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UKWUOMA ONAEDO ILOZUMBA Date

HPV VACCINATION KNOWLEDGE AND ATTITUDES AMONGST STUDENTS IN TWO AND FOUR YEAR COLLEGES IN ATLANTA, GEORGIA

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GEORGIA SOUTHERN UNIVERSITY

2008

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An abstract of

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Abstract

HPV VACCINATION KNOWLEDGE AND ATTITUDES AMONGST STUDENTS IN TWO AND FOUR YEAR COLLEGES IN ATLANTA, GEORGIA

By UKWUOMA ONAEDO ILOZUMBA

Introduction: HPV is the most commonly transmitted STI in the United States. With the FDA approval of two vaccines for HPV infection prevention there has been increased research in the field, assessing knowledge levels among various groups, especially college students. Researchers have also evaluated people's attitudes towards HPV and the HPV vaccination by utilizing the Health Belief Model**. Objective:** The present study aims to assess knowledge and attitudes about HPV and the HPV vaccination among college students in two- and four-year post-secondary institutions in Atlanta, Georgia.

Methods: In Spring 2011, a convenience sample of 792 students at two-year and four-year colleges in Atlanta were surveyed. The 41-item paper and pencil questionnaire included items for demographic information, HPV vaccination status, HPV knowledge, and HPV related attitudes.

Results: There were statistical differences in knowledge scores between those who attended two-year institutions (mean= 7.73, standard deviation=1.66) and participants at four year colleges (mean= 8.17, standard deviation= 1.51) (t=-3.94, $p<.0001$, (CI 1.51-1.67)). Females (mean=8.15, standard deviation=1.50) also performed significantly better on the knowledge test than males (mean=7.67, standard deviation=1.69) (t = -4.08, $p<.0001$).

Conclusion: The data revealed that students at four-year institutions were more likely than students at two-year colleges to score better on a knowledge test about HPV. Females and vaccinated students also performed better than males and non-vaccinated students on the knowledge test.

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Chapter 1

Introduction

Human Papillomavirus (HPV) is one of the most common sexually transmitted infections (STIs) in the United States (Conroy et al., 2009). Approximately 20 million people are infected with HPV and about six million new infections occur annually (Allen et al., 2009). About 50% of sexually active men and women will get the STI at some point in their lives. Over half of the infected population is comprised of females aged 15-24 (Allen, et al., 2009) and they are more severely affected by the infection and the clinical complications of HPV. The infection is generally asymptomatic and can be transmitted unknowingly. Lingering infections can also lead to mortality and morbidity (Daley et al., 2010). Men transmit the virus to their female partners, however they also suffer from HPV related morbidity and mortality. Approximately 5% of anal cancer and 50% of penile cancer in men is attributable to HPV (Sundstrom et al., 2010). One of the complications of HPV in women is cervical cancer – the virus is found in almost 100% of cervical cancer cases (Cermak, Cottrell, & Murnan, 2010). There were over 11,000 new cases of cervical cancer diagnosed in 2008, and cervical cancer accounts for over 4,000 deaths annually (Downs, Scarinci, Einstein, Collins, & Flowers, 2010).

There are about 40 strains of HPV that lead to a variety of health complications including genital warts and anogenital cancers affecting the vulva, vagina and cervix of females, and the penis of males (Daley, et al., 2010). HPV 16 and 18 are considered high-risk oncogenic HPV types and are associated with approximately 99.7% of all cervical cancers. HPV 16 alone is believed to be associated with about 50% of all cervical cancers (Trottier & Franco, 2006). HPV 11 and 6 are included among the low-risk strains of HPV which are responsible for abnormal Papanicolaou (Pap) test results and genital warts. About 90% of all HPV cases will resolve themselves within two years (Control, 2009).

However, when HPV persists without detection it can lead to cervical cancer, and there is also a possibility of re-infection with a different strain of the virus.

There are currently two vaccines approved by the Food and Drug Administration (FDA) to prevent HPV; Cervarix (GlaxoSmithKline) and Gardasil (Merck). Gardasil is a quadrivalent vaccine protecting against cervical cancer and genital warts (HPV 16, 18, 6, 11). Cervarix is bivalent and protects against HPV 16 and 18. Both vaccinations are approved for females ages nine to 26. To be fully vaccinated, three shots of each vaccination are required (Control, 2009). Gardasil has been shown to be about 100% effective at preventing HPV 16, 18, 6, and 11 infections (Daley, et al., 2010). Cervarix has been shown to be more than 90% effective against infection (Sundstrom, et al., 2010). The vaccines should ideally be administered between the ages of nine to 12, before the onset of sexual activity (Control, 2009). In 2009, the FDA approved the use of the quadrivalent vaccine for boys and men aged nine to 26 (Elbasha & Dasbach, 2010). More recent studies have shown that these HPV vaccines have high efficacy in men (Elbasha & Dasbach, 2010).

Due to the relatively recent introduction of the vaccine, most current college students did not have the vaccine available to them prior to the onset of sexual activity. Considering the large number of HPV infected people, especially young college-aged students, HPV has significant public health implications. Seventy-five to ninety percent of college students report being sexually active and having more than two sexual partners yearly (Daley, et al., 2010). These sexual behaviors put young women at higher risk and make catch-up vaccinations very important (Daley, et al., 2010; Sundstrom, et al., 2010). Catch-up vaccinations are also helpful because only a small portion of these college women and men will have been previously exposed to the four main cervical cancer and genital warts causing strains of HPV (Sundstrom, et al., 2010).

Previous HPV studies have examined attitudes of college students towards HPV and the vaccination (Black, Zimet, Short, Sturm, & Rosenthal, 2009; Conroy, et al., 2009; Downs, et al., 2010; Frazer, 2006; Sandfort & Pleasant, 2009). These studies have found that students' attitudes and beliefs about HPV and the vaccination are correlated with their odds of getting vaccinated (Caskey, Lindau, & Alexander, 2009; Stupiansky, Rosenthal, Wiehe, & Zimet, 2010). They have also found that previous STI history or positive Pap tests are more highly correlated with positive attitudes towards the HPV vaccination among college-aged students (Short et al., 2010; Wong & Sam, 2010).

