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HPV Vaccination Knowledge, Attitudes, and Uptake in College Nursing Students

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Abstract

Background: The human papillomavirus (HPV) is a preventable, sexually transmitted infection. The vaccines for HPV are safe and effective, but previous research demonstrated that nursing students have low knowledge levels and vaccine uptake. Low knowledge and attitude levels in nurses and nurse practitioners can influence parental and patient decision making for HPV vaccination. **Purpose:** The purpose of this scholarly project was to evaluate HPV knowledge and attitudes and their association with vaccination uptake in college nursing students. There is limited research in the United States on HPV knowledge, attitudes, and uptake of the vaccine among nursing students. **Methods:** This project was a replication study utilizing an anonymous, cross-sectional, online survey methodology to measure the HPV knowledge, attitudes, and uptake of the vaccine in nursing students. The survey was given to a convenience sample of undergraduate and graduate nursing students (n = 447) at a private, liberal arts university. **Results:** Nursing students had high knowledge and attitude scores. While there were no significant differences between knowledge between genders (p = .59), there were differences in knowledge between undergraduate and graduate students (p < .001). There were no differences in attitude between genders and student classification. Knowledge was not associated with uptake (p = .63), but there was an association between attitudes and uptake (p <.001). **Conclusion:** This study supported that nursing students have high knowledge and attitude levels towards HPV and HPV vaccination, which may lead to improved vaccination uptake in the future.

Keywords: HPV infection, papillomavirus vaccines, nurses, vaccinations, health knowledge, student health, knowledge, attitudes

Introduction and Background

The human papillomavirus (HPV) is one of the most common sexually transmitted diseases in the world. HPV affects about 79 million Americans, with the majority in their late teens or early twenties (Centers for Disease Control and Prevention [CDC], 2017). In the past, HPV was one of the leading causes of deaths for women in the United States due to cervical cancer. Incidence rates for cervical cancer have decreased over last 20 years. From 2011 to 2016, the rate has decreased by 29% for women ages 15 to 24 years old and 13% for women ages 25 to 34 due to increased emphasis on HPV vaccine and routine cervical cancer screening (Guo, Cofie, & Berenson, 2018).

HPV was found to be the cause of 79% of the 44,000 yearly cases of HPV-related cancers (Saraiya et al., 2015). Exposure to HPV causes an increased risk for cervical, oral, penile, vaginal, anal, oropharyngeal cancers and warts. For females, the most common HPV-related cancer is cervical cancer (48.6%) followed by anal (17.6%), vulvar (16.2%), and oropharyngeal cancer (14.0%) (CDC, 2019a). Although there has been a significant decline in cervical cancer rates over the past several decades, rates for HPV-related squamous cell carcinoma of the oropharynx, anus, and vulva have increased (Van Dyne et al., 2018). The prevention of HPV tends to focus on females, but males are also at risk for the development of HPV cancer. For males, the most common HPV-related cancer is oropharyngeal cancer (81.3%) followed by anal (11.9%) and penile cancer (6.8%) (CDC, 2019a). Although penile cancer is rare (0.69 per 100,000 men), rates have slightly increased worldwide (Kidd et al., 2017). HPV is found in half of all penile cancers (American Cancer Society, 2018). These conditions may be preventable with HPV vaccination. Approximately 51.1% of American adolescents are up to date on the HPV series, but this is still below the national target goal of 80% for adolescents that

up to date on HPV vaccination (Healthy People 2020, 2019; Walker et al., 2019). Over half (68.1%) of American adolescents have had at least one dose of the HPV series, but, about 35% have completed the series by age 15 (Bednarcyzyk, Ellingson, & Omer, 2019; Walker et al., 2019).

HPV

HPV is a sexually transmitted disease associated with genital warts and increased risks of certain cancers (CDC, 2019b). There are more than 200 types of HPV, which are divided into low-risk and high-risk classifications. Low-risk HPV types are more likely to cause genital, anal, and oral warts, and high-risk HPV types are more likely to cause cervical, vaginal, vulvar, anal, penile, and oropharyngeal cancer. Of the 14 high-risk types that can cause cancer, types 16 and 18 cause 70% of pre-cervical lesions and cancers (CDC, 2019b).

HPV-related cancers are easily preventable through immunization and routine cervical cancer screening. Eighty percent of the population will be infected with HPV at least once during their lifetime, and in most cases, one's immune system can overcome the infection without complications (CDC, 2019c). Cervical cancer is the only type of HPV-related cancer with a recommendation for routine screening. Since there are no other screenings for other types of HPV-related cancers and may be undetected for years until symptoms appear, it is even more important to encourage patients to prevent cancer through immunization.

HPV Vaccines

The CDC recommends the vaccine for males and females age 11 to 12, but the vaccine may be given as early as nine years old. Females up to age 26 and for males up to age 21 are eligible to be vaccinated. Although the United States Federal Food and Drug Administration (FDA) (2018) approved the vaccine for all persons up to age 45 for Gardasil 9, the CDC only

recommends vaccination for adults age 27 to 45 if they are at a higher risk for infection (Meites et al., 2019). Adolescents who receive the vaccination between the age of nine to 14 are eligible to receive the two-dose vaccine six months apart. Those who initiate the vaccine at ages 15 or older are recommended to receive the three-dose vaccine. Immunocompromised persons nine to 26 years old are also recommended to have the three-dose vaccine.

There are three HPV vaccines approved for use in the United States: Cervarix, Gardasil, and Gardasil 9. GlaxoSmithKline manufactures Cervarix, and it prevents infections from HPV 16 and 18. Merck & Co. manufacture Gardasil and Gardasil 9. Gardasil prevents infections from types 6, 11, 16, 18. However, Gardasil 9 is broader in coverage and prevents types 6, 11, 16, and 18 as well as five other types that cause 20% of cancers (types 31, 33, 45, 52, and 58). If the HPV vaccine for 16 and 18 (Cervarix) covered 100% of the population, then 63.4% (24,548) of HPV cancer cases (24,548) could be prevented annually and an additional 10% of cases (3,944) if the 9-valent vaccine were given (Saraiya et al., 2015). These results are agreeable with a previous meta-analysis from two international HPV vaccine studies (Serrano, 2012). In 2018, 51.1% of adolescents were up-to-date on HPV vaccinations, with 68.1% of the adolescent population has received at least one dose (Walker et al., 2019). Even though the vaccination rate has increased, only 35% of adolescents 15 or older have completed the series (Bednarcyzyk et al., 2019). This is still below the national target goal of 80% (Healthy People 2020, 2019).

One of the key interventions to prevent the spread of HPV and HPV morbidity and mortality is the uptake of the HPV vaccination. In the United States, there are about 33,700 men and women who have HPV cancer, but with the vaccine, 32,100 cases could be prevented (CDC, 2019b). Nurses and Advanced Practice Registered Nurses (APRNs) are in a remarkable position to educate patients, parents, and the community on HPV and vaccination. Patients expect nursing

professionals to have sound knowledge and understanding if they have questions about the vaccine. However, there have been few studies focusing solely on the knowledge and attitudes of HPV and the vaccinations in nursing students (Schmotzer & Reding, 2013).

Among the general undergraduate college student population, there are poor knowledge and attitudes of HPV and the vaccine. Even more so, there are low rates of HPV vaccine uptake. As future healthcare workers, nursing students are expected to have higher knowledge levels regarding HPV, but there is limited research available on nursing students' knowledge and attitudes regarding this topic (Schmotzer & Reding, 2013). The lack of information on American nursing students' knowledge and attitudes and uptake of the vaccine supports the need for further research on the topic.

Problem Statement

While there have been many studies on general college students and HPV, there is a gap in the literature on knowledge and attitudes of HPV and the uptake of the HPV vaccine among college nursing students.

Purpose

The purpose of this scholarly project was to evaluate HPV knowledge and attitudes, and their association to vaccination uptake in college nursing students.

Research Questions

In consideration of the project's purpose to assess HPV knowledge, attitudes, and uptake in nursing students, the project aimed to focus on the following four questions:

1. What is the knowledge level of undergraduate and graduate nursing students?
2. What are the attitudes of undergraduate and graduate nursing students?
3. What is the vaccine uptake rate among undergraduate and graduate nursing students?

4. How do knowledge and attitudes affect uptake in undergraduate and graduate nursing students?

Hypotheses

Based on previous findings in the college population and nursing students, the project leader hypothesized low knowledge levels in undergraduate and graduate nursing students. Due to their health care background and training, the project leader also hypothesized there will be a favorable attitude toward HPV vaccination. The author hypothesized there will be low uptake of the HPV vaccine among undergraduate and graduate students which is comparable to literature findings.

Review of Evidence

Previous studies investigated the impact of knowledge and attitudes on the uptake in college students (Beshers, Murphy, Fix, & Mahoney, 2015; Cunningham-Erves & Talbot, 2015; Stephens, Tamir, & Thomas, 2016; Barnard, George, Perryman, & Wolff, 2017; Kasymova, Harrison, & Pascal, 2019). These studies have focused on a single gender, both biological genders, or minorities. However, to date, there is only one study since 2013 that has explored knowledge and attitudes in American nursing students and their relationship to HPV vaccination uptake, but only focused on the differences between ethnicities (Schmotzer & Reding, 2013). Due to the limited amount of research among American college nursing students regarding this topic, the discussion will also generalize the knowledge, perceptions, and uptake of the influenza vaccine to support the review of the literature.

