



Published in final edited form as:

Vaccine. 2017 February 01; 35(5): 802–807. doi:10.1016/j.vaccine.2016.12.045.

Associations of trust and healthcare provider advice with HPV vaccine acceptance among African American parents

Linda Y. Fu^a, Gregory D. Zimet^b, Carl A. Latkin^c, and Jill G. Joseph^d

^a General and Community Pediatrics, Children's National Health System, 111 Michigan Ave, NW Washington, DC, 20010, United States

^b Department of Pediatrics, Indiana University, 410 W. 10th Street, HS 1001, Indianapolis, IN 46202, United States, gzimet@iu.edu

^c Department of Health, Behavior and Society, Johns Hopkins Bloomberg School of Public Health, 624 North Broadway, 7th floor, Baltimore, MD 21205, United States, Carl.Latkin@jhu.edu

^d Betty Irene Moore School of Nursing, University of California, Davis, CA, 4610 "X" Street, Sacramento, CA 95817 United States, jgoseph@ucdavis.edu

Abstract

Objective—Healthcare providers (HCPs) are advised to give all parents a strong recommendation for HPV vaccination. However, it is possible that strong recommendations could be less effective at promoting vaccination among African Americans who on average have greater mistrust in the healthcare system. This study examines the associations of parental trust in HCPs and strength of HCP vaccination recommendation on HPV vaccine acceptance among African American parents.

Methods—Participants were recruited from an urban, academic medical center between July 2012 and July 2014. We surveyed 400 African American parents of children ages 10 to 12 years who were offered HPV vaccine by their HCPs to assess sociodemographic factors, vaccine beliefs, trust in HCPs, and the HPV vaccine recommendation received. Medical records were reviewed to determine vaccination receipt.

Results—In multivariable analysis, children whose parents were “very strongly” recommended the HPV vaccine had over four times higher odds of vaccine receipt compared with those whose parents were “not very strongly” recommended the vaccine. Having a parent with “a lot of” versus “none” or only “some” trust in HCPs was associated with over twice the odds of receiving HPV vaccine. Very strong HCP recommendations were associated with higher odds of vaccination

Corresponding author: Linda Fu, MD, MS, Goldberg Center for Community Pediatric Health, Children's National Health System, 111 Michigan Ave, NW, Washington, DC 20010, United States, lfu@childrensnational.org, 202-476-3931.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Potential conflicts of interest: Drs. Fu, Latkin and Joseph have no potential conflicts of interest. Dr. Zimet has been an investigator on investigator-initiated HPV-related research projects funded by Merck and Roche. In 2014 he served as a one-time advisory board member for Merck.

among all subgroups, including those with more negative baseline attitudes toward HPV vaccine and those with lower levels of trust. Adding the variables strength of HCP recommendation and parental trust in HCPs to a multivariable model already adjusted for sociodemographic factors and parental vaccine beliefs improved the pseudo R^2 from 0.52 to 0.55.

Conclusions—Among participants, receiving a strong vaccine recommendation and having a higher level of trust in HCPs were associated with higher odds of HPV vaccination, but did not add much to the predictive value of a model that already adjusted for baseline personal beliefs and sociodemographic factors.

Keywords

Human papillomavirus vaccines; African Americans; directive counseling; health knowledge; attitudes; practice

Introduction

Racial disparities in cervical cancer morbidity and mortality have persisted over the last decade.¹ Cervical cancer is diagnosed 30% more frequently in African American women, who die nearly twice as frequently of cervical cancer as white women. Given that human papillomavirus (HPV) vaccination protects against up to roughly 81% of cases of invasive cervical cancer (as well as 74% of all invasive HPV-associated cancers),²⁻⁵ achieving a high HPV vaccination coverage level could help eliminate cervical cancer health disparities. Nonetheless, complete coverage with three vaccine doses in the United States are low among all 13-17 year old girls (41.9%) and boys (28.1%) and among African American girls (40.8%) and boys (26.0%).⁶

The Centers for Disease Control and Prevention (CDC) stresses the importance of a strong healthcare provider (HCP) recommendation for HPV vaccination with suggested standard language to be used in discussions.⁷ Nonetheless, some studies suggest that vaccination counseling should be tailored to each parent's beliefs and perspectives. In two recent studies, exposing people to CDC-based information counterintuitively reduced intention to vaccinate among those with pre-existing negative attitudes toward vaccination.^{8,9} Qualitative research suggests trust in the HCP promotes parental vaccine acceptance.¹⁰⁻¹²