To date, most studies on the knowledge, acceptance and attitudes of HPV vaccination have been limited to college students attending four-year institutions (Allen, et al., 2009; Boehner, Howe, Bernstein, & Rosenthal, 2003; Caskey, et al., 2009; Downs, et al., 2010; Gerend & Magloire, 2008; Kahn, Rosenthal, Hamann, & Bernstein, 2003; Sandfort & Pleasant, 2009). However, little is known about the knowledge and attitudes among students in two-year institutions. Past behavioral research has shown that important differences can exist between these two populations in regard to preventative action and behavior change initiation (Berg et al., 2009; Sanem, Berg, An, Kirch, & Lust, 2009).

The purpose of this study is to fill this gap in the literature by surveying the attitudes, knowledge and receipt of the vaccine among college students in both two- and four-year colleges. The study will also explore differences in the knowledge obtaining habits of students in two- and four-year colleges. Additionally, the study will explore connections between sexual history, STI history, and college students' knowledge and attitudes about the HPV vaccination.

Theoretical Framework

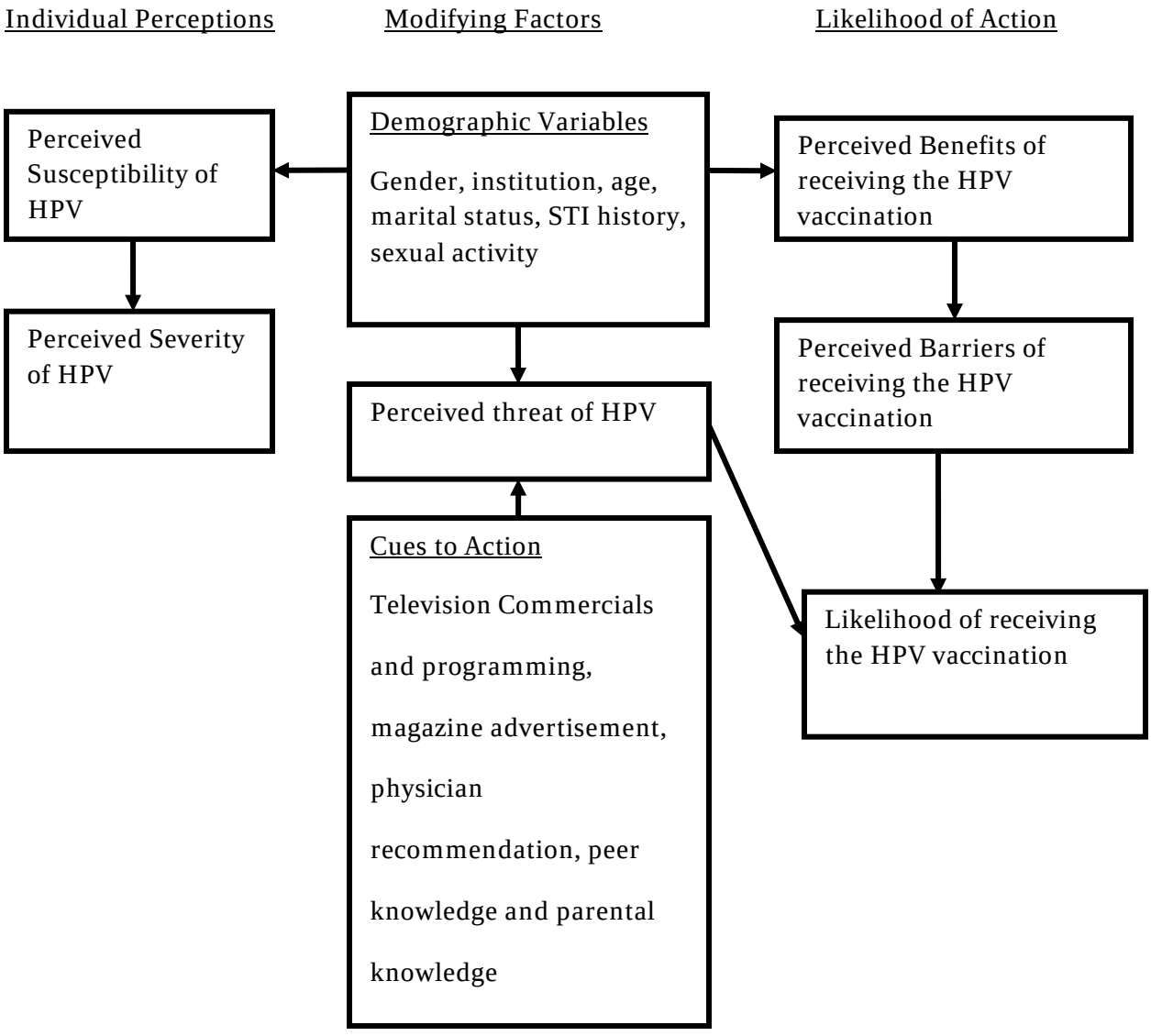
The proposed study intends to utilize the Health Belief Model (HBM). This model has been used since the 1950's to explain health-related behaviors and has shaped many behavioral interventions. HBM is regarded as a value-expectancy theory. Value-expectancy means that in regards to health behaviors individuals' desire to avoid illness or to get well lead to their adoption of specific health actions to prevent or stop illnesses. These concepts were further expanded into the six constructs that constitute the HBM theory. This model is frequently used to explain or encourage the receipt of early interventions such as vaccination. This theory has been used recently in studies about HPV vaccination acceptance in relation to four major constructs that are generally associated with vaccination acceptance: perceived susceptibility, perceived severity, perceived benefits, and perceived barriers (Champion V.l. & Skinner, 2008).

Perceived susceptibility examines an individual's perception of his/her risk of a negative outcome; in this case, acquiring HPV. This idea of susceptibility is related to a person's acceptance of medical diagnosis and their general susceptibility to illness. Perceived severity is the individual's belief of the consequences of the infection on their lives; for example, the possibility of contracting a cancer-causing strain of HPV. This concept also includes believes about the medical, social and clinical consequences of an infection. Perceived benefits are the advantages an individual associates with a certain action or behavior; for example, the belief that the HPV vaccination will prevent cancer. While perceived susceptibility and severity are essential to create the idea of adopting a behavior, the actual beliefs about the effectiveness of an action can lead to behavior change.

