

Knowledge, Attitudes, and Informational Behaviors of College Students in Regard to the Human Papillomavirus

Jessica R. Sandfort, BS; Andrew Pleasant, PhD

Abstract. Objective: To assess students' human papillomavirus (HPV) knowledge, attitudes, and behaviors. **Participants/Methods:** Students ($N = 1,282$) at a large, public university in the Northeast United States completed a questionnaire during February 2008 assessing HPV knowledge, prevalence, transmission, cervical cancer risk and stigma; sexual behavior, vaccination status, as well as past and preferred sources of information about HPV and sexual health. **Results:** A majority of respondents know of HPV. However, understanding was insufficient in several important areas. Overwhelmingly, respondents heard about HPV via television commercials yet preferred to obtain sexual health information from physicians. Hearing about HPV on a TV commercial was associated with increased knowledge. More knowledge of HPV was associated with less stigma. Men exhibit a higher level of stigma and less knowledge than women. **Conclusions:** Publicly funded health campaigns aimed at increasing knowledge about HPV are overdue and necessary. This is especially true for efforts targeting young adults about this extremely common sexually transmitted infection (STI).

Keywords: college students, health education, health literacy, HPV, human papillomavirus, knowledge

The human papillomavirus (HPV) is likely the most common sexually transmitted infection (STI) among young, sexually active people and is of increasing public health importance. Approximately 20 million Americans are currently infected with HPV.¹ Even though it is not mandatory to report new cases of HPV, the estimated 6.2 million new cases of HPV annually far exceeds the preva-

lence of other common reportable STIs such as chlamydia, where over 1 million cases were reported during 2006.²

College students are an important segment of American society and are often thought of as a high-risk population in regard to sexual behavior and sexually transmitted infections.^{3,4} One study found that "the highest rates of genital HPV infection have consistently been found in sexually active women under twenty-five years of age" (p. 5).³

An understanding of HPV, risk factors, modes of transmission, and the virus' role in cervical cancer is generally low or nonexistent in many populations. A national survey in 2000 found that less than one third of Americans had heard of HPV and only 2% of Americans were able to identify HPV as a sexually transmitted disease.⁵ Researchers have consistently found low levels of knowledge about HPV in college-aged and older groups.^{4,6-8} In particular, broad gaps exist in knowledge about HPV transmission and prevention, the meaning of Pap smear test results, and risk factors for cervical cancer.⁹

A poor understanding of HPV's prevalence has important implications.¹⁰ The anxiety produced by HPV infection and diagnosis seem to be linked to a lack of understanding about HPV.¹¹ One study reports that "women have consistently reported increased distress and anxiety after receiving an abnormal Pap smear result" (p. 237).¹² A study conducted in Australia found that knowing how common the HPV infection is often lessened a woman's anxiety level, highlighting the importance of including this facet of information in public health campaigns about HPV.¹³

Although cervical cancer is a relatively rare outcome of infection from high-risk strains of HPV, the virus is the causal factor in nearly 100% of cervical cancer cases.¹⁴ However, as a result of the lack of widespread education about the virus, the link between HPV and cervical cancer is not common knowledge.¹⁵ When participants in a study were informed about the link between HPV and cervical cancer, many

Ms Sandfort is an MPH student at the Department of Sociomedical Sciences, Mailman School of Public Health, Columbia University, New York. Dr Pleasant is director of Health Literacy and Communication at the Canyon Ranch Institute in Tucson, Arizona. He is also with the Department of Human Ecology and the Extension Department of Family and Community Health Sciences, Rutgers, The State University of New Jersey, New Brunswick, New Jersey.

Copyright © 2009 Heldref Publications

expressed shock and fear and generated many additional questions about HPV.⁵ Research clearly indicates that the link between HPV and cervical cancer remains a vital piece of information that the public at large should know.

Transmission, infection, and the progression to cervical cancer are also not entirely understood by the medical community.¹⁶ As the prevalence and natural history of HPV are far from being completely understood, providing definitive answers for women can be challenging given the frequent remission, low overall risk of developing cervical cancer, and uncertainty about the natural history and transmission.^{11,16} More recently, controversy over efficacy and cost-utility of large scale HPV vaccinations has emerged.¹⁷ Such developments within the scientific community may help explain why knowledge and understanding of HPV are typically low among the general public. If there are factors about HPV that the medical community still does not fully understand, then society is more likely to be confused about HPV as well. For instance, some people have confused HPV with the herpes simplex virus (HSV).¹⁸ Thus, HPV is a complex and confusing virus that contributes to a wide range of emotional responses.¹⁹