Cultural issues affecting health beliefs may be different for African Americans compared with Americans of other races. African American parents may have greater concern that accepting new vaccines for their children could be exposing them to medical experimentation.¹²⁻¹⁵ In 2007, Washington, DC became one of the first jurisdictions in the country to pass an HPV vaccine school mandate (with an opt out clause).^{16,17} The legislation was initially condemned in the *Washington Post* as a paternalistic mandate imposed by white legislators on African American girls and was likened, inaccurately, to the Tuskegee syphilis experiment.¹⁸ This example illustrates how strong HPV vaccine legislation may be perceived as oppressive and discriminatory. It is not clear whether strong HPV vaccination recommendations delivered by individual HCPs could also be perceived negatively among some African American parents. It is also unclear whether the outcome depends on trust in the recommending HCP. The current study examined the dual

associations of parental trust in HCPs for vaccine advice and strength of HCP vaccination recommendation with HPV vaccine acceptance among African American parents.

Materials and Methods

This study protocol was approved by the Children's National Medical Center Institutional Review Board.

Participants and Setting

Between July 2012 to July 2014, 400 participants were recruited from the waiting rooms of the pediatric and adolescent health centers within an academic teaching hospital in Washington, DC. The health centers report about 40,000 annual encounters from a patient population that is 78% African American and 83% publically insured. Participants' children were treated by 26 attending physicians, 4 adolescent medicine fellows, 8 nurse practitioners, and 51 pediatric residents (hereafter referred to collectively as HCPs) who ordered vaccines and provided all vaccination counseling (i.e., no standing orders). Prior to beginning study enrollment, HCPs were informed about the study via email and at one of six study information sessions. All HCPs had previously been informed of CDC best practices regarding immunization recommendations. In none of the study-specific sessions were HCPs instructed to change their practices with respect to recommending immunizations.

Participants were self-identified African American, English-speaking parents or legal guardians (hereafter referred to collectively as parents) of children 10-12 years old who had not previously received HPV vaccine and were offered the vaccine at that healthcare encounter. Age criteria included children recommended for routine receipt of HPV vaccine (11-12 years),⁵ as well as 10 year old children because some HCPs in the practice routinely offered HPV vaccine starting at age 10. Parents were excluded if their children had any medical contraindications to HPV vaccination.

Survey Administration

Research staff previewed appointment schedules for children meeting age criteria. They obtained written informed consent from eligible, interested parents. Study refusers were asked for basic demographic information. Upon survey completion, participants were given a copy of the HPV Vaccine Information Statement (VIS), the factsheet "Vaccine Safety: The Facts" developed by the American Academy of Pediatrics, and a \$10 grocery store gift card.

Survey

Items included in the current analysis were part of an orally administered survey designed to assess social influences on HPV vaccination decision-making. The survey consisted of two parts. Part one was administered prior to the HCP encounter. It assessed sociodemographic characteristics (respondent's age, gender, highest educational attainment, history of vaccine refusal, whether older children had received HPV vaccine in the past, and child's age, gender, and whether the child was overdue for other vaccinations), parental trust in different sources of vaccine advice (including "your child's doctors, nurses or other healthcare providers," "websites from doctor groups like the American Academy of Pediatrics," and

“government websites like the Centers for Disease Control and Prevention, also called the CDC”), and attitude toward HPV vaccine. Response options for items assessing trust in sources of vaccine advice were “not at all,” “some,” and “a lot.” For the item assessing trust in HCPs, “not at all” and “some” responses were combined in multivariate analysis due to a very low frequency of “not at all” responses.

Items assessing attitude toward HPV vaccination were adapted from a previously validated scale of vaccine beliefs.¹⁹ The six items were modified slightly to address parental respondents and to specify HPV vaccine (e.g., “Vaccines are good for your health” was changed to “The HPV vaccine is good for my child's health”). We added a seventh item, “African Americans are being targeted for HPV vaccine while it is still somewhat experimental” to assess frequency of this potential concern. Response options ascertained level of agreement (1= “strongly disagree” to 5= “strongly agree,” with anti-vaccine statements reverse coded). A summary pro-vaccine beliefs score was calculated as the mean of the seven items’ responses and included in multivariate analysis.