Perceived barriers are the conditions that discourage an individual from adopting a certain behavior. A major step in adopting a behavior is a form of cost-analysis in

which people weigh the effectiveness of the treatment and the unpleasantness, expense, and other potential inconveniences. The cost of the HPV vaccination could be considered a barrier. In general, for a behavior change to occur a person needs to believe that a disease is severe and that they want to reduce their susceptibility. They also need to believe that the benefits of an action are greater than the barriers. In order to develop programs aimed at increasing vaccination, the constructs of the HBM theory need to be explored fully among these two populations.

Figure 1: Theoretical Framework



Chapter 2

Literature Review

HPV incidence in the United States currently exceeds the reported rates of other STIs (Ramirez, Ramos, Clayton, Kanowitz, & Moscicki, 1997; Trottier & Franco, 2006). College students have been found to have the highest reported rates of HPV with most cases occurring among sexually active women 25 and younger (Sandfort & Pleasant, 2009). The majority of HPV infections is asymptomatic and resolve over time. However, Pap test abnormalities, pre-cancers and cancers of the anogenital and head and neck regions, and genital warts are all possible consequences of HPV infection (Licht et al., 2010). Regular health checkups and Pap testing have led to a decrease in the morbidity and mortality of cervical cancer. The vaccination is also expected to further decrease the rates of cervical cancer (Schnatz, Humphrey, & O'Sullivan, 2010). While there has been extensive literature examining HPV vaccination knowledge, beliefs, and acceptance among adolescents, young adults and college students, research among students at two-year colleges is limited. Additionally, there is no literature evaluating potential differences in attitudes and knowledge between students in two- and four-year colleges. The following literature review summarizes the influence of the HPM constructs on HPV vaccine acceptance, and also HPV knowledge levels among college students.

HPV Knowledge

Greater knowledge about HPV seems to be highly correlated with greater acceptance of the vaccination. Researchers have found significant gaps in knowledge levels among college-aged students and older Americans about the mode of transmission

and prevention of HPV and cervical cancer (Friedman & Shepeard, 2007; Ramirez, *et al.*, 1997). A national study in 2000 discovered that only about 2% of the population was able to successfully identify HPV as a sexually transmitted infection. In one study participants underestimated the prevalence of HP; they felt that the prevalence of HPV was below 35%, contrary to CDC records which estimate HPV prevalence at 50%. Men were also found to be less aware of HPV, the existence of a vaccination, as well as problems that could arise from the infection (Sandfort & Pleasant, 2009). A recent study showed that HPV knowledge levels have increased. In this study, about 78% of the study population had heard of the HPV infection. The percentage of women (94%) who knew about the infection was greater than men (62%) (Gerend & Magloire, 2008). In another study focused on men's knowledge, researchers found that overall knowledge was low; however, gay and bisexual men scored higher than heterosexual men (49% vs. 33% correct answers) (Brewer, Ng, McRee, & Reiter, 2010). In a 2010 study, about 61% of males surveyed had heard about HPV prior to the survey and only about 45% were aware of the availability of the vaccination (Brewer, *et al.*, 2010).

Health Belief Model Constructs and Vaccine Acceptance

Perceived Barriers

Cost is a major barrier to the acceptance of vaccinations among women. In a Canadian study the percentage of women who strongly agreed to accept HPV vaccination decreased from 56% to 28% when they were informed of the $100 cost of the vaccination (Sauvageau, Duval, Gilca, Lavoie, & Ouakki, 2007) . In a similar study in Denmark, cost was also identified as the greatest barrier to the receipt of the vaccine among young

women (Mortensen, 2010). These results are similar to those found in HIV vaccine research indicating that higher costs are correlated with lower acceptance of the vaccination (Black, *et al.*, 2009; Ravert & Zimet, 2009). Other barriers to the receipt the vaccination that have been found in most studies include cost of transportation to the hospital and lack of insurance coverage for the vaccination (Short, *et al.*, 2010). Fear of the side effects of the vaccination was also another commonly cited barrier to receiving the vaccination (Short, *et al.*, 2010). People who received the vaccine were less likely to believe that the vaccine would make them sick (Daley, et al., 2010). The inconvenience of having to receive three shots in a six month period is another barrier to the receipt of the vaccination (Mortensen, 2010). Some other barriers in the receipt of the vaccination, especially among high-risk women, are access to healthcare, cultural beliefs, and lack of education (Downs, *et al.*, 2010).

Perceived Susceptibility

Perceived susceptibility has long been acknowledged as an important component in the acceptance of vaccines (Ravert & Zimet, 2009). US college students in particular despite high sexual activity underestimate their risk of contracting STIs (Ravert & Zimet, 2009). Various studies have demonstrated that among those with knowledge about HPV, the misconception that the infection possesses only minor health problems does exist (Dell, Chen, Ahmad, & Stewart, 2000). Perceptions of risk however increase among individuals who are sexually active (Dell, et al., 2000; Ramirez, *et al.*, 1997). Having a greater number of sexual partners has also been shown to be associated with increased perception of risk (Gerend & Magloire, 2008). Parents also seemed to be more likely to accept the vaccination for their children if they believe that their children are at risk for

HPV infection (Allen *et al.*, 2010). Brewer et al (2010) found that most men perceived themselves to be at low risk for HPV and HPV-related disease.

Perceived Benefits

Few studies have shown perceived benefits to be a determining construct of the HBM in regards to HPV vaccination acceptance. One study of sexually active young adults found that perceived benefits were slightly correlated with participants' intention to receive the vaccine (Kahn *et al.*, 2008). One of the main reasons women accepted the HPV vaccine was for the prevention of cervical cancer (Mortensen, 2010). Those who rejected the vaccine on the other hand felt that their doctors had not provided sufficient proof of the benefits of the vaccine to justify getting it (Mortensen, 2010). Some women also felt that it was not particularly helpful to receive the vaccine, given the availability of methods of detecting cervical cancer, such as Pap smears (Mortensen, 2010). Some men have reported low levels of perceived effectiveness of the HPV vaccine. However, the same men also expressed that they would regret not receiving the vaccination if they subsequently contracted HPV. Nonetheless, only 37% of the men expressed willingness to receive the vaccine (Brewer, *et al.*, 2010).

