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## Characteristics Associated With Initiation of the HPV Vaccine Among a National Sample of Male and Female Young Adults

**Debra H. Bernat, PhD\***,

Behavioral and Community Health, School of Public Health, University of Maryland

**Mary A. Gerend, PhD,**

Medical Humanities & Social Sciences, College of Medicine, Florida State University

**Kenya Chevallier, BA,**

Medical Humanities & Social Sciences, Florida State University

**Marc A. Zimmerman, PhD,** and

Health Behavior & Health Education, University of Michigan

**Jose A. Bauermeister, PhD**

Health Behavior & Health Education, University of Michigan

### Abstract

**Purpose**—To examine rates of Human Papillomavirus (HPV) vaccine initiation, and characteristics associated with initiation, among a national sample of male and female young adults.

**Methods**—Participants (n=3,448; 48% female) were recruited using a web-based respondent driven sampling strategy and completed a web-based survey between October and December 2010.

**Results**—Forty-five percent of females and four percent of males initiated the vaccine. Females who were younger, never married, in school, attended religious services less than once a month, sexually active, reported a greater number of lifetime sex partners, and who had been tested for HIV were more likely to report initiation. Males who were African American, attended religious services less than once a month, reported a greater number of sex partners in their lifetime and who had been tested for HIV were more likely to report initiation.

**Conclusions**—Factors associated with HPV vaccine initiation may differ for males and females. Further research, with larger samples of males, is needed to fully understand characteristics associated with male initiation. Regardless of gender, however, the majority of young adults who have not initiated sexual activity have not received the vaccine. Further research is needed to examine how to increase vaccination rates among this population, as they may benefit most from vaccination.

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\*Corresponding Author, Debra H. Bernat, 1115 West Call Street, P.O. Box 3064300, Tallahassee, FL 32306-4300, Tel: 850.645.9223, Fax: 850.645.1773, [debra.bernat@med.fsu.edu](mailto:debra.bernat@med.fsu.edu).

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## Keywords

Human Papillomavirus; Vaccine; Initiation; Young adults; HPV

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## Introduction

Human papillomavirus (HPV) is the most common sexually transmitted infection in the United States<sup>1</sup>. An estimated 20 million Americans are infected with HPV, and about 6.2 million new cases are diagnosed each year. HPV infections can lead to cervical, anal, mouth, throat, and other cancers. The Food and Drug Administration (FDA) approved a 3-dose vaccine to prevent HPV types that are most likely to cause cancer for females ages 9–26 in June 2006<sup>2</sup> and for males ages 9–26 in October 2009<sup>3</sup>. Both the bivalent and quadrivalent vaccines have been approved for females, whereas only the quadrivalent vaccine has been approved for males.

While vaccination rates for HPV have been increasing, its prevalence among adolescents and young adults remain lower than for other vaccines<sup>4</sup>. According to the 2011 National Immunization Survey for teens, 53% of adolescent females received one or more doses of the HPV vaccine, whereas 71% had received one or more doses of the meningococcal meningitis vaccine (MenACWY) and 78% had received one or more doses of the tetanus, diphtheria, and pertussis vaccine (Tdap)<sup>5</sup>. Furthermore, rates of HPV vaccine initiation are lower for young adults than for adolescents. Data from the National Health Interview Survey, for example, indicated that 20.7% of young adult females aged 19–26 received one or more doses of the vaccine in 2010<sup>6</sup>. In contrast, less than 1% of males aged 19 to 26 reported receiving one or more doses of the HPV vaccine in 2010. Given the vaccine's potential to reduce cancer-related HPV, even after potentially one dose<sup>7</sup>, it is vital to identify the demographic and psychosocial factors that may be associated with HPV initiation in order to improve on-going public health vaccine initiatives.

In prior studies, researchers have found that HPV vaccine initiation decreases with age among young adult females (i.e., 19–20 year old females are more likely to initiate than females ages 25–26)<sup>8–11</sup>. Demographic characteristics including being enrolled in school<sup>12</sup> and never having been married<sup>10,13</sup> have also been associated with initiation. Fewer researchers, however, have examined the relationship between initiation of the HPV vaccination and sexual behavior. Using data from the National Survey of Family Growth, Liddon and colleagues<sup>10</sup> reported no association between HPV initiation and sexual activity or number of sex partners among 15 to 24 year old females. Similarly, Marchand et al.<sup>11</sup> found no association between having had sexual intercourse and initiation of the vaccine. Other researchers, however, have found a significant positive association between sexual activity and initiation of the vaccine among females<sup>14,15</sup>. Given that the results of these studies are equivocal, further examination of how sexual characteristics are related to HPV vaccination is needed.

In the present study, we examine the association between sociodemographic and sexual health/behavior characteristics and initiation of the HPV vaccine. We contribute to the current HPV vaccine literature in several ways. First, surveillance of HPV vaccination in national samples provide critical information for increasing vaccination rates and decreasing disparities in vaccination; however, the majority of research on the HPV vaccination that includes young adults has focused on females in specific settings (e.g. colleges/universities) which have limited generalizability<sup>9,14,16–19</sup>. As a contribution to the literature, we extend this work by providing an assessment of HPV vaccination in a national sample of youth. Second, since the HPV vaccination was more recently approved for males, the majority of

studies on HPV vaccination among males to date have assessed factors associated with male acceptability rather than uptake<sup>20,21</sup>. The present study expands this research by examining factors associated with male initiation of the vaccine. Finally, this study adds to the literature by examining how HPV vaccination is related to sexual health and behavior. Data for the present study were collected in 2010--four years after the vaccine's approval for females, and one year after its approval for males. While the vaccine was approved for males at the time of this study, the vaccine was not routinely recommended for males until 2012.

## Methods

### Study Sampling

Participants were recruited using web-based respondent driven sampling (webRDS) strategy<sup>22</sup>. Initial seeds (n=22) were recruited through an online Facebook advertisement seeking participants between 18 and 24 year olds who were U.S. residents to complete a University of Michigan online health survey. The initial seeds were selected based on race/ethnicity (i.e., White, Black/African American, and Hispanic/Latino) and region of the U.S. This sampling strategy ensured that the initial network seeds were diverse and reduced the likelihood that recruitment would be focused in a single region in the United States. Participants who clicked on the Facebook advertisement were linked to the study's eligibility screener, where information about the study could be found and potential participants could provide contact information so that the research team could contact them. A member of our research team called eligible participants and, if they filled a vacancy in our race/region matrix, provided them with a link and password to the web questionnaire. Twenty-two seeds were recruited with a diverse racial and regional composition (5 Black/African American, 8 Latino/Hispanic, 9 White/European American; 7 from the Northeast region, 6 from the South, 4 from the West, and 5 from the Midwest). The remainder of our sample (N = 3,426) was recruited through referral chains from the original 22 seeds. A statistical weight was calculated to correct for the intraclass correlation that resulted from the webRDS network-referral procedures (unweighted N = 3,448; weighted N = 829)<sup>22-24</sup>. Data collection occurred between October 1, 2010 and December 15, 2010.

### Study Procedures

Participants read and consented to the study online and immediately proceeded to the survey. Participants were asked about their Internet use, alcohol and other drug use, lifetime sexual behaviors, psychosocial factors (e.g. mental health, social support), and demographic characteristics. On average, the questionnaire took 37 minutes to complete. Participants received \$20 dollars for their participation and were offered an additional \$10 for each additional participant who they referred into the study and who completed the survey (up to five). Best practices were followed to identify and exclude duplicate and fraudulent entries (n=675 entries; 16% of completed entries)<sup>25</sup>. The study was approved by the University of Michigan Institutional Review Board.

### Measures

#### Outcome Variable

**HPV Vaccine Initiation:** Participants indicated if they ever received one or more doses of the HPV vaccine (yes/no/don't know).

#### Predictor Variables

**Sociodemographic Characteristics:** Sociodemographic characteristics include age, race, ethnicity, school enrollment, and marital status. Age was calculated based on date of birth and survey completion date. Participants indicated their race (Check all that apply: White or

European American, African American or Black, Asian or Pacific Islander, Native American, or Other). Race was recoded into a 4-level variable with the following categories: Black, Asian, White, and Other/Multiracial. Participants also indicated whether they were Hispanic or Latino (yes/no), in school full or part time (yes/no), and their legal marital status (never married, married, divorced, separated, widowed). Due to the small number of respondents who indicated divorced, separated, or widowed, marital status was recoded into a 3-level variable (never married, married, and divorced, separated, or widowed).

**Religious Service Attendance:** Participants indicated how often they attend religious services (1=Not at all, 2=Less than once a year, 3=A few times a year, 4=Once a month, 5=A few times per month, 6=Once a week, 7=More than once a week). This variable was recoded into a dichotomous variable in which '1' represented once a month or more and '0' represented less than once a month. This dichotomy was selected based on the distribution of responses and to distinguish participants who more regularly attend religious services versus those who attend religious services less frequently.

**Sexual Health and Behavior:** Participants indicated their sexual orientation (Straight/Heterosexual, Gay/Lesbian/Homosexual, Bisexual, Other). This variable was recoded into a dichotomous variable in which '1' indicated straight/heterosexual and '0' indicated all other response options. Participants also indicated whether they ever had any sexual (genital) experiences (yes/no). Participants who were sexually active also indicated the number of partners with whom they have had sexual (genital) experiences in their lifetime. The lifetime sexual partner variable was recoded into a 3-level variable, where '1' denoted one partner, '2' denoted two to five partners, and '3' denoted 6 or more partners. Participants also indicated how many times they had been tested for HIV. This was dichotomized to indicate whether a participant had ever been tested for HIV (0=zero times, 1=one or more times).

## Data Analytic Strategy

Participants who did not indicate their gender or respond to the HPV vaccination item were excluded from the present study (n=168). Analyses were conducted separately for females and males. First, the proportion of participants who self-reported having initiated the vaccine series was examined. Participants who did not know if they had received the vaccine were omitted from subsequent analyses (unweighted n=381). The proportions were weighted to generalize more broadly to the young adult population. T-test and chi-square analyses were conducted to examine differences in vaccine initiation by sociodemographics (age, race, ethnicity, marital status, school enrollment, and religious attendance) and sexual behavior characteristics (sexual orientation, lifetime sexual activity, lifetime partners, and lifetime HIV testing). Finally, logistic regression analyses were conducted to examine the relationship between sexual health/behavior on HPV initiation after controlling for sociodemographic characteristics. All variables examined in the present study were included in the multivariate models. The bivariate and multivariate analyses were not weighted. The purpose of these analyses were to examine etiological associations and due to the smaller sample of males who had been vaccinated, using the unweighted data for the bivariate and multivariate associations increased our power to detect significant associations in the present study.

## Results

### Participant Characteristics

The mean age of the participants in the present study was 20.8 (SD=1.76). The majority of the participants identified themselves as White and non-Hispanic. Approximately three-quarters of the sample reported being in school and most participants indicated they were

never married. The characteristics of the study sample, both weighted and unweighted, are shown by gender in Table 1.

### HPV Vaccination

Among females, 45.2% reported receiving one or more doses of the HPV vaccine and 48.4% reported not initiating the vaccine. Six percent (6.4%) of the females reported not knowing if they had received the vaccine. In contrast, over three-quarters of the males in the present study had not initiated the vaccine (78.7%). Less than 5% (4.2%) of the males initiated the vaccine and 17% (17.1%) reported they didn't know if they had received the vaccine.

### Bivariate Results

**Females**—Sociodemographic characteristics associated with HPV initiation among females include age ( $t(1441.9) = -6.04, p < .0001$ ), marital status ( $\chi^2(1, N=1486) = 34.84, p < .0001$ ), current school enrollment ( $\chi^2(1, N=1500) = 19.62, p < .0001$ ), and religious service attendance ( $\chi^2(1, N=1486) = 20.28, p < .0001$ ) (see Table 2). On average, female participants who were vaccinated were more likely to report being younger in age, never married, currently in school, and to not have attended religious services in the past 30 days. Sexual health characteristics including lifetime sexual activity ( $\chi^2(1, N=1493) = 22.76, p < .0001$ ) and lifetime partners ( $\chi^2(2, N=1098) = 11.59, p = .0030$ ) were also associated with initiation. No association was found between females' initiation of the HPV vaccine and race, ethnicity, sexual orientation, or HIV testing.

**Males**—Sociodemographic characteristics associated with HPV initiation among males include race ( $\chi^2(3, N=1368) = 15.31, p = .0016$ ) and religious service attendance ( $\chi^2(1, N=1382) = 4.88, p = .0272$ ) (see Table 3). African American males were more likely to receive the vaccine than males of all other races combined (12.9% versus 4.6%;  $\chi^2(1, N=1368) = 9.71, p = .0018$ ) and males who received the vaccine were less likely to have attended religious services in the past 30 days. Sexual health factors including lifetime partners ( $\chi^2(2, N=935) = 14.47, p = .0007$ ) and lifetime HIV testing ( $\chi^2(1, N=1374) = 20.48, p < .0001$ ) were also associated with initiation. No relationship was found between males' initiation of the HPV vaccine and age, ethnicity, marital status, school enrollment, sexual orientation, or lifetime sexual activity.

### Multivariate Results

**Females**—After controlling for sociodemographic characteristics, lifetime sexual activity, lifetime partners, and HIV testing were associated with initiation of the vaccine among females (see Table 4). Specifically, females who had been sexually active in their lifetime had nearly two times the odds of initiating the vaccine than females who reported no sexual activity. Females who reported more than one lifetime partner had approximately 1.5 times the odds of initiating the vaccine than females with one lifetime partner. Females who reported having been test for HIV had nearly 1.5 times the odds of initiating the vaccine compared to females who had not been tested for HIV.

**Males**—After controlling for sociodemographic characteristics, lifetime partners and HIV testing were associated with initiation of the vaccine among males (see Table 4). Males who reported 4 or more lifetime partners had over 4 times the odds of initiating the vaccine than males with one lifetime partner. In addition, those who had been tested for HIV had nearly 3 times the odds of initiating the vaccine compared to males who had never been tested for HIV.

## Discussion

The goal of the present study was to examine rates of initiation of the HPV vaccine, and characteristics associated with initiation, among a national sample of both female and male young adults. When we examined the demographic characteristics of our sample, we found young adult females who were younger, never married, in school, and who reported less frequent religious service attendance were more likely to have received the vaccine than their counterparts. In contrast, only race/ethnicity was a predictor of HPV vaccine uptake among males. This racial/ethnic difference, however, was not noted among female young adults. While there is some inconsistency in the literature about racial and ethnic differences in rates of HPV vaccination, this finding is consistent with several previous national surveys including data from the National Health Interview Survey in 2010 and in NHANES in 2008<sup>15</sup>. Given the sex difference in HPV rates, we discuss our sex-specific findings in greater detail below.

The prevalence of HPV initiation among young adult females in the present study was 45%, a higher rate of initiation than the data from the National Health Interview Survey (20.7% of young adult females aged 19–26 initiated the HPV vaccine). Aside from the difference in age (i.e., our study focused on 18–24 whereas the NHIS focused on ages 19–26), it is also plausible that our higher initiation rate is associated with the higher educational attainment of our sample - over three-quarters of participants in our study were enrolled in school. The prevalence of HPV vaccination reported in the present study is consistent with previous studies on female college student populations<sup>14,16,17</sup>. In a study of college students conducted in 2010, for example, Bednarczyk and colleagues (2011) found that 56% of female undergraduates had reported initiating the HPV vaccine<sup>14</sup>. Taken together, this finding underscores the need to understand how educational attainment may influence HPV vaccine uptake. Much of the current literature on HPV vaccination among young adults is based on female college student samples or national samples in which information on secondary education is either not collected or reported<sup>6,15</sup>. Education stratified estimates of HPV vaccine uptake in national surveys are needed to better understand this disparity. Studies are also needed to examine what structural and environmental factors may increase vaccine uptake in school settings. These studies could form the basis for interventions designed to increase vaccine uptake among young adults not enrolled in school.

Although the relationship between religion and HPV vaccination has not been well-studied, our findings are consistent with previous studies that have shown that HPV initiation among females is associated with less frequent religious service attendance<sup>26,27</sup>. Historically, religion has played an important role in vaccine decisions. Religion may play an even more significant role in HPV vaccination since religious affiliation and beliefs may influence perceptions of vaccine acceptance. Further studies are needed to better understand how religious beliefs are related to vaccination in order to involve religious institutions in HPV uptake campaigns.

The vaccination rate for males in the present study was very low (4%), but is comparable with estimates from the National Health Interview Survey which indicated that less than 1% of males had received one or more doses of the vaccine in 2010<sup>6</sup>. As discussed previously, it is possible that the higher educational attainment of our sample may account for the slightly higher estimate of initiation in the present study. The low rate of vaccination, overall, is likely to be due to the recency of FDA approval for male vaccination. While the vaccine had been approved by the FDA when the current data were collected, routine vaccination was not recommended for males until 2012<sup>28</sup>. Thus, vaccination rates may have substantially increased since these data were collected in 2010. Further surveillance is needed to examine the pattern of uptake among males.



Few demographic characteristics examined in the present study were associated with male initiation. Male initiation of the HPV vaccine varied by race. Specifically, Black males were more likely to initiate the vaccine than all other races. Similar to females, males who received the HPV vaccine were less likely to report attending religious services at least once a month. While this study included a large sample, the low prevalence of HPV vaccination among males may have underpowered our ability to detect demographic differences. Further research, with larger samples of males, is needed to fully understand characteristics associated with male initiation.

The association between initiation of the HPV vaccine and sexual behavior has been of particular interest because the HPV vaccine is designed to prevent a sexually transmitted infection. To date, studies exploring the relationship between the HPV vaccine and sexual activity have resulted in inconsistent findings. After controlling for sociodemographic characteristics we found that females who initiated sexual activity and who had more than one lifetime partner were more likely to have initiated the vaccine than their same age counterparts. No association was found between male initiation of the HPV vaccine and lifetime sexual activity. Yet, males who had four or more partners were more likely than males who reported one lifetime partner to initiate the vaccine. These results could suggest that those who have received the vaccine may be those who are at higher risk for HPV. The vaccine, however, is most effective if received prior to initiation of sexual activity. Importantly, this study shows that nearly 60% of young adult females who have not initiated sexual activity have not been vaccinated. Male initiation in 2010 was relatively uncommon and it is possible that males who were identified by their health care provider as higher risk were offered the vaccine first (four or more partners, tested for HIV). While it is crucial to vaccinate those at high risk, it is also vital to focus on young adults who have not initiated sexual activity as this group may benefit most from vaccination. Further research is needed to examine how to increase vaccination rates among those who are not sexually active, as they may view HPV vaccination as unnecessary<sup>29</sup>.

### Limitations

The present study has several limitations. First, this is a cross-sectional study so the temporal relationship between HPV vaccine initiation and the characteristics examined in the present study cannot be established. Second, while our study included a national sample, it may not be representative of all young adults who are 18 to 24 years old in the United States. The demographic characteristics suggest that youth enrolled in school and white youth may be overrepresented in the present study. Also, these data were collected prior to recommendations regarding routine HPV vaccine for males. Thus, it is possible that the factors found to be associated with the small sample of males vaccinated in the present study do not generalize to males currently being vaccinated. Third, only initiation was examined in the present study. The HPV vaccine consists of three doses and those who initiated the vaccine may not have completed the 3-dose series. Initiation of the vaccine, however, is critical to examine as several studies suggest that one or two doses of the vaccine may be as effective as three doses<sup>7</sup>, although more studies on HPV dosing are needed. Finally, information was not collected about several factors that have been shown to be important predictors of initiation including parent approval, physician recommendation, and perceived risk for HPV.

Despite these limitations, the present study includes useful information about HPV vaccination in a national sample of young adults. This is one of the first studies to examine factors associated with initiation of the vaccine among young adult males. In addition, we were able to examine potential differences in factors that contribute to initiation among males and females. Our findings suggest that further research examining factors associated with initiation of the HPV vaccine among national samples of young adults is warranted,

with a particular emphasis on examining disparities in vaccination by educational attainment.

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### Implications and Conclusions

Factors associated with HPV vaccine initiation may differ for males and females. Regardless of gender, the majority of young adults who have not initiated sexual activity have not been vaccinated. Research is needed to examine how to increase vaccination among this population.

**Table 1**Sociodemographics by gender, weighted and unweighted<sup>a</sup>

| Characteristic                      | Female              |                        | Male                |                        |
|-------------------------------------|---------------------|------------------------|---------------------|------------------------|
|                                     | Weighted<br>(n=389) | Unweighted<br>(n=1598) | Weighted<br>(n=401) | Unweighted<br>(n=1682) |
| <b>Mean Age</b>                     | 20.8                | 20.8                   | 20.7                | 20.7                   |
| <b>Race</b>                         |                     |                        |                     |                        |
| White or European American          | 75.5                | 75.7                   | 74.9                | 75.2                   |
| African American or Black           | 5.4                 | 5.3                    | 5.0                 | 4.9                    |
| Asian or Pacific Islander           | 11.5                | 11.6                   | 11.6                | 11.9                   |
| Other                               | 7.5                 | 7.4                    | 8.6                 | 8.0                    |
| <b>Hispanic or Latino</b>           |                     |                        |                     |                        |
| Yes                                 | 8.7                 | 8.3                    | 9.2                 | 8.6                    |
| No                                  | 91.4                | 91.7                   | 90.8                | 91.4                   |
| <b>Current School Enrollment</b>    |                     |                        |                     |                        |
| In School (Full- or Part-time)      | 79.1                | 79.7                   | 79.1                | 80.1                   |
| Not in School                       | 20.9                | 20.3                   | 20.9                | 19.9                   |
| <b>Marital Status</b>               |                     |                        |                     |                        |
| Never Married                       | 94.3                | 94.8                   | 97.6                | 97.4                   |
| Married                             | 5.5                 | 5.0                    | 1.9                 | 2.2                    |
| Divorced, Separated, Widowed        | .2                  | .3                     | .5                  | .4                     |
| <b>Religious Service Attendance</b> |                     |                        |                     |                        |
| Once a month or more                | 33.5                | 34.5                   | 36.7                | 38.4                   |
| Less than once a month              | 66.5                | 65.5                   | 63.3                | 61.6                   |

<sup>a</sup>Percentages may not add up to 100 due to rounding.

**Table 2**

Factors associated with HPV Vaccine Initiation among Females (unweighted; n=1500)

| Characteristic                   | N    | 1+ Doses<br>(n=758)<br>Mean or % | No Doses<br>(n=742)<br>Mean or % | T-Test/<br>Chi-Square |
|----------------------------------|------|----------------------------------|----------------------------------|-----------------------|
| <b>Sociodemographics</b>         |      |                                  |                                  |                       |
| <b>Mean Age</b>                  | 1495 | 20.5 (SD=1.62)                   | 21.1 (SD=1.92)                   | <b>6.04*</b>          |
| <b>Race</b>                      |      |                                  |                                  |                       |
| White American                   | 1138 | 52.4                             | 47.6                             | 7.21                  |
| African American or Black        | 78   | 41.0                             | 59.0                             |                       |
| Asian or Pacific Islander        | 147  | 49.0                             | 51.0                             |                       |
| Other                            | 108  | 42.6                             | 57.4                             |                       |
| <b>Hispanic or Latino</b>        |      |                                  |                                  |                       |
| Yes                              | 128  | 43.0                             | 57.0                             | 3.21                  |
| No                               | 1368 | 51.2                             | 48.8                             |                       |
| <b>Marital Status</b>            |      |                                  |                                  |                       |
| Never Married                    | 1411 | 52.3                             | 47.7                             | <b>34.84*</b>         |
| Married                          | 75   | 17.3                             | 82.7                             |                       |
| <b>Current School Enrollment</b> |      |                                  |                                  |                       |
| In School (Full/Part-time)       | 1192 | 53.4                             | 46.6                             | <b>19.62*</b>         |
| Not in School                    | 308  | 39.3                             | 60.7                             |                       |
| <b>Religious Attendance</b>      |      |                                  |                                  |                       |
| Once a month or more             | 513  | 42.5                             | 57.5                             | <b>20.28*</b>         |
| Less than once a month           | 973  | 54.8                             | 45.2                             |                       |
| <b>Sexual Health/Behavior</b>    |      |                                  |                                  |                       |
| <b>Sexual Orientation</b>        |      |                                  |                                  |                       |
| Heterosexual                     | 1361 | 51.1                             | 48.9                             | 1.93                  |
| Gay/Bisexual/Other               | 138  | 44.9                             | 55.1                             |                       |
| <b>Lifetime Sexual Activity</b>  |      |                                  |                                  |                       |
| Yes                              | 1104 | 54.2                             | 45.8                             | <b>22.76*</b>         |
| No                               | 389  | 40.1                             | 59.9                             |                       |
| <b>Lifetime Partners</b>         |      |                                  |                                  |                       |
| One Partner                      | 325  | 46.2                             | 53.9                             | <b>11.59*</b>         |
| Two-Five Partners                | 329  | 58.1                             | 42.0                             |                       |
| Six or More Partners             | 444  | 56.8                             | 43.2                             |                       |
| <b>HIV Testing</b>               |      |                                  |                                  |                       |
| Never                            | 1003 | 49.4                             | 50.7                             | 2.66                  |
| One or More Times                | 454  | 54.0                             | 46.0                             |                       |

\* p&lt;.05

**Table 3**

Factors associated with HPV Vaccine Initiation among Males (unweighted; n=1399)

|                                  | N    | 1+ Doses<br>(n=68)<br>Mean or % | No Doses<br>(n=1331)<br>Mean or % | T-Test /<br>Chi-Square |
|----------------------------------|------|---------------------------------|-----------------------------------|------------------------|
| <b>Sociodemographics</b>         |      |                                 |                                   |                        |
| <b>Mean Age</b>                  | 1395 | 20.5 (SD=1.68)                  | 20.8 (SD=1.74)                    | 1.38                   |
| <b>Race</b>                      |      |                                 |                                   |                        |
| White                            | 1042 | 3.8                             | 96.2                              | <b>15.31*</b>          |
| African American or Black        | 70   | 12.9                            | 87.1                              |                        |
| Asian or Pacific Islander        | 151  | 7.3                             | 92.7                              |                        |
| Other                            | 105  | 7.6                             | 92.4                              |                        |
| <b>Hispanic or Latino</b>        |      |                                 |                                   |                        |
| Yes                              | 116  | 6.0                             | 94.0                              | .36                    |
| No                               | 1277 | 4.8                             | 95.2                              |                        |
| <b>Marital Status</b>            |      |                                 |                                   |                        |
| Never Married                    | 1357 | 4.9                             | 95.1                              | 1.61                   |
| Married                          | 31   | 0.0                             | 100.0                             |                        |
| <b>Current School Enrollment</b> |      |                                 |                                   |                        |
| In School (Full/Part-time)       | 1129 | 5.4                             | 94.6                              | 3.72                   |
| Not in School                    | 270  | 2.6                             | 97.4                              |                        |
| <b>Religious Attendance</b>      |      |                                 |                                   |                        |
| Once a month or more             | 542  | 3.3                             | 96.7                              | <b>4.88*</b>           |
| Less than once a month           | 840  | 6.0                             | 94.1                              |                        |
| <b>Sexual Health/Behavior</b>    |      |                                 |                                   |                        |
| <b>Sexual Orientation</b>        |      |                                 |                                   |                        |
| Heterosexual                     | 1328 | 4.7                             | 95.3                              | .95                    |
| Gay/Bisexual/Other               | 68   | 7.4                             | 92.7                              |                        |
| <b>Lifetime Sexual Activity</b>  |      |                                 |                                   |                        |
| Yes                              | 935  | 5.1                             | 94.9                              | .31                    |
| No                               | 450  | 4.4                             | 95.6                              |                        |
| <b>Lifetime Partners</b>         |      |                                 |                                   |                        |
| One Partner                      | 245  | 2.0                             | 98.0                              | <b>14.47*</b>          |
| Two-Three Partners               | 255  | 3.1                             | 96.9                              |                        |
| Four or More Partners            | 435  | 8.1                             | 92.0                              |                        |
| <b>HIV Testing</b>               |      |                                 |                                   |                        |
| Never                            | 1021 | 3.3                             | 96.7                              | <b>20.48*</b>          |
| One or More Times                | 353  | 9.4                             | 90.7                              |                        |

\* p&lt;.05

**Table 4**

Multivariate results examining relationship between sexual health/behavior and HPV vaccine initiation by gender

| Predictor <sup>a</sup>                      | Females                  | Males                     |
|---|--------------------------|---------------------------|
|   | OR (95% CI)              | OR (95% CI)               |
| Sexual Orientation (heterosexual vs. other) | 1.43 (.98, 2.09)         | .82 (.31, 2.15)           |
| Lifetime Sexual Activity (yes vs. no)       | <b>2.01 (1.55, 2.61)</b> | 1.37 (.77, 2.42)          |
| Lifetime Partners <sup>b</sup>              |                          |                           |
| Two-Three vs. One                           | <b>1.50 (1.08, 2.10)</b> | 1.49 (.47, 4.68)          |
| Four+ vs. One                               | <b>1.60 (1.16, 2.20)</b> | <b>4.61 (1.73, 12.27)</b> |
| HIV Test (yes vs. no)                       | <b>1.46 (1.14, 1.87)</b> | <b>2.95 (1.72, 5.04)</b>  |

<sup>a</sup>Each sexual health/behavior factor was examined in a separate logistic regression model. All sociodemographic variables (age, race, ethnicity, marital status, school enrollment, and religious service attendance) were included in each model.

<sup>b</sup>Among those who have been sexually active