The second part of the survey was administered after the HCP encounter to verify that HPV vaccine was offered that day, and to assess each participant's impression of how strongly the HCP recommended HPV vaccination (“not very strongly,” “somewhat strongly,” and “very strongly”), as well as overall impression of the HCP (1=“worst” and 10=“best”). After the encounter, each child's medical record was reviewed to determine prior vaccination status and whether HPV vaccine was received that day. We also noted the encounter type (well or sick), the healthcare provider's level of training and his/her race.

Statistical Analysis

Only respondents whose children were offered the HPV vaccine that day were included in these analyses. All analyses were performed in Stata v13.1.²⁰ Initial bivariate statistics were derived using Student's *t*, Wilcoxon rank-sum, chi-square and Fisher's exact tests. Multivariable logistic regression models were created to examine the relationship of the two predictor variables of interest, parental trust in the HCP and strength of provider's HPV vaccination recommendation, to the outcome, HPV vaccine receipt by the child. Potential covariates were checked for collinearity using Pearson correlation coefficients (PCCs), and for independence using variable inflation factors (VIFs). Two variables, trust in government websites and trust in websites from doctors’ groups for vaccine advice, were highly collinear (PCC=0.69), so the variable, trust in websites from doctors’ groups, was dropped. Final models included adjustment for parental age and education, child's age and gender, parental trust in government websites, parental pro-vaccine beliefs score and encounter type. Models treated HCP as a random effect using the *xtlogit* command. PCC for model variables ranged from 0 to |0.39| and all VIFs were <5. Adjusted odds ratios (aOR) with 95% confidence intervals (95% CI) were reported for the two variable of interest, strength of HPV vaccine recommendation and trust in HCP. To explore the predictive values of these two variables in explaining HPV vaccine receipt, increasingly inclusive models were compared for goodness of fit using McKelvey & Zavoina's pseudo R^2 values. To test for possible modification of the effect of strength of provider HPV vaccine recommendation on vaccine receipt by child's

gender, parental trust in the HCP and also by parental vaccine beliefs, interaction terms were examined.

Results

Of 452 parents initially approached for study participation, 23 did not meet inclusion criteria and 29 (6.4%) refused mostly for lack of time. Study refusers were more likely to be men (59.0% vs. 24.1%, $p < 0.1$), but were not different from participants in terms of their children's genders and ages.

Of the remaining 400 parents included in all analyses, 219 (54.8%) consented for their children to receive HPV vaccination that day. Collectively, they were offered the vaccine by 89 HCPs. Neither the level of training nor race of the HCP was associated with vaccine acceptance. Participants were in their late 30s on average and overwhelmingly female (Table 1). Roughly three-quarters accompanied children who were up-to-date with all other recommended vaccinations. Vaccine refusers differed from acceptors in that they were more likely to have delayed or refused a vaccine in the past, and were less likely to have consented for an older child to receive HPV vaccine in the past. Their children were more likely to be female, and less likely to be 11 years old and also less likely to be there for a well child encounter that day.

The average pro-vaccine beliefs score for vaccine acceptors was higher than for refusers (mean, standard deviation= 3.7, 0.51 vs. 3.0, 0.68, $p < .001$). Vaccine acceptors were significantly more likely to endorse each of the pro-HPV vaccine sentiments and reject each of the anti-HPV vaccine sentiments (Table 2). Nonetheless, half of vaccine acceptors did not disagree that “African Americans are being targeted for HPV vaccine while it is still somewhat experimental,” and 39.7% did not disagree that “If a child gets too many vaccines, it can ruin his or her immune system.”

Most participants had at least “some” trust in HCPs for vaccine advice, as well as in websites from doctors’ groups from governmental agencies (Table 2). There appeared to be a difference in how participants regarded vaccine advice from websites of doctors’ groups and governmental agencies as compared with advice received directly from HCPs. While trust in websites from doctors’ groups and from governmental agencies were relatively highly correlated with each other (PCC= 0.69), neither was highly correlated with trust in HCPs (PCC=0.24 and 0.3, respectively). Furthermore, whereas 7.7% of vaccine refusers had no trust in doctors’ groups and 13.2% had no trust in government websites, only 1.1% did not trust HCPs at all.