Perceived Severity

There is a lack of consensus on the effects of perceived severity on vaccination acceptance. In 2003, a study by Kahn and colleagues showed that perceived severity of HPV was not significantly associated with vaccine acceptance (Kahn, *et al.*, 2003). However, a more recent study found that perceived severity was one of the most important factors contributing to vaccine acceptance among adult women (Kahn, et al.,

2008). Other studies have found that among women who reject the vaccine, a commonly cited reason is that HPV was not serious enough to justify the cost and discomfort of receiving the vaccine (Mortensen, 2010).

Information Sources

One of the important factors in vaccination acceptance involves where participants receive their information. A study by Daley *et al.* (2010) showed that women who had received the vaccination were more likely to consider their healthcare provider to be an important source of information or to know someone else who had received the vaccine. Those who refused the vaccine generally heard about the vaccine from television or radio commercials (Daley, *et al.*, 2010). A study by Rosenthal and colleges showed that even among women who could consent to receiving the vaccine, maternal approval was associated with vaccine acceptance (Roberts, Gerrard, Reimer, & Gibbons, 2010). Research has identified healthcare providers and the media as two important information sources for HPV related information.

Health differences in two- and four-year colleges

Various behavioral studies, mostly examining smoking behaviors, have found interesting differences between students in two- and four-year colleges. Because of the variety of programs offered in community college – many geared towards immediate entrance into the workforce – the students in these schools have different demographics. Students in two-year colleges are more likely to belong to minority groups and high-risk groups, both of which increase risk for negative health outcomes (VanKim, Laska, Ehlinger, Lust, & Story, 2010). Some smoking cessation studies have shown smoking

levels at four-year colleges to be 16%, compared to 31% at two-year colleges or technical schools (Solberg, Asche, Boyle, McCarty, & Thoele, 2007). One study which surveyed the health information available at two- and four-year colleges found that four-year colleges were more likely to have a health center that provided sexual health information and testing to students (Koumans *et al.*, 2005).

Chapter 3

Methods

Study Sample

The target populations for this study are college undergraduate students in two and four year colleges. Since sampling all two and four year institutions Georgia or even the greater Atlanta area is not feasible, a convenience sample of two schools within the Atlanta area. The sampling frame for this study will include a convenience sample of students at Georgia State University (GSU), a four-year institution, and Georgia Perimeter College (GPC), a two-year institution, both in Atlanta. Based on Cohen's (1992) primer to determine sample size, the estimated total sample size of n=686 was determined assuming power of 80% with α=0.05 to determine a small effect for a multiple regression analysis containing six variables. Both the two and four year colleges will have an estimated n=343 each.

Methodology

A cross-sectional survey design was used to obtain data from participants. Data collection occurred from February 2011 to March 2011. After approval from the Emory Institutional Review Board, the Georgia State Institutional Review Board and the Georgia Perimeter College Institutional Review Board, students at GSU and GPC were approached to complete the survey. There was no screening procedure other than relying on participants to self-report that they were at least 18 years old and undergraduate students at GSU or GPC. These criteria were also listed on the informed consent form. Verbal assent was obtained from all the participants before they were allowed to participate in the study. Every participant was provided with a copy of the consent form

for their records. Students were approached in the campus cafeteria and asked to participate in the study. Demographic records were kept of students who refused to participate in the study. Campus visits were made for four weeks.

Incentives

All students who completed the survey were given the option of being entered into a random drawing for one of fifteen (1 of 15) Visa cards valued at $15. Students elected to be enrolled in the drawing by providing an email address and name to the interviewer. The random drawing took place after data collection was completed. Winners received notification and an electronic gift (e-gift) card delivered to their email address which they provided. The email addresses and their surveys were kept completely separate from each other to maintain confidentiality.

Instruments

The instrument was a two-page 41-item self-administered paper and pencil questionnaire. The survey obtained information on participant demographics, knowledge about HPV and attitudes about HPV and the vaccination. The survey was printed on test sheets with unique number identifiers and no identifying information was including on the surveys. The instrument was piloted on a small sample of Emory students to assess readability and participant burden. The data from this pilot was not included in the final data analysis because the respondents did not attend either of the two selected institutions.

Data from the study was scanned and saved as a .dat file by the Emory test center. The data sheet was exported into SAS where the data was analyzed. Demographic data were collected first with questions 1-5. Questions 6-12 addressed participants' sexual history and vaccination status. Questions 13-25 were designed to assess participants' knowledge about HPV and the HPV vaccination. The answer choices for these questions were presented in a true or false format. One of the items presented in this section of the survey was: "HPV infection is relatively uncommon."

Questions 26-41 assessed participants' attitudes about HPV and HPV vaccination using the Health Belief Model. Barriers to receiving the vaccination were assessed by questions 28, 33 and 39; a sample question was: "Receiving the vaccination is against my religion." Perceived severity of HPV was assessed with questions 27, 29, and 30, One of the questions that assesses this domain is: "I believe HPV is curable with proper medical treatment." Perceived benefits of receiving the HPV vaccination were assessed with questions 31, 34, and 41, such as: "Getting the HPV vaccination will reduce my chances of getting the HPV infection." Questions 32, 36 and 40 assessed perceived susceptibility to HPV; for example, "I have the ability to avoid getting HPV."

Chapter 4

Results

Statistical Analysis

Descriptive statistics for respondent characteristics were presented by institution and vaccination status. Chi-square tests were used to compare differences in individual knowledge questions by institution and self-reported vaccination status. Separate bivariate regression equations were created, with corresponding 95% confidence intervals, were conducted to calculate the odds of being vaccinated (vaccinations status) for each of the independent variables: summed HPV knowledge score, perceived severity, perceived susceptibility, barriers, and perceived benefits of HPV and the HPV vaccination. A t-test was also conducted to compare the average mean knowledge scores of both institutions. A linear regression was run for the continuous outcome variable knowledge.