In June of 2006, The Food and Drug Administration (FDA) approved the use of Merck's vaccine Gardasil, which protects against HPV types 6, 11, 16, and 18. Types 6 and 11 are low-risk strains that cause 90% of genital warts cases and types 16 and 18 are high-risk strains that cause 70% of cervical cancer cases.²⁰ The Centers for Disease Control and Prevention's (CDC's) Advisory Committee on Immunization Practices recommendations on use were published on March 23, 2007, and insurer recommendations followed suit.²¹ Merck has initiated two advertising campaigns via print, television, and online media. The "Tell Someone" campaign originated prior to vaccine approval and the "One Less" campaign was initiated after vaccine licensing. Some predict that because of the licensing of HPV vaccines and the increased use of HPV testing as a screening measure, awareness of the link between cervical cancer and HPV is likely to improve.¹⁵ However, it remains unknown exactly what effect the vaccine's introduction, approval, and ensuing advertising campaigns and shift in physician behavior has had on the previously described gaps in knowledge.

Although those commercial marketing campaigns have been launched to promote vaccine use, there have been few, if any, large-scale publicly funded initiatives targeting HPV education. As recently as 2006, researchers found no national public health campaigns to educate Americans about HPV.⁵ Furthermore, the information that has been made available by public health agencies, pharmaceutical companies, special interest groups, and through the news media and on the Internet is often conflicting, inaccurate, outdated, biased, incomplete, or written at inappropriately high literacy levels for general audiences.^{5,22} Such poor health communication and education practices contribute to public confusion.^{22,23}

Increasing the understanding of how common and widespread the HPV infection is may reduce the stress within and stigma about individuals diagnosed with HPV. Further,

knowledge about the means of transmission and prevention of HPV seem to be lower than desirable. This is not only a case of an "uninformed public" with low health literacy or little knowledge about HPV as some frame the issue. The virus has also not been fully understood or well communicated by and within the scientific community. Further, the impact of widespread commercial campaigns about HPV vaccination has yet to be fully identified. College students are a population in need of such information and should benefit from properly informed public health interventions focusing on improving health literacy skills and increasing knowledge about HPV and HPV vaccination. Therefore, the goal of this study was to assess the current knowledge, attitudes, and behaviors about HPV in a population of college students and to identify current sources of HPV information, as well as where these college students wanted to obtain information about sexual health. The ultimate goal is to help inform the development of successful interventions targeting college students.

METHODS

This study surveyed a sample of over 1,500 college students enrolled at a large public university in the Northeast United States about HPV prevalence, modes of transmission, cervical cancer and STI risk factors, and stigma. The Centers for Disease Control and Prevention Web site, *Human Papillomavirus (HPV) Infection*, was the source of information for knowledge and risk factor questions.²⁴ Additionally, information was collected about participants' sexual behavior, vaccination status, primary sources of information about HPV and a HPV vaccine, as well as their preferences for obtaining information about sexual health. Information was collected via a paper-based survey consisting of 30 questions with both Likert scales and true/false response formats. All Likert-type questions employed a 5-point scale with labels at each scale point. The survey included a newly developed scale to measure stigma about individuals with HPV that was modeled after a previously developed HIV stigma scale.²⁵

After obtaining approval from the Institutional Review Board (Protocol E08-228), the survey was distributed during the spring of 2008. Students were read an oral assent statement approved by the Institutional Review Board that explained their rights as a research participant, including anonymity, and that completing the survey was acknowledging consent. Students enrolled in 2 large introductory courses that draw students from a wide variety of majors and backgrounds were the purposely targeted participants of this research study. The initial population consisted of 1,617 students, of whom 1,282 submitted completed surveys for an overall response rate of 77%.

Data Analysis

Several survey questions asked students to select multiple answers, hence not all percentages reported will add up to 100%. Likewise, students had the ability to choose not to answer any particular question, meaning that the final sample

TABLE 1. Demographic Characteristics of Study Participants

Variable (n)	n	%
Age (1215)		
Male	521	42.9%
Female	694	57.1%
Sex (1215)		
Male	521	42.9
Female	694	57.1
Marital status (1208)		
Single, never married	1155	95.6
Single, living with a partner	38	3.1
Married	13	1.1
Divorced/separated	1	0.1
Widowed	1	0.1
Race (1154)		
White	551	47.7
Asian	427	37.0
Black	91	7.9
Native Hawaiian/Pacific Islander	25	2.2
Multiracial	22	1.9
American Indian/Alaskan Native	3	0.3
Other	35	3.0
Hispanic (1127)		
Non-Hispanic	1044	92.6
Hispanic female	46	4.1
Hispanic male	36	3.2
Hispanic, but did not identify sex	1	0.1

size varies from question to question. A *t* test for independent samples for the 2 introductory courses using demographics and key variables such as knowledge of HPV, stigma, number of lifetime partners, and general demographics found no statistically significant differences between the classes. A *t* test for independent samples was also used to investigate differences by sex. Where indicated, statistical significance is based on a 95% confidence interval.