Opinions about the HCPs who offered participants’ children the HPV vaccine were overwhelmingly positive (Table 3). The median HCP rating by both vaccine acceptors and refusers was 10 out of 10. There was a difference between how strongly HPV vaccine acceptors and refusers felt the vaccine was recommended to them, with 42.9% of acceptors versus only 26.0% of refusers claiming to have received a very strong recommendation ($p < .001$). Of those who reported receiving a “very strong” recommendation, 66.7% accepted the vaccine, compared with only 56.1% who received a “somewhat strong” recommendation

and only 23.8% who received a “not very strong” recommendation. Recommendation strength did not interact significantly with child’s gender, trust in HCPs for vaccine advice or any of the vaccine belief variables in predicting HPV vaccine receipt.

In multivariable analysis, the stronger the HCP recommendation for HPV vaccination, the higher the odds of the child receiving it; children whose parents were “very strongly” recommended the vaccine had a 4.6 times higher adjusted odds of vaccine receipt compared with those whose parents were “not very strongly” recommended the vaccine (Table 4). Trust in HCPs for vaccine advice was also associated with HPV vaccine receipt in multivariable analysis. Having a parent with “a lot of” versus “none” or only “some” trust in HCPs was associated with over twice the adjusted odds of receiving HPV vaccine.

In comparing three incrementally inclusive regression models, we found that the most limited model, adjusted only for clustering by HCP and for parental age and education, child age and gender, parental trust in government websites, pro-vaccine beliefs score and encounter type, had a pseudo R^2 of 0.52. Adding the variable strength of HCP’s vaccination recommendation minimally improved the pseudo R^2 to 0.54. Further adding the variable, parental trust in HCPs for vaccine advice increased the pseudo R^2 slightly to 0.55. Among the 80 parents who claimed prior to the healthcare encounter that they preferred their children to receive the HPV vaccine at a later date, only 17 (21.2%) ended up changing their minds and accepting same-day vaccination after talking with HCPs.

Discussion

Among this sample of African American parents, receiving a stronger vaccine recommendation and having more trust in the HCP were associated with greater odds of HPV vaccination. However, these two variables did not add much predictive value to a model already adjusted for personal vaccination beliefs and sociodemographic factors in terms of explaining variance in vaccination decisions.

The literature on optimal strength of HCP recommendation is limited and somewhat inconsistent. Two previous studies, which surveyed the same commercial research panel 4 years apart, found that parents who reported receiving strong HPV recommendations were also more likely to self-report their children being vaccinated.^{21,22} Perhaps conflictingly, two other studies found that exposure to strong vaccine advice adapted from CDC’s website was not associated with increased influenza and measles-mumps-rubella vaccination intention, respectively.^{8,9} In fact, exposing the subgroup of people with more negative vaccine beliefs to information debunking anti-vaccine myths actually decreased their vaccination intention. We were encouraged to find that among our study population, very strong HCP recommendations were associated with higher odds of HPV vaccine uptake among all subgroups, including those with more negative baseline attitudes toward HPV vaccine. The differences in our results and those of previous studies might suggest that parental attitudes toward HPV vaccine may be different from parental attitudes toward other vaccines in terms of how strongly they are entrenched and how amenable they are to change. Alternatively, the differences may be explained by the fact that virtually all our participants trusted their children’s HCPs for vaccine advice.

While 99% of parents trusted their children's HCPs at least some, those who trusted their children's HCPs "a lot" had over double the odds of accepting HPV vaccine as compared to parents with lower levels of trust. This suggests that HCPs should continually strive to build parental trust even after the basic foundation of the parent-provider relationship has been established. According to the findings of previous studies, barriers to trust in HCPs for African Americans include concerns about financial conflicts of interest, racism and experimentation.^{15,23,24} Suggestions to enhance trust in general include improving African Americans' confidence in HCPs' cultural, clinical and interpersonal competence.^{15,23,24} To date, no studies have attempted to enhance HCPs' ability to counsel African American parents about HPV vaccine by increasing awareness of and sensitivity to common negative vaccine attitudes and beliefs in the African American community. Nevertheless, the benefits of culturally tailored health messages is supported by empirical evidence demonstrating improved patient outcomes in diabetes and mental health care.²⁵⁻²⁸ Our findings suggest that additional research is warranted to determine culturally informed approaches to building parental trust and conveying strong HPV vaccination recommendations to African American parents.