For the purposes of analysis the attitudinal constructs were transformed into binary variables. Respondents who “Agreed” or “Strongly Agreed” were classified together while those who “Disagreed” or “Strongly Disagreed” were classified together. Before the linear regression was run, 42 observations in total, 21 from each institution were set aside to serve as a validity test for the final predictive model. Some variables considered for the final multiple linear regression models included selected sociodemographic characteristics such as age, institution, gender and race. All the attitudinal scales, which were perceived severity, perceived susceptibility, barriers, and perceived benefits, were also included in the multiple logistic regression models. Multiple linear regression analyses examined the independent contribution of each of the significant bivariate factors, controlling for all other significant bivariate factors in

the model. Potential models were created using the all possible models method. This method was chosen over the stepwise or forward method because it allowed more control over the possible model. AIC (Akaike information criterion) describes the tradeoff between bias and variance in model building. When estimating model parameters using maximum likelihood estimation, this likelihood is increased by adding parameters, which may result in over fitting the model. The Bayesian information criterion (BIC) resolves this problem by introducing a penalty term for the number of parameters in the model. For these reasons the best models were created by examining C (p), Adjusted R-Square, AIC, and BIC scores. The number of variables in the model was also considered. To ensure parsimony of the model, no model with more than six variables was considered as a potential model. Refer to Fig.4.1 for the models selected from the model building process. To examine potential multicollinearity, VIF scores were examined for each of the five potential models. There were no VIF scores >10 thus multicollinearity was not identified as a problem for any of the models.

Sample

Of the 900 male and female students approached by the researchers, 821 surveys were completed, representing a 90% response rate. Some surveys were excluded from this analysis because participants completed less than 50% of the survey. In total, there were 386 participants (49%) from the two-year community college and 406 participants (51%) from the four-year college. In the overall sample about 515 participants (67%) reported their marital status as single, 200 (26%) classified themselves as married, and 41 (5%) were divorced. The mean age for the entire study was 21.39 years (standard deviation 4.05, range 18-52). The mean age for the two-year college was 21.49 years (standard deviation 4.18, range 18- 41) and the mean age for the four-year college was

21.31 (standard deviation 3.87, range 18-52). Overall, 55% of participants reported their race/ethnicity as African American, 18% reported being non-Hispanic white, and 11% reported being Asian. Over half of the entire sample reported being sexually active (60%) in the last three months.

HPV vaccination Status

In the entire sample, 152 females (34%) had received the vaccination while 18 males (6%) indicated that they had received at least one shot of the HPV vaccination. Of the 172 participants in the entire study who have initiated the vaccination series, 49% of participants had received all three doses, 31% had received two doses, and 20% had received only the first shot. When further analyzed by gender, of the 151 females who self-reported starting the vaccination series, 53% had received all three shots, 32% had received at least two shots, and 15% had received only the first dose of the series. Of the 18 males who had initiated the vaccination series, 19% of them had received all three shots, 24% had received two shots, and 57% had received the first dose of the vaccination.

Attitudes

The attitude survey was broken down into four different categories based on survey design namely perceived susceptibility, perceived severity, barriers and benefits. These factors were made binary by collapsing the likert scale, participants who selected agree and strongly agree were classified as one category. Participants who selected disagree and strongly disagree were grouped as a separate category.100% of participants agreed or strongly agreed that their susceptibility to HPV was low. About 98% of all

participants also did not consider HPV to be a severe infection. A full breakdown of the frequencies by institution and HPV vaccination status are presented in table 4.7

Knowledge

Vaccinated students at both the two (74%) and four (82%) year college were more likely to report hearing about the vaccination from a physician than from any other source, including television. Both vaccinated and unvaccinated students at both institutions reported hearing about the vaccination on television, although students at the four-year college were more likely to have indicated this response (OR=2.68 CI=1.41-5.08)(Figure 4.3).

Males in both the two (30%) and four year (49%) colleges were most likely to have heard about the HPV vaccination on television than females. After television, males in two- and four-year colleges were likely to have heard of the vaccination from school classes than females (14% vs. 28%). Although the results were not significant (OR=0.83, CI=-0.63-1.72) males were more likely than females to report hearing about HPV in a school class. Students in four year colleges were more likely to have heard about HPV from their friends than student in two year colleges (OR= 3.00, CI=1.14-7.87).

Table 4.4 presents the bivariate logistic regression results that display the odds of attending either a two or four year institution for each of the independent variables, with corresponding 95% confidence intervals. In bivariate analyses of each of the 13 knowledge questions, students at four year colleges demonstrated increased knowledge on certain questions, including "HPV can be transmitted by genital skin to skin contact" (p=0.005) and "Most people with HPV have no visible signs or symptoms" (p<.0001).

There were statistical differences in knowledge scores between those who attended two-year institutions (mean= 7.73, standard deviation=1.66) and participants at four year colleges (mean= 8.17, standard deviation= 1.51) (t=3.94, $p<.0001$, (CI 1.51-1.67)). Females (mean=8.15, standard deviation=1.50) also performed significantly better on the knowledge test than males (mean=7.67, standard deviation=1.69) (t = 4.08, $p<.0001$).

To create a linear regression model the following nine factors were considered age, institution, gender, HPV vaccination status, receiving information about HPV from the television, receiving information about HPV from a physician, receiving information about HPV from a school class, perceived susceptibility of HPV, perceived severity of HPV, benefits and barriers. Based on the analysis the factors predictive of knowledge score were age, institution, gender, HPV vaccination status, and reporting television as a source of HPV and HPV vaccination related information. This model was selected as the best fit by validating all the models against the hold-out sample. The final model had the best PRESS values of all the models (closest to zero). This model also had the lowest error of 1.548 when compared to all the other values (Range: 1.548-2.041). Figure 4.8 contains a complete list of all the models considered for the linear regression.

