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## HPV Awareness, Knowledge and Attitudes among Older African-American Women

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### Abstract

**Objective**—To assess correlates of human papillomavirus (HPV) awareness, knowledge, and attitudes among older, church-going African-American women.

**Methods**—Participants (N = 759), aged 40-80, answered survey questions about HPV awareness, knowledge, and attitudes toward vaccination of adolescent daughters. Associations between participant characteristics and HPV items were assessed using chi-square tests and logistic regression analyses.

**Results**—Younger age, higher education, a family history of cancer, and less spirituality were each associated with HPV awareness individually, and when considered jointly in a single model (p values .038). Higher education was related to HPV knowledge (p = .006).

**Conclusions**—African-American women of older age, less education, no family history of cancer, and/or higher spirituality might benefit from targeted church-based HPV educational campaigns.

### Keywords

HPV; African-American women; church

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**Human Subjects Statement:** The Institutional Review Boards at The University of Texas MD Anderson Cancer Center and the University of Houston approved this study. Written informed consent for all study procedures was obtained before data collection.

The human papillomavirus (HPV) is linked to the incidence rates of cervical, vaginal, vulvar, anal, and oropharyngeal cancer among women,<sup>1</sup> with an estimated 70% of all cervical cancers caused by HPV-16 and HPV-18.<sup>2</sup> The first HPV vaccine was licensed in 2006, with 2 vaccines currently available for recommended use in adolescents.<sup>3,4</sup> The most recent guidelines for girls include the complete administration of the 3-dose series for either vaccine between the ages of 11-12 years, although the doses can be given to girls as early as the age of 9.<sup>3,4</sup> Prior to introduction of the HPV vaccine, some of the highest invasive cervical cancer rates were found among African-American women,<sup>5,6</sup> particularly in the South.<sup>5,7</sup> Furthermore, some studies have found that African-Americans were less likely to receive routine screening for cervical cancer with increasing age<sup>8</sup> and were more likely to receive late stage diagnoses coupled with higher mortality rates - disparities that increased with decreasing socioeconomic status.<sup>6</sup> The introduction of the HPV vaccine presents an opportunity to reduce the incidence of cervical cancer and other HPV-related cancers across a diverse range of populations, thereby making awareness of HPV and knowledge of its health risks a critical health issue. This is particularly the case among African Americans, given the aforementioned disparities in cervical cancer and cancer screenings.

Unfortunately, vaccination rates remain suboptimal among adolescent girls.<sup>9</sup> Although one national survey found that minority and below-poverty girls had a higher percentage of vaccine initiation,<sup>9</sup> another with a nationally representative sample found that vaccine initiation was only 18.2% for African Americans in comparison to 33.1% among non-Hispanic Whites, a disparity that remained after controlling for access to care and socio-demographic status.<sup>10</sup> These results emphasize that more information is needed to understand the underlying factors that influence African Americans' decisions about vaccination. Some studies found that African-American parents were less likely to accept the vaccine for young girls, especially those under the age of 13.<sup>11</sup> A frequently cited reason for parental refusal or indecision regarding the intent to vaccinate adolescent daughters across racial groups is a persistent lack of information regarding HPV infection and its relation to cervical cancer.<sup>6,12</sup> Furthermore, studies of racially diverse populations indicate that lower educational attainment is also associated with lower odds of having heard about HPV or the vaccine,<sup>13</sup> although the literature is mixed.<sup>11</sup> On the other hand, a higher perceived risk of cancer, often influenced by having a family history of cancer, might be associated with a higher likelihood of compliance with vaccination given its link to higher rates of preventative screenings in general.<sup>14-16</sup> A better understanding of the factors that influence parental decisions about HPV vaccination is important to improve compliance and prevent unnecessary cancer risk among African-American women.