Although we found that strength of the HCP's vaccination recommendation and parental trust were associated with vaccine acceptance, these two variables explained only a small percentage of the total variance in HPV vaccination acceptance. Much more variance was explained by parental vaccine beliefs and sociodemographic factors. Similar to two previous studies conducted with African American parents,^{13,14} only roughly half of our participants accepted HPV vaccine for their children after it was recommended by the HCP. Thus, HCP recommendation may be important, but insufficient to persuade many African American parents to vaccinate. In a previous study, African American parents overwhelmingly cited doctors as their trusted source of vaccine advice, but also cited other sources including friends, media, written materials and the internet.²⁹ Therefore, it may be beneficial to align efforts to increase pro-vaccination messages from medical and nonmedical sources and broaden interventions beyond simply encouraging HCPs to give strong HPV vaccination recommendations.

In a recent randomized controlled trial involving 30 practices in North Carolina, practices that received announcement training (i.e., training in how to give brief statements assuming parents are ready to vaccinate) had 5.4% larger 6-month increases in first-dose HPV vaccination coverage among 11-12 year old children than control practices.³⁰ Based on the findings of that study, announcing to a parent that his/her 11 year old child is due for 3 recommended vaccines that day and placing HPV vaccine in the middle of the list may constitute a strong, effective HPV vaccination recommendation for parents in general. Further research is needed to determine the effectiveness of using this simple, scripted recommendation approach with different subpopulations including parents with baseline vaccine hesitancy. Such research could compare the correlation between recommendation strength as perceived by the delivering HCP and the receiving parent. This information would be helpful for examining whether confirmation bias diminishes the impact of HCP recommendations among vaccine hesitant parents. The theory of confirmation bias posits that people tend to interpret new information such that it confirms their existing beliefs.³¹ Thus, between two parents exposed to the same provider counseling, the parent with a more

positive baseline opinion of HPV vaccine may tend to interpret the recommendation to be more strongly supportive of vaccination than the parent with more a negative baseline opinion of HPV vaccine.

A limitation of our study is that it was conducted in the medical setting to assess health beliefs. Thus, although all surveys were conducted in private, responses could have been affected by social desirability bias. We also found that trust in HCPs was very high among virtually all participants. Thus, our results should not be generalized to populations with lower levels of trust in HCPs. In addition, awareness of the purpose of the survey may have influenced parental vaccine acceptance or how HCPs recommended vaccination; however, we do not think this occurred in any substantial manner since HPV vaccine uptake among participants mirrored that of the entire health centers' population. Further, although we examined many variables potentially relevant to parental HPV vaccine decision-making for possible inclusion in the multivariable analyses, we cannot account for unmeasured factors. Lastly, as with all observational studies, we cannot determine causation only association.

Conclusions

This study supports the notion that HCPs should give African American parents a very strong recommendation for HPV vaccine as long as a basic foundation of trust been established. This study also finds that strength of vaccine recommendation and trust in HCP only explain a small fraction of the variance in HPV vaccine decision-making among African American parents suggesting that interventions to improve vaccine uptake should be more broadly focused.

Acknowledgements

This work was funded in part by the Eunice Kennedy Shriver National Institute of Child Health & Human Development grant #1K23HD068394 (L.Y.F.) which had no role in the design and conduct of the study; collection, management, analysis and interpretation of the data; and preparation, review and approval of the manuscript.

