccine; fewer completed the HPV vaccine series (42%) (Reagan-Steiner et al., 2015). For both groups of females, figures fall short of the *Healthy People 2020* target of 80% of girls aged 13–15 completing the vaccine series (U.S. Department of Health and Human Services, 2010).

Gaps in the literature include limited assessment of HPV vaccine acceptability and uptake (Bair, Mays, Sturm, Perkins, et al., 2008; Constantine & Jerman, 2007; Kepka, Ulrich, & Coronado, 2012; Lazcano-Ponce et al., 2001; Watts et al., 2009; Yeganeh, Curtis, & Kuo, 2010) among underserved, low income populations such as Hispanics (Fernandez, Allen, Mistry, & Kahn, 2010; Kobetz et al., 2010). However, those studies that are available suggest that underserved Hispanic populations have limited and sometimes inaccurate levels of HPV knowledge, especially about the virus' relationship to cervical cancer (Kobetz, et al., 2010; Morales-Campos, Markham, Peskin, & Fernandez, 2013; Tiro, Meissner, Kobrin, &

Chollette, 2007; Vanslyke et al., 2008). Health promotion theories (Becker, 1974; Janz & Becker, 1984) substantiate that HPV and HPV vaccine knowledge contribute to the adoption and/or maintenance of HPV vaccination. In addition, a systematic literature review focusing on barriers to HPV vaccination among U.S. adolescents identified a lack of knowledge regarding HPV and HPV vaccine as a key barrier for underserved parents (Holman et al., 2014).

There is also a paucity of research examining differences in HPV knowledge and vaccine acceptability regarding adolescents within ethnic groups, such as differences between U.S. Hispanics and geographically-isolated island Puerto Rican Hispanics. Researchers have compared U.S. Hispanic, non-Hispanic Whites, non-Hispanic blacks, and island Puerto Ricans using population-based health data to compare disparities across racial/ethnic groups for breast, stomach, liver, cervical, endometrial, colorectal, and oropharyngeal cancers (Ortiz, Perez, et al., 2010; Ortiz, Soto-Salgado, Calo, Nogueras, et al., 2010; Ortiz, Soto-Salgado, Calo, Tortolero-Luna, et al., 2010; Soto-Salgado et al., 2009; Suarez et al., 2009). Investigating if differences exist within the Hispanic ethnic group is important because it comprises subgroups (e.g., Mexicans, Puerto Ricans, Cubans) that have distinct cultures, immigration histories, healthcare experiences, and relationships to mainland U.S. In addition, researchers have found differences between Hispanic subgroups regarding health outcomes such as diabetes prevalence (Arroyo-Johnson et al., 2016), AIDS knowledge (Hajat, Lucas, & Kington, 2000), self-assessed health status (Hajat, Lucas, & Kington, 2000), and interval since last physician contact (Hajat, Lucas, & Kington, 2000). Researchers may limit their ability to understand health disparities affecting Hispanics, along with their ability to appropriately target intervention efforts, by grouping all subgroups into a single Hispanic ethnic category for research purposes. Thus, it remains unclear if current explanatory models of HPV knowledge and vaccine acceptability explain behavior among U.S. Hispanics and geographically-isolated island Puerto Ricans, two populations disproportionately affected by cervical cancer and not meeting current public health HPV vaccination goals.

The literature also suggests adults (parents) are crucial to the success of HPV vaccine uptake efforts because (1) they are the primary decision-makers in their child(ren)'s medical care and (2) their beliefs about HPV impact HPV-related health behaviors and outcomes for their children. The literature indicates parents are more likely to report willingness to vaccinate if they: (1) feel their child is susceptible to HPV or cervical cancer (Dempsey, Zimet, Davis, & Koutsky, 2006; Fazekas, Brewer, & Smith, 2008; Gerend, Lee, & Shepherd, 2007; Kahn et al., 2009); (2) believe the vaccine is effective and provides benefits (Bair et al., 2008; de Visser & McDonnell, 2008; Dempsey, et al., 2006; Fazekas, et al., 2008; Gerend, et al., 2007; Zimet et al., 2005); and (3) perceive few barriers to accessing the vaccine (Fazekas, et al., 2008; Sauvageau, Duval, Gilca, Lavoie, & Ouakki, 2007). The literature also provides mixed results (Bair, Mays, Sturm, Perkins, et al., 2008; Dempsey, et al., 2006; Fazekas, et al., 2008; Kahn, et al., 2009; Marlow, Waller, & Wardle, 2007; Zimet, et al., 2005) regarding perceptions of severity of HPV-related diseases and parental attitudes regarding vaccination. Approval from significant others (i.e., spouse, doctor) or a parent's perception that vaccination is the norm are associated with vaccine acceptability (Dempsey, et al., 2006; Dinh et al., 2007; Kahn, et al., 2009; Ogilvie et al., 2007). Mothers' compliance with Pap

test screening guidelines has also been positively associated with daughters' HPV vaccine initiation and completion (Chao, Slezak, Coleman, & Jacobsen, 2009; Monnat & Wallington, 2013; Rahman, Elam, Balat, & Berenson, 2013).

Therefore, the purpose of this study was to examine potential differences in HPV awareness and knowledge and HPV vaccine awareness and acceptability between a population-based sample of U.S. Hispanic and island Puerto Rican women. Although cervical cancer or HPV risk is not solely determined by knowledge and awareness, these constructs are recognized by health promotion theories (Becker, 1974; Janz & Becker, 1984) that substantiate HPV and HPV vaccine knowledge contribute to the adoption and/or maintenance of HPV vaccination. In addition, the authors of the current paper acknowledge that the U.S. Hispanic and island Puerto Rican comparison has certain limitations; however, the authors consider this comparison important in order to highlight racial/ethnic group disparities, stimulate hypothesis generation, and illustrate use of an innovative, population-based island PR health dataset.