Chapter 5

Discussion, Recommendations, and Conclusion

In this study population the percentage of women who reported receiving the vaccine (33%) is lower than a similar study which reported a 43% vaccine uptake rate among college students *(*Daley, *et al*., 2010). However, this number is higher than the 10% of 18-26-year olds who were reported to have received the vaccine in the 2007 National Immunization adult survey(Daley, *et al.*, 2010). More recent studies that have examined college women have reported rates between 12%-43%(Allen, *et al.*, 2009; Daley, *et al.*, 2010; Sandfort & Pleasant, 2009). Considering these results, this study's reported rate of 33% is not extreme in either direction. Considering the amount of time that has elapsed in the years following the 2007 vaccination study, it is understandable that vaccination rates will have increased. However, the 33% rate does not represent participants who had completed the three dose vaccination; all women who had initiated the vaccine were included in this number. When vaccination rates were analyzed by institution, the 19% rate of vaccination among females at the two-year institution was not significantly lower than the 24% rate of vaccination among females at the four year institution(OR=1.37, CI=0.98-1.94). Although vaccination levels were lower at the two-year college, the rate still remains within the range that has been observed in recent HPV studies.

When vaccination status is broken down by number of doses received, the results are a little less encouraging. Only 18% of female participants at both institutions had received all three vaccination doses at the time of the study. Most studies on HPV vaccination have not assessed vaccine uptake by number of doses, so there are few comparisons for this number. However, considering that all three doses of the vaccine must be completed for individuals to receive all benefits of the vaccination, it would be

ideal for this number to be close to number of females who reported receiving the vaccine.

The inclusion of both men and women in this study led to a novel finding. In this study, 18 men (5%) reported having received the vaccine. According to the diffusion of innovation theory, these men can be considered early innovators. It is especially encouraging considering that there have been no active media campaigns targeting men. The rate of adoption was noticeably higher in the two-Year College (9%) compared to the four-year college (3%) (OR=0.32, CI=0.10-1.01). Unfortunately, it was beyond the scope of this study to discover what motivated these males to accept the vaccination. Also, considering the lack of research on these two populations it is difficult to hypothesize why these differences might exist in the rate of adoption between these two institutions.

In this study, 5% of vaccinated participants at the two-year college reported that they had not heard about the HPV vaccination, and 2% of participants at the four-year college reported not having heard about the HPV vaccination. These numbers are unexpected and concerning, it was expected that 100% of participants who had received the vaccine should at least have heard about the HPV vaccination. In informal discussions with the participants multiple students referred to the HPV vaccination as the “cervical cancer shot”. It is possible that in trying to promote the importance of the vaccine some health providers are using the health risk of cervical cancer to promote the vaccination and in the process young adults are misidentifying the vaccination. Knowledge levels among the unvaccinated were lower with 78% of students at two-year college indicating that they had heard about the vaccination, and 87% of students at four-year college indicating that they had not heard of the vaccination. These numbers are consistent with the most recently published studies (Daley, *et al.*, 2010; Gerend & Magloire, 2008; Sandfort & Pleasant, 2009). The percentage of men versus women at both institutions who indicated they had heard about the vaccination was relatively

similar for the two-year college (73% vs. 80%) and four year college (88% vs. 95%). These indicate a change in trend from some of the most recent studies in which over 50% of the sample reported that they had never heard of HPV (Sandfort & Pleasant, 2009). This change is quite encouraging and the author hypothesizes that the prolonged existence of the vaccination has increased both males' and females' individual awareness of the infection. It is important to note that this increased awareness of HPV is however not correlated to an overall increase in knowledge about the cause of HPV, or the effects of the HPV vaccination.

Vaccinated students in the four-year college were more likely to have heard about the vaccination on television and read about it in magazines than vaccinated students at the two-year college. Although there were no significant differences in hearing about the vaccination from a physician, 74% of vaccinated students in the two-year college and 82% of vaccinated students in the four-year college reported hearing about the vaccination from their physician. Students in the four-year college were also more likely to hear about the HPV vaccine from their friends than students in the two-year college. When compared to females, males at both types of institution were less likely to have heard about HPV from the television, magazines, physicians, or their parents.

This study did not explore the reasons for the differences in sources of information about HPV. Television was one of the significant sources of information. This may be in part due to the Gardasil "One Less" commercials which were aired consistently on television between 2006 and 2008. However, the commercials have receive low air time in the last two years which might have affected the number of people who reported hearing about HPV and the HPV vaccination from the television. The commercials were also targeted solely at young women and their mothers it is probable that males did not pay much attention to these commercials. Also considering the

reduced airtime it is possible that even those males who noticed the commercials might have forgotten about them. It is not surprising that females were more likely to have read about HPV in magazines. Information about the vaccination is featured mainly in women's magazines which is understandable considering that women experience the more serious effects of HPV and has until recently only been marketed to females. It is understandable that most males would not have come across information about the vaccination in magazines not specifically oriented towards women. Physicians are more likely to discuss HPV and the HPV vaccination with women. This is an expected finding considering the more recent approval of the vaccine for male's physicians did not have any reasons to discuss the vaccine with men. Also, considering that sexually active females are advised to see a physician once a year while males do not, it is also possible that females were more likely to meet with physicians in situations that allowed for the HPV vaccine to be discussed.

Knowledge was noticeably higher in both institutions among those who had received the vaccination. On questions where overall respondent knowledge was generally low, those who had initiated or completed the vaccination did considerably better. However, participants from the four-year institution performed significantly better on more of the knowledge questions than participants in the two-year college. For example, participants in the four-year college were more likely to know that HPV can also cause health problems for men, and that HPV is transmitted by genital skin-to-skin contact. When comparing the total knowledge scores, students in the four-year institution scored significantly higher than students at the two-year college. Since previous studies on HPV vaccination have not investigated the differences between two- and four-year colleges, it is difficult to understand if these results are atypical. Some possible reasons for the differences can be hypothesized considering the data on source of information. Students in four-year colleges were more likely to receive information

from multiple sources, including television, magazines, and friends. It is possible that this multiplicity of information sources contributes to students having more knowledge about HPV.