Knowledge

American college students were shown to be aware of HPV but have more deficient knowledge levels of HPV and HPV vaccination. In studies sampling female students, poor

knowledge levels were attributed to misinformation or lack of knowledge of HPV and the vaccine (Licht et al., 2010; Beshers, et al., 2015; Zhang, Tsark, Campo, & Teti, 2015; Stephen, Tamir, & Thomas, 2016; Kasymova, Harrison, & Pascal, 2019; Kellogg et al., 2019). Females tended to know more than males about HPV, and females that were vaccinated were more likely to have higher knowledge levels. Males were revealed to be less aware than women about HPV and also have weaker knowledge levels (Katz, Krieger, & Robert, 2012; Beshers, et al., 2015; Cunningham-Erves, & Talbot, 2015; Johnson & Ogletree, 2017). Poor knowledge levels among men may be influenced by several factors, such as the belief that HPV vaccination is only for women, the lack of visible symptoms when males are positive for HPV, and the lack of routine male HPV screening (Kasymova et al., 2019; Fontenot, Fantasia, Charyk, & Sutherland, 2014). Most college students are aware of HPV, but they lack knowledge about the prevalence of HPV in the general population and its association with diseases (Kasymova et al., 2019).

Schmotzer and Reding's (2013) study with American nursing students revealed that students with inaccurate HPV knowledge were more likely to be vaccinated or intended to be vaccinated. For example, those who were vaccinated were more likely to believe that HPV caused herpes and did not cause cervical or anal cancer. This group also did not know that the HPV vaccine was also for men. One study indicated undergraduate nursing students have poorer vaccine-related knowledge, with 24.7% having high knowledge scores as compared to medical (74.3%), pharmacy (62.7%), and doctoral nursing students (57.1%) (Dysband, Hall, & Carson, 2019). It is important to educate and train all nursing students to understand the importance of vaccination. Those with poorer knowledge levels may not have had education or may need reeducation on HPV and the HPV vaccine. The knowledge they share can impact a patient’s or a parent’s decision to vaccinate for HPV.

Attitudes

Positive attitudes towards vaccination were associated with uptake of the vaccine, and women tended to have more favorable attitudes toward vaccination (Barnard et al., 2017). Findings in the literature showed females have low levels of perceived HPV severity and risk, perceived HPV vaccine safety, and perceived social approval (Marchand, Glenn, & Bastani, 2012; Stephens, Tamir, & Thomas, 2016). Generally, males tended to have lower perceived risk as compared to women. However, if there was an increased risk due to risky sexual behavior or practices, they were more willing to consider vaccination (Katz et al., 2012; Fontenot et al., 2014; Johnson & Ogletree, 2017). In several studies, males were less likely to consider vaccination (Fontenot et al., 2014; Barnard et al., 2017; Kasymova et al., 2019).

Nurses' attitudes toward vaccination play a significant role in influencing patients. The bedside or clinic nurse most often meets the patient before the provider. This meeting can set the tone for the parents' or the patient's decision to receive the HPV vaccine. Schmotzer and Reding (2013) did not address attitudes in their study of nursing students towards HPV. One study revealed that undergraduate nursing students were more hesitant, less likely to recommend, and had less confidence in recommending vaccinations in general (Dysband et al., 2019). However, doctorate nursing students were more confident at discussing vaccines with patients than medical and pharmacy students. Limiting the concerns and barriers to vaccination among nurses may result in favorable attitudes towards HPV vaccination and recommendation.

Uptake

Across the literature, 25% to 68.8% of college females and 0% to 52% of college males were up-to-date on HPV vaccination (Schmotzer & Reding, 2013; Richman, Maddy, Torres, & Goldberg, 2016; Barnard et al., 2017; Johnson & Ogletree, 2017) Younger students were more

likely to receive the HPV vaccine, which may be due to the effects of the vaccine being released in 2006 (Thompson et al., 2017). In nursing students, less than half (28.9%) of the respondents reported receiving the vaccine (Schmotzer & Reding, 2013). For participants who have not started the vaccine series or have not completed it, it is recommended to start or complete the vaccination process for all students to prevent consequences of HPV and transmission of the virus to others.

Other Influencers to Uptake

Barriers. Other barriers to HPV vaccination are mentioned in the literature. The most frequent concerns were logistics, cost, insurance, stigma, and fear of side effects (Katz et al., 2012; Stephens et al., 2016; Martin et al., 2018; Kasymova et al., 2019). Logistics included waiting time and transportation to a clinic if the vaccine was not offered on campus. Younger college students may rely on their parents for finances, insurance, and may be embarrassed to ask them to pay for the vaccination due to perceived sexual stigma (Katz et al., 2012; Martin et al., 2018). Other historical and current barriers to HPV vaccination uptake are moral and religious reasons against the vaccine (Vamos, McDermott, & Daley, 2008).

Facilitators. Facilitators to HPV vaccination uptake are recommendations from the provider, parental influence, increased communication, and perceived risk of HPV (Barnard et al., 2017; Katz et al., 2012; LaJoie, Kerr, Clover, & Harper, 2018; Marchand et al., 2012; Stephens, Tamir, & Thomas, 2016). A health care provider's recommendation is one of the strongest predictors for the uptake of the vaccine (Gilkey et al., 2016; Kellogg et al., 2019). Students prefer to receive knowledge from a provider due to their credibility and expertise on this topic (Lanning, Golman, and Crosslin, 2017). Although parents no longer make medical decisions for the majority of college students, parental influence may continue to play a role in

some young adults as college students learn to become independent (LaJoie et al., 2018). Providing proper education about HPV and the HPV vaccine to parents and students is an appropriate intervention. Some interventions used to increase communication and awareness of HPV vaccination are electronic medical record notifications for the providers, provider education, and social media prompts (Richman et al., 2016; Lanning et al., 2017; Vorsters et al., 2017; Zhang et al., 2017).

Currently, there is one study since 2013 on the knowledge and attitudes and uptake of the HPV vaccine in American nursing students (Schmotzer & Reding, 2013). Research indicates there are poor knowledge levels concerning HPV and the HPV vaccine. More information is required to assess nursing students' knowledge and attitudes on these topics. Generally, there are favorable attitudes towards the benefits of vaccination, but undergraduate nursing students were more hesitant to recommend and inform patients about the purpose, safety, and efficacy of vaccination (Dysband et al., 2019). Students may not have the knowledge or the confidence to explain this information to patients and may feel they are imposing on the primary nurse’s influence on the patient. Also, in Schmotzer and Reding's (2013) study, both male and female students had a low perceived risk of HPV.

Overall, it appears that undergraduate nursing students scored low in knowledge, attitudes, and confidence. By addressing misconceptions, removing barriers, and improving the facilitators, there is an excellent opportunity to increase the knowledge and confidence in educating patients on this topic. Implications for the nursing students surpass the conclusion of this project. As future nurses, undergraduate nursing students can influence and inform patients of HPV and the overall benefits of the vaccine. Graduate nurse practitioner students will become APRNs who educate, provide anticipatory guidance to parents, and encourage vaccination

scheduling adherence to parents and patients. Because nurses tend to have more contact with the patients than any other health care worker, current and correct knowledge, improving misconceptions, and encouraging our young patients and parents on vaccination is key to preventing consequences of HPV and transmission to others.

Theoretical Model

The Precautionary Adoption Process Model (PAPM) is a stage theory that describes and explains the preventative behavior of a health issue (Weinstein, 1988; Weinstein, Sandman, & Blalock, 2008). Stage theories are useful in describing an individual's willingness to engage in preventative behaviors. Because individuals behave differently at each stage, interventions can be tailored to encourage them to move from one stage to the next. PAPM is similar to the well-known Transtheoretical Model with its five Stages of Change (pre-contemplation, contemplation, preparation, action, and maintenance) (Prochaska & DiClemente, 1983). With the Stages of Change, the model assumes the individual is aware of the health issue, but it does not include those that are not aware of the issue. The PAPM has a broader scope and recognizes some people are not aware of specific health problems. Those with no knowledge of HPV have a different set of obstacles compared to those who are aware of HPV and its consequences.

PAPM differentiates itself from other stage theories through its identification of seven stages from a person's awareness to actions for preventative behavior. In Stage One, the individual is unaware or has not heard of HPV or receiving HPV vaccination for cancer and wart prevention. A person moves from Stage One to Stage Two after the individual has heard about a health issue. In Stage Two, the individual is aware of HPV but does not act on the issue. The person does not consider acting because other issues may compete for personal time and attention (Weinstein, Sandman, and Blalock, 2008). In Stage Three, the individual is undecided

about receiving the HPV vaccination. The individual will move out of the action stages into Stage Four if there is no intention to receive the vaccine. In Stage Five, the individual decides to get the HPV vaccine. In Stage Six, the individual gets the HPV vaccine. In Stage Seven, the last stage, the individual engages in the maintenance of the preventative behavior. In this example, the individual would complete the HPV vaccination series and participate in routine cervical Papanicolaou (Pap) testing (see Figure 1 for PAPM diagram).

By identifying the stage in which individuals reside, nurses and nurse practitioners can apply specific interventions for individuals at each of the stages. For example, individuals who are in Stage One and Stage Two would highly benefit from education on HPV and how to prevent the consequences of HPV through vaccination and screening. This project does not address Stage 1, but for participants in Stage 2 with poor knowledge levels, it would be valuable to educate or reinforce HPV education in this group. Health care providers can target individuals in Stage Three and Four by looking at barriers and facilitators to HPV vaccination. Those that are in Stage Five, Six, and Seven will need resources and reminders or assistance in acting in the maintenance of preventative behaviors.

This scholarly project applies this model through the utilization of an online survey. Participants who have received zero HPV vaccinations are asked about their willingness to get the HPV vaccine. This question categorizes participants into the PAPM Stage Two through Stage Five. By identifying stages in which students most identify with, interventions can be made that can help them transition into the next stage. The knowledge portion of the survey may indicate the student classification or age groups that have poorer knowledge levels. Whether or not students have been vaccinated or not, improving the knowledge of HPV and the vaccines in those with poor knowledge will be beneficial to their practice and educating their patients.

Project Design

This scholarly project was a cross-sectional, replication study utilizing an anonymous, online survey methodology designed to assess the knowledge and attitudes of nursing students towards HPV and HPV vaccination. Subjects were undergraduate and graduate nursing students 18 or older at Belmont University. Convenience sampling of male and female nursing students was used for this project. The anonymous survey methodology was low risk to the subjects allowing it to be verified as exempt by the Belmont University Institutional Review Board.