A large percentage of African Americans belong to a church community, with as many as 87% of African Americans affiliated with a religious organization in the United States, a percentage that is usually larger in the South.<sup>17</sup> As such, the church setting may be an important platform for the dissemination of information about HPV and HPV-related health promotion. However, HPV infection can be a sensitive issue for religious populations, possibly because its transmission occurs primarily through sexual encounters.<sup>18</sup> Religiosity and regular church attendance is related to lower vaccine acceptance rates among parents of adolescent girls,<sup>11,19-20</sup> with some studies identifying a parental concern that uptake might increase the likelihood of engaging in sexual activities.<sup>21</sup> However, because young adults

may be less likely to ascribe to a religious orientation or regularly attend church than older adults,<sup>17</sup> the influence of spirituality might be more relevant to older generations of parents and caregivers. However, there is scant research on associations of spirituality on HPV awareness, knowledge, and attitudes among older church attending African Americans.

The social structure of African-American families includes the commonality of intergenerational guardianship of children.<sup>22</sup> For example, approximately 22% of African-American grandparents acted as caregivers of their grandchildren in 2011, a trend that increases during periods of economic recession.<sup>23</sup> However, to our knowledge, current literature fails to address the HPV perceptions of older African-American women, which neglects their potentially influential role in the family decision making processes, including decisions regarding vaccine acceptance. Further understanding is needed regarding the attitudes of older African-American women in this regard.

The purpose of the current study was to characterize the awareness, knowledge, and attitudes regarding HPV among a population of older African-American women in an urban church environment, and explore how age, educational attainment, parental status, a family history of cancer, and spirituality might relate to these factors. Understanding more about these relations might provide important initial insights to inform educational strategies to increase HPV awareness, knowledge, and acceptance among older African-American women who may play important roles in family decision-making regarding HPV vaccinations.

## Methods

### Design

Data were from the first year of a longitudinal cohort study designed to better understand cancer risk among African-American adults. Details about this study have been previously published.<sup>24-31</sup> Participants (N = 1501) were recruited into the cohort study from a large, Methodist church in Houston, Texas, via televised media and in-person solicitation. Participants were required to be 18 years old, residents of the Houston area with a functional telephone number, able to read and speak English, and church attendees. A convenience sampling method was used. Participants were enrolled in the study and data were collected between December 2008 and July 2009. Surveys were completed in person at the church. Participants viewed questionnaire items on a computer screen and entered responses into the computer using a keyboard. Data were thereby automatically converted into a data file, avoiding the problem of data entry errors by study personnel. Participants were compensated with a \$30 gift card following survey completion. Study procedures were approved by the Institutional Review Board at the University of Texas MD Anderson Cancer Center; written informed consent was obtained from all participants.

### Sample

Data relevant to HPV were only asked among a subset of the cohort (women aged 40; N = 760), one of whom did not provide a valid response for any HPV item. Consequently, the current sample comprised 759 African-American women aged 40 or older.

## Measures

**Participant characteristics**—Participant characteristics included age (40-59 vs. 60), which was categorized based on previous literature.<sup>32</sup> Other characteristics included education (<Bachelor's degree vs. Bachelor's degree), parental status (“How many living children do you have?” 0 vs. 1), family history of cancer (“Have any of your family members ever had cancer?” no vs. yes), and spirituality (“I rely on God to keep me in good health,” with 1=strongly agree, 2=agree, 3=disagree, and 4=strongly disagree). Two participants in the current sample did not answer the family history of cancer item and another 2 participants did not answer the spirituality item.

**HPV items**—HPV items were investigator generated. The first HPV item assessed HPV awareness (N = 759; “Have you ever heard of HPV? HPV stands for Human Papillomavirus.” yes vs. no or don't know). The second and third items were administered only to those answering yes to the HPV awareness item (N = 506). The second HPV item assessed HPV knowledge as related to cervical cancer (Do you think that HPV causes cervical cancer?” yes vs. no or don't know). One eligible participant failed to answer the HPV knowledge item. The third HPV item assessed HPV attitudes (“If you had a daughter ages 9-18, would you want her to be vaccinated for HPV?” now or later vs. not at all). Thirteen eligible participants failed to answer the HPV attitudes item.