METHODS

Sample

The Health Information National Trends Survey (HINTS) was developed by the NCI to assess cancer-related behavior (e.g., prevention, screening, and treatment) in the population in order to assess associations between key communication constructs and behavioral outcomes, and to monitor trends in the rapidly evolving health communication landscape (Tortolero-Luna et al., 2010). HINTS 2007 used a mixed-mode, dual-frame design for participant recruitment. One frame was a list-assisted, random digit dial (RDD) computer-assisted telephone interview, wherein one adult from each household was selected for an interview. The second frame was a relatively comprehensive national listing of addresses available from the U.S. Postal Service for the purpose of administering a mail survey. Both the RDD and mail survey were conducted from January through April 2008. The overall response rates were 24.2% for the RDD household screener and 40.0% for the mailed survey (Cantor et al., 2007; Davis, Dipko, & Sigman, 2009).

HINTS-PR 2009 used a RDD and a computer-assisted telephone interview system. It used a stratified sampling frame representing eight geographic regions designated by the PR Department of Health. Within each stratum, sampled telephone numbers were selected with equal probability. Non-working and non-residential numbers were eliminated from the sample. Data were collected from April to June 2009. Trained bilingual Puerto Rican interviewers collected 639 interviews from 837 screened households. The unweighted screener and extended interview response rate both equaled 76.3%. Further details on the HINTS 2007 and HINTS-PR 2009 samples and sampling designs are published elsewhere (Cantor, et al., 2007; Davis, et al., 2009).

For the current study, we restricted our analyses to female respondents in both surveys for a total sample of 792 women (n = 375; U.S. Hispanic HINTS 2007 and n = 417; HINTS-PR 2009). We selected only adult female respondents for the study because, at the time of survey implementation, the focus was on cervical cancer prevention for women and the HPV

vaccine was only recommended for girls. In addition, some of our outcome variable questions were only asked of women. Despite differences in methods of sampling and data collection between the HINTS 2007 and HINTS-PR 2009, the overlap in question content provides a point of comparison to examine potential variability in HPV awareness and knowledge and HPV vaccine awareness and acceptability between U.S. Hispanic and island Puerto Rican women. The ability to compare the samples is a strength, not only because island Puerto Ricans are typically not included in U.S. public health data (Calo & Ortiz, 2015), but also because detailed data for Hispanic subgroups are lacking (Escarce, Morales, & Rumbaut, 2006). Due to the de-identified nature of the publicly-available HINTS data, the University of Texas Health Science Center at San Antonio Institutional Review Board deemed this secondary data analysis exempt from review.

Measures

Measures collected included: sociodemographics, Pap test screening history, health status, HPV awareness and knowledge, and HPV vaccine awareness and acceptability. Specifically, HPV awareness and knowledge, and HPV vaccine awareness and acceptability were used as dependent variables, and sociodemographics, Pap test screening history, and health status as covariates.

Sociodemographic Characteristics—Sociodemographics included: age (18–34 years, 35–49 years, 50–64 years, 65+ years), health status (excellent/very good, good, fair/poor), health care coverage (yes/no), occupational status (employed, unemployed/other, homemaker), marital status (married/living as married, separated/divorced/widowed/single, never been married), education (high school graduate or less, some college or more), born in U.S. (yes/no), place of birth (PR, U.S. mainland, other), number of children under 18 in household (0/1 or more), female children in household (yes/no), and annual household income (less than $35,000/$35,000 or more).

Family history of cancer—Respondents were asked, “Have any of your family members ever had cancer?” Response options were: yes, no, and has no family.

Pap test screening history—Respondents were asked, “When did you have your most recent Pap test?” Response options were: a year ago or less, more than 1 but not more than 3 years ago, more than 3 but not more than 5 years before, and more than 5 years ago.

HPV and HPV vaccine awareness—Participants were asked, “Have you ever heard of HPV? HPV stands for Human Papillomavirus. It is not HIV, HSV or herpes.” and “Have you heard anything about a vaccine or shot to prevent cervical cancer?” Response options for both questions were: yes, no, and don’t know.

HPV knowledge—Only women who responded “yes” to having heard of HPV were asked three HPV knowledge questions. The questions assessed whether a woman could correctly identify that HPV (1) causes cervical cancer, (2) is transmitted through sexual contact, and (3) may go away on its own without treatment. Response options were yes or no.

HPV vaccine acceptability—A description of the HPV vaccine was read to respondents: "A vaccine to prevent the human papillomavirus or HPV infection is recommended for girls ages 11–12 and is called the cervical cancer vaccine, HPV shot, or GARDASIL®." To assess vaccine acceptability, respondents were asked: "If you had a daughter that age, would you have her get it?" Response options were: yes, no, not sure/it depends, and don't know.

Analytic Approach

We used STATA 12.0 for all analyses (StataCorp, 2009). Because of the HINTS sample design and weighting procedures, we used the jackknife variance estimation technique. For the purposes of these analyses, we coded "don't know" responses as equivalent to "missing" because of data patterns where some categories had no data, otherwise known as quasi-complete separation, causing convergence failures in logistic regression models (Allison, 2008). Missing data were excluded from the analyses. We used descriptive statistics (e.g., overall sample size, sample sizes in important subgroups, and the proportion of subjects in each of the sociodemographic categories) to describe the sample and the distribution of variables. To assess if there were significant difference between U.S. Hispanics and island PR women, we conducted the Wald chi-square test. We selected the Wald X^2 test because (1) all our variables are categorical and our research question was to look at difference between two groups (U.S. Hispanic women and island PR women) and (2) our dataset is population-based. In addition, for any significant outcomes from the Wald X^2 test, we conducted logistic or multinomial regression to adjust for covariates. Because we performed multiple tests on our data, we utilized the modified Bonferroni procedure to control for type 1 error (Holland & Copenhaver, 1988).