Clinical Setting

The project took place at Belmont University, a private, Christian, liberal arts university located in the southeastern United States. The university has 6,820 undergraduate students and 1,621 graduate students with a total of 8,441 students. About 34.6% of the students identify as male, and 65.4% identify as female. The racial/ethnic diversity is primarily White, non-Hispanic (79.5%) followed by Hispanic (5.9%); Black, non-Hispanic (5.4%); two or more races, non-Hispanic (3.9%); Asian (2.5%); and unknown race/ethnicity or other (2.6%). At the time of this project, HPV vaccination was not offered through Student Health Services.

Project Population

Inclusion criteria were students 18 years or older at Belmont University. Exclusion criteria were those less than age 18 or non-nursing majors. There were 800 undergraduate and graduate nursing students enrolled in the fall semester of 2019 at Belmont University. Power analyses were conducted using G*Power version 3.1.9.4 statistical software (Faul, Erdfelder, Buchner, & Lang, 2009). A sample size of 226 was needed for a moderate effect. This was determined with an alpha of 0.05, power of 0.8, a moderate effect size of 0.5, and an allocation ratio of 0.2.

Undergraduate students included traditional nursing students and accelerated nursing students. Traditional students may have started as freshmen or may be transferred from another school or program with the opportunity to earn a four-year Bachelor of Science in Nursing (BSN) degree. The accelerated track was for individuals who have previously obtained a Bachelor's degree in another discipline. Of note, the undergraduate nursing program was mid-way through a curriculum change to a concept-based model to address the vast amount of content taught in the undergraduate nursing program. Graduate nursing programs offered at Belmont are Master's, Post-Master's to Doctorate, BSN to Doctorate, and post-graduate APRN with a Family Nurse Practitioner (FNP) concentration. Depending on the student's progress in the nursing program, students may or may not have received education on HPV. A survey question was added to indicate if they have had this content in their curriculum at the time of participation.

Adolescents and young adults are typically the individuals who receive the HPV vaccine. Several undergraduate and graduate students will be outside the recommended age range for vaccination. Older students may have personal reasons for not considering it, such as being in a married or monogamous relationship for several years. Nevertheless, it is beneficial to know the knowledge levels and perceptions of all nursing students even though uptake, PAPM staging, and factors associated with vaccination will be skewed.

Recruitment

Convenience sampling was used to recruit participants for the project. Of the 800 nursing students, the project leader aimed to recruit approximately 226 participants for the study. Recruitment strategies include emailed letters, visiting classes, and speaking to students in the nursing building. A letter of invitation was sent by the Associate Dean of Nursing, on October 1,

2019. The letter invited undergraduate and graduate nursing students to participate in the survey (see Appendix A for the letter of invitation). The letter of invitation included the purpose of the survey, the approximate time to take the survey, gift card incentives, and the project leader's contact information. Students could access the Qualtrics survey through a link in the email or a Quick Response (QR) code. The project leader also visited key classes to reach most of the nursing students. Potential participants received information about the project, estimated time to take the survey, and ways to access the survey. Printed QR codes were given to the students for alternate access to the survey (see Appendix B for QR codes). The project advisor also visited several classes with the project leader to help promote the study. Incentives for the class visits included candy and the chance to win one of four $25 Amazon gift cards.

Instructions to win one of four $25 Amazon gift cards were placed at the end of the survey. To be placed in the drawing, participants were instructed to email a screenshot of the survey submission page to the project leader's email address. This assures answers could not be associated with individual participants. Names were placed in an Excel spreadsheet in the order the email was sent. A random number generator was used for the drawing. The winners were notified by email with instructions where to pick up the gift card by November 15, 2019.

Sources of Data and Data Collection Instruments

This project replicated a survey by Barnard et al. (2017). The original survey was based on several previously utilized HPV surveys (Licht et al., 2010; Katz et al., 2012; Marchand et al., 2012). Permission was granted by the author to alter the survey as needed. The project's survey had a total of 53 items: seven demographic questions, 19 knowledge questions, 24 Likert questions, one question on vaccination uptake, one question on factors related to vaccination, and one question related to staging. At the beginning of the survey, a short narrative told participants

about the purpose of the survey, the time it takes to complete, incentives, and implied consent. Participants can exit the survey at any time if they do not wish to continue (see Appendix C for HPV survey).

Before collection, the survey was piloted among a group of doctorate nursing students in their final year of graduate school. Concerns, questions, and suggestions for improvement or clarity by the cohort were considered for changes to the survey. Barnard et al.'s (2017) survey was not tested for reliability and validity. Content validity and face validity were verified by a content expert and the project leader's advisor.

Demographics. The demographic section included age, gender, student classification (undergraduate or graduate), ethnicity, whether or not they have received education on HPV, and whether or not they receive routine, preventative care. The participants' biological gender was asked due to the relationship between gender and HPV. This question was placed at the end of the survey to prevent bias.

Knowledge. Two content experts verified the content validity of the survey. The knowledge section contained 19 true or false questions regarding HPV and the vaccine. One question regarding condoms was removed from the original survey. Two additional questions were added to the knowledge section after discussion with a content expert: 1) "There are many types of HPV" and 2) "The HPV vaccine covers certain HPV strains." These questions were added to assess if students were aware of multiple HPV types and specific HPV vaccines only protect for particular strains. Two questions were reversed scored. The maximum number of correct questions that could be acquired was 19. If 14 or more questions were correct, the participant was considered to have a high level of knowledge regarding HPV. Seven to 13

questions correct answers indicated a moderate level of knowledge. If six or less questions are correct, the participant was considered to have a poor level of knowledge.

Attitudes. Susceptibility and concerns (attitudes) were assessed through 24 questions on a one-to-five Likert Scale (1 – "Strongly Disagree," 2 – "Disagree," 3 – "Neutral," 4 – "Agree," and 5 – "Strongly Agree"). The original survey had 25 questions, but one question on the association of HPV to liver cancer was removed after discussion with the content expert. Three items were reverse scored. The total score of a participant was calculated by summing the 24 items in this section with a maximum score of 120. A score of one to 41 reflected a poor attitude, a score a 42 to 89 reflected a moderate attitude, and a score of 90 to 120 reflects a high attitude level toward HPV and vaccination. Questions within this section were further classified into perceived susceptibility (10 items), concerns (eight items), vaccine safety (five items), and vaccine efficacy (one item). Perceived susceptibility had a maximum score of 50 with a score of one to 19 representing poor levels, 20 to 36 representing moderate levels, and 37 to 50 representing high levels. Perceived susceptibility had a maximum score of 50 with a score of one to 19 representing poor levels, 20 to 36 representing moderate levels, and 37 to 50 representing high levels. Concerns had a maximum score of 40 with a score of one to 14 representing poor levels, 15 to 29 representing moderate levels, and 30 to 40 representing high levels. Vaccine safety had a maximum score of 25 with a score of one to eight representing poor levels, nine to 17 representing moderate levels, and 18 to 25 representing high levels. Lastly, vaccine efficacy had a maximum score of 5 with a score of one to two representing poor levels, three representing moderate levels, and 4 to 5 representing high levels.

Uptake. In the original study, the uptake section asked whether or not participants have been vaccinated for HPV. If they were not, participants were asked about their thoughts about

being vaccinated in the fifth section. After discussing with a content expert, participants were asked how many vaccine doses the participant has received (0, 1, or 2 or more). If participants chose "zero vaccines," then they were prompted to the staging question.

Staging and Factors. The fifth section determined the stage participants were in at the time of they answered the survey. The answers were based on the Precautionary Adoption Process Model (Weinstein, 1988; Weinstein, Sandman, & Blalock, 2008). The last section assessed influences toward vaccination (provider, family, friends, and the belief the virus or the vaccine can cause health problems) through a multiple select question.

Data Collection Process/Procedures

Data collection began on October 1, 2019 and was scheduled to end on October 31, 2019. On October 1, 2019, the HPV survey was sent to the students via email by the associate dean of nursing. This letter included the purpose of the survey, the approximate time to take the survey, gift card incentives, and contact information. Students were able to access the Qualtrics survey through a link in the email or a QR code.

To optimize response rate, professors of undergraduate and graduate nursing classes were contacted in the Spring and Fall semester of 2019 for permission to speak to their students about the scholarly project. Professors that agreed to the visit allowed the project leader to speak to their class for five to ten minutes. The project leader visited the following classes during October: Wellness, Assessment, and Health; Perspectives; Care Management I; Care Management II; Transition to Graduate Nursing; Pediatrics; Nursing Leadership; Childbearing; and Advanced Health Assessment. These classes were chosen to reach as many nursing students who were in the older undergraduate curriculum, newer concept-based curriculum, and graduate nursing students. Potential participants received information about the project, estimated time to

take the survey, and ways to access the survey. Printed QR codes were given to the students. Incentives for the class visits included candy and the chance to win one of four $25 Amazon gift cards. The project advisor also visited several classes with the project leader to help promote the study. If time allowed, the students were able to take the survey during class time. In between classes, the project leader recruited students in the lobby and hallways of the nursing building. Because the response rate was greater than 50%, the survey ended early on October 23, 2019, with approval from the project leader advisor.

Data Analysis. Data was downloaded into an Excel spreadsheet and transferred to SPSS Statistics 19.0. An alpha level of 0.05 was used to determine statistical significance. Independent variables were demographic information, knowledge, attitudes, stage in PAPM, and factors associate with uptake. The dependent variable was the uptake of the HPV vaccine.

Descriptive statistics, chi-square, and independent t-tests compared data between genders and student classification (undergraduate or graduate). Knowledge is a dichotomous variable, and the independent t-test was used to find the difference in knowledge scores between genders, student classification, and vaccine uptake. Although the uptake of the vaccine had three possible options, it was treated as a dichotomous variable to find a relationship in the independent variables. Since attitude was measured with a Likert-scale, it is a scale variable. Logistic regression was used to correlate knowledge between genders, student classification, and vaccine uptake. PAPM staging and factors associated with uptake are nominal variables, and Chi-square was used to measure their association with gender, student classification, and uptake.