Participants responded to a newly created stigma scale that initially consisted of 8 statements. Responses were on a 5-point Likert scale with labels ranging from “strongly disagree” to “strongly agree.” Using Chronbach’s alpha as a guide, we removed one original statement to increase the alpha value. The final alpha value was .835, which is quite acceptable. Additionally, confirmatory factor analysis using varimax rotation found only a single factor with an eigenvalue over 1.0, explaining 50.9% of the variance.

RESULTS

Descriptive Analyses

The age range of the undergraduate students who participated in this research project was from 17 to 45 years old. Participants were 19.4 years old on average and were generally in their second year of college (1.79 years on average).

Fifty-seven percent were women and 42.9% were men. In terms of race, 47.7% were White, 37% were Asian, 7.9% were Black, 2.2% were Native Hawaiian/Pacific Islander, 1.9% reported multiracial, and 3% identified as belonging to another race. A total of 7.3% reported Hispanic ethnicity. Hispanic females composed 4.1% of the sample and 3.2% were Hispanic males. Nearly all participants (95.6%) were single and never married. Additionally, 3.1% were single and living with a partner, 1.1% were married, 0.1% were divorced or separated, and 0.1% were widowed (Table 1). Over 80% (84.6%) reported that they had not been vaccinated for HPV and 14.2% reported they had been vaccinated for HPV. Additionally, 1.2% of males reported that they had been vaccinated for HPV.

Sexual Behavior

The average number of self-reported lifetime sexual partners was 2.37. Males reported having significantly more sexual partners than did females over their lifetime, but there was no significant difference in number of sexual partners over the past 30 days (mean of 0.78). Of those who reported having sexual intercourse, the average age of first sexual intercourse was 16.95 years old (*SD* = 1.6). A third (33.8%) reported having no sexual partners in their lifetime. Responses to questions related to ability to protect themselves during sexual activity revealed a lower sense of protection than would perhaps be desired (Table 2). For example, the mean response to 2 questions relating to condom use was at or near the mean of the 5-point Likert scale. At the same time, participants expressed a fairly low perception of their risk of acquiring a sexually transmitted infection. Men were significantly more likely to report always using a condom during sex (Table 2).

Knowledge and Attitudes

Although there was a moderate level of knowledge about HPV in this population, what participants did not understand were often the most important information about the virus (Table 3). For instance, participants generally understood that HPV is sexually transmitted (74.8%) and that women are disproportionately affected (85.6%). However, they were unclear about the prevalence of HPV infections (13.6%), that HPV is transmitted via skin-to-skin contact (51.5%) and by oral sex (49.6%). Additionally, half of the participants were unclear about the fact that condom use does not fully protect against transmission of HPV, whereas only 28% of participants correctly identified that HPV cannot be transmitted via bodily fluids (blood, semen). Participants were also misinformed about the fact that most women with HPV infections will not develop cervical cancer.

Women demonstrated significantly higher levels of knowledge on questions related to HPV being transmitted by kissing, sexual contact, and warts on the hands or feet touching the genital area. Women also demonstrated significantly higher levels of knowledge that HPV can cause significant health risks for women, can cause cervical cancer, may have

TABLE 2. Sexual Behavior Profile

Sexual behavior (<i>n</i>)	Total sample mean (<i>SD</i>)	Male mean (<i>SD</i>)	Female mean (<i>SD</i>)
Number of lifetime sexual partners (1182)	2.37 (3.8)	3.05 (4.6)	1.88 (2.9)***
Age of first sexual intercourse (747)	16.95 (1.6)	16.98 (1.6)	16.94 (1.7)**
I always use condoms during sex (1186)*	2.92 (2.1)	3.30 (1.9)	2.64 (2.1)***
I can always ask my sexual partner(s) to use a condom (1173)*	3.00 (2.2)	2.70 (2.2)	3.24 (2.2)***
I am at risk of acquiring a sexually transmitted disease or infection (1185)*	1.65 (1.5)	1.82 (1.5)	1.52 (1.5)***

*Values reported on a 5-point Likert scale.