## Analysis

Analyses were performed using SPSS version 19 (IBM, NY). First, participant characteristics were examined using descriptive statistics. Next, associations between each participant characteristic and each HPV item were assessed using a series of chi-square tests, except for spirituality which was assessed using logistic regression analysis. Finally, all participant characteristics emerging as significant in the previous analyses were then examined together in a single logistic regression model (per HPV item, as/if applicable) to assess unique variance. Significance was set at  $p < .05$  and only participants with complete data on the variables (in each respective analysis) were analyzed.

## Results

Participants (N = 759) ranged from age 40-80, and were 52.1 (+7.9) years old on average. There were 624 participants aged 40-59 (82.2%), and 135 aged 60-80 (17.8%). Other characteristics were as follows: 49.7% had > Bachelor's degree, 77.9% were parents, and 77% (of those responding) had a family history of cancer. The average spirituality response was 1.25 (+.54), with 79.4% (of those responding) indicating strong agreement with this item. In this sample, 66.7% (N = 506) had heard of HPV. Of those who had heard of HPV, 73.5% (N = 371) of responders knew it caused cervical cancer and 89.1% (N = 404) of responders would want their daughter to get vaccinated for HPV at some point in time. See Table 1 for overall participant characteristics.

Results from the main analyses are presented in Table 1. Age, education, family cancer history, and spirituality were each significantly associated with HPV awareness. Specifically, younger age, more educational attainment, a family history of cancer, and lower reliance on

God for good health predicted having heard of HPV. The average spirituality score was 1.29 among the HPV aware group versus 1.19 among those who had not heard of HPV. Moreover, the proportion of those strongly agreeing with the spirituality item was 76.8% among those with HPV awareness versus 84.5% among those who had not heard of HPV. Finally, education was significantly associated with HPV knowledge, such that more educational attainment was associated with a greater likelihood of knowing HPV caused cervical cancer. All other associations were non-significant.

Because multiple participant characteristics examined were associated with HPV awareness in univariate models, we conducted a single logistic regression analysis to examine their unique relations with all variables in the model. Results indicated that age ( $\beta=-.54$ ,  $SE=.20$ ;  $OR=.58$ ,  $p=.006$ ), education ( $\beta=.37$ ,  $SE=.16$ ;  $OR=1.46$ ;  $p=.017$ ), family cancer history ( $\beta=.38$ ,  $SE=.18$ ;  $OR=1.46$ ,  $p=.037$ ), and spirituality ( $\beta=.37$ ,  $SE=.16$ ;  $OR=1.45$ ,  $p=.023$ ) each remained independently associated with HPV awareness in a full model.

## Discussion

Among a sample of African-American women aged 40 or above from a large urban church in Houston, Texas, 66.7% of responders had heard of HPV infection, greater than 70% of those individuals knew it caused cervical cancer, and almost 90% endorsed a willingness to have a daughter vaccinated. Older age (> 60 years), lower education (< Bachelor's degree), no family history of cancer, and a stronger reliance on God for good health were predictors of a lack of awareness about HPV. However, only lower education was associated with a lack of knowledge about the role of HPV infection in cervical cancer, and none of the participant characteristics examined was associated with HPV attitudes.

To our knowledge, this study is among the first to characterize HPV awareness, knowledge, and attitudes among a sample of older African-American women. One previous study conducted among diversely-aged caregivers found a similar rate of HPV awareness (68%) among the African-American study participants, which was lower than that found among White participants (87%).<sup>33</sup> However, other studies cite lower rates of HPV awareness among African-American women than that reported in the current study (eg, 24%).<sup>34</sup> Our results suggest particular segments of the African-American church-going population that might benefit from increased education regarding HPV in order to potentially increase vaccination rates among African-American girls. Previous literature suggests that health education and promotional events offered by African-American churches are well-received,<sup>35</sup> suggesting the potential appeal of church-based campaigns for HPV-related education. Such education might be endorsed by the congregation leadership and provided within the church setting, either as a part of regular services or via health- or family-focused ministries. Improving HPV awareness among African-American women is valuable because, although vaccine completion rates have increased in recent years, African-American adolescent girls may not only be less likely to receive the vaccine than Whites but also less likely to complete the 3 required dosages.<sup>36</sup> However, it is important to note that increasing knowledge about the relation between HPV and cervical cancer alone may not affect a decision to vaccinate loved ones if decision-makers hold a negative regard for vaccinations in general. Therefore, health education campaigns in this area may also have to provide

information on vaccinations and their value more generally, while attending to relevant concerns that underlie negative perceptions.