Results

The total number of participants was 507 with a response rate of over 60% of all nursing students attending the fall semester of 2019. Several participants were omitted from the final

analysis for 1) identifying as being below the age of 18 (n = 1), 2) not answering more than half of the knowledge and attitude sections (n = 59), and 3) identifying as "Other" for the gender (n = 1). The final number of surveys included in the data analysis was 447. One student did not answer a majority of the attitude questions and was removed for the attitude analysis (n = 446). Unanswered questions appeared to be missing at random, and data was not imputed for the knowledge section. If participants missed a question, it was assumed they did not know the answer and was considered incorrect. Data were imputed for the attitudes section with the mean score for each question.

Demographics

Demographic information included age, gender, student classification, ethnicity, engaging in preventative health care, HPV education, and HPV vaccination uptake. The age of the participants ranged from 18 to 62 years with a mean of 22.5 years (SD = 4.69). The majority of the participants reported being female (93.1%, n = 416), White (87.3%, n = 391), and undergraduate student students (84.1%, n = 376). Most of the respondents participated in routine, preventative health care (89%, n = 398). Of the 447 responses, 31.1% (n = 139) had zero HPV vaccinations and 68.9% (n = 308) having at one or more doses (see Table 1 for demographics).

Knowledge Results

The maximum knowledge score in this survey was 19. Knowledge scores for the participants ranged from three to 19 with a mean knowledge score of 14.6 (SD = 2.39). The majority of the participants (61.7%, n = 311) had a high knowledge level of HPV followed by moderate levels (30%, n = 134) and low levels (0.4%, n = 2) (see Table 2 for knowledge scores for all participants). The top three questions students answered incorrectly were 1) "HPV is

transmitted by skin-to-skin contact," 2) "Most adults are infected with HPV," and 3) "There is a routine HPV test for men." These questions were related to transmission, prevalence, and screening guidelines.

The independent *t*-test showed there were no significant differences between the knowledges score for males (M = 14.84, SD = 2.62) and females (M = 14.60, SD =2.37), $t(445)$= .544, p = .59, d = 0.96 (see Table 3 for *t*-Test for Independent Groups – Knowledge). Graduate students (M = 15.6, SD = 2.46) had a higher mean knowledge score than undergraduate students (M = 14.4, SD = 2.34), $t(444) = -3.92$, d = -.5, $p < .001$. Furthermore, there were some statistically significant differences on certain items between undergraduate and graduate students. More undergraduate students incorrectly answered items related to transmission, cure, and cancer caused by HPV compared to graduate students. Nearly 47.1 % (n = 177) of undergraduate students knew that HPV is transmitted by skin-to-skin contact, $\chi^2(1, N = 446) = 4.87$, $\varphi = .1$, $p = .027$. Undergraduates (68.6%, n = 258) were also more likely to believe that there is no cure for HPV, $\chi^2(1, N = 446) = 4.67$, $\varphi = .1$, $p = .031$. Finally, a smaller percentage of undergraduate students were aware that HPV could cause oral cancer (58.2%, n = 219) and anal cancer (68.4%, n = 257) than graduate students (see Table 4 for Knowledge – Correct Answers).

The mean knowledge score was similar between those who were unvaccinated (M = 14.53, SD = 2.58) and those who had received at least one vaccination (M = 14.65, SD = 2.31), $t(445) = -4.78$, d =. -.049, p = 0.63. Additionally, there were no differences in having HPV education (M=14.3, SD = 2.33) or not having HPV education (M = 14.7, SD = 2.41), $t(444) = -1.29$, d = -.17, p = .2 (see Table 3 for *t*-Test for Independent Groups – Knowledge).

Attitude Results

The mean attitude score for all participants was 91.2 (*SD* = 9.99) and ranged from 36 to 110. A low numeric attitude score represented a more negative attitude towards HPV and HPV vaccination. A higher numeric attitude score represented a more positive attitude. The majority of participants had a high attitude score (61.7%, *n* = 276) followed by moderate levels (37.8%, *n* = 169) and low levels (0.4%%, *n* = 2). Most respondents had a high level of perceived susceptibility (97.1%, *n* = 434) and a moderate level of personal and social concerns towards HPV and vaccination (91.9%, *n* = 411). The majority of participants had high levels of confidence in vaccine safety (67.2%, *n* = 300) and vaccine efficacy (82.6%, *n* = 369) (see Table 5 for attitude scores for all participants).

Unvaccinated participants (*M* = 87.3, *SD* = 12.1) had a lower mean attitude score (*M* = 93, *SD* = 8.28), *t*(445) = -5.02, *d* = -.055, $p < .001$. There were no differences between the overall attitude scores of males (*M* = 89.2, *SD* = 8.2) and females (*M* = 91.4, *SD* = 10.1), *t*(445) = -1.18, *D* = -.024. *p* = .24 and in undergraduate (*M* = 91.3, *SD* =9.85) and graduate students (*M* = 90.8, *SD* = 10.54), *t*(444) = .42, *d* = -.049, *p* = .67. Attitude levels were not associated with having HPV education (*M* = 91.5, *SD* = 9.76) or not having HPV education (*M* = 89.6, *SD* = 10.72), *t*(445) = -1.61, *d* = .19, *p* = .11 (see Table 6 for *t*-Test for Independent Groups – Attitudes).

Chi-square analysis revealed differences on several items in those who "somewhat agreed" or "strongly agreed" on an item and participants who did not. Male students (*n* = 18, 58.1%) were less likely to agree that HPV would be a severe threat to their health than females (*n* = 313, 75.2%), χ^2 (1, *N* = 446) = 4.43, φ = .1, *p* = .04. There were no significant differences between undergraduate and graduate students on any item (see Table 7 for Attitudes – Percent "Strongly Agree" and "Somewhat Agree").

Uptake

Participants age 18 to 20 (37.3%, *n* = 115) and age 21 to 29 (58.8%, *n* = 181) reported higher rates of vaccination compared to participants age 30 or older (3.9%, *n* = 12) (see Table 1). There were several statistically significant results with the chi-square analysis for uptake. Between genders, more females (71.2%, *n* = 295) had at least one HPV vaccination compared to males (38.7%, *n* = 12), χ^2 (1, *N* = 447) = 14.17, φ = .18, *p* <.001. Those who had HPV education (85.4%, *n* = 263) were more likely to be vaccinated than those who did not have HPV education (14.6%, *n* = 45), χ^2 (1, *N* = 447) = 18.8, φ = .21, *p* <.001. Likewise, students who participate in regular, preventative healthcare (71.6%, *n* = 285) were more likely to be vaccinated that those who did not (46.9%, *n* = 23), χ^2 (1, *N* = 447) = 12.4, φ = .17, *p* <.001. There were no differences in uptake between undergraduate (69.9%, *n* = 263) and graduate students (64.3%, *n* = 45), χ^2 (1, *N* = 446) = .86, φ = -.045, *p* = .38. Vaccination (78.4%, *n* = 109) was associated with the belief vaccines do not cause problems, χ^2 (1, *N* = 447) = 44.4, φ = -.32, *p* <.001. The majority of unvaccinated participants 49.6% (*n* = 69) reported not being offered the vaccine, χ^2 (1, *N* = 447) = 152.3, φ = -.58, *p* <.001 (see Table 8 for Chi-square Analysis for Independent Groups – Uptake).

PAPM

The majority of males (78.9%, *n* = 15), females (57.5%, *n* = 69), undergraduate (61.9%, *n* = 70) and graduate students (52%, *n* = 13) who were not vaccinated reported never thinking about getting the HPV vaccination. One male (5.3%) and 16 females (13.3%) intended to get the vaccine within six months. Sixteen undergraduate students (13.3%) and two (8%) of graduate students intend to be vaccinated within six months. Twenty-three females (19.2%) and two graduate students (32%) decided against vaccination (see Table 9 for PAPM staging). Chi-square

analysis showed no significant association between those who did not participate in preventative health care and never thinking about the getting the vaccine, χ^2 (1, N = 139) = 2.14, φ = .12, p = .21 (see Table 10 for Chi-square Analysis for Preventative Care and Never Getting the Vaccine).

Factors Associated with Vaccination

Logistic regression was completed to indicate factors associated with vaccination status. The Hosmer and Lemeshow Test confirmed a good fit, χ^2 (6, N = 447) = 8.36, p = .21). This model predicted 70.5% of the vaccination statuses in this study. Significant factors for vaccination were provider offered (p = <.001), family (p = <.001), belief the vaccine does not cause problems (p = <.001), belief the virus causes problems (p = .047), and no one offered the vaccine (p = <.001). More females (68.3%, n = 284) reported that providers recommended the vaccine to them than males (29%, n = 9), χ^2 (1, N = 447) = 17.69, φ = .21, p = <.001. Of the vaccinated participants, 97.2% (n=172) reported family influence as a factor to being vaccinated. Participants were 39.6 times more likely to get the vaccine if their family encouraged them and 10.6 times more likely if a provider offered it to them. A friend's recommendation was not statistically significant as a factor to vaccination (see Table 11 for Factors Associated with Vaccination).

Discussion

The purpose of this scholarly project was to evaluate HPV knowledge and attitudes, and their association to vaccination uptake in college nursing students. This project expanded on a previous study by Bernard et al. (2017), which examined the effect knowledge and attitudes have on HPV vaccination uptake and added a focus of a specific population of college nursing students. The last study on the topic of HPV and nursing students was in 2013 and occurred in New Mexico (Schmotzer & Reding, 2013). This project and Barnard et al.'s (2017) study were

located in the South and used the PAPM model for its theoretical basis. All three studies differed in ethnicity, student classification, and the students' disciplines of study.