**Significantly different at the .05 level.

***Significantly different at the .001 level.

no visible signs or symptoms, and can cause genital warts. Women also knew the percent of sexually active people who acquire HPV and that there is a vaccine significantly more than did men. Men demonstrated significantly higher levels of knowledge about HPV possibly causing infertility, that HPV can cause serious health problems for men, and that HPV cannot be transmitted by sharing underwear or towels. Overall, there was a statistically significant difference

in total correct knowledge between males and females, men exhibited lower levels of knowledge on average. Particular information that is not widely held (less than 50%) correct on average in general include the health threat to men of HPV, the connection to genital warts, that HPV is not transmitted via bodily fluids such as blood and semen, the percent of sexually active people with HPV, and that most women with HPV will not develop cervical cancer.

TABLE 3. HPV Knowledge

Knowledge questions about HPV (1208)	Percent correct—total sample	Percent correct by sex	
		% of males	% of females
HPV can be transmitted by kissing***	95.2	92.4	97.4
HPV can be transmitted by toilet seats	90.0	90.3	89.4
HPV can cause HIV/AIDS	90.5	89.3	91.3
HPV can cause herpes	87.3	87.5	86.8
HPV can cause serious health problems for women Δ ***	85.6	80.6	89.4
HPV can be transmitted by warts on hand/feet touching the genital area**	82.5	81.0	83.9
HPV can be transmitted by sharing underwear or towels**	79.2	82.2	77.2
HPV can cause cervical cancer Δ ***	77.7	67.7	85.5
HPV can be sexually transmitted Δ **	74.8	68.1	77.1
Most people with HPV have no visible signs or symptoms Δ ***	64.2	58.3	68.9
There is a vaccine to protect against HPV Δ ***	59.8	45.2	71.1
HPV infection can be treated	57.7	58.1	57.0
HPV can cause infertility***	52.7	58.1	49.3
HPV can be transmitted by genital skin-to-skin contact Δ	51.5	49.4	53.8
HPV can be transmitted by oral sex Δ	49.6	53.5	46.1
Using condoms during sexual intercourse prevents the spread of HPV	50.0	51.6	49.3
HPV can cause serious health problems for men Δ ***	33.9	41.3	30.1
HPV can cause genital warts Δ **	31.2	27.4	34.0
HPV can be transmitted by the exchange of bodily fluids (blood, semen)	28.0	28.3	27.5
Percentage of sexually active people that acquire HPV (50%)***	13.6	10.1	16.5
Most women with HPV will NOT develop cervical cancer Δ	13.1	13.1	11.9

Δ These statements are true.

**Significantly different between sexes at the .05 level.

***Significantly different between sexes at the .01 level.

TABLE 4. Knowledge About Cervical Cancer Risk Factors

Cervical cancer risk factors (n)*	Total sample		Males		Females	
	Mean	SD	Mean	SD	Mean	SD
A sexually transmitted infection (1096)	4.54	0.8	4.49	0.8	4.58	0.8
Having a partner who has had multiple sexual partners (1114) ^{Δ***}	4.47	0.9	4.36	1.0	4.55	0.8
Lack of condom use (1119) ^{Δ***}	4.46	0.9	4.38	0.9	4.53	0.9
Number of lifetime sexual partners (1087) ^{Δ***}	4.27	1.0	4.18	1.0	4.34	1.0
Early age of sexual intercourse (1064) ^{Δ***}	3.86	1.1	3.75	1.2	3.94	1.1
Genetic inheritance (1039)	3.49	1.3	3.49	1.3	3.48	1.3
Drug use (968) ^{***}	2.99	1.3	3.22	1.3	2.82	1.3
Smoking (980) ^{Δ***}	2.81	1.4	2.98	1.4	2.68	1.3
Poor nutrition (974) ^{***}	2.75	1.3	2.97	1.3	2.60	1.2
Alcohol use (958) ^{***}	2.71	1.3	2.87	1.3	2.59	1.3

*Values reported on a 5-point Likert scale.

^ΔThese factors are associated with an increased risk of developing cervical cancer.

^{***}Significantly different between sexes at the .01 level.