Abbreviations

CDC	Centers for Disease Control and Prevention
HCP	Healthcare provider
HPV	Human papillomavirus

References

1. Centers for Disease Control and Prevention, National Cancer Institute. [December 6, 2016] CDC Wonder. United States Cancer Statistics, 1999-2012 Mortality Incidence Rate Ratios Request. Available at: <https://wonder.cdc.gov/cancer.html>.
2. Saraiya M, Unger ER, Thompson TD, et al. US assessment of HPV types in cancers: implications for current and 9-valent HPV vaccines. *J Natl Cancer Inst.* 2015; 107(6):dju086. [PubMed: 25925419]
3. Serrano B, Alemany L, Tous S, et al. Potential impact of a nine-valent vaccine in human papillomavirus related cervical disease. *Infect Agent Cancer.* 2012; 7(1):38. [PubMed: 23273245]

4. Viens LJ, Henley SJ, Watson M, et al. Human Papillomavirus-Associated Cancers - United States, 2008-2012. *MMWR Morb Mortal Wkly Rep.* 2016; 65(26):661–666. [PubMed: 27387669]
5. Petrosky E, Bocchini JA Jr, Hariri S, et al. 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]
6. Reagan-Steiner S, Yankey D, Jeyarajah J, et al. National, Regional, State, and Selected Local Area Vaccination Coverage Among Adolescents Aged 13-17 Years - United States, 2015. *MMWR Morb Mortal Wkly Rep.* 2016; 65(33):850–858. [PubMed: 27561081]
7. [December 6, 2016] Tips and time-savers for talking with parents about HPV vaccine.. You are the key to cancer prevention. www.cdc.gov/vaccines/who/teens/for-hcp-tipsheet-hpv.html.
8. Nyhan B, Reifler J. Does correcting myths about the flu vaccine work? An experimental evaluation of the effects of corrective information. *Vaccine.* 2015; 33(3):459–464. [PubMed: 25499651]
9. Nyhan B, Reifler J, Richey S, Freed GL. Effective messages in vaccine promotion: a randomized trial. *Pediatrics.* 2014; 133(4):e835–842. [PubMed: 24590751]
10. Benin AL, Wisler-Scher DJ, Colson E, Shapiro ED, Holmboe ES. Qualitative analysis of mothers' decision-making about vaccines for infants: the importance of trust. *Pediatrics.* 2006; 117(5): 1532–1541. [PubMed: 16651306]
11. Griffioen AM, Glynn S, Mullins TK, et al. Perspectives on decision making about human papillomavirus vaccination among 11- to 12-year-old girls and their mothers. *Clin Pediatr.* 2012; 51(6):560–568.
12. Sanders Thompson VL, Arnold LD, Notaro SR. African American parents' HPV vaccination intent and concerns. *J Health Care Poor Underserved.* 2012; 23(1):290–301. [PubMed: 22643477]
13. Thompson VL, Arnold LD, Notaro SR. African American parents' attitudes toward HPV vaccination. *Ethn Dis.* 2011; 21(3):335–341. [PubMed: 21942167]
14. Joseph NP, Clark JA, Bauchner H, et al. Knowledge, attitudes, and beliefs regarding HPV vaccination: ethnic and cultural differences between African-American and Haitian immigrant women. *Womens Health Issues.* 2012; 22(6):e571–579. [PubMed: 23122214]
15. Shui I, Kennedy A, Wooten K, Schwartz B, Gust D. Factors influencing African-American mothers' concerns about immunization safety: a summary of focus group findings. *J Natl Med Assoc.* 2005; 97(5):657–666. [PubMed: 15926642]
16. District of Columbia Register. Human Papillomavirus Vaccination and Reporting Act of 2007, DC Act 17-39. May 25.2007 54(21)
17. District of Columbia Register. Notice of Final Rulemaking. Dec 19.2014 61(52)
18. Milloy C. District's HPV Proposal Tinged With Ugly Assumptions. *The Washington Post.* Jan 10.2007
19. Liao A, Stupiansky NW, Rosenthal SL, Zimet GD. Health beliefs and vaccine costs regarding human papillomavirus (HPV) vaccination among a U.S. national sample of adult women. *Prev Med.* 2012; 54(3-4):277–279. [PubMed: 22342703]
20. StataCorp. Stata Statistical Software: Release 13. StatCorp LP; College Station, TX: 2013.
21. Gilkey MB, Calo WA, Moss JL, Shah PD, Marciniak MW, Brewer NT. Provider communication and HPV vaccination: The impact of recommendation quality. *Vaccine.* 2016; 34(9):1187–1192. [PubMed: 26812078]
22. Kester LM, Zimet GD, Fortenberry JD, Kahn JA, Shew ML. A national study of HPV vaccination of adolescent girls: rates, predictors, and reasons for non-vaccination. *Matern Child Health J.* 2013; 17(5):879–885. [PubMed: 22729660]
23. Kennedy BR, Mathis CC, Woods AK. African Americans and their distrust of the health care system: healthcare for diverse populations. *J Cult Divers.* 2007; 14(2):56–60. [PubMed: 19175244]
24. Jacobs EA, Rolle I, Ferrans CE, Whitaker EE, Warnecke RB. Understanding African Americans' Views of the Trustworthiness of Physicians. *J Gen Intern Med.* 2006; 21(6):642–647. [PubMed: 16808750]
25. Bhui K, Aslam RW, Palinski A, et al. Interventions designed to improve therapeutic communications between black and minority ethnic people and professionals working in psychiatric services: a systematic review of the evidence for their effectiveness. *Health Technol Assess.* 2015; 19(31):vii–xxiv. 1–173.