Nursing programs usually have a smaller percentage of males to females. Gender percentages among nursing students mirrored those in Schmotzer and Reding's (2013) population of nursing students but differed from Barnard et al.'s (2017) population since they surveyed the entire campus. Ethnicity among this sample population was similar to the setting of the project and Barnard et al.'s (2017) population. Schmotzer and Reding's(2013) study had an almost equal number of Hispanics and non-Hispanics attending the nursing school near the U.S.-Mexico border

The majority of the nursing students had high knowledge levels (61.7%, $n = 311$), with only 0.4% having low knowledge levels. This finding differed from the project's hypothesis of the presence of low knowledge levels among nursing students and may be attributed to the medical and healthcare interests of the sample. Additionally, there has been a drive to increase HPV vaccination and education from primary care providers and media over the last several years. The majority of students (79.9%, $n = 357$) reported having HPV education before taking the survey. Undergraduate students generally begin receiving HPV education in their third or fourth year but may have received some HPV information earlier with the change in nursing curriculum at the university. Schmotzer and Reding's (2013) study did not report the knowledge levels in their research, but the majority of the participants answered eight of the 19 (42.1%) knowledge questions incorrectly in the study. A survey of the general student body revealed moderate knowledge levels at the undergraduate level (Barnard et al., 2017). Similar to Barnard et al.'s, (2017) study, most participants incorrectly answered questions on HPV transmission, prevalence, and screening guidelines. Undergraduate nursing students were more likely to miss

questions regarding transmission, cure, and cancer caused by HPV. The lack of knowledge in these areas may require nursing education to increase or reinforce this information. These facts are important in educating patients and preventing the spread of HPV.

Males and females had similar knowledge scores, which mirrored the parent study (Barnard et al., 2013). Schmotzer and Reding's (2013) study did not look at the difference between males and females. Graduate students (M = 15.6, SD = 2.46) had a higher mean score than undergraduate students (M = 14.4, SD = 2.34), $t(444) = -3.92$, $d = -.5$, $p < .001$. This finding was not unexpected since they were in an advanced nursing program to become NPs. Undergraduate students may have had some HPV education, but not to the extent of advanced nursing students. Knowledge was not affected by vaccination status or having previous HPV education.

Nursing students possessed high attitude levels (61.7%, n = 276). Further analysis revealed the majority of students had high levels of perceived susceptibility (97.1%, n = 434), moderate personal and social concerns (91.9%, n = 411), and high levels of confidence in vaccine safety (91.9%, n = 411) and efficacy (82.6%, n = 369). Due to their background and training in healthcare, it is expected for this population to have higher attitude levels compared with the general student population. The general student population had lower (moderate) levels of perceived risk as compared to this project's evaluation of perceived susceptibility (Barnard et al., 2017). The previous nursing study did not examine attitudes and beliefs.

Nurses play a key role in the safety and optimization of the health of families and patients. For all nurses, the primary approach is to educate. This approach may begin with listening for any concerns and addressing those specific concerns with sound research regarding the risks and benefits of vaccination. Knowledge of HPV, consequences, prevention, vaccination

contraindications, and side effects will be helpful in alleviating the fears and concerns of parents and patients. This may happen formally in the clinic or informally in social settings or social media. NPs regularly counsel and order vaccinations for patients. NPs may begin the process of HPV vaccination through anticipatory guidance before the child reaches the age of nine allowing parents time to make a thoughtful, educated decision before the next well-child appointment.

Although several factors influence the decision to vaccinate, attitude was associated with vaccination status (M = 93, SD = 8.28), $t(445) = -5.02$, $d = -.055$, $p < .001$. There was no statistical difference between attitude and gender ($p = .24$), student classification ($p = .67$), or HPV education ($p = .11$). Gender differences in 12 questions were found in the previous study of the general student population, but only in one question for this project (Barnard et al., 2013). In both studies, men were less likely to agree that HPV would be "a severe threat to their health" as compared to females, similar to the previous study. A high percentage (96.3%, n = 426) understood that HPV could be transmitted without having signs or symptoms; however, men did not see themselves at risk. Presenting HPV vaccination as a form of herd immunity may be an effective method to increase uptake. Vaccination decreases health risks for the vaccine recipient but also protects future sexual partners. A nurse's attitude toward vaccination can influence personal uptake of the vaccination but also a parent's decision. If a nurse has a negative attitude towards vaccination, it can dissuade a parent from vaccinating, especially one who trusts the nurse's medical opinion.

The majority of the students (68.9%, n = 308) reported receiving at least one dose. This percentage is higher than previous studies ranging uptake from zero to 68% (Schmotzer & Reding, 2013; Richman, Maddy, Torres, & Goldberg, 2016; Barnard et al., 2017; Johnson & Ogletree, 2017). These statistics also include Schmotzer and Reding's (2013) study in which

28.9% of nursing students reported being vaccinated against HPV. Similar to Barnard et al.'s (2013) study, more females (47.3%) reported having at least one vaccine dose. Participants (73.7% , n = 263) who had routine, preventative health care and previous HPV education reported to have at least one dose of the vaccination. This finding suggests that those who participate in preventative health care, whether it be having a primary care provider or going to the school clinic for routine checks or immunizations, are more likely to be vaccinated. As a healthy, young student, most of the general students may not see the need for primary care. Educating the importance of an annual check, preventative measures, and routine vaccination can decrease the disease and illness.

A small percentage of vaccinated participants (14.6%, n = 45) indicated they did not have HPV education. These participants may have received the vaccination as part of their childhood immunizations and may or may not understand the purpose of the vaccine. Educating parents on HPV and the role of the vaccine can assist them in making informed vaccine decisions for their children. Older students were more likely to be unvaccinated, which may be attributed to vaccine being released in 2006 and the recent advancement in educating and awareness of HPV over the last several years. There were no differences in uptake between undergraduate and graduate students (p = .35).

The PAPM model was used to describe the stage of change unvaccinated participants were occupied. The majority of unvaccinated males, females, undergraduate and graduate students reported being in Stage 1 (unawareness) and Stage 2 (unengaged) (60.4%, n = 84) or Stage 4 (decided against) (17.3%, n = 24). These higher rates of Stage 1 and 2 highlight the need to increasing awareness and education of HPV and risks and benefits of HPV vaccination among students. This study possibly prompted participants in this group to begin thinking about

vaccination. Several students (12.2%, n = 17) intend to be vaccinated within the next six months. These students would benefit with information about HPV, vaccination, and accessing a provider. Although 24 students did decide against vaccination, emphasis on safe, sexual practices and routine pap screens are alternate recommendations nurses can educate these patients on limiting the spread of HPV. Despite the association between having preventative healthcare and uptake, there was no association between lack of preventative healthcare and "never thinking of vaccination" (p = .21).

Stage 7 (maintenance) was not addressed in the survey. Aside from vaccination, other preventative measures for HPV are safe, sexual practices (condom and dental dam use). It is important to educate patients on the abstinence if genital warts are present, because the virus is more likely to be transmitted during this time. Although there is not a cure for genital warts, there are treatment options such as topicals and surgery. For females, routine pap tests are essential for early screening of HPV. Despite no recommendations for screening for HPV in males, men who have sex with men who are considered high-risk may consider periodic anal pap tests (CDC, 2015)

Consistent with the literature, provider recommendation was a significant factor for vaccination (Gilkey et al., 2016; Barnard et al., 2017; Kellogg et al., 2019). In this sample, the family influence was markedly significant. Participants were 39.6 times more likely to be vaccinated if the family recommended vaccination as compared to Barnard et al.'s (2017) finding of a 1.89 increased likelihood. Similar to Barnard et al.'s (2017) finding, participants in this sample were 10.6 times more likely to be vaccinated if a provider recommended the vaccine. When children are young, the medical decision making generally belongs to the parents. In the previous study, both provider and family/friends influence were factors to vaccination (Barnard

et al., 2017). Family and parental beliefs concerning vaccination certainly play a significant role in the health of a young child. Young adults may not recall a provider's recommendation or education on HPV from when they are young. Parents make the ultimate decision for young children and adolescents' vaccinations. It is part of the nurse's role to educate the parents and patients. Discussing the vaccine as a cancer prevention method may highlight the importance of the vaccine to both parties.

Practice Implications

Nurses play a key role in safety and optimizing the health of families and patients. For all nurses, the primary approach is to educate. This may begin with listening for any concerns and addressing specific worries with research and the risks and benefits of vaccination. Knowledge of HPV, consequences, prevention, vaccination contraindications and side effects will help alleviate the fears and concerns of parents. This may happen formally in the clinic or informally in social settings or social media. With the NPs' scope of practice, they may regularly care for patients and order the HPV vaccine. NPs may begin the process of HPV vaccination through anticipatory guidance with families when a child is eight or nine years old. This allows parents time to make a thoughtful, educated decision before their next well-child appointment.

It is also important for nurses to not only be knowledgeable but also have a favorable attitude towards vaccination. Confidence in the safety and efficacy of the vaccine can affect parental decisions in vaccination. A positive attitude can make vaccination seem more favorable to parents and patients, especially in those who trust and value the medical opinion of the RNs and NPs at the clinic.

The results of the study may assist nursing educators in the effectiveness of their HPV education in their program. The students of this program did have high knowledge levels, but

educators can emphasize transmission, prevalence, and screening guidelines. Knowledge and attitudes towards HPV and vaccination also have implications from a public health perspective. The benefits of the vaccine are health optimization, cost, reduction of possible emotional distress, and mitigation of viral transmission, warts, and cancer. Fourteen million people are infected yearly with HPV, and usually, HPV resolves without treatment (CDC, 2017). When it does not resolve, it can cause warts and cancer. Uptake of the vaccine can prevent the spread of disease and decrease the risk of warts and cancer in an especially vulnerable community.