On average, 85.76% of participants understood the risk factors associated with an increased risk of developing cervical cancer (Table 4). A Likert-scale score above the scale's mean of 3 was interpreted as having a correct understanding of such risk factors. Risk factors that were underestimated included the increased risk associated with smoking (2.81), poor nutrition (2.75), and alcohol use (2.71). Many participants incorrectly identified genetic inheritance (3.49) as impacting a woman's risk of developing cervical cancer.

Knowledge about several risk factors for cervical cancer significantly differed by sex. Men expressed significantly less awareness of the risk of having multiple sexual partners,

the role of condoms, number of lifetime sexual partners, and early age of sexual intercourse. Women expressed less awareness of the role of smoking.

On a newly created HPV stigma scale, the mean response was 2.0, indicating that stigma was not excessively prevalent or strong in this population overall. Particular statements drawing a higher level of agreement, on average, were those indicating a lack of stigma about people with HPV, whereas statements that indicated the presence of a fear or stigma of people with HPV drew lower average responses in general (Table 5). However, a calculated total stigma score and responses to 5 statements on the scale were statistically

TABLE 5. HPV Stigma Scale

Stigma about HPV (n)*	Total sample		Males		Females	
	Mean	SD	Mean	SD	Mean	SD
The freedom of people who have HPV should not be restricted (1203) ^{***#}	3.95	1.0	3.82	1.1	4.05	0.9
People who have HPV should not be ashamed (1208) [#]	3.77	1.3	3.69	1.7	3.83	0.9
It is safe for people who have HPV to work with children (1202) [#]	3.61	1.0	3.56	1.0	3.64	1.0
I am not afraid of interacting with people who have HPV (1204) [#]	3.49	1.2	3.51	1.2	3.48	1.3
People who have HPV must have done something wrong (1205) ^{***}	2.12	1.0	2.27	1.0	2.00	0.9
People who have HPV are dirty (1210) ^{***}	2.05	1.0	2.28	1.1	1.88	0.9
I do not want to be friends with people who have HPV (1205) ^{***}	1.72	0.9	1.86	0.9	1.62	0.8
People who have HPV should be isolated (1206) ^{***}	1.63	0.8	1.83	0.9	1.48	0.7
Total stigma score ^{***}	14.21	4.8	15.24	5.2	13.45	4.5

*Values reported on a 5-point Likert scale.

[#]Values on these positive statements reversed to calculate total stigma score.

^{***}Statistically significant differences between sexes at the .01 level.

different between sexes. Men demonstrated a significantly higher level of stigma than did women.

Information Sources

Just over 8% of the sample reported never having heard of the human papillomavirus (8.3%) and just over 22% reported not being aware of a vaccine for HPV. Additionally, 20.6% reported feeling confused about HPV, 6.4% reported that they did not know who to trust about HPV and 4.9% reported that they did not know who to talk to about HPV. Of those who had heard of HPV, the most reported sources of information were via television commercials (65.7%), from friends (37.7%), during a high school/college class (37.7%), and from the Internet (32%). That is strikingly in contrast to where students in this sample reported that they would prefer to obtain information about sexual health (Table 6). Preferred sources were family physicians (67.1%), gynecologists (45.3%), and the Internet (43.4%). Additionally, the most reported source of information about a vaccine for HPV was television commercials (50.5%).

Men reported wanting to learn about their sexual health from their family doctor, the Internet, academic articles, newspapers, and books more than women. Women preferred receiving information from their gynecologist, family, TV commercials, and TV drama/comedy shows more than men. Women also reported receiving information about HPV from more sources than men, with the exception of via the Internet, newspapers, TV news, and TV drama/comedy shows. Women reported receiving more information about the HPV vaccine from all information sources that were significantly

different between men and women except for television news shows.

COMMENT

Several conclusions can be drawn from this study, the first being that the majority of college students in this sample have heard of HPV. What exactly they know about the virus is entirely another matter. Their understanding was insufficient and spotty, as they were generally unaware of the more important factors about HPV infection, such as the modes of transmission, methods of prevention, the commonality of HPV infections, and the virus' role in cervical cancer. This lack of understanding about HPV could potentially translate into unnecessary stress and alarm if participants are diagnosed with HPV in the future. Having the appropriate information about HPV infection is key to avoiding undue stress and alarm.

However, as previous studies found that levels of knowledge about HPV were low or nonexistent, the moderate level of knowledge in this population is an indication of positive change. The level of knowledge in this sample, at the time of this study, can potentially be attributable to information obtained from the television commercial campaign for Gardasil, but this study can neither prove or disprove that possibility. Nonetheless, the fact that less than half of the participants correctly answered the knowledge questions about HPV reinforces the necessity of public health educational campaigns about HPV.