While a family history of cancer was associated with HPV awareness, it had no relation to knowledge about the role of HPV in cervical cancer nor was it associated with the intent to vaccinate a daughter against HPV infection. In contrast, perceived risk of disease oftentimes motivates preventive care for other cancers (eg, routine mammograms for the early detection of breast cancer).<sup>14-16</sup> Having a family history of cancer but being unaware that HPV infection can cause cancer might present an educational opportunity that has been overlooked by health professionals. In fact, only education was associated with HPV knowledge, which suggests that informational sessions or educational materials that would further knowledge regarding the dangers of HPV infection and the benefits of the vaccine might be a helpful approach among older African-American women of lower educational attainment. Future studies might investigate these relationships further through more tailored assessment about the types of cancer among participants' family history to determine whether HPV-related cancers influence knowledge and vaccination initiation in contrast to the general history of cancer analyzed in this study.

One limitation of this study is that the HPV knowledge and attitude items were only administered to women that responded positively to the HPV awareness item. Interest in HPV vaccination for daughters was not assessed for women who had never heard of HPV infection, but it is possible that a parent would want to vaccinate a child without having heard of the virus because of a general belief in the value of vaccinations.<sup>37</sup> Furthermore, the participants were asked to consider a hypothetical daughter when responding to these items. Although 77.9% of the population identified as parents, some of the responders were not parental figures, and it is unknown whether responders specifically had daughters. A parent might feel more strongly about HPV infection and the intent to vaccinate their child than someone referencing a hypothetical daughter, and a parent might be more aware of HPV due to an active role in their child's health care. Moreover, the relatively high percentage of women in our study that indicated an intention to vaccinate adolescent daughters might drop significantly if actual initiation and completion of the vaccine among their female adolescent daughters were measured. Future studies might consider measuring vaccination initiation and completion among older, African-American women acting as guardians or caregivers of adolescent girls to expand upon these results. Again, within this study, it is important to consider that these high percentages were only among women that had heard of HPV. However, another study found that older parents ( > 40 years of age) were more likely to initiate vaccination among their daughters than were younger parents.<sup>12,38</sup> Therefore, age might be an important moderator to consider in future studies when examining associations between HPV attitudes and HPV vaccination initiation and completion, even among samples with relatively older demographics. Other potential risk factors not considered in this study, such as access to health care, might be of interest to future work. Finally, it is important to note that HPV awareness, knowledge, and attitudes - although important and potentially necessary factors - might not be sufficient to influence parental decision making about the HPV vaccine.

This study analyzed data for a large sample of participants from a unique population of African-American women that was part of an ongoing longitudinal cohort study. In addition to the large sample size, participation rates were high, with a maximum of 13 participants failing to provide a valid response for any HPV item. However, participants were recruited into a cohort study that was focused on better understanding the potential factors associated with cancer risk via convenience sampling methods, and, as a result, might have been potentially more health-conscious or knowledgeable about cancer than those not participating in the parent project. Likewise, as an observational study from a sample of convenience, these results may not be generalizable to all African-American women or to African-American women residing in rural areas, below the age of 40, regions outside of the South, those uninvolved in a religious community, or those ascribing to different faiths. Moreover, the current sample was well educated, with 49.7% of participants reporting a Bachelor's degree or higher. This figure is in contrast to national statistics indicating that 23% of African Americans in 2012 had achieved this level of educational attainment.<sup>39</sup> However, even among this highly educated sample of women, education was still significantly associated with HPV awareness. Despite these limitations, the current study contributed to an important gap in knowledge regarding HPV awareness, knowledge, and attitudes among older women with a religious background among an urban environment in the South, and it provides direction to inform future work in this area.

In conclusion, results suggest that African-American women of older age, less education, no family history of cancer, and/or higher spirituality might benefit from targeted church-based educational campaigns to better understand the HPV and its role in cervical cancer. There is some evidence that older generations of African Americans retain an influential role in family decision-making processes, and targeted health campaigns in partnership with religious organizations might be beneficial to these communities, and ultimately affect initiation of and compliance with HPV vaccination among younger generations. Future studies might consider assessing these HPV items among similar populations of older, African-American adults, including men, to better understand their response to targeted educational campaigns, identify remaining gaps in knowledge, and address other factors that might influence this population's decision and execution of HPV vaccination among adolescents in their care, both boys and girls, for optimal health outcomes.

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## References

1. Bosch FX, Broker TR, Forman D, et al. Comprehensive control of human papillomavirus infections and related diseases. *Vaccine*. 2013; 31(Suppl 7):H1–H31. [PubMed: 24332295]
2. Clifford G, Franceschi S, Diaz M, et al. Chapter 3: HPV type-distribution in women with and without cervical neoplastic diseases. *Vaccine*. 2006; 24(Suppl 3):S3/26–34. [PubMed: 16950015]
3. Centers for Disease Control and Prevention. FDA licensure of bivalent Human Papillomavirus Vaccine (HPV2, Cervarix) for use in females and updated HPV vaccination recommendations from the advisory committee on immunization practices (ACIP). *MMWR Morb Mortal Wkly Rep*. 2010; 59(20):626–629. [PubMed: 20508593]
4. Centers for Disease Control and Prevention. Recommendations of the advisory committee on immunization practices (ACIP). *MMWR Morb Mortal Wkly Rep*. 2007; 56(RR02):1–24. [PubMed: 17218934]
5. Barnholtz-Sloan J, Patel N, Rollison D, et al. Incidence trends of invasive cervical cancer in the United States by combined race and ethnicity. *Cancer Causes Control*. 2009; 20(7):1129–1138. [PubMed: 19253025]
6. Downs LS, Smith JS, Scarinci I, et al. The disparity of cervical cancer in diverse populations. *Gynecol Oncol*. 2008; 109(2):S22–S30. [PubMed: 18482555]
7. Watson M, Saraiya M, Benard V, et al. Burden of cervical cancer in the United States, 1998-2003. *Cancer*. 2008; 113(10):2855–2864. [PubMed: 18980204]
8. Bolen J, Adams M, Shenson D. Routine preventive services for older women: a composite measure highlights gaps in delivery. *J Womens Health (Larchmt)*. 2007; 16(5):583–593. [PubMed: 17627396]
9. Bednarczyk RA, Curran EA, Orenstein WA, Omer SB. Health disparities in Human Papillomavirus vaccine coverage: trends analysis from the national immunization survey-teen, 2008-2011. *Clin Infect Dis*. 2013; 58:238–241. [PubMed: 24162745]
10. Gelman A, Miller E, Schwarz EB, et al. Racial disparities in human papillomavirus vaccination: does access matter? *J Adolesc Health*. 2013; 53(6):756–762. [PubMed: 23992645]
11. 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]
12. Gottlieb SL, Brewer NT, Sternberg MR, et al. Human papillomavirus vaccine initiation in an area with elevated rates of cervical cancer. *J Adolesc Health*. 2009; 45(5):430–437. [PubMed: 19837348]
13. Polonijo AN, Carpiano RM. Social inequalities in adolescent human papillomavirus (HPV) vaccination: a test of fundamental cause theory. *Soc Sci Med*. 2013; 82:115–125. [PubMed: 23337830]
14. Brewer NT, Fazekas KI. Predictors of HPV vaccine acceptability: a theory-informed, systematic review. *Prev Med*. 2007; 45(2-3):107–114. [PubMed: 17628649]
15. Vernon SW. Risk perception and risk communication for cancer screening behaviors: a review. *J Natl Cancer Inst Monogr*. 1999; (25):101–119. [PubMed: 10854465]
16. McCaul KD, Branstetter AD, Schroeder DM, Glasgow RE. What is the relationship between breast cancer risk and mammography screening? A meta-analytic review. *Health Psychol*. 1996; 15(6):423–429. [PubMed: 8973921]
17. Pew Research Center. [December 21, 2013] A religious portrait of African-Americans (on-line). Available at: <http://www.pewforum.org/2009/01/30/a-religious-portrait-of-african-americans/>
18. Grimes RM, Benjamins LJ, Williams KL. Counseling about the HPV vaccine: desexualize, educate, and advocate. *J Pediatr Adolesc Gynecol*. 2013; 26(4):243–248. [PubMed: 24049807]
19. Barnack JL, Reddy DM, Swain C. Predictors of parents' willingness to vaccinate for human papillomavirus and physicians' intentions to recommend the vaccine. *Womens Health Issues*. 2010; 20(1):28–34. [PubMed: 20123174]
20. Shelton RC, Snavely AC, De Jesus M, et al. HPV vaccine decision-making and acceptance: does religion play a role? *J Relig Health*. 2013; 52(4):1120–1130. [PubMed: 22076049]



21. Brawner BM, Baker JL, Voytek CD, et al. The development of a culturally relevant, theoretically driven HPV prevention intervention for urban adolescent females and their parents/guardians. *Health Promot Pract.* 2013; 14(4):624–636. [PubMed: 23099659]
22. Billingsley, A. *Climbing Jacob's Ladder: The Enduring Legacies of African-American Families.* New York: Simon and Schuster; 1994.
23. Pew Research Center. [December 21, 2013] At grandmother's house we stay, one-in-ten children are living with a grandparent (on-line). Available at: [http://www.pewsocialtrends.org/files/2013/09/grandparents\\_report\\_final\\_2013.pdf](http://www.pewsocialtrends.org/files/2013/09/grandparents_report_final_2013.pdf)
24. Advani PS, Reitzel LR, Nguyen NT, et al. Financial strain and cancer risk behaviors among African Americans. *Cancer Epidemiol Biomarkers Prev.* 2014; 23(6):967–975. [PubMed: 24740200]
25. Cuevas AG, Reitzel LR, Adams CE, et al. Discrimination, affect, and cancer risk factors among African Americans. *Am J Health Behav.* 2014; 38(1):31–41. [PubMed: 24034678]
26. Cuevas AG, Reitzel LR, Cao Y, et al. Mediators of discrimination and self-rated health among African Americans. *Am J Health Behav.* 2013; 37(6):745–754. [PubMed: 24001623]
27. Fisher FD, Reitzel LR, Nguyen N, et al. Loneliness and self-rated health among church-attending African Americans. *Am J Health Behav.* 2014; 38(4):481–491. [PubMed: 24636110]
28. Savoy EJ, Reitzel LR, Nguyen N, et al. Financial strain and self-rated health among black adults. *Am J Health Behav.* 2014; 38(3):340–350. [PubMed: 24636030]
29. Strong LL, Reitzel LR, Wetter DW, McNeill LH. Associations of perceived neighborhood physical and social environments with physical activity and television viewing in African-American men and women. *Am J Health Promot.* 2013; 27(6):401–409. [PubMed: 23398134]
30. Reitzel LR, Nguyen N, Strong LL, et al. Subjective social status and health behaviors among African Americans. *Am J Health Behav.* 2013; 37(1):104–111. [PubMed: 22943107]
31. Reitzel LR, Regan SD, Nguyen N, et al. Density and proximity of fast food restaurants and body mass index among African Americans. *Am J Public Health.* 2014; 104(1):110–116. [PubMed: 23678913]
32. Flegal KM, Carroll MD, Kit BK, Ogden CL. Prevalence of obesity and trends in the distribution of body mass index among US adults, 1999–2010. *JAMA.* 2012; 307(5):491–497. [PubMed: 22253363]
33. Hughes J, Cates JR, Liddon N, et al. Disparities in how parents are learning about the human papillomavirus vaccine. *Cancer Epidemiol Biomarkers Prev.* 2009; 18(2):363–372. [PubMed: 19190161]
34. Cates JR, Brewer NT, Fazekas KI, et al. Racial differences in HPV knowledge, HPV vaccine acceptability, and related beliefs among rural, southern women. *J Rural Health.* 2009; 25(1):93–97. [PubMed: 19166567]
35. Odulana AA, Kim MM, Isler MR, et al. Examining characteristics of congregation members willing to attend health promotion in African-American churches. *Health Promot Pract.* 2014; 15(1):125–133. [PubMed: 23493800]
36. Nicolai LM, Mehta NR, Hadler JL. Racial/Ethnic and poverty disparities in Human Papillomavirus vaccination completion. *Am J Prev Med.* 2011; 41(4):428–433. [PubMed: 21961471]
37. Allen JD, Othus MK, Shelton RC, et al. Parental decision making about the HPV vaccine. *Cancer Epidemiol Biomarkers Prev.* 2010; 19(9):2187–2198. [PubMed: 20826829]
38. Garcini LM, Galvan T, Barnack-Tavlaris JL. The study of human papillomavirus (HPV) vaccine uptake from a parental perspective: a systematic review of observational studies in the United States. *Vaccine.* 2012; 30(31):4588–4595. [PubMed: 22579865]
39. U.S. Department of Education. [December 21, 2013] The condition of education 2013 (NCES 2013-037) (on-line). Available at: <http://nces.ed.gov/pubs2013/2013037.pdf>