Strengths and Limitations

A strength of this project included a high response rate and sample size. Over 60% (*n* = 507) of nursing students started the survey. This project had 447 surveys included in the analysis compared to the parent study (*n* = 383). As a replication study, this project was able to support the previous study. This study also included both undergraduate and graduate nursing students, instead of solely undergraduate students. To the project leader's knowledge, this was the second study to use the PAPM to assess college students' knowledge, attitudes, and uptake of the HPV vaccine. This project was the only study to address the knowledge gap concerning HPV and American nursing students since 2013. As future nurses and providers, providing accurate information and evidence about HPV gives patients, parents, and the community the means to make an informed decision about being vaccinated.

Limitations of this study were the use of cross-sectional design and a self-reported survey. The self-reported survey was not proctored; therefore, participants had the opportunity to search for the information on HPV while taking the survey, possibly skewing the data on knowledge. This was a convenience sample at a private, religious, liberal arts university of nursing students in the Southeastern U.S. Generalizability was limited because nursing students are assumed to

have more healthcare knowledge compared to the general college students. It also lacked generalizability to nursing students because the sample came from a private, religious university. This is not reflective of many schools of nursing in the United States. Although adapted from a previous study, this instrument was not tested for reliability and validity. Data may have been skewed with some participants being older or in a long-term, monogamous relationship and viewed this topic as inapplicable. Social desirability response bias may have been present as the target population was nursing students and answered questions in a manner congruent with health care's pro-stance on vaccination. Finally, this project did not ask questions on completion of all doses of the HPV vaccine. Some participants may have started the process and have forgotten or decided to stop the vaccinations. Although the data will show if they have received the vaccine, it does not indicate if they are up to date on HPV vaccinations. This project did not follow-up on student's vaccination status or participation in preventative screening.

Conclusion

This replication deepened the insight into the knowledge, beliefs, and uptake of the HPV and HPV vaccination in undergraduate and graduate nursing students. This study also contributed to closing the gap in research concerning nursing students and HPV. This study supported that nursing students, who will be at the forefront of providing health care, have high levels of knowledge and positive attitudes toward HPV and HPV vaccination. Without minimizing concerns and worries for vaccination, nurses can educate parents on how the benefits outweigh the risks for vaccination. The use of the Precaution Adoption Process Model helped identify the stage of change the unvaccinated students resided. Developing appropriate interventions for each stage aids in uptake. Finally, from a public health perspective, increasing the uptake of vaccination decreases transmission and risk of warts and cancer in a community.

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Figure 1: *Precautionary Adoption Process Model* (adapted from Weinstein, Sandman, and Blalock, 2008).

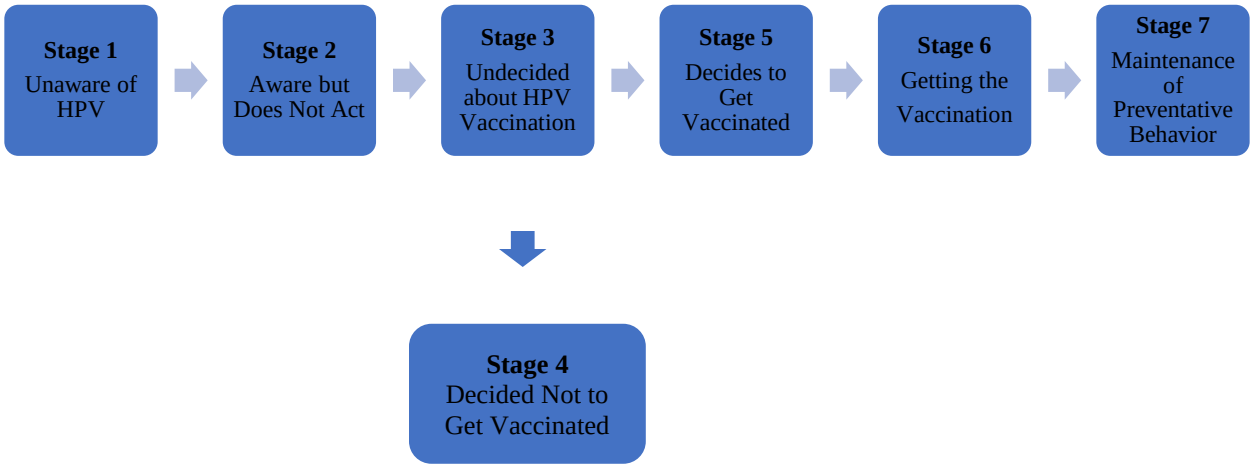

Table 1: Demographics

Age	
Mean Age	22.5 (SD=4.69)
Range	18 – 62
18-20	37.1% (*n* = 166)
21-29	55.9% (*n* = 250)
>30	6.9% (*n* = 31)
Gender	
Male	6.9% (31)
Female	93.1% (416)
College Classification	
Undergraduate	84.1% (*n* = 376)
Graduate	15.7% (*n* = 70)
Ethnicity	
Caucasian	87.3% (*n* = 391)
African-American	2% (*n* = 9)
Hispanic	3.4% (*n* = 15)
Middle Eastern	1.6% (*n* = 7)
Asian	3.4% (*n* = 15)
Other	2.2% (*n* = 10)
Preventative Healthcare	
No	11% (*n* = 49)
Yes	89% (*n* = 398)
Vaccination Uptake	
No Vaccinations	31.1% (*n* = 139)
1 Dose	17.2% (*n* = 77)
2 or More doses	51.7% (*n* = 231)
$\geq$ 1 Vaccination Dose	
Age 18-20	37.3% (*n* = 115)
Age 21- 29	58.8% (*n* = 181)
$\geq$ Age 30	3.9% (*n* = 12
HPV Education	
No	20.1% (*n* = 90)
Yes	79.9% (*n* = 357)

Table 2: Knowledge Scores for All Participants

Knowledge	
Mean Knowledge Score	14.61 (*SD* =2.39)
Range	3 - 19
Low	.4% (*n* = 2)
Moderate	30% (*n* = 134)
High	69.6% (*n* = 311)

Table 3: *t*-Test for Independent Groups – Knowledge

Knowledge Mean (*SD*)	**Gender**					
	Male	**Female**	***df***	***t***	***d***	***p***
	14.84 (2.62)	14.6 (2.37)	445	.544	.096	.59
	Student Classification					
	Undergraduate	**Graduate**	***df***	***t***	***d***	***p***
	14.4 (2.34)	15.6 (2.46)	444	-3.92	-.50	<.001
	Uptake					
	None	**≥1**	***df***	***t***	***d***	***p***
	14.53 (2.56)	14.65 (2.31)	445	-4.78	-.049	.63
	HPV Education					
	Yes	**No**	***df***	***t***	***d***	***p***
	14.3 (2.33)	14.7 (2.41)	444	-1.29	-.17	.2

Table 4: Knowledge – Correct Answers

Questions	All	Gender				Student Classification			
		Male	Female	φ	*p*	Undergrad	Graduate	φ	*p*
1. Genital warts are caused by HPV	72% (*n* = 322)	80.6% (*n* = 25)	71.4% (*n* = 297)	-.052	.37*	70.7% (*n* = 266)	78.6% (*n* = 55)	.063	.18
2. HPV can cause cervical cancer	95.3% (*n* = 426)	90.3% (*n* = 28)	95.7% (*n* = 398)	.064	.17**	94.4% (*n* = 355)	100%(*n* = 70)	.096	.058**
3. Abnormal pap tests may indicate that a woman has HPV	87.9% (*n* = 393)	96.8% (*n* = 30)	87.3% (*n* = 363)	-.077	.16**	87.8% (*n* = 330)	88.6% (*n* = 62)	.009	1**
4. HPV can cause penile cancer	60.2% (*n* = 269)	58.1% (*n* = 18)	60.3% (*n* = 251)	.012	.80	58.5% (*n* = 220)	68.6% (*n* = 48)	.075	.12
5. HPV is transmitted by skin-to-skin contact	49.2% (*n* = 220)	54.8% (*n* = 17)	48.8% (*n* = 203)	-.031	.52	47.1% (*n* = 177)	61.4% (*n* = 43)	.1	.027
6. HPV infects both men and women equally	61.1% (*n* = 273)	58.1% (*n* = 18)	61.3% (*n* = 255)	.017	.72	61.2% (*n* = 230)	60% (*n* = 42)	-.009	.85
7. HPV is sexually transmitted	96.6% (*n* = 432)	96.8% (*n* = 30)	96.6% (*n* = 402)	-.002	1**	96.3% (*n* = 362)	98.6% (*n* = 69)	.046	.48**

8. I can transmit HPV even if I don't have symptoms	95.3% (*n* = 426)	96.8% (*n* = 30)	95.2% (*n* = 396)	-.019	1**	94.9% (*n* = 357)	97.1% (*n* = 68)	.038	.55**
9. Most persons with HPV have no visible signs or symptoms	91.1% (*n* = 407)	93.5% (*n* = 29)	90.9% (*n* = 378)	-.024	1**	90.7% (*n* = 341)	92.9% (*n* = 65)	.028	.72*
10. HPV can lay dormant in the body for years without symptoms	96% (*n* = 429)	96.8% (*n* = 30)	95.9% (*n* = 399)	-.011	1**	95.5% (*n* = 359)	98.6% (*n* = 69)	.057	.33**
11. There is a vaccine available to prevent HPV infection	94.6% (*n* = 423)	100% (*n* = 31)	100% (*n* = 394)	.013	.68	94.1% (*n* = 354)	98.6% (*n* = 69)	.073	.15**
12. There is no cure for HPV	70.5% (*n* = 315)	74.2% (*n* = 23)	70.2% (*n* = 292)	-.022	.79*	68.6% (*n* = 258)	81.4% (*n* = 57)	.1	.031
13. Most adults are infected with HPV	38% (*n* = 170)	38.7% (*n* = 12)	38% (*n* = 158)	-.004	.94	37.2% (*n* = 140)	42.9% (*n* = 30)	.042	.37
14. HPV infection among men is rare	80.1% (*n* = 358)	74.2% (*n* = 23)	80.5% (*n* = 335)	.040	.54*	79.8% (*n* = 300)	81.4% (*n* = 57)	.015	.75
15. HPV can cause oral and throat cancer	61.5% (*n* = 275)	67.7% (*n* = 21)	61.1% (*n* = 254)	-.035	.46	58.2% (*n* = 219)	78.6% (*n* = 55)	.152	.001