The majority of participants also did not understand the prevalence of HPV infections. The Centers for Disease Control and Prevention (CDC) report that at least 50% of

TABLE 6. Reported and Preferred Information Sources

	Preferred Sexual health information sources (1233)		Reported HPV information sources (1242)		Reported HPV vaccine information sources (1183)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Family doctor	827***	67.1	315***	25.4	354***	29.9
Gynecologist	558***	45.3	241***	19.4	231***	19.5
Internet	535***	43.4	397**	32.0	224	18.9
Brochure/pamphlet	463	37.6	361***	29.1	262***	22.1
College/high school course	376	30.5	468	37.7	159	13.4
Magazine	357	29.0	254***	20.5	150***	12.7
Academic article	340***	27.6	165	13.3	89	7.5
Friends	319	25.9	468***	37.7	330***	27.9
Family	283**	23.0	315***	25.4	287***	24.3
Newspaper	255***	20.7	171**	13.8	113	9.6
Book	208**	16.9	61	4.9	32	2.7
Television commercial	188**	15.3	816***	65.7	598***	50.5
Television news show	177	14.4	244***	19.6	153**	12.9
Television dramatic/comedy show	69***	5.6	51**	4.1	24	2.0

Note. Participants had the ability to choose multiple answers. Other sources receiving less than 1% included pediatricians, mentor, university clinic, church, clinic, DVD, and billboard.

**Significant differences between sexes at .05 level.

***Significant differences between sexes at .01 level.

sexually active individuals will acquire an HPV infection at some point in their life, but three quarters of the participants in this study believed the prevalence was lower than 35%.²⁴ Participants also generally underestimated their risk of acquiring a sexually transmitted infection and have a lower than desirable sense of an ability to control that risk. Both are worthy targets for efforts to improve health literacy, reduce inequities in health, and improve overall health status.

Some of the differences in knowledge level between sexes are also troublesome. Men were very less aware than women that there is a vaccine for HPV, that a person infected with HPV may show no visible signs or symptoms, that HPV can be sexually transmitted, that HPV can cause serious health problems for women, and that HPV can cause cervical cancer. Although both sexes exhibited low levels of knowledge about the possible health consequences for men, women were less aware of this. Although the marketing of the vaccine toward women and a historical focus of concern about HPV toward women may have something to do with this, this knowledge is important if sexual partners are to share the responsibility for their actions. Women were less clear that HPV could not be transmitted by sharing underwear or towels, indicating that incorrect knowledge is still circulating. These are all areas that future HPV campaigns would do well to target.

As the association between HPV and cervical cancer has become clear, designing effective national public health efforts for HPV education and prevention has become increasingly imperative. For instance, participants generally did know that women are disproportionately affected by the human papillomavirus but they generally did not know that most women with HPV will not develop cervical cancer. Half of the participants did not understand that HPV can be transmitted via oral sex and skin-to-skin contact, they were also largely unaware that the human papillomavirus causes genital warts. Fifty-percent believed that condoms are an effective method of protection against a HPV infection and a majority of participants (72%) incorrectly believed that HPV can be transmitted via bodily fluids (i.e., blood and semen) and, thus, may incorrectly believe that the use of condoms can successfully prevent HPV infection. HPV is transmitted via direct skin-to-skin contact, so the CDC acknowledges that the use of condoms is not a fail-safe method for the prevention of HPV infection. A small positive correlation (.110; significant at the .01 level) was found between the number of lifetime sexual partners and knowledge about HPV. Therefore, our findings shows that some participants are becoming educated in some manner as their risk of exposure increases over the span of their lifetime. However, it seems likely that the large number of misunderstandings underpin the low level of perceived risk of acquiring a STI. This is clearly an area where improvement is needed.

A noteworthy, but troubling, finding is that although a majority of participants (65.7%) reported hearing about HPV from television commercials, 67% reported that they would prefer to receive information about sexual health from their physicians. Only 15% preferred to received sexual health information via television commercials. There was a positive

correlation (.217; significant at the .01 level) between hearing about a HPV vaccine on a television commercial and overall knowledge about HPV. Although it is interesting that television commercials were associated with an increased awareness about HPV, commercials are simply marketing tools directed at selling a product. The information presented in such commercials will include only what is deemed necessary to sell the intended product, versus what might be addressed in a public health campaign. As a majority of participants wanted to obtain information about sexual health from their physicians, a public education campaign about HPV would be advised to directly involve physicians. Allowing the commercial marketplace to be the dominant force in educating the public about HPV has not fully informed the participants of this study.