26. Bhui KS, Aslam RW, Palinski A, et al. Interventions to improve therapeutic communications between Black and minority ethnic patients and professionals in psychiatric services: systematic review. *Br J Psychiatry*. 2015; 207(2):95–103. [PubMed: 26243761]
27. Griner D, Smith TB. Culturally adapted mental health intervention: A meta-analytic review. *Psychotherapy (Chic)*. 2006; 43(4):531–548. [PubMed: 22122142]
28. Zeh P, Sandhu HK, Cannaby AM, Sturt JA. The impact of culturally competent diabetes care interventions for improving diabetes-related outcomes in ethnic minority groups: a systematic review. *Diabet Med*. 2012; 29(10):1237–1252. [PubMed: 22553954]
29. Perkins RB, Apte G, Marquez C, et al. Factors affecting human papillomavirus vaccine use among White, Black and Latino parents of sons. *Pediatr Infect Dis J*. 2013; 32(1):e38–44. [PubMed: 22914585]
30. Brewer NT, Hall ME, Malo TL, Gilkey MB, Quinn B, Lathren C. Announcements Versus Conversations to Improve HPV Vaccination Coverage: A Randomized Trial. *Pediatrics*. 2016
31. Klayman J, Ha Y. Confirmation, disconfirmation, and information in hypothesis testing. *Psychol Rev*. 94:211–228.

Table 1

Sociodemographic characteristics of participants, their children and their healthcare providers

Characteristic	Overall N=400	Acceptors N=219	Refusers N=181	p-value
Respondent's age, mean±SD	37.9±7.7	37.9±7.3	37.9±8.1	0.98
Female respondent, n (%)	374 (93.5)	203 (92.7)	171 (94.5)	0.47
Respondent's educational attainment, n (%) [*]				
High school graduate	178 (44.7)	104 (47.7)	74 (41.1)	0.23
Some college/technical school	167 (42.0)	90 (41.3)	77 (42.8)	
College/technical school graduate	53 (13.3)	24 (11.0)	29 (16.1)	
Child's age, n (%) [*]				
10 years	83 (20.8)	22 (10.0)	61 (33.7)	<.001
11 years	209 (52.3)	146 (66.7)	63 (34.8)	
12 years	108 (27.0)	51 (23.3)	57 (31.5)	
Female child, n (%)	164 (41.0)	79 (36.1)	85 (47.0)	0.03
Child up-to-date with all other vaccines, n (%)	289 (72.3)	157 (71.7)	132 (72.9)	0.78
Respondent delayed/refused other vaccines in past, n (%) [*]	34 (8.5)	11 (5.0)	23 (12.7)	<.01
Respondent has older children [*]	198 (49.9)	111 (51.2)	87 (48.3)	0.58
Among respondents with older children, any older child received HPV vaccine [*]				<.001
No	97 (49.0)	40 (36.0)	57 (65.5)	
Yes	89 (44.9)	64 (57.7)	25 (28.7)	
Don't know	12 (6.1)	7 (6.3)	5 (5.8)	
Well encounter [*]	361 (92.1)	209 (96.8)	152 (86.4)	<.001
Healthcare provider training [*]				0.39
Attending physician	178 (45.0)	99 (45.4)	79 (44.4)	
Adolescent medicine fellow	30 (7.6)	12 (5.5)	18 (10.1)	
General pediatrics resident	96 (24.2)	54 (24.8)	42 (23.6)	
Nurse practitioner	92 (23.2)	53 (24.3)	39 (21.9)	
Healthcare provider race [*]				0.11
non-Hispanic White	205 (51.9)	112 (51.6)	93 (52.3)	
African American	88 (22.3)	41 (18.9)	47 (26.4)	
Asian	73 (18.5)	48 (22.1)	25 (14.0)	
Other/Mixed race	29 (7.3)	16 (7.4)	13 (7.3)	