16. HPV can cause anal cancer	70.2% (*n* = 314)	64.5% (*n* = 20)	70.7% (*n* =294)	.034	.47	68.4% (*n* = 257)	80% (*n* = 56)	.093	.05
17. There is a routine HPV test for men	55.7% (*n* = 249)	61.3% (*n* = 19)	55.3% (*n* = 230)	-.031	.52	54.3% (*n* = 204)	64.3% (*n* = 45)	.073	.12
18. There are many types of HPV	91.1% (*n* = 407)	93.5% (*n* = 29)	90.9% (*n* = 378)	-.024	1**	91% (*n* = 342)	91.4% (*n* = 64)	.006	1*
19. The HPV vaccine covers certain HPV strains	94.9% (*n* = 424)	93.5% (*n* = 29)	95% (*n* = 395)	.016	.67**	93.9% (*n* = 353)	100% (*n* = 70)	.10	.035**

* Yates continuity correction

**Fisher's Exact Test

φ = effect size

Table 5: Attitude Scores for All Participants

Attitudes	
Mean Score	91.2 (*SD* = 9.99)
Range	36 - 110
Low	0.4% (*n* = 2)
Moderate	37.8% (*n* = 169)
High	61.7% (*n* = 276)
Perceived Susceptibility	
Mean Score	41.63 (*SD* = 5.58)
Range	18 - 50
Low	0.2% (*n* = 1)
Moderate	2.7% (*n* = 12)
High	97.1% (*n* = 434)
Concerns	
Mean Score	22.1 (*SD* = 4.16)
Range	7 - 33
Low	4.3% (*n* = 19)
Moderate	91.9% (*n* = 411)
High	3.8% (*n* = 17)
Vaccine Safety	
Mean Score	19.2 (*SD* = 3.86)
Range	5 - 25
Low	0.9% (*n* = 4)
Moderate	32% (*n* = 143)
High	67.2% (*n* = 300)
Vaccine Efficacy	
Mean	4.2 (*SD* = 1)
Range	1 – 5
Low	6.9% (*n* = 31)
Moderate	10.5% (*n* = 47)
High	82.6% (*n* = 369)

Table 6: *t*-Test for Independent Groups – Attitudes

Attitudes Mean (*SD*)	**Gender**					
	Male	**Female**	***df***	***t***	***d***	***p***
	89.2 (8.2)	91.4 (10.1)	445	-1.18	-.024	.24
	Student Classification					
	Undergraduate	**Graduate**	***df***	***t***	***d***	***p***
	91.3 (9.85)	90.8 (10.54)	444	.42	-.049	.67
	Uptake					
	None	**≥1**	***df***	***t***	***d***	***p***
	87.3 (12.1)	93 (8.28)	198.3	-5.02	-.055	<.001
	HPV Education					
	Yes	**No**	***df***	***t***	***d***	***p***
	91.5 (9.76)	89.6 (10.72)	445	-1.61	.19	.11

Table 7: Attitudes - Percent "Strongly Agree" and "Somewhat Agree"

Questions	All	Gender (N=447)				Student Classification (N =. 446)			
		Male	Female	φ	*p*	Undergrad	Graduate	φ	*p*
1. I am at risk for getting HPV	17.4% (*n* = 78)	12.9% (*n* = 4)	17.8% (*n* = 74)	.03	.63**	18.1% (*n* = 68)	14.3% (*n* = 10)	-.036	.44
2. I am likely to contract the HPV virus in my lifetime	26.6% (*n* = 119)	22.6% (*n* = 7)	26.9% (*n* = 112)	.03	.75*	27.1% (*n* = 102)	24.3% (*n* = 17)	-.023	.62
3. HPV would be a severe threat to my health	74% (*n* = 331)	58.1% (*n* = 18)	75.2% (*n* = 313)	.1	.04	75.5% (*n* = 285)	65.7% (*n* = 46)	-.084	.077
4. HPV would be a serious threat to my sex life	72.3% (*n* = 323)	64.5% (*n* = 20)	72.8% (*n* = 303)	.05	.32	72.6% (*n* = 273)	70% (*n* = 49)	-.021	.65
5. HPV would make it difficult to find a long-term partner	58.8% (*n* = 263)	54.8% (*n* = 17)	59.1% (*n* = 246)	.02	.64	60.4% (*n* = 227)	51.4% (*n* = 36)	-.066	.16
6. I would tell my sexual partner if I had HPV	93.3% (*n* = 417)	93.5 % (*n* = 29)	93.3% (*n* = 388)	-.003	1**	93.9% (*n* = 353)	91.4% (*n* = 64)	-.036	.62*
7. If I had HPV I would be at risk for transmitting it to others	87.7% (*n* = 392)	83.9% (*n* = 26)	88% (*n* = 363)	.032	.7*	87.5% (*n* = 329)	90% (*n* = 63)	.028	.7*

8. I would need the HPV vaccine if I had a high number of sexual partners	89% (*n* = 398)	90.3% (*n* = 28)	88.9% (*n* = 370)	-.01	1 ***	88.8% (*n* = 334)	91.4% (*n* = 64)	.031	.66*
9. I would need the HPV vaccine if I had multiple sexual partners	90.2% (*n* = 403)	87.1% (*n* = 27)	90.4% (*n* = 376)	.03	.53**	90.2% (*n* = 339)	91.4% (*n* = 64)	.016	.91*
10. I would need the HPV vaccine if I had a family history of cervical cancer	84.8% (*n* = 379)	71% (*n* = 22)	85.8% (*n* = 357)	.11	.05*	84.8% (*n* = 319)	85.7% (*n* = 60)	.009	.85
11. I would need the HPV vaccine if I regularly used a condom when engaging in sexual activity	78.7% (*n* = 352)	74.2% (*n* = 23)	79.1% (*n* = 329)	.03	.68*	79% (*n* = 297)	78.6% (*n* = 55)	-.004	.94
12. I would need the HPV vaccine if I engaged in	80.3% (*n* = 359)	67.7% (*n* = 21)	81.3% (*n* = 338)	.13	.07	81.6% (*n* = 305)	74.3% (*n* = 52)	-.068	.15

	sexual activity with a same sex partner								
13.	I would need the HPV vaccine if I had a steady long-term partner	71.4% (*n* = 319)	58.1% (*n* = 18)	72.4% (*n* = 301)	.08	.09	71.8% (*n* = 270)	70% (*n* = 49)	-.015	.77
14.	I would need the HPV vaccine if I smoked	48.8% (*n* = 218)	54.8% (*n* = 17)	48.3% (*n* = 201)	-.03	.48	49.2% (*n* = 185)	47.1% (*n* = 33)	-.015	.75
15.	I would need the HPV vaccine if I engaged in sexual activity with a partner of the opposite sex	87% (*n* = 389)	83.9% (*n* = 26)	92.5% (*n* = 363)	.08	.17*	87.5% (*n* = 329)	85.7% (*n* = 60)	-.019	.68
16.	I would need the HPV vaccine if I engage in unprotected sexual activity	91.9% (*n* = 411)	83.9% (*n* = 26)	92.8% (*n* = 385)	.084	.085**	91.8% (*n* = 345)	94.3% (*n* = 66)	.034	.63**
17.	The HPV vaccine has significant side effects	27.7% (*n* = 124)	22.6% (*n* = 7)	28.1% (*n* = 117)	.031	.65*	29% (*n* = 109)	21.4% (*n* = 15)	-.061	.2
18.	The HPV vaccine was	68.9% (*n* = 308)	54.8% (*n* = 17)	70% (*n* = 291)	.083	.08	68.4% (*n* = 257)	72.9% (*n* = 51)	.035	.45

	thoroughly tested								
19.	The HPV vaccine is likely to cause health problems	21.9% (*n* = 98)	25.8% (*n* = 8)	21.6% (*n* = 90)	-.026	.75*	23.9% (*n* = 89)	12.9% (*n* = 9)	-.095	.064*
20.	I could get HPV from the vaccine	11% (*n* = 49)	3.2% (*n* = 1)	11.5% (*n* = 48)	.068	.23**	11.4% (*n* = 453	8.6% (*n* = 6)	-.033	.62*
21.	I am concerned my family would find out if I got the HPV vaccine	14.8% (*n* = 66)	19.4% (*n* = 6)	14.4% (*n* = 60)	-.04	.63*	15.7% (*n* = 59)	8.6% (*n* = 6)	-.073	.17*
22.	I am concerned my friends would find out if I got the HPV vaccine	12.5% (*n* = 56)	16.1% (*n* = 5)	12.3% (*n* = 51)	-.04	.73*	13.6% (*n* = 51)	7.1% (*n* = 5)	-.07	.19*
23.	The HPV vaccine is an effective way to prevent HPV infection	82.6% (*n* = 369)	77.4% (*n* = 24)	82.9% (*n* = 345)	.04	.59*	82.2% (*n* = 309)	85.7% (*n* = 60)	.034	.47
24.	Overall, the HPV vaccine is safe	84.8% (*n* = 379)	77.4% (*n* = 24)	85.3% (*n* = 355)	.06	.36	84% (*n* = 316)	90% (*n* = 63)	.061	.27