The results of this research study indicate a real need for effective campaigns about HPV. Although the college-aged participants in this study had a higher level of knowledge than previous studies found, the participants still lack vital knowledge about the methods of transmission and greatly misunderstood the actual prevalence of HPV infection in the population. This knowledge is important as we did find a negative correlation (-.225; significant at the .01 level) between stigma about HPV and knowledge about HPV, indicating that stigma decreases as individuals are more aware of HPV. A troubling difference is the higher level of stigma exhibited by men. Men were more likely to feel people with HPV should have their freedom restricted, should be isolated, must have done something wrong, are dirty, and they do not want to associate with people who have HPV. These attitudes are not only unfounded in general but reveal a lack of awareness among men that they are not the sex most at risk from HPV even though they are, at a minimum, equally responsible for spreading the virus and do face risk of penile and anal cancers.

Participants were very clear in their understanding that HPV was not related to human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) or herpes simplex virus (HSV). Successful efforts to address HSV and HIV/AIDS could be used as a template for the development of large-scale campaigns about HPV that avoid further stigmatizing individuals with the virus while increasing knowledge and appropriate behavior choices.

This study also highlights the importance of understanding the value of educating and targeting incoming college freshman about sexual health, HPV, and potential HPV vaccination. A recent study found college-aged men and women had significant intentions to get vaccinated against HPV and that "higher levels of HPV knowledge and a subsequent increase in perceived risk of becoming HPV-infected also led to higher levels of intention to receive the vaccine."²⁶ In our study, a third of the participants said they have not had sex with another person, indicating for a very low risk for HPV. Thus, it is vital to not underestimate the value of providing sexual health information and education to this population of young adults by assuming they are already sexually active and their behavior patterns are somewhat set. Our study and

others indicate this is a crucial population to target in regard to protecting their sexual health.

Limitations to this study include reliance on self-reporting, so participants may attempt to respond with what they believe that the researcher wants to hear or attempt to present themselves in a misleading fashion. However, no potentially identifying information was asked of participants in order to reduce those possibilities. Poor memory of past events may also be a possible confounder. Also, although the sample was of sufficient size, it was not randomly selected and only drawn from one university so the findings may not be representative of college students in general.

Future research remains needed to determine what, if any, information physicians are currently conveying about HPV, the risk of HPV infection, and how that information is being conveyed from a health literacy perspective.^{22,23,27} Physician-patient interaction represents an important opportunity to increase public awareness and health literacy about this very common virus.

Information about HPV can be somewhat confusing. Considering that research is still producing new knowledge about HPV, public education about this virus and the ongoing scientific process is key. However, the lack of complete scientific understanding about HPV should not be seen as a deterrent for efforts to increase health literacy and knowledge about this highly prevalent STI. A lack of understanding can lead to increased stigma about the virus, either as a result of a fear of the unknown or as fear of the misunderstood. Health literacy is a key tool that can increase empowerment about sexual health and is vital to increasing the public's ability to prevent the further spread of HPV.

ACKNOWLEDGMENTS

We would like to thank those who have been instrumental in the success of this research project: The Rutgers University SAS Honors Program for providing funding and support; the faculty and students for participating in this research study and for their support of this project.

NOTE

For comments and further information, address correspondence to Mr Andrew Pleasant, Canyon Ranch Institute, 8600 E. Rockcliff Road, Tucson, AZ 85750, USA (e-mail: andrew@canyonranchinstitute.org).