Based on the data in this study attitudes were not related to the attitudes of participants. Participants' responses were extremely homogenous within the various categories. When attitudinal variables were included in the logistic model building, none of them was included in the final model. This might be related to the analysis of the attitude categories; by collapsing the likert scale into binary variables reduced the analysis power.

The predictive model generated by this study demonstrated several correlations which were in line with the researchers' hypothesis. The researchers expected that age would be highly correlated with HPV knowledge because most of the HPV campaigns have been targeted at young people. Considering the significant differences in knowledge amongst this sample, it was also expected that type of institution might be a predictor of knowledge levels in this study population. Gender was also predictive of knowledge scores, a finding that aligns with previous studies that have demonstrated differences in knowledge levels between males and females. Particularly unexpected findings from this study were the differences and correlations relating to hearing about HPV from the television and friends. A previous study by Allen *et al* (2009) found that the belief that peers were also receiving the HPV vaccine was strongly correlated with vaccine uptake. This finding could explain the inclusion of hearing about HPV as a predictor in this study. Another unexpected finding was that none of the attitudes (perceived severity, perceived susceptibility, barriers and benefits) were considered predictive of knowledge. This may be attributable to the fairly homogenous responses on the attitude scale in this study.

The HBM theoretical framework utilized in this study was not shown to be consistent with the results of the study. The individual perceptions which were perceived susceptibility and perceived severity were not shown to be correlated among these samples. The inclusion of males in this study might be correlated to this result. Most participants did not consider HPV an infection that affected men so this might have affected male's perceptions of susceptibility and severity which would have influenced the overall findings. The modifying factors such as gender, institution and the various cues to actions (sources of information) did seem to be related to the likelihood of receiving the vaccination. Perceived benefits and perceived barriers also were shown to be correlated to receipt of the vaccine. However, the model generally measures likelihood of a performing an action which this study did not collect any data on.

A key limitation of this study was the restrictive sampling frame. Although the sample size for both institutions was sufficiently large and representative of the institutions' demographics, caution is required in generalizing the results to other men and women at two- and four-year colleges, or peers not attending college. Another limitation is the low numbers of participants who reported that they have received the vaccine in both colleges it is important to be careful in generalizing this studies results to other colleges. It is important to note that although this study did ask how many doses of the vaccine students have received, they were all classified as vaccinated if they had received at least one dose of the vaccine. Unfortunately, the researcher could not completely control communication between participants so there was some sharing of knowledge as participants completed the survey. However, the researcher worked to keep this at a minimum so it is unlikely that results were significantly affected by any sharing of information.

Recommendations

Although the knowledge levels in this study are encouraging more work still needs to be done to increase the knowledge level among undergraduate students in Atlanta. These results suggest the need for more educational interventions, possibly within the schools. Most students identified hearing about HPV on the television so a statewide television educational campaign targeting both male and female college-aged students could prove influential in raising the knowledge levels among Atlanta and Georgia college undergraduates. Although physicians were not a statistically significant source of information in this study, over 80% of vaccinated students reported hearing about the HPV vaccination through this route. Multiple research studies have also shown the relationship between physician recommendations and vaccine receipt(Daley, *et al.*, 2010), so physicians should be encouraged to address this topic with both their female and male patients.

Further research should continue working with two-year colleges; the results of this study have demonstrated that there are differences in vaccine uptake and knowledge levels between two- and four-year college students. It is important that the literature on two-year colleges grows to enable the development of targeted interventions. It is also important that further research explores the decision making behaviors among students in two- and four-year colleges. Understanding what motivates students at these institutions to receive the vaccine could be instrumental in increasing the effectiveness of health interventions and campaigns aimed at increasing vaccination uptake.

Utilizing other theories such as the diffusion of innovation in HPV vaccination research could also help further the understanding of college populations and their behaviors regarding HPV and HPV vaccination. This theory will also be particularly

useful in studies on males since the HPV vaccination is a relatively new innovation for them.

Conclusion

These data revealed that students at four-year institutions were more likely than students at two-year colleges to score better on a knowledge test about HPV. Females and vaccinated students also performed better than males and non-vaccinated students on the knowledge test. This sample shows vaccination rates for the entire population within the range of the previous studies; however, when considered individually, vaccination rates were lower than expected. The rates of completion of all three doses of the vaccination were also low. However, an encouraging trend of male vaccination was observed in this study. Male and female college students are a group that is particularly vulnerable to HPV infection, and understanding the knowledge and factors associated with HPV vaccination among these populations can contribute to the efforts aimed at reducing the morbidity and mortality associated with this infection.