* Yates continuity correction
**Fisher's Exact Test
φ (Phi) = effect size

Table 8: Chi-square Analysis for Independent Groups – Uptake

Uptake (None)	**Belief Vaccine Causes Problems**			
	Yes	**No**	**φ**	***p***
	78.4% (*n* = 69)	97.4% (*n* = 300)	.58	<.001
	Offered (in general)			
	Yes	**No**	**φ**	***p***
	2.3%% (*n* = 7)	49.6% (*n* = 69)	-.58	<.001
Uptake (≥1 dose)	**Gender**			
	Male	**Female**	**φ**	***p***
	38.7% (*n* = 12)	71.2% (*n* = 296)	-.18	<.001
	Student Classification			
	Undergraduate	**Graduate**	**φ**	***p***
	69.9% (*n* = 263)	64.3% (*n* = 45)	-.045	.35
	Preventative Healthcare			
	Yes	**No**	**φ**	***p***
	71.6% (*n* = 285)	46.9% (*n* = 23)	.17	<.001
	HPV Education			
	Yes	**No**	**φ**	***p***
	73.7% (*n* = 263)	50% (*n* = 45)	-.21	<.001
	Provider Offered			
	Yes	**No**	**φ**	***p***
	88.4% (*n* = 259)	31.8% (*n* = 49)	.58	<.001
	Belief Virus Causes Problems			
	Yes	**No**	**φ**	***p***

	26.9% (*n* = 83)	73.1% (*n* =225)	.16	.001
	Belief Vaccine Causes Problems			
	Yes	**No**	**φ**	***p***
	21.6% (*n* = 30)	78.4% (*n* = 109)	-.32	<.001

Table 9: PAPM Staging

Stage	All	Gender		Student Classification	
		Male	Female	Undergrad	Graduate
Stages 1 and 2: I never seriously thought about getting the HPV vaccination.	60.4% (*n* = 84)	78.9% (*n* = 15)	57.5% (*n* = 69)	61.9% (*n* = 70)	52% (*n* = 13)
Stage 3: I have seriously thought about getting the HPV vaccination but have not thought about it in past 6 months.	10.1% (*n* =14)	10.5% (*n* = 2)	10% (*n* = 12)	10.6% (*n* = 12)	8% (*n* = 2)
Stage 4: I have seriously thought about getting the HPV vaccination but decided against it.	17.3% (*n* = 24)	5.3% (*n* = 1)	19.2% (*n* = 23)	14.2% (*n* = 16)	32% (*n* = 8)
Stage 5: I am seriously thinking about getting the HPV vaccination sometime within the next 6 months.	10.8% (*n* = 15)	5.3% (*n* = 1)	11.7% (*n* = 14)	11.5% (*n* = 13)	8% (*n* = 2)
Stage 5, transitioning to Stage 6: I plan to get the HPV vaccination within the next month.	1.4% (*n* = 2)	0% (*n* = 0)	1.7% (*n* = 2)	1.8% (*n* = 2)	0% (*n* = 0)

Table 10: Chi-square Analysis for Preventative Care and Never Getting the Vaccine

	Have Never Thought about Getting the HPV Vaccine	**Have Thought about Getting HPV Vaccine**
Preventative Healthcare	22.6% (*n* = 19)	12.7% (*n* = 7)
No Preventative Healthcare	77.4% (*n* = 65)	87.3% (*n* = 48)

Pearson Chi-square: χ^2 (1, *N* = 139) = 2.14, φ = .12, *p* = .21 (Yates)

Table 11: Factors Associated with Vaccination

	β (SE)	Wald Statistic	*df*	*p*	95% CI for Odds Ratio		
					Lower	Odds Ratio	Upper
Provider Offered	2.357 (.412)	32.807	1	.000	4.715	10.564	23.669
Family Wanted	3.678 (.623)	34.907	1	.000	11.680	39.566	134.032
Friends Wanted	-.262 (1.240)	.045	1	.832	.068	.769	8.736
Belief the Vaccine Causes Problems	-2.528 (.688)	.688	1	.000	.021	.080	.307
Belief the Virus Causes Problems	.873 (.440)	.440	1	.047	1.011	2.394	5.668
No One Offered	-2.043	.589	1	.001	.041	.130	.411
Constant	-.997	.400	1	.013		.369	

CI = Confidence interval; Hosmer & Lemenshow χ^2 (6, N = 447) = 8.358, p = .21; Nagelkerke R^2 = .501; Cox & Snell R^2 = .71.

Appendix A: Letter of Invitation

October 1, 2019

Dear Belmont Nursing Students,

We are writing to ask for your help by participating in a short, online survey on human papilloma virus (HPV) and HPV vaccination. The purpose of this project is to assess knowledge and concerns of HPV and HPV Vaccination in nursing students. This survey does not ask questions about your personal or sexual history.

Undergraduate and graduate participants will have the opportunity to win one of four $25 Amazon gift cards through a randomized drawing. All nursing students, 18 years and older, are eligible to participate. The survey should take approximately 5 minutes to complete. Your participation is voluntary, and your responses will be kept confidential and anonymous. If you choose to participate you may choose to discontinue participation at any time and you may choose any of the survey questions that you do not wish to answer. Your completion of the survey and returning it to the investigators indicates your consent to participate in this study. If you have any questions, please contact Joanna Plumb via the contact information below.

You can access the online, mobile -friendly survey through these options:
Survey on HPV and HPV Vaccination
Or copy and paste the URL code into your internet browser:
https://belmont.az1.qualtrics.com/jfe/form/SV_domFUFv6m57F2UR
Or scan the QR code

Thank you for your participation in this survey,

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Appendix B: QR Code

HPV and HPV Vaccine Survey

You may access the survey through the link sent to your school email

OR scan this QR Code:

Thank you for your participation!

Appendix C: HPV Vaccination Survey

Demographics

Q1 Are you 18 or older?

- ○ Yes
- ○ No

Q2 How old are you? *Please enter a 2-digit whole number.* _____

Q3 Are you an undergraduate or graduate student?

- ○ Undergraduate
- ○ Graduate

Q4 Have you had education on HPV or HPV vaccination?

- ○ Yes
- ○ No

Q5 What is your ethnicity?

- ○ Caucasian
- ○ African American
- ○ Hispanic
- ○ Middle Eastern
- ○ Asian
- ○ Other

Q6 Are you receiving routine, preventative health care?

- ○ Yes
- ○ No

Knowledge

Q7 Please answer the following true or false questions regarding HPV and the HPV vaccine.

	True	False
Genital warts are caused by HPV	○	○
HPV can cause cervical cancer	○	○
Abnormal pap tests may indicate that a woman has HPV	○	○
HPV can cause penile cancer	○	○
HPV is transmitted by skin-to-skin contact	○	○
HPV infects both men and women equally	○	○
HPV is sexually transmitted	○	○
I can transmit HPV even if I don't have symptoms	○	○
Most persons with HPV have no visible signs or symptoms	○	○
HPV can lay dormant in the body for years without symptoms	○	○
There is a vaccine available to prevent HPV infection	○	○
There is no cure for HPV	○	○
Most adults are infected with HPV	○	○
HPV infection among men is rare	○	○
HPV can cause oral and throat cancer	○	○
HPV can cause anal cancer	○	○
There is routine HPV screening for men	○	○
There are many types of HPV	○	○
The HPV vaccine covers certain HPV strains	○	○

Concerns and Opinions about HPV

Q8 Please rate your concerns and opinions regarding HPV.

	Strongly agree	Somewhat Agree	Neutral	Somewhat disagree	Strongly disagree
I am at high risk for getting HPV	○	○	○	○	○
I am likely to contract the HPV virus in my lifetime	○	○	○	○	○
HPV would be a severe threat to my health	○	○	○	○	○
HPV would be a serious threat to my sex life	○	○	○	○	○
HPV would make it difficult to find a long-term partner	○	○	○	○	○
I would tell my sexual partner if I had HPV	○	○	○	○	○
If I had HPV I would be at risk for transmitting it to others	○	○	○	○	○
I would need the HPV vaccine if I had a high number of sexual partners	○	○	○	○	○
I would need the HPV vaccine if I had multiple sexual partners	○	○	○	○	○
I would need the HPV vaccine if I had a family history of cervical cancer	○	○	○	○	○
I would need the HPV vaccine if I regularly used a condom when engaging in sexual activity	○	○	○	○	○

	Strongly agree	Somewhat Agree	Neutral	Somewhat disagree	Strongly disagree
I would need the HPV vaccine if I engaged in sexual activity with a same sex partner	○	○	○	○	○
I would need the HPV vaccine if I had a steady long-term partner	○	○	○	○	○
I would need the HPV vaccine if I smoked	○	○	○	○	○
I would need the HPV vaccine if I engaged in sexual activity with a partner of the opposite sex	○	○	○	○	○
I would need the HPV vaccine if I engage in unprotected sexual activity	○	○	○	○	○
The HPV vaccine has significant side effects	○	○	○	○	○
The HPV vaccine was thoroughly tested	○	○	○	○	○
The HPV vaccine is likely to cause health problems	○	○	○	○	○
I could get HPV from the vaccine	○	○	○	○	○
I am concerned my family would find out if I got the HPV vaccine	○	○	○	○	○

	Strongly agree	Somewhat Agree	Neutral	Somewhat disagree	Strongly disagree
I am concerned my friends would find out if I got the HPV vaccine	○	○	○	○	○
The HPV vaccine is an effective way to prevent HPV infection	○	○	○	○	○
Overall, the HPV vaccine is safe	○	○	○	○	○

Q9 How many HPV vaccine doses have you received?

- ○ 0
- ○ 1
- ○ 2 or more

Q10 Have you thought about getting the HPV vaccine?

- ○ I never seriously thought about getting the HPV vaccination.
- ○ I have seriously thought about getting the HPV vaccination but have not thought about it in past 6 months.
- ○ I have seriously thought about getting the HPV vaccination but decided against it.
- ○ I am seriously thinking about getting the HPV vaccination sometime within the next 6 months
- ○ I plan to get the HPV vaccination within the next month.

Q11 Which factors influenced you to receive the vaccine or not to receive the vaccine?

- ☐ Provider Offered Vaccine
- ☐ Family wants you to get vaccine
- ☐ Friends wants you to get vaccine
- ☐ Belief that the vaccine causes health problems
- ☐ Belief that the virus causes health problems
- ☐ No one has offered the vaccine

Q12 What is your gender?
We recognize there are multiple genders, but due the nature of this study, we ask for your biological gender (sex you are born with).

- ○ Male
- ○ Female
- ○ Other _____