RESULTS

Sample Sociodemographics

Table 1 presents sociodemographic information for both study samples. U.S. Hispanic women were commonly between the ages of 35–49 (31.5%), born in the U.S. (53.1%), employed (47.7%), married/living as married (56.3%), and in excellent/very good health (36.1%), with a high school education or less (53.8%). U.S. Hispanic women also had high rates of health insurance coverage (70.8%), were likely to have one or more children in the household (54.7% of these, 59.5% had female children), and commonly reported an annual income less than $35,000 (54.1%). Almost two in five island PR women were aged 65 or older (39.1%) and a high school education or less (51.9%); the majority were born in PR (95.2%). Less than half of island PR women were homemakers (43.4%), married/common law (48.0%), and in fair/poor health (40.3%). Although four out of five PR women reported an annual income of less than $35,000 (82.6%), they were well covered by health insurance (96.2%). Approximately, one-quarter of these women had one or more children in the household (26.4%); of these women, 65.5% had female children. The majority of both groups of Hispanic women were up to date on their Pap test screening (88.7% and 81.1%, respectively) using current screening guidelines (U.S. Preventive Services Task Force, 2012).

Bivariate Analysis

Table 2 depicts the proportion of the two samples that had ever heard of HPV and the HPV vaccine. Both samples had moderately high awareness of HPV (64.0% [U.S. Hispanics] vs. 65.5% [PR]). Similarly, both groups of women were highly knowledgeable that HPV causes cancer (89.2% in both samples) and that HPV is a sexually transmitted infection (78.1% [U.S. Hispanics] and 84.7% [PR]). Less than 10% of both groups recognized that HPV can clear on its own without treatment. Island PR women had significantly higher HPV vaccine awareness (66.9% vs. 61.0%; Wald X^2 F(1, 97) = 16.03, p < .001) and were more accepting of the HPV vaccine for a real or hypothetical daughter (74.8% vs. 56.1%; Wald X^2 F(2, 96) = 7.18, p < .001), compared to U.S. Hispanic women. Of those women who had a female child in the home, 56.3% of U.S. Hispanic women indicated acceptance of the HPV vaccine, compared to 76.4 % of island PR women (Wald X^2 F(2,96) = 3.70, p < .03). For HPV vaccine awareness and acceptability, we conducted additional analyses to further explore the significant findings.

Regression Analysis

As shown in Table 3, results from the adjusted logistic regression model indicate that after controlling for age, health insurance, occupational status, education, number of children in household, annual income, family history of cancer, and survey group, there was no longer a significant difference between the two groups of Hispanic women and HPV vaccine awareness (AOR = .53; 95% CI = .23, 1.24; p = .14). Women having at least some college education were also 52% less likely to report being aware of the HPV vaccine compared to women having a high school education or less (AOR = .48; 95% CI = .25, .91; p = .03).

Regarding HPV vaccine acceptability, results from the adjusted multinomial regression model comparing revealed that island PR women were significantly less likely to have their hypothetical daughter get the HPV vaccine, compared to US Hispanic women (AOR = 0.26; 95% CI = .08, .81; p=.02). Within the total sample, none of the sociodemographic variables were statistically associated with HPV vaccine acceptability (Table 4).

DISCUSSION

To our knowledge, this is the first study to examine potential differences in HPV awareness and knowledge and HPV vaccine awareness and acceptability between a population-based sample of U.S. Hispanic and island PR women. The majority of U.S. Hispanic women and island PR women in this study reported high levels of HPV awareness. Some studies have reported similar results (Allen et al., 2010; Kepka, et al., 2012; Morales-Campos, et al., 2013), while others have reported low levels of HPV awareness among Hispanics (Bair, Mays, Sturm, & Zimet, 2008; Vanslyke, et al., 2008). This inconsistency may be attributed to some of the studies having been conducted prior to the HPV vaccine's licensure and prior to media advertising campaigns bringing attention to HPV and preventive vaccination. Among the women who had heard of HPV in our study, knowledge levels were high. The majority of women in both Hispanic samples correctly identified that HPV causes cancer, is transmitted through sexual contact, and can clear on its own. Kobetz et al. (2010) reported similar findings among U.S. Hispanic women, while other studies of Hispanic women

reported low levels of HPV knowledge (Kepka, et al., 2012; Vanslyke, et al., 2008). Fernandez et al.'s (2014) study of PR women also found low levels of HPV and cervical cancer knowledge. These inconsistencies in both U.S. Hispanic and PR samples could be due to variations in how researchers measured HPV knowledge and in the different samples of Hispanic women who participated in these studies.

In bivariate analyses, our study found that island PR women were more aware of and accepting of the HPV vaccine when compared to U.S. Hispanic women, but the literature shows inconsistencies. Colon-Lopez et al. (2015) found similar findings in their sample of parents attending a federally qualified health center in PR. In that particular study, over half of the parents had heard of the HPV vaccine and more than three-quarters were willing to get their child vaccinated. Conversely, Fernandez et al. (2014), in their study of mothers and daughters living in PR, found that there was low knowledge of HPV vaccination; mothers also reported reluctance to vaccinate their daughters due to concerns about vaccine efficacy and benefits of HPV vaccination. Our findings could also be attributed to when the data (2008 vs. 2009) for each sample were collected. In 2008, the HPV vaccine had only been licensed for use for two years, compared to three years with the PR sample. Thus, the island PR survey respondents may have received more exposure to HPV vaccine media advertising and/or recommendations from health care providers. Interestingly, when controlling for significant sociodemographics and survey group, significant differences in HPV vaccine awareness and acceptability were no longer present between the two groups of women. This shift illustrates the important influence of social determinants of health (e.g., education), on awareness of and action on preventive health measures.