* N=392-398 due to missing values

Table 2

Vaccine beliefs and trust in sources for vaccine advice

	Vaccine Acceptors n (%) N=219	Vaccine Refusers n (%) N=181	p value
<i>Vaccine beliefs</i>			
It is important for children to get the HPV vaccine to prevent genital warts and cervical cancer. *			<.001
Agree	194 (88.6)	92 (51.1)	
Do not agree	25 (11.4)	88 (48.9)	
The HPV vaccine is good for my child's health. *			<.001
Agree	188 (86.2)	67 (37.0)	
Do not agree	30 (13.8)	114 (63.0)	
It is helpful for my child to get the HPV vaccine. *			<.001
Agree	197 (90.0)	63 (35.0)	
Do not agree	22 (10.0)	117 (65.0)	
It is safe for a person to get the HPV vaccine.			<.001
Agree	184 (84.0)	77 (42.5)	
Do not agree	35 (16.0)	104 (57.5)	
If a child gets too many vaccines, it can ruin his or her immune system.			<.001
Disagree	132 (60.3)	87 (48.1)	
Do not disagree	87 (39.7)	94 (51.9)	
The HPV vaccine is dangerous or could cause a bad reaction.			<.001
Disagree	130 (59.4)	54 (29.8)	
Do not disagree	89 (40.6)	127 (70.2)	
African Americans are being targeted for HPV vaccine while it is still somewhat experimental.			.001
Disagree	109 (49.8)	61 (33.7)	
Do not disagree	110 (50.2)	120 (66.3)	
<i>How much do you trust the following sources for vaccine advice?</i>			
Your child's doctors, nurses or other healthcare providers *			<.001
None	1 (0.4)	2 (1.1)	
Some	26 (11.9)	61 (33.9)	
A lot	192 (87.7)	117 (65.0)	
Websites from doctor groups like the American Academy of Pediatrics *			.30
None	9 (4.1)	14 (7.7)	
Some	136 (62.4)	111 (61.3)	
A lot	73 (33.5)	56 (31.0)	

	Vaccine Acceptors n (%) N=219	Vaccine Refusers n (%) N=181	<i>p</i> value
Government websites like the Centers for Disease Control and Prevention, also called the CDC			.001
None	7 (3.2)	24 (13.2)	
Some	120 (54.8)	93 (51.4)	
A lot	92 (42.0)	64 (35.4)	

*N=399 due to a missing value

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 3

Impression of the healthcare provider and his/her vaccination recommendation

	Vaccine Acceptors N=219	Vaccine Refusers N=181	<i>p</i> value
Rate the doctor or nurse who offered your child the HPV vaccine. (1=worst and 10=best), median [IQR]	10 [9, 10]	10 [9, 10]	.1
How strongly did the doctor or nurse recommend your child get the HPV vaccine? n (%)			<.001
Not very strongly	15 (6.9)	48 (26.5)	
Somewhat strongly	110 (50.2)	86 (47.5)	
Very strongly	94 (42.9)	47 (26.0)	

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 4

Trust in the healthcare provider and strength of his/her vaccination recommendation

Variable	OR (95%CI)	aOR* (95%CI)
How much do you trust your child's doctors, nurses or other healthcare providers for vaccine advice?		
None/some	ref	ref
A lot	3.6 (2.2, 6.0)	2.3 (1.1, 4.8)
How strongly did the doctor or nurse recommend your child get the HPV vaccine?		
Not very strongly	ref	ref
Somewhat strongly	4.2 (2.2, 8.0)	2.5 (1.1, 5.7)
Very strongly	6.4 (3.3, 12.6)	4.6 (1.9, 11.1)

* Adjusted for clustering by HCP, and for parent's age and education, child's age and gender, visit type, strength of HCP vaccination recommendation, trust in HCPs, trust in government websites and vaccine beliefs score

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript