

# Exploring Gender Differences on Risk Taking Behaviors, Attitudes, Knowledge, and Perception of Risk for Human Papillomavirus

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## Abstract

**Objective:** To examine gender differences among college students' HPV knowledge, perception of risk for HPV, and risk-taking behaviors. **Methods:** Seventy-eight college students from an urban area in the Midwestern United States completed an online survey assessing risk-taking behaviors and knowledge, attitudes, and beliefs about Human Papillomavirus (HPV) and cervical cancer, as well as the HPV vaccine. Univariate and bivariate statistics were used to assess gender differences in knowledge, vaccine acceptance, and sexual behaviors and substance use. **Results:** The majority of participants identified as gay and reported engaging in substance use and risky sexual behaviors. Females were more knowledgeable about risk factors for cervical cancer, while some differences were identified for vaccine acceptance and screening behavior. **Conclusions:** Both male and female college students require targeted prevention education that is also sensitive to gender and sexual orientation in order to decrease their risk for HPV, other STDs, cervical cancer, and substance use.

## BACKGROUND

Human Papillomavirus (HPV) is the most common sexually transmitted disease (STD) in the United States and is the leading cause of cervical cancer. HPV is transmitted through sexual intercourse, with the highest prevalence among women between the ages of 22 and 25 (1). According to the Centers for Disease Control and Prevention (CDC), over 30 million people are infected with HPV, and at least 50% of sexually active men and women acquire genital HPV infection at some point in their lives; by age 50, at least 80% of women have acquired HPV infection (2). In 2006, the Food and Drug Administration (FDA) approved a vaccine, Gardasil, to protect against HPV. Gardasil protects against four strains of HPV: HPV 6, 11, 16, and 18. HPV-11 causes 90% of genital warts, while HPV-16 and HPV-18 cause 70% of cervical cancer (3). Although cervical cancer is most commonly found in middle-aged or elderly women, HPV is usually acquired through sexual transmission at much younger ages, often in adolescence (4). Therefore, risky sexual behaviors during adolescence and early adulthood can have long-term consequences for health in later adulthood. This is true partially because adolescence and early adulthood is a period of sexual experimentation and irregular

access to medical care.

In the past 15 years, a number of researchers have examined college students' knowledge of HPV in relation to risk-taking behaviors (1,5-7). Key findings from this body of work indicate that: sexually active American college women and men lack awareness of HPV; more than half of sampled students were sexually active; and they engaged in multiple risky behaviors such as substance use, unprotected sex, smoking, and multiple sexual partners (1,5-7,8). However, a number of gaps still exist in the literature. For instance, among studies that have examined HPV knowledge in college students, few have surveyed both men and women, and limited empirical research exists on college students' knowledge of both cervical cancer and the relevance of HPV/cervical cancer screening. Although a number of advertising and educational campaigns have been associated with the release of the vaccine, college students may still have limited knowledge of HPV and cervical cancer. This pilot study seeks to provide a better understanding of both male and female college students' HPV and cervical cancer knowledge, their perception of risk for HPV, screening behaviors, and involvement in risk-taking behaviors.

## **METHODS**

### **SAMPLE**

The Young Adult Health Study (YAHS) was a cross-sectional pilot study of young adults that was designed to examine the extent of college students' HPV and cervical cancer knowledge, perception of HPV risk, knowledge of HPV and cervical cancer, screening behavior, and involvement in risk-taking behaviors. Participants were recruited between November 2008 and June 2009 from college campuses in an urban area in the Midwest. To be eligible for the study, participants had to be currently enrolled in a college or university, be 18 to 24 years old, and be single and never married. One hundred and three participants were recruited and screened for the study. Of those screened, 95 were eligible to participate in the study, and 85 consented. Of the 85 participants who completed the consent process, 78 completed the survey. Participants provided written consent and were assured that data would remain confidential. IRB approval was granted by Case Western Reserve University.

## **MEASURES**

### **DEMOGRAPHIC CHARACTERISTICS**

Gender was assessed by the question, "What is your gender e.g. male or female?" Participants were asked to identify their race/ethnicity by answering, "How do you describe yourself?" (e.g. white, black, Hispanic, Asian or Other). Next, participants were asked to identify their sexual orientation (e.g. gay, lesbian, bisexual, heterosexual, questioning or unsure). Educational level was assessed by asking students their class standing (e.g., freshmen to graduate or professional student). Socioeconomic status (SES) was assessed using the highest level of education completed by the participants' mother and father.

### **HPV AND CERVICAL CANCER KNOWLEDGE, VACCINE ACCEPTANCE, SCREENING, AND PERCEPTION OF RISK FOR STDs**

Individual-level HPV and cervical cancer knowledge questions are detailed in the Appendix. To assess vaccine acceptance and screening, female participants were asked if they had ever had a Pap smear, while all participants' were asked, "If your health care provider suggested that you get the HPV vaccine, how likely is it that you would get it (e.g. very likely, somewhat likely, not likely at all, would not get the vaccine)?" Participants were also asked if they had ever had an HIV/AIDS test and if they had seen or heard any HPV or cervical cancer prevention messages within the past

12 months. Perception of risk for STDs and HPV was assessed by the following two questions: 1) "How concerned are you about contracting an STD?"; and 2) "How concerned are you about contracting HPV?"

### **SUBSTANCE USE**

Tobacco, alcohol, and marijuana use were assessed as part of this study. Participants were asked, "During the past 30 days, on how many days did you smoke cigarettes?" Current tobacco use was coded (1) if participants responded they had smoked on one or more days during the past 30 days. Current alcohol use was assessed by asking participants, "During the past 30 days, on how many days did you have at least one drink of alcohol?" Current alcohol use was coded (1) if participants responded that they had drunk alcohol on one or more days during the past 30 days. Next, we asked participants about binge drinking. Binge drinking was assessed by asking participants, "During the past 30 days, on how many days did you have five or more drinks of alcohol in a row, that is, within a couple of hours?" Current binge drinking use was coded (1) if participants responded they had drunk alcohol 5 or more drinks of alcohol in a row during the past 30 days. The final substance assessed was marijuana. Participants were asked, "During the past 30 days, how many times did you use marijuana?" Current marijuana use was coded (1) if participants responded that they had smoked one or more times during the past 30 days.

### **SEXUAL BEHAVIOR**

Sexual behavior was based on whether the participants engaged in oral, vaginal or anal sex. Oral sex was assessed by asking participants, "Have you ever had oral sex?" To assess whether participants engaged in safer sex or used protection during oral sex, we asked only those who engaged in oral sex the following question: "Now, thinking back about the last time you had oral sex; did you or your partner use protection?" Then, to assess whether participants were mixing substance use and oral sex, we asked, "The last time you had oral sex, were you drinking alcohol or using drugs to get high before or during sex?"

Vaginal sex was defined as when a man puts his penis into a woman's vagina. Vaginal sex was assessed by asking participants, "Have you ever had vaginal sex?" Next, we sought to assess the lifetime number of vaginal sex partners. Participants were asked, "How many people have you had vaginal sex with?" To assess whether participants engaged in safer sex or used protection during vaginal sex, we asked

only those who engaged in vaginal sex the following question: “Now, thinking back about the last time you had vaginal sex, did you or your partner use a condom?” Then, to assess whether participants were mixing substance use and sexual activity, we asked, “The last time you had vaginal sex, were you drinking alcohol or using drugs to get high before or during sex?”

The final sexual behavior assessed was anal sex. Anal sex was assessed by asking participants, “Have you ever had anal sex?” Then, to examine whether participants were mixing substance use and anal sex, we asked, “The last time you had anal sex, were you drinking alcohol or using drugs to get high before or during sex?”

## STATISTICAL ANALYSIS

Means and frequencies were used to assess demographic characteristics of the sample, their knowledge of HPV and cervical cancer, rates of screening, vaccine acceptance, and substance use and sexual behavior. More specifically, Student’s T and chi-square tests were used to examine mean and proportional differences by gender for differences in knowledge and behavior. All data were analyzed using Stata 9.0.

## RESULTS

The participants’ demographic and social characteristics are displayed in Table 1. Males’ mean age was 20.72 years (SD=1.35), while females’ mean age was 20.57 (SD=1.85); 59% of the sample was female. The sample was predominantly white (59% of males, 65% of females). More than 75% of both males and females identified as gay, and participants were distributed across educational level. Sixty-nine percent of males and 78% of females reported that their fathers were college graduates; 59% of males and 67% of females reported that their mothers were college graduates.

**Figure 1**

Table 1—Demographic and Social Characteristics of Participants in the Young Adult Health Study by Biological sex (n=78)

Characteristics	(%) Males 20.72 years (SD=1.35)	% Females 20.57 years (SD=1.85)	Significance
Mean age			
Biological sex		59	
Race/ethnicity			
White	59	65	
Non-white	41	35	n.s.
Sexual orientation			
Gay	84	81	
Lesbian	3	5	
Bisexual	6	5	
Heterosexual	6	7	
Questioning/unsure	--	2	n.s.
Educational Level			
Freshman	16	24	
Sophomore	22	9	
Junior	19	26	
Senior	31	28	
Graduate/Professional	12	13	n.s.
Mother’s education (SES)			
Less than high school	6	4	
High school graduate or GED	16	17	
Some education after high school	19	11	
College graduate	59	67	n.s.
Father’s education (SES)			
Less than high school	3	2	
High school graduate or GED	9	7	
Some education after high school	19	13	
College graduate	69	78	n.s.

**Figure 2**

Table 2: Knowledge of HPV, Vaccine Acceptance, Screening and Risk for STDs among Young Adult Health Study Participants (n=78)

HPV Knowledge	Percent correct by sex		
	(%) Male	% Females	Significance level
% Percent who report:			
• Heard of HPV	90	95	
• There is a cure for HPV	63	74	
• HPV risk factor for cervical cancer	97	100	
• Believe that HPV affect only men		3	0
• Believe that HPV affect only women	33	39	
• HPV is a Sexually Transmitted Infection	93	87	
• HPV can be spread when not visible	93	93	
• HPV may remain dormant for years after exposure	93	100	p=.076*
• CDC recommends condom use to prevent HPV	93	100	p=.076*
• HPV is transmitted via genital contact	100	98	
Risk factors for cervical cancer			
• Multiple sex partners is a risk factor for cervical cancer (T)	40	80	p=.000
• HPV is a risk factor for cervical cancer (T)	47	85	p=.000
• Smoking is a risk factor for cervical cancer (T)	37	63	p=.02
Vaccine acceptance and screening			
Percent who report:			
• Having had a pap test	--	67	
• Very/somewhat likely to get vaccine if recommended by provider	62	89	p=.043
• Seen/heard HPV prevention messages in last 12 months	80	98	p=.01
• Seen/heard cervical cancer prevention messages in last 12 months	75	87	
• Screened/tested for STDs	27	43	
• Had HIV/AIDS test	17	22	
Perception of risk for STDs			
Percent who report:			
• Being somewhat/very concerned about getting an STD	53	46	
• Being somewhat/very concerned about getting HPV	33	50	

\*means marginal significance level

Participants’ knowledge of HPV, risk factors for cervical cancer, vaccine acceptance, pap screening, and perception of

risk for STDs are shown in Table 2. In terms of HPV knowledge, almost all participants had heard of HPV (90% of males, 95% of females); identified HPV as a Sexually Transmitted Infection (STI) (90% of males, 95% of females); identified HPV as a risk factor for cervical cancer (97% of males, 100% of females); knew that HPV can be spread when not visible (90% of males, 93% of females); knew that HPV can remain dormant for years after exposure (90% of males, 100% of females); knew that the CDC recommends condom use to prevent the spread of HPV (90% of males, 100% of females); and knew that HPV is transmitted by genital contact (100% of males, 98% of females). However, approximately one-third of both males and females believed that HPV affects only women; no males and 3% of females reported that HPV affects males. In addition, 63% of males and 74% of females believed that there is a cure for HPV. Asked about risk factors for cervical cancer, 40% of males and 80% of females identified having multiple sex partners; 47% of males and 85% (p=.001) of females identified HPV; and 37% of males and 63% of females (p=.02) identified smoking.

Turning to vaccine acceptance, when asked what were the most important factors associated with whether or not they would be willing to get the vaccine, participants cited the cost, their provider’s recommendation, and vaccine efficacy. Among those who said they would not get the vaccine, cost, not being sexually active, having already received the vaccine, and identifying as male were factors. Perception of risk for STDs was also assessed; 53% of males and 46% of females reported being somewhat to very concerned about getting an STD, while 33% of males and 50% of females expressed concern about getting HPV. More than three-quarters of the participants reported seeing or hearing HPV prevention messages in the past 12 months (80% of males, 98% of females); 75% of males and 87% of females reported seeing or hearing cervical cancer prevention messages in the past 12 months.

Next, we sought to identify the prevalence of preventive screenings, specifically pap tests and STD tests, among the female participants. We found that 67% of females reported ever having a pap test. In terms of STD and HIV/AIDS testing, 17% of males and 22% of females reported being tested for HIV/AIDS, while 27% of males and 43% of females reported being tested for STDs.

Table 3 shows the distribution of participants engaging in risk-taking behaviors. For substance use, our findings

indicate the following: 20% of males and 12% of females reported current cigarette use; 87% of males and 82% of females reported current alcohol use; 63% of males and 51% of females reported current binge drinking; and 27% of males and 16% of females reported current marijuana use. In terms of participants sexual behaviors, 80% of males and 89% of females reported ever having oral sex, 13% of males and 10% of females reported drinking or using drugs prior to last oral sex, and 4% of males and 8% of females reported using protection during last oral sex. For vaginal sex, 70% of males and 84% of females reported ever having vaginal sex, 19% of males and 11% of females reported drinking or using drugs prior to last vaginal sex, and 38% of males and 49% of females reported no condom use during last vaginal sex. Fourteen percent of males and 26% of females reported ever having anal sex; only females (9%) reported drinking or using drugs prior to last anal sex. When asked about the number of lifetime sexual partners, males reported a mean of 1.52 partners (SD=.98, range 1-5), while females reported 1.62 partners (SD=.95). No relationships were observed between sexual orientation and non-use of condoms for oral and vaginal sex.

Figure 3  
Table 3: Proportion of Young Adult Health Study Participants Engaging in Risk Behaviors (n=78)

Risk Behaviors	(%) Male	% Females	Significance level
<u>Substance use</u>			
Percent who report:			
• Current cigarette use	20	12	
• Current alcohol use	87	82	
• Current binge drinking	63	51	
• Current marijuana use	27	16	
<u>Sexual behaviors</u>			
Percent who report:			
Oral sex			
• Ever had oral sex	80	89	
• Drank or used drugs prior to last oral sex	13	10	
• Used protection during last oral sex*	4	8	
Vaginal sex			
• Ever had vaginal sex	70	84	
• Mean # of vaginal sex partners	1.52 (SD=.98)	1.62 (SD=.95)	
• Drank or used drugs prior to last vaginal sex	19	11	
• No condom use at last sex	38	49	
Anal sex			
• Ever had anal sex	14	26	
• Drank or used drugs prior to last anal sex	--	9	
• Used protection during last anal sex*	33	36	

\*a Used protection during last oral sex (n=62)  
\*b Used protection during last anal sex (n=6)

DISCUSSION

The current study examines male and female college students’ knowledge and attitudes of HPV and cervical cancer. Key findings included statistically significant differences regarding knowledge of risk factors for cervical cancer. Female participants were more likely than males to correctly identify most risk factors for cervical cancer. Our

findings indicate that risk-taking behaviors continue to thrive in college-age populations. These findings are consistent with previous studies where the majority of college students were engaged in sexual relationships and were involved in risk-taking behaviors (1, 4, 5,7). For example, Ingledue et al. (2004) found that about a third of college students reported never using condoms; about 55% of our sample reported no condom use at last sex. One unexpected finding of the current study is that a large proportion of participants reported their sexual orientation as gay. Previous studies have indicated that individuals who self-identify as gay have often had opposite gender relationships in the past. However, we did not assess more current sexual experiences (within the past week, 30 days, etc.). Numerous studies have established links among LGBTQ youth between risk of victimization and risk-taking behaviors, including substance use and risky sexual behaviors (9,10,11). In a more recent study, Rew and colleagues examined differences in sexual health risks and protective resources between LGBT and heterosexual youth (10). Rew et al. (2005) indicate that more than 75% report ever having vaginal sex and oral sex, while only 21% report participating in anal sex which is consistent with findings from the current study.

## **SEXUAL BEHAVIORS**

Sexual initiation and experimentation with alcohol are part of the developmental trajectory. However, we have to be concerned when individuals are not protecting themselves from potentially life-threatening diseases and disability. Our findings indicate that oral and vaginal sexual activities are the two most prevalent behaviors, with anal sex reported less frequently. Engaging in vaginal and oral sex is common practice in this population, but only 4% of males and 8% of females used protection during last oral sex and more than a third of males (38%) and half of females reported no condom use at last vaginal sex. The latter finding is intriguing because although approximately half of the participants reported that they were concerned about getting an STD (e.g., HPV), they engaged in behaviors that indicate otherwise. This reveals an interesting paradox that we see when examining health behaviors and perception of risk. Often, individuals are concerned about risk but don't taking the necessary precautions to protect themselves against exposure to the risk. Previous studies have found similar patterns of sexual activity among college students (1,4,5,7). The lack of condom use and the use of alcohol or drugs prior to their last sexual encounter (e.g., last vaginal sex, oral or anal sex act) puts students at risk for unplanned pregnancy

and STDs. One encouraging finding was that among sexually active participants, both males and females reported only slightly more than one lifetime partner, which suggests several potential hypotheses: 1) they are having sex with a "regular" partner, which may provide some explanation for the lack of condom use at last sexual intercourse; and 2) they are not engaging in regular sexual activity. However, the lack of condom use and combination of substance use and engaging in sexual activity is reason for concern; this behavior increases young people's risk for STDs, unplanned pregnancy, and sexual violence.

## **SUBSTANCE USE**

A large proportion of our sample reported significant alcohol use within the last 30 days, with a smaller proportion reporting tobacco use. We found that 20% males and 12% of females reported current cigarette use, a smaller proportion than in Rigotti et al.'s (2000) study, where one-third of college students ages 18-24 were current smokers. We also examined the prevalence of marijuana; 27% of males and 16% of females reported current marijuana use. The prevalence of marijuana use among this sample is lower than the national average, which is encouraging. However, our findings are contrary to a recent study by Reed et al. (2010) that examined the differences in substance use among gay, lesbian, bisexual, and non- gay, lesbian or bisexual college students. They found that compared to heterosexual students, GLB students were more likely to report recent illicit drug use. However, compared to this study, Reed's study used a random and much larger sample of adolescents (n=1000). A larger sample size would 1) stratify analyses by gender and 2) allow one to explore multivariate associations and detect statistically significance differences. The prevalence of marijuana and tobacco use is lower in our study than in previous studies, there is still reason for concern, as research shows that smoking is an independent risk factor for cervical cancer. Among women infected with HPV 16 and 18, dysplasia and invasive cancer occur two to three times more often in current and former smokers (13). Therefore, it is important to educate women about the additional risks associated with use of and exposure to tobacco.

The prevalence of alcohol use and binge drinking in our study also provides reason for concern. More than 75% of both males and females reported alcohol use, and 64% of males and 51% of females reported binge drinking. The NSDUH found that college students ages 18-22 were more likely to use alcohol in the past month, binge drink, and

drink heavily compared to their peers who were not enrolled fulltime (14). In addition, based on combined data from 2002-05, 58% of full-time college students ages 18-20 used alcohol in the past month, 40% engaged in binge drinking and 17% engaged in heavy alcohol use (14). Previous studies have documented the risk that alcohol and illicit drug use pose to individuals, including death, assault, sexual abuse, and unsafe sex (15). However, it is worth noting that marijuana use is trending down in the overall college-age population. Use among college students was down from 33.3 percent in 2005 and young adults as a whole (this number includes college students) reported a drop from 28.2 to 27.7 percent in 2005. However, substance use trends may continue to remain higher among GLB students as they may use alcohol and illicit substances as a means of coping. We did examine sexual orientation, sexual behavior and substance use trends. We found statistically significant differences for sexual orientation and lifetime cigarette use ( $p=.008$ ), orientation and marijuana use ( $p=.021$ ), orientation and anal sex initiation ( $p=.032$ ; we also found that 44% of gay youth reported no condom use at last vaginal sex. Given our small sample size, we were unable to use multivariate models to examine these associations further. However, they warrant further exploration and are consistent with findings from other studies that have identified associations among sexual risk-taking, substance use, and LGBTQ youth (9,10,11).

## **HPV AND CC KNOWLEDGE**

HPV and other STDs are prevalent among adolescents and young adults, disproportionately affecting some populations. One objective of the current study was to gain a better understanding of college students' HPV and cervical cancer knowledge. Our findings indicate few differences between males and females in knowledge about HPV, except in one area. Although both males and females were very familiar with HPV and recognized that it is transmitted sexually, participants have some misconceptions about whom HPV affects (e.g. HPV only affects women). Furthermore, a little more than a third of males and a quarter of females believe there is a cure for HPV. Our findings are consistent with Sandfort and Pleasant (2009), where knowledge about several risk factors for cervical cancer and HPV differed by sex. In the latter study, researchers found that men expressed less awareness about the risk that multiple sexual partners, condom use, and early age of sexual intercourse pose for cervical cancer, while women lacked awareness about the role of smoking, as did the females in the present study.

Clearly, additional education needs to be provided to address misconceptions in terms of susceptibility and treatment.

Overall, our findings indicate young people's awareness of HPV is improving. This improvement may be attributed to the launch of the HPV vaccine and the mass marketing messages that preceded its release in 2006. However, knowledge of cervical cancer was mixed. More women correctly identified risk factors for cervical cancer. This finding makes sense given that women, not men, are at risk for cervical cancer. However, both males and females play a role in HPV transmission. Having a good understanding of HPV, cervical cancer, and their risk factors is important for both men and women, as sexual partners should share in taking responsibility for their choices. Given that the association between cervical cancer and HPV is clear and that the HPV vaccine is now approved for males, designing effective HPV and cervical cancer prevention messages for wider audiences is even more imperative. Prior to the HPV vaccine's approval for men, the public awareness campaigns focused on girls and young women. However, now that the vaccine is recommended for males, they can no longer be left out of educational campaigns. Our findings, which are consistent with the literature, indicate that male and female college students need to be informed about both HPV and cervical cancer, specifically focusing on the factors that can increase one's risk for transmission.

In terms of screening behaviors, more than half of the female participants reported having a pap exam, which is the first step in detecting HPV among women. When asked how likely it was that they would get the HPV vaccine if recommended by their health care provider, 62% of males and 89% of females said they were somewhat to very likely to get the vaccine, though vaccine efficacy and cost would also play a role in their decision making. Those who were not willing to get the vaccine cited barriers such as cost, not being sexually active, being male and having already received it. However, an important finding in this work is the role that providers can play in HPV and cervical cancer prevention. Our findings indicate that referrals from a provider make a difference; now that the HPV vaccine has been approved for males, providers can counsel their male patients about the benefits of vaccination. Therefore, public health professionals need to work closely with medical providers to ensure that both male and females who are within the recommended vaccine age group are being educated and informed about the HPV vaccine. In terms of

other potential strategies to improve knowledge and understanding of HPV and cervical cancer prevention, previous studies have evaluated the effectiveness of a brief HPV-focused educational intervention for college students that could be take place in a classroom or a clinicians' office. This type of program could target incoming students, for example. Findings indicated that both at 30 and 90 days students got more than 75% of the questions correct, proving that in the short term a brief intervention could be effective (3, 176). While we cannot say whether this type of brief intervention will decrease sexual risk-taking behaviors, or reduce college students' exposure to HPV or cervical cancer, providing brief education during a clinician visit or as part of a health-related class could be implemented at a minimal cost and would take not take a large amount of time. Effective education is a big component of primary prevention of HPV and cervical cancer. Public education about the virus, the risk of exposure to the virus, screening, and cervical cancer is not only critical but empowers young men and women so that they can make well-informed decisions about their health and reduce their risk of disease.

## **STRENGTHS AND LIMITATIONS**

This study has several limitations and strengths that should be noted. Due to the study's exploratory nature, reported findings are descriptive. This may limit the generalizability of the study findings to different populations and may have limited our ability to produce statistically significant findings. Our study also had a large proportion of participants identifying as lesbian or gay. Recruitment flyers were posted in student activities centers and student e-newsletter/papers. It is unclear why there is a high proportion of lesbian and gay youth as our efforts sought to recruit students from all backgrounds. However, having a large sample of this population allows us to further explore their knowledge, attitudes, and behaviors. In the future, larger studies that employ probability sampling procedures are needed to further explore male and female students' knowledge, attitudes, and beliefs around HPV, cervical cancer, screening practices, and the HPV vaccine. Also, given the high level of vaginal sex in our sample, the findings lead us to hypothesize that some of the gay and lesbian participants may have experimented with vaginal sex at some point but may no longer engage in vaginal sex, preferring oral sex instead. However, given the sample size, we were not able to further explore these hypotheses, and we did not assess sexual behaviors within the past week, 30 and 90 days. It would be useful to examine sexual behaviors

within the past week and past 30 days to present a true picture of the level of sexual activity among this population.

However, the study also has notable strengths. It explored an understudied area, provided a better understanding of knowledge and attitudes about HPV, cervical cancer, and vaccine acceptance among male and female college students, and provided some guidance on where to focus prevention and educational efforts.

Our findings indicate that there is a need for targeted education to decrease individuals' risk for HPV and cervical cancer and substance use. In order for HPV and cervical cancer prevention efforts to be effective, they must be aimed at both men and women and must be sensitive to sexual orientation. Men and women need to be aware of what HPV is, how it is associated with other diseases such as cervical cancer, how to be screened for HPV, and how they can protect themselves from becoming infected; women need to be educated on what cervical cancer is, factors that increase their risk for cervical cancer and how to prevent it. Although we have the HPV vaccine and effective strategies to prevent or reduce morbidity from cervical cancer, we are not able to protect individuals from all strains of HPV, nor can we cure it. Young people will continue to experiment with sex, alcohol and other substances; we need to continue to provide prevention education to inform them of the dangers of alcohol, marijuana, tobacco, other drugs and risky sexual behaviors. Therefore, we need to focus on identifying and creating effective primary prevention strategies that will keep young people informed so that they can make well-informed decisions about their health and well-being.

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## **DISCLOSURES**

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