REFERENCES

- Centers for Disease Control and Prevention. Tracking the hidden epidemics: trends in STDs in the United States, 2000. <http://www.cdc.gov/std/Trends2000/Trends2000.pdf>. Accessed January 30, 2008.
- Centers for Disease Control and Prevention. Trends in reportable sexually transmitted diseases in the United States, 2006: national surveillance data for chlamydia, gonorrhea and syphilis. 2007; <http://www.cdc.gov/std/stats/pdf/trends2006.pdf>. Accessed February 20, 2008.
- Koutsky L. Epidemiology of genital human papillomavirus infection. *Am J Med*. 1997;102:3-8.
- Ramirez JE, Ramos DM, Clayton L, Kanowitz S, Moscicki A. Genital human papillomavirus infections: Knowledge, perception of risk, and actual risk in a nonclinic population of young women. *J Womens Health*. 1997;6:113-121.
- Friedman AL, Sheppard H. Exploring the knowledge, attitudes, beliefs, and communication preferences of the general public regarding HPV: findings from CDC focus group research and implications for practice. *Health Educ Behav*. 2007;34:471-485.
- Dell DL, Chen H, Ahmad F, Stewart DE. Knowledge about human papillomavirus among adolescents. *Obstet Gynecol*. 2000;96(5 Pt 1):653-656.
- Keller ML, Egan JJ, Mims LF. Genital human papillomavirus infection: common but not trivial. *Health Care Women Int*. 1995;16:351-364.
- Vail-Smith K, White DM. Risk level, knowledge, and preventative behavior for human papillomaviruses among sexually active college women. *J Coll Health*. 1992;40:227-230.
- Mays RM, Zimet GD, Winston Y, Kee R, Dicks J, Su L. Human papillomavirus, genital warts, pap smears, and cervical cancer: knowledge and beliefs of adolescent and adult women. *Health Care Women Int*. 2000;21:361-374.
- Baer H, Allen S, Braun L. Knowledge of human papillomavirus in infection among young adult men and women: implications for health education and research. *J Community Health*. 2000;25:67-78.
- Waller J, McCaffery KJ, Forrest S, Wardle J. Human papillomavirus and cervical cancer: Issues for biobehavioral and psychosocial research. *Ann Behav Med*. 2004;27:68-79.
- Pruitt SL, Parker PA, Peterson SK, Le T, Follen M, Basen-Engquist K. Knowledge of cervical dysplasia and human papillomavirus among women seen in a colposcopy clinic. *Gynecol Endocrinol*. 2005;99(3 Suppl. 1):S236-S244.
- McCaffery K, Irwig L. Australian women's needs and preferences for information about human papillomavirus in cervical screening. *J Med Screen*. 2005;12:134-141.
- Walboomers JM, Jacobs MV, Manos MM, et al. Human papillomavirus is a necessary cause of invasive cervical cancer worldwide. *J Pathol*. 1999;189:12-19.
- Goldsmith MR, Bankhead CR, Kehoes ST, Marsh G, Austoker J. Information and cervical screening: a qualitative study of women's awareness, understanding and information needs about HPV. *J Med Screen*. 2007;14:29-33.
- Howard M, Koteles J, Lytwyn A, Elit L, Kaczorowski J, Randazzo J. Giving patients information on abnormal cytology and human papillomavirus: survey of health providers. *Eur J Gynaecol Oncol*. 2007;28:15-17.
- Kim JJ, Golde SJ. Health and economic implications of HPV vaccination in the United States. *N Engl J Med*. 2008;359:821-832.
- Fernbach M. Young women's issues associated with Pap tests: a qualitative study of Victorian women. *Health Promot J Aust*. 2001;12:254-257.
- Perrin KK, Daley EM, Naom SF, Packing-Ebuen JL, Rayko HL, McFarlane M. Women's reactions to HPV diagnosis: insights from in-depth interviews. *Women Health*. 2006;43:93-110.
- Merck & Co. 2006. <http://www.gardasil.com/>. Accessed Jan. 30, 2008.
- Markowitz LE, Dunne EF, Saraiya M, Lawson HW, Chesson H, Unger ER. Quadrivalent human papillomavirus vaccine: recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Morb Mort Wkly Rep*. 2007;56(RR02):1-24.
- Zarcadoolas C, Pleasant A, Greer D. *Advancing Health Literacy: A Framework for Understanding and Action*. San Francisco: Jossey-Bass; 2006.
- Zarcadoolas C, Pleasant A, Greer D. Understanding health literacy: An expanded model. *Health Promot Int*. 2005;20:195-203.

24. Centers for Disease Control and Prevention. Human papillomavirus (HPV) infection. 2008. <http://www.cdc.gov/std/HPV/default.htm>. Accessed April 26, 2008.
25. Kalichman SC, Simbayi LC, Jooset S, et al. Development of a brief scale to measure AIDS-related stigma in South Africa. *AIDS Behav*. 2005;9:135–143.
26. Jones M, Cook R. Intent to receive an HPV vaccine among university men and women and implications for vaccine administration. *J Am Coll Health*. 2008;57:23–31.
27. Pleasant A, Kuruvilla S. A tale of two health literacies? Public health and clinical approaches to health literacy. *Health Promot Int*. 2008;23:152–159.

Copyright of *Journal of American College Health* is the property of Taylor & Francis Ltd. and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.