Limitations

The limitations of this study include its cross-sectional study design, overall low survey response rate, differing years of data collection, and small sample size for both U.S. Hispanic (HINTS 2007; n = 375) and island PR (HINTS-PR 2009; n = 417) women. The current study provides a snapshot of U.S. Hispanic and island PR women at one point in time; thus, we are unable to draw any conclusions about causal relationships between awareness, knowledge, and vaccine acceptability. HINTS 2007 response rates were low, which could raise issues regarding selection bias for those who did versus did not respond, especially in underserved populations. HINTS 2007 and HINTS-PR 2009 data were collected seven to ten years ago; given the time that has passed, the HPV vaccination environment has changed over the years, potentially altering the methods of information dissemination. The HINTS 2007 survey also did not collect information from respondents regarding country of origin; thus, we were unable to differentiate the sample into cultural groups (e.g., Mexican, Cuban, Puerto Rican). We acknowledge that although island PR are a Hispanic subgroup, U.S. Hispanics comprise individuals from different Hispanic subgroup origins, each of which may have variable beliefs, attitudes, knowledge, and cervical cancer incidence and mortality rates (Pinheiro et al., 2009). Although comparing U.S. Hispanics to island PR is not a perfect comparison, racial/ethnic groups may identify differences in personal determinants of health that could potentially impact HPV-related cancer prevention efforts in vulnerable populations and generate hypotheses about how these determinants and other environmental factors impact uptake of the HPV vaccine. The findings provide

evidence that similarities and differences in HPV knowledge and awareness and HPV vaccine awareness and acceptability do exist between ethnic subgroups that otherwise are routinely excluded from or grouped together in public health research. Furthermore, this current analysis extends the original intent of HINTS-PR, which was to use the collected data for secondary data analyses, including regional geographic comparisons *within* PR and comparison of differences *between* HINTS-PR and mainland HINTS results, and to inform cancer control research and practice for Hispanic populations (Tortolero-Luna et al., 2010).

CONCLUSION

Given that both U.S. Hispanic and island PR women have higher cervical cancer incidence and mortality rates than non-Hispanic white women, our findings provide novel insight into similarities and differences between groups regarding HPV awareness and knowledge and HPV vaccine awareness acceptance that may assist in developing culturally appropriate health promotion programs to improve HPV vaccination rates among both groups. Future research should further explore these in-group differences, especially reasons why island PR women may be more accepting of the HPV vaccine overall, but also why differences may exist within specific PR sociodemographic groups. Further qualitative and quantitative assessments of what in the PR socio-cultural context or environment influences acceptance (or non-acceptance) of the HPV vaccine may contribute to the current body of evidence and aid in the development of effective health education programs.

Acknowledgments

The first author was supported by funding from the Hispanic-Serving Health Professions Schools, Hispanic Health Services Research Scholars Program, the Cancer Prevention & Research Institute of Texas (CPRIT)(Grants PP11057, PP120050, P140049), the Cancer Therapy & Research Center (Cancer Center Support Grant, P30 CA054174), the National Cancer Institute (NCI) Mentored Research Scientist Development Award to Promote Diversity (K01 CA181530), and the Latino Research Initiative at the University of Texas at Austin. The second author was supported by Cooperative Agreement Number 5U48DP005014-02 from the Centers for Disease Control and Prevention (CDC). The content of this article is solely the responsibility of the authors and does not necessarily represent the official views of CPRIT, NCI or CDC.

References

Allison, PD. [Accessed: 28 October 2018] Convergence Failures in Logistic Regression. 2008. Available at http://www2.sas.com/proceedings/forum2008/360-2008.pdf

Allen JD, Othus MK, Shelton RC, Li Y, Norman N, Tom L, del Carmen MG. Parental decision making about the HPV vaccine. Cancer Epidemiol Biomarkers Prev. 2010; 19(9):2187–2198. DOI: 10.1158/1055-9965 [PubMed: 20826829]

American Cancer Society. Cancer Facts & Figures for Hispancis/Latinos 2012–2014. Atlanta, GA: American Cancer Society; 2012.

Arroyo-Johnson C, Mincey KD, Ackermann N, Milam L, Goodman MS, Colditz GA. Racial and Ethnic Heterogeneity in Self-Reported Diabetes Prevalence Trends Across Hispanic Subgroups, National Health Interview Survey, 1997–2012. Prev Chronic Dis. 2016; 13:E10. [PubMed: 26796518]

Bair RM, Mays RM, Sturm LA, Perkins SM, Juliar BE, Zimet GD. Acceptability to Latino parents of sexually transmitted infection vaccination. Ambul Pediatr. 2008; 8(2):98–103. [PubMed: 18355738]

Bair RM, Mays RM, Sturm LA, Zimet GD. Acceptability of the human papillomavirus vaccine among Latina mothers. J Pediatr Adolesc Gynecol. 2008; 21(6):329–334. [PubMed: 19064226]

Becker, MH. The Health belief model and personal health behavior. San Francisco: Society for Public Health Education; 1974.

Calo WA, Ortiz AP. Dec 02.2015 2015, [Telephone interview].

Cantor, D., Coa, K., Crystal-Mansour, S., Davis, T., Dipko, S., Sigman, R. National Information Trends Survey (HINTS) 2007 Final Report. Rockville, MD: National Cancer Institute; 2007.

Centers for Disease Control and Prevention. Quadrivalent human papillomavirus vaccine: Recommendations of the advisory committee on immunization practices (ACIP). MMWR. 2007b; 56(R2-2):26.

Centers for Disease Control and Prevention. Vaccines for Children Program (VFC). Atlanta, GA: 2012.

Centers for Disease Control and Prevention. Race/Ethnicity and by State and Selected Area. National Immunization Survey-Teen; United States: 2015a. Estimated Vaccination Coverage with ≥ 1 Dose of HPV Vaccine Among Adolescents Aged 13–17 Years. 2015

Centers for Disease Control and Prevention. Race/Ethnicity and by State and Selected Area. National Immunization Survey-Teen; United States: 2015b. Estimated Vaccination Coverage with ≥ 3 Doses of HPV Vaccine§ Among Adolescents Aged 13–17 Years. 2015

Chao C, Slezak JM, Coleman KJ, Jacobsen SJ. Papanicolaou screening behavior in mothers and human papillomavirus vaccine uptake in adolescent girls. Am J Public Health. 2009; 99(6):1137–1142. [PubMed: 19372507]

Colon-Lopez V, Quinones V, Del Toro-Mejias LM, Conde-Toro A, Serra-Rivera MJ, Martinez TM, Villanueva H. HPV Awareness and Vaccine Willingness Among Dominican Immigrant Parents Attending a Federal Qualified Health Clinic in Puerto Rico. J Immigr Minor Health. 2015; 17(4): 1086–1090. [PubMed: 25023490]

Constantine NA, Jerman P. Acceptance of human papillomavirus vaccination among Californian parents of daughters: a representative statewide analysis. J Adolesc Health. 2007; 40(2):108–115. [PubMed: 17259050]

Davis, T., Dipko, S., Sigman, R. HINTS Puerto Rico Final Report. Rockville, MD: National Cancer Institute; 2009.

de Visser R, McDonnell E. Correlates of parents' reports of acceptability of human papilloma virus vaccination for their school-aged children. Sex Health. 2008; 5(4):331–338. [PubMed: 19061552]

Dempsey AF, Zimet GD, Davis RL, Koutsky L. Factors that are associated with parental acceptance of human papillomavirus vaccines: a randomized intervention study of written information about HPV. Pediatrics. 2006; 117(5):1486–1493. [PubMed: 16651301]

Dinh TA, Rosenthal SL, Doan ED, Trang T, Pham VH, Tran BD, Breitkopf CR. Attitudes of mothers in Da Nang, Vietnam toward a human papillomavirus vaccine. J Adolesc Health. 2007; 40(6):559–563. [PubMed: 17531763]

Escarce, J., Morales, L., Rumbaut, R. The Health Status and Health Behaviors of Hispanics. In: Tienda, M.Mitchell, F., National Research Council (U.S.). Panel on Hispanics in the United States. & National Research Council (U.S.). Committee on Population. , editors. Hispanics and the future of America. Washington, DC: National Academies Press; 2006. p. 362-422.

Fazekas KI, Brewer NT, Smith JS. HPV vaccine acceptability in a rural Southern area. J Womens Health (Larchmt). 2008; 17(4):539–548. [PubMed: 18370586]

Fernandez ME, Allen JD, Mistry R, Kahn JA. Integrating clinical, community, and policy perspectives on human papillomavirus vaccination. Annu Rev Public Health. 2010; 31:235–252. [PubMed: 20001821]

Fernandez ME, Le YC, Fernandez-Espada N, Calo WA, Savas LS, Velez C, Colon-Lopez V. Knowledge, attitudes, and beliefs about human papillomavirus (HPV) vaccination among Puerto Rican mothers and daughters, 2010: a qualitative study. Prev Chronic Dis. 2014; 11:E212. [PubMed: 25474384]

Figueroa-Vallés, N., Ortiz-Ortiz, K., Pérez-Ríos, N., Villanueva-Rosa, E., Traverso-Ortiz, M., Torres-Cintrón, C., Suárez-Ramos, T. Cancer in Puerto Rico, 2004–2009. San Juan, PR: Puerto Rico Central Cancer Registry; 2012.

Gerend MA, Lee SC, Shepherd JE. Predictors of human papillomavirus vaccination acceptability among underserved women. Sex Transm Dis. 2007; 34(7):468–471. [PubMed: 17139233]

Hajat A, Lucas JB, Kington R. Health outcomes among Hispanic subgroups: data from the National Health Interview Survey, 1992–95. Adv Data. 2000; (310):1–14.

Holland BS, Copenhaver MD. Improved Bonferroni-type multiple testing procedures. Psychological Bulletin. 1988; 104(1):145.

Holman DM, Benard V, Roland KB, Watson M, Liddon N, Stokley S. Barriers to human papillomavirus vaccination among US adolescents: a systematic review of the literature. JAMA Pediatr. 2014; 168(1):76–82. [PubMed: 24276343]

Howlader, N., Noone, AM., Krapcho, M., Garshell, J., Miller, D., Altekruse, SF., Cronin, KA. SEER Cancer Statistics Review, 1975–2011. Bethesda, MD: National Cancer Institute; 2014.

Janz NK, Becker MH. The Health Belief Model: a decade later. Health Educ Q. 1984; 11(1):1–47. [PubMed: 6392204]

Kahn JA, Ding L, Huang B, Zimet GD, Rosenthal SL, Frazier AL. Mothers' intention for their daughters and themselves to receive the human papillomavirus vaccine: a national study of nurses. Pediatrics. 2009; 123(6):1439–1445. [PubMed: 19482752]

Kepka DL, Ulrich AK, Coronado GD. Low knowledge of the three-dose HPV vaccine series among mothers of rural Hispanic adolescents. J Health Care Poor Underserved. 2012; 23(2):626–635. [PubMed: 22643612]

Kobetz E, Kornfeld J, Vanderpool RC, Finney Rutten LJ, Parekh N, O'Bryan G, Menard J. Knowledge of HPV among United States Hispanic women: opportunities and challenges for cancer prevention. J Health Commun. 2010; 15(Suppl 3):22–29. [PubMed: 21154081]

Lazcano-Ponce E, Rivera L, Arillo-Santillan E, Salmeron J, Hernandez-Avila M, Munoz N. Acceptability of a human papillomavirus (HPV) trial vaccine among mothers of adolescents in Cuernavaca, Mexico. Arch Med Res. 2001; 32(3):243–247. [PubMed: 11395192]

Marlow LA, Waller J, Wardle J. Parental attitudes to pre-pubertal HPV vaccination. Vaccine. 2007; 25(11):1945–1952. [PubMed: 17284337]

Monnat SM, Wallington SF. Is there an association between maternal pap test use and adolescent human papillomavirus vaccination? J Adolesc Health. 2013; 52(2):212–218. [PubMed: 23332487]

Morales-Campos DY, Markham CM, Peskin MF, Fernandez ME. Hispanic mothers' and high school girls' perceptions of cervical cancer, human papilloma virus, and the human papilloma virus vaccine. J Adolesc Health. 2013; 52(5 Suppl):S69–75. S1054. [PubMed: 23601613]

Ogilvie GS, Remple VP, Marra F, McNeil SA, Naus M, Pielak KL, Patrick DM. Parental intention to have daughters receive the human papillomavirus vaccine. CMAJ. 2007; 177(12):1506–1512. [PubMed: 18056599]

Ortiz AP, Perez J, Otero-Dominguez Y, Garcia-Rodriguez O, Garced-Tirado S, Escalera-Maldonado F, Figueroa-Valles N. Endometrial cancer in Puerto Rico: incidence, mortality and survival (1992–2003). BMC Cancer. 2010; 10:31. [PubMed: 20128912]

Ortiz AP, Perez J, Otero-Dominguez Y, Garcia-Rodriguez O, Garced-Tirado S, Escalera-Maldonado F, Figueroa-Valles N. Endometrial cancer in Puerto Rico: incidence, mortality and survival (1992–2003). BMC Cancer. 2010; 10:31. [PubMed: 20128912]

Ortiz, A., Ortiz-Ortiz, K., Pillsbury, M., Kothari, S., Rios, M., Laborde, J. Impact of quadrivalent HPV types 6, 11, 16, 18 in Puerto Rico; Paper presented at the 28th International Papillomavirus Conference; Nov 30–Dec 6, 2012; San Juan, Puerto Rico. 2012.

Petrosky E, Bocchini JA Jr, Hariri S, Chesson H, Curtis CR, Saraiya M, Markowitz LE. Use of 9-valent human papillomavirus (HPV) vaccine: updated HPV vaccination recommendations of the Advisory Committee on Immunization Practices. MMWR Morb Mortal Wkly Rep. 2015; 64(11): 300–304. [PubMed: 25811679]

Pinheiro PS, Sherman RL, Trapido EJ, Fleming LE, Huang Y, Gomez-Marin O, Lee D. Cancer incidence in first generation U.S. Hispanics: Cubans, Mexicans, Puerto Ricans, and new Latinos. Cancer Epidemiol Biomarkers Prev. 2009; 18(8):2162–2169. [PubMed: 19661072]

Rahman M, Elam LB, Balat MI, Berenson AB. Well-woman visit of mothers and human papillomavirus vaccine intent and uptake among their 9–17 year old children. Vaccine. 2013; 31(47):5544–5548. [PubMed: 24099869]

Reagan-Steiner S, Yankey D, Jeyarajah J, Elam-Evans LD, Singleton JA, Curtis CR, Stokley S. National, Regional, State, and Selected Local Area Vaccination Coverage Among Adolescents

Aged 13–17 Years–United States, 2014. MMWR Morb Mortal Wkly Rep. 2015; 64(29):784–792. [PubMed: 26225476]

Sauvageau C, Duval B, Gilca V, Lavoie F, Ouakki M. Human papilloma virus vaccine and cervical cancer screening acceptability among adults in Quebec, Canada. BMC Public Health. 2007; 7:304. [PubMed: 17961209]

Soto-Salgado M, Suarez E, Calo W, Cruz-Correa M, Figueroa-Valles NR, Ortiz AP. Incidence and mortality rates for colorectal cancer in Puerto Rico and among Hispanics, non-Hispanic whites, and non-Hispanic blacks in the United States, 1998–2002. Cancer. 2009; 115(13):3016–3023. [PubMed: 19402167]

StataCorp.. Stata Statistical Software: Release 11. College Station, TX: Stata Corp LP; 2009.

Suarez E, Calo WA, Hernandez EY, Diaz EC, Figueroa NR, Ortiz AP. Age-standardized incidence and mortality rates of oral and pharyngeal cancer in Puerto Rico and among Non-Hispanics Whites, Non-Hispanic Blacks, and Hispanics in the USA. BMC Cancer. 2009; 9:129. [PubMed: 19400958]

Tiro JA, Meissner HI, Kobrin S, Chollette V. What do women in the U.S. know about human papillomavirus and cervical cancer? Cancer Epidemiol Biomarkers Prev. 2007; 16(2):288–294. [PubMed: 17267388]

Tortolero-Luna G, Finney Rutten LJ, Hesse BW, Davis T, Kornfeld J, Sanchez M, Davis K. Health and cancer information seeking practices and preferences in Puerto Rico: creating an evidence base for cancer communication efforts. J Health Commun. 2010; 15(Suppl 3):30–45. [PubMed: 21154082]

U.S. Department of Health and Human Services. Healthy People 2020, Objective IID-11.4. 2010

U.S. Department of Health and Human Services. [Retrieved 06/30/2014] About the law: The affordable care act. 2014. from http://www.hhs.gov/healthcare/rights/

U.S. Preventive Services Task Force. [Retrieved 07-10-2014] Screening for Cervical Cancer: Clinical Summary of U.S. Preventive Services Task Force Recommendation. 2012. from http://www.uspreventiveservicestaskforce.org/uspstf11/cervcancer/cervcancersum.htm

Vanslyke JG, Baum J, Plaza V, Otero M, Wheeler C, Helitzer DL. HPV and cervical cancer testing and prevention: knowledge, beliefs, and attitudes among Hispanic women. Qual Health Res. 2008; 18(5):584–596. [PubMed: 18337618]

Watts LA, Joseph N, Wallace M, Rauh-Hain JA, Muzikansky A, Growdon WB, del Carmen MG. HPV vaccine: A comparison of attitudes and behavioral perspectives between Latino and non-Latino women. Gynecol Oncol. 2009; 112(3):577–582. [PubMed: 19150120]

Yeganeh N, Curtis D, Kuo A. Factors influencing HPV vaccination status in a Latino population; and parental attitudes towards vaccine mandates. Vaccine. 2010; 28(25):4186–4191. [PubMed: 20417261]

Zimet GD, Mays RM, Sturm LA, Ravert AA, Perkins SM, Juliar BE. Parental attitudes about sexually transmitted infection vaccination for their adolescent children. Arch Pediatr Adolesc Med. 2005; 159(2):132–137. [PubMed: 15699306]

Table 1

Demographics of U.S. Hispanic women (n=375; HINTS 2007) and island Puerto Rican (PR) women (n=417; HINTS-PR 2009), N = 792.

		U.S. Hispanic n (%)	Island PR n (%)	p-value[4] (Wald X^2)
Pap test screening history	1 year ago or less	230 (66.9)	232 (61.1)	0.58
	More than 1 but not more than 3 years ago	75 (21.8)	76 (20.0)	
	More than 3 but not more than 5 years ago	14 (4.1)	29 (7.6)	
	More than 5 years ago	24 (7.0)	43 (11.3)	
Family history of cancer[2]	Yes	216 (58.7)	277 (66.8)	.03
	No	152 (41.3)	138 (33.3)	
Health Status	Excellent/Very Good	135 (36.1)	99 (23.7)	.05
	Good	133 (35.6)	150 (36.0)	
	Fair/Poor	106 (28.3)	168 (40.3)	
Age[2]	18–34	112 (29.9)	42 (10.1)	<.001
	35–49	118 (31.5)	81 (19.4)	
	50–64	90 (24.0)	128 (30.7)	
	+65	55 (14.6)	163 (39.1)	
Health Insurance[2]	Yes	264 (70.8)	401 (96.2)	<.001
	No	109 (29.2)	16 (3.8)	
Occupational Status[2]	Employed	178 (47.7)	100 (24.0)	<.001
	Unemployed/Other	113 (30.4)	136 (32.6)	
	Homemaker	81 (21.7)	181 (43.4)	
Marital Status	Married/Living as married	211 (56.3)	200 (48.0)	.14
	Separated/Divorced/Widowed/Single (never married)	164 (43.8)	217 (52.1)	
Education[2]	High school or less	201 (53.8)	215 (51.9)	.02
	Some college or more	173 (46.2)	200 (48.2)	
Born in U.S.[1]	Born in U.S.	205 (53.1)	9 (2.2)	NA
	Other/Puerto Rico	181 (46.3)	397 (97.8)	
No. of children under 18 in household[2]	0	169 (45.3)	307 (73.6)	<.001
	1 or more	204 (54.7)	110 (26.4)	
Female children in household[3]	Yes	122 (59.5)	72 (65.5)	0.43
	No	83 (40.5)	38 (34.6)	
Annual Income[2]	Less than $35,000	185 (54.1)	206 (82.6)	<.001
	$35,000 or more	157 (46.0)	43 (17.2)	

Note:

[1] HINTS 2007 participants were asked were you born in the U.S., with response options Yes or No, whereas HINTS-PR 2009 participants were asked where were you born, with response options Puerto Rico, continental U.S., or other.

[2] Variable has missing data.

[3] n=170 U.S. Hispanic and n=307 island PR skipped this question due to HINTS survey skip pattern.

[4] p-value = significant at .05 level.

NA = Not Applicable.

Table 2

Differences in HPV awareness, HPV vaccine awareness, HPV knowledge, and HPV vaccine acceptability between U.S. Hispanic women (n=375; HINTS 2007) and island Puerto Rican (PR) women (n=417; HINTS-PR 2009), N = 792.

		U.S. Hispanic n (%)	Island PR n (%)	p-value[3] (Wald X^2)
HPV Awareness[2]	Yes	236 (64.0)	271 (65.5)	0.15
	No	133 (36.0)	143 (34.5)	
HPV Vaccine Awareness[2]	Yes	224 (61.0)	279 (66.9)	<.001
	No*	143 (39.0)	138 (33.1)	
HPV Knowledge[1]	HPV causes cancer[2]			0.91
	Yes	181 (89.2)	189 (89.2)	
	No	22 (10.8)	23 (10.9)	
	HPV is transmitted through sexual contact[2]			.041
	Yes	164 (78.1)	183 (84.7)	
	No	46 (21.9)	33 (15.3)	
	HPV goes away on its own[2]			0.17
	Yes	18 (8.3)	14 (5.8)	
	No	199 (91.7)	227 (94.2)	
HPV Vaccine Acceptability[2]	Yes	205 (56.1)	312 (74.8)	<.001
	No	81 (22.2)	27 (6.5)	
	Not Sure	79 (21.6)	68 (16.3)	

Note:

[1] Participants who answered “No” to the HPV awareness question (n=281) skipped all the subsequent HPV knowledge questions due to HINTS survey skip pattern.

[2] Variable has missing data.

[3] p-value = significant at .05 level.

Table 3

Crude and adjusted odds ratio assessing association between demographic characteristics and HPV vaccine awareness using logistic regression

	HPV Vaccine Awareness (N = 570)							
Characteristic	**Crude OR**	**95% CI**		***P*[2]**	**Adj. OR**	**95% CI**		***P*[2]**
Age[1]								
18–34	**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**	
35–49	1.08	0.50	2.31	0.84	1.32	0.54	3.23	0.54
50–64	0.88	0.43	1.78	0.72	0.96	0.40	2.29	0.93
65+	2.01	0.90	3.88	0.06	2.40	0.72	7.94	0.15
Health Insurance[1]								
Yes	**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**	
No	**3.01**	**1.57**	**5.78**	**0.00**	2.27	0.98	5.26	0.06
Occupation Status[1]								
Employed	**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**	
Unemployed/Other	**2.80**	**1.45**	**5.40**	**0.00**	2.04	0.85	4.92	0.11
Homemaker	1.57	0.86	2.85	0.14	1.27	0.57	2.85	0.56
Education[1]								
≥High school	**1.00**	**REF**	**REF**		1.00	**REF**	**REF**	
<High school	**0.24**	**0.14**	**0.42**	**0.00**	**0.48**	**0.25**	**0.91**	**0.03**
No. children in household[1]								
0	**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**	
1 or more	1.41	0.76	2.61	0.27	1.46	0.64	3.36	0.37
Annual Income[1]								
Less than $35,000	**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**	
$35,000 or more	**0.37**	**0.16**	**0.83**	**0.02**	0.46	0.19	1.13	0.09
Family history of cancer[1]								
Yes	**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**	
No	0.59	0.30	1.16	0.12	0.72	0.29	1.75	0.46

	HPV Vaccine Awareness (N = 570)							
Characteristic	**Crude OR**	**95% CI**		***p*[2]**	**Adj. OR**	**95% CI**		***p*[2]**
Group								
U.S. Hispanic Women	**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**	
Island PR Women	**0.45**	**0.30**	**0.67**	**0.00**	0.53	0.23	1.24	0.14

Note:

[1] Variable has missing data.

[2] p-value = significant at .05 level.

Table 4

Crude and adjusted odds ratio comparing HPV vaccine acceptability (yes, no, not sure) by demographic characteristics using multinomial logistic regression (N = 567)

	HPV Vaccine Acceptability - Yes						HPV Vaccine Acceptability - No								HPV Vaccine Acceptability - Not Sure							
	Crude OR	95% CI		Adj. OR	95% CI		Crude OR	95% CI		P^2	Adj. OR	95% CI		P^2	Crude OR	95% CI		P^2	Adj. OR	95% CI		P^2
Age[1]																						
18–34	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**	
35–49	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**	2.00	0.75	5.32	0.16	2.70	0.96	7.60	0.06	1.00	0.36	2.79	1.00	1.48	0.47	4.69	0.50
50–64	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**	1.84	0.74	4.55	0.19	2.85	0.91	8.95	0.07	1.47	0.62	3.45	0.38	1.81	0.66	4.97	0.25
65+	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**	2.44	0.87	6.82	0.09	2.96	0.71	12.4	0.14	1.70	0.49	5.88	0.40	0.95	0.15	5.79	0.95
Health Insurance[1]																						
Yes	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**	
No	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**	1.29	0.53	3.13	0.57	1.20	0.48	2.97	0.69	1.13	0.43	2.96	0.81	1.17	0.38	3.57	0.78
Occupation Status[1]																						
Employed	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**	
Unemployed/Other	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**	1.85	0.82	4.17	0.14	2.41	0.98	5.96	0.06	1.68	0.67	4.20	0.27	1.86	0.63	5.47	0.26
Homemaker	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**	1.15	0.51	2.56	0.73	0.93	0.35	2.48	0.88	0.79	0.48	1.31	0.36	0.69	0.34	1.38	0.29
Education[1]																						
≥HS	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**	
<HS	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**	0.67	0.34	1.31	0.24	0.77	0.34	1.72	0.52	0.86	0.44	1.67	0.65	1.20	0.50	2.87	0.68
# children in HH[1]																						
0	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**	
1 or more	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**	1.02	0.47	2.21	0.95	1.17	0.53	2.59	0.70	1.10	0.53	2.26	0.80	1.17	0.43	3.18	0.75
Annual Income[1]																						
>$35,000	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**	
$35,000+	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**	1.62	0.79	3.32	0.19	1.95	0.83	4.57	0.12	0.66	0.33	1.34	0.25	0.66	0.33	1.33	0.24
Family cancer HX[1]																						
Yes	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**	

	HPV Vaccine Acceptability - Yes						HPV Vaccine Acceptability - No								HPV Vaccine Acceptability - Not Sure							
	Crude OR	**95% CI**		**Adj. OR**	**95% CI**		**Crude OR**	**95% CI**		***P*[2]**	**Adj. OR**	**95% CI**		***P*[2]**	**Crude OR**	**95% CI**		***P*[2]**	**Adj. OR**	**95% CI**		***P*[2]**
No	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**	0.65	0.29	1.43	0.28	0.53	0.24	1.15	0.11	1.01	0.51	2.02	0.97	0.77	0.30	1.98	0.59
Survey Group																						
U.S. Hispanic WM	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**		**1.00**	**REF**	**REF**	
Island PR WM	**1.00**	**REF**	**REF**	**1.00**	**REF**	**REF**	**0.30**	**0.13**	**0.68**	**0.00**	**0.26**	**0.08**	**0.81**	**0.02**	0.60	0.32	1.12	0.11	0.73	0.31	1.70	0.47

Note: The 2 categories "no" and "unsure" are compared with the omitted reference category of "yes";

[1]Variable is missing data.

[2]p-value = significant at .05 level.

HH = household, WM = women, HS = high school, HX = history