**Table 1**  
**Participant Characteristics Overall and by Endorsement of HPV Awareness, HPV Knowledge, and Pro-HPV Attitudes**

Participant Characteristics	Total Sample			HPV Awareness			HPV Knowledge			HPV Attitudes		
	N = 759	N = 506 (yes) / 759	N = 404 (pro) / 493	% (N)	$\chi^2$	p	% (N)	$\chi^2$	p	% (N)	$\chi^2$	p
Age												
40-59 (REF)	82.2 (624)	68.9 (430)		68.9 (430)	7.95	0.005	72.7 (312)	0.80	0.37	81.1 (339)	1.33	0.25
60	17.8 (135)	56.3 (76)		56.3 (76)			77.6 (59)			86.7 (65)		
Education												
< Bachelor's degree (REF)	50.3 (382)	62.8 (240)		62.8 (240)	5.10	0.02	67.8 (162)	7.52	0.006	81.0 (188)	0.25	0.62
Bachelor's degree	49.7 (377)	70.6 (266)		70.6 (266)			78.6 (209)			82.8 (216)		
Parental Status												
0 children (REF)	22.1 (168)	72.6 (122)		72.6 (122)	3.44	0.06	79.5 (97)	3.01	0.08	83.5 (96)	0.24	0.63
1 child	77.9 (591)	65.0 (384)		65.0 (384)			71.6 (274)			81.5 (308)		
Family History of Cancer												
No (REF)	23.0 (174)	60.3 (105)		60.3 (105)	4.30	0.04	74.3 (78)	0.05	0.83	84.8 (89)	0.71	0.40
Yes	77.0 (583)	68.8 (401)		68.8 (401)			73.3 (293)			81.2 (315)		
Spirituality												
	N = 757	N = 505	N = 370	N = 370						N = 403		
	M [SD]	M [SD]	M [SD]	M [SD]	$\beta$ [SE]	p	M [SD]	$\beta$ [SE]	p	M [SD]	$\beta$ [SE]	p
	1.25 [1.54]	1.29 [1.57]	1.31 [1.58]	1.31 [1.58]	0.38 [1.16]	0.02	1.31 [1.58]	0.22 [1.19]	0.25	1.29 [1.58]	0.70 [2.11]	0.73

Note: Sample proportions [% (N)] and descriptives (M [SD]) presented for HPV Awareness, HPV Knowledge, and HPV Attitudes represent those relevant to participants who had heard of HPV, had knowledge of its association with cervical cancer, and would get a daughter vaccinated for HPV. For HPV items, proportions were calculated from the Total Sample (N) per category for each participant characteristic. Relations between participant characteristics and HPV variables were assessed using chi-square or logistic regression analyses. Missing data included family history of cancer N = 2; spirituality N = 2; HPV knowledge N = 1; HPV attitudes N = 13.