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APPENDIX A: TABLES

Table 4.1: Demographics of Participants

	2 year		*4 year*			
Factor	*Number non-vaccinated (%)*	*Number vaccinated (%)*	*Number non-vaccinated (%)*	*Number vaccinated (%)*	*Total (%)*	*Bivariate OR (95% CI)*
Age	21.71 (SD:4.42)	20.58 (SD=3.36)	21.62 (SD=4.2)	20.40 (SD=2.32)	21.39 (SD=4.05)	____
Gender						
Male (329)(41.91%)	162(53.11)	14(19.44)	143(47.51)	4(4.08)	____	5.672 (1.781-18.)
Female (456)(58.09%)	143(46.89)	58(80.56)	158(52.49)	94(95.92)		
Race						
American Indian	2 (0.66)	1(1.39)	1(0.33)	2(2.04)	6(0.77)	
Hawaiian	3(1.00)	4(5.56)	5(1.65)	____	12(1.53)	
Asian	44(14.62)	4(5.56)	31(10.23)	7(7.14)	86(10.98)	
Black	181(60.13)	47(65.28)	152(50.17)	51(52.04)	434(55.43)	____
Hispanic	16(5.32)	5(6.94)	31(10.23)	5(5.10)	58(7.41)	
Non-Hispanic White	40(13.29)	7(9.72)	60(19.80)	28(28.57)	137(17.50)	
Other	15(4.98)	4(5.56)	23(7.59)	5(5.10)	50(6.39)	
Marital Status						
Single	204(68.69)	31 (45.59)	210(70.47)	63(66.32)	515(67.14)	____
In a relationship	67(22.56)	27(39.71)	72(24.16)	32(33.68)	200(26.08)	
Married	21(7.07)	9 (13.24)	11(3.69)	____	41(5.35)	
Divorced	2(1.01)	1(1.47)	3(1.01)	____	7(0.91)	
Widowed	2(0.67)	____	2(0.67)	____	4(0.52)	
Sexual activity in the last 3 months						
Yes (1)	176(57.52)	53(74.65)	173(57.10)	64(65.31)	473(60.10)	0.639
No (0)	130(42.48)	18(25.35)	130(42.90)	34(34.69)	314(39.90)	(0.325-1.259)
Condom Use						
Never	48(16.67)	10(14.29)	51(18.09)	15(16.48)	124(16.78)	0.903
Sometimes	50(17.36)	16(22.86)	57(20.21)	24(26.37)	148(20.03)	(0.685-1.191)
Most of the time	52(18.06)	12(17.14)	61(21.63)	15(16.48)	142(19.22)	
All of the time	138(47.92)	32(45.71)	113(40.07)	37(40.66)	325(43.98)	
I have heard about the HPV vaccination from?						
TV						
Yes	125(40.58)	22(30.56)	180(59.02)	53(54.08)	384(48.42)	2.677
No	183(59.42)	50(69.44)	125(40.98)	45(45.92)	409(51.58)	(1.412-5.075)
Magazines						
Yes	48(15.58)	8(11.11)	79(25.90)	30(30.61)	166(20.93)	3.529
No	260(84.42)	64(88.89)	226(74.10)	68(69.39)	627(79.07)	(1.507-8.268)
Physician						
Yes	57(18.51)	53(73.61)	86(28.20)	80(81.63)	277(34.93)	1.593
No	251(81.49)	19(26.39)	219(71.80)	18(18.37)	516(65.07)	(0.766-3.313)
Other Health Professionals						
Yes	61(19.81)	15(20.83)	46(15.08)	18(18.37)	141(17.78)	0.855
No	247(80.19)	57(79.17)	259(84.92)	80(81.63)	652(82.22)	(0.398-1.837)
Friends						
Yes	74(24.03)	6(8.33)	77(25.25)	21(21.43)	180(22.70)	3.00
No	234(75.97)	66(91.67)	228(74.75)	77(78.57)	613(77.30)	(1.143-7.874)
Parents						
Yes	20(6.49)	19(26.39)	27(8.85)	25(25.51)	93(11.73)	0.955
No	288(93.51)	53(73.61)	278(91.15)	73(74.49)	700(88.27)	(0.477-1.911)
School classes						
Yes	54(17.53)	8(11.11)	74(24.26)	18(18.37)	155(19.55)	1.800
No	254(82.47)	64(88.89)	231(75.74)	80(81.63)	638(80.45)	(0.735-4.41)

Table 4.2: Demographics By Institution

Factor	*Number in 2 year (%)*	*Number in 4 year (%)*	*Bivariate OR (95% CI)*
Age	21.49	21.31	____
Gender			
Male (329) (41.91%)	181(47.26)	148(36.82)	1.538(1.156-2.045)
Female (456) (58.09%)	202(52.74)	254(63.18)	
Race			
American Indian	3(0.79)	3(0.74)	____
Hawaiian	7(1.85)	5(1.24)	
Asian	48(12.66)	38(9.41)	
Black	229(60.42)	205(50.74)	
Hispanic	21(5.54)	37(9.16)	
Non-Hispanic White	49(12.93)	88(21.78)	
Other	22(5.80)	28(6.93)	
Marital Status			
Single	239(64.42)	276(69.70)	____
In a relationship	96(25.88)	104(26.26)	
Married	30(8.09)	11(2.78)	
Divorced	4(1.08)	3(0.76)	
Widowed	2(0.54)	2(0.51)	
Sexual activity in the last 3 months			
Yes (1)	234(61.10)	239(59.16)	0.922-(0.693-1.227)
No (0)	149(38.90)	165(40.84)	
Condom Use			
Never	58(15.93)	66(17.60)	0.901(0.794-1.023)
Sometimes	67(18.41)	81(21.60)	
Most of the time	66(18.13)	76(20.27)	
All of the time	173(47.53)	152(40.53)	
Vaccination			
Yes	72(18.96)	98(24.32)	1.374(0.975-1.937))
No	308(80.11)	305(75.68)	
I have heard about the HPV vaccination from?			
TV			
Yes	149(38.60)	235(57.88)	2.186(1.645-2.905)
No	237(61.40)	171(42.12)	
Magazines			
Yes	57(14.77)	109(26.85)	2.118(1.483-3.026)
No	329(85.23)	297(73.15)	
Physician			
Yes	111(28.76)	166(40.89)	1.714(1.274-2.304)
No	275(71.24)	240(59.11)	
Other Health Professionals			
Yes	77(19.95)	64(15.76)	0.751(0.521-1.082)
No	309(80.05)	342(84.24)	
Friends			
Yes	82(21.24)	98(24.14)	1.180(0.845-1.646)
No	304(78.76)	308(75.86)	
Parents			
Yes	40(10.36)	53(13.05)	1.299(0.839-2.009)
No	346(89.64)	353(86.95)	
School classes			
Yes	62(16.06)	93(22.91)	1.553(1.087-2.219)
No	324(83.94)	313(77.09)	
Other			
Yes	31(8.03)	15(3.69)	____
No	355(91.97)	391(96.31)	

Table 4.3 Sources of Information by gender

Factor	2 YEAR COLLEGE		4 YEAR COLLEGE		OR (95% C.I)
	MALES	*FEMALES*	*MALES*	*FEMALES*	
TV					
No	127(70.17)	108(53.47)	75(50.68)	95(37.40)	1.923
Yes	54(29.83)	94(46.53)	73(49.32)	159(62.60)	(1.321-2.799)
MAGS					
No	162(89.50)	164(81.19)	121(81.76)	173(68.11)	2.020
Yes	19(10.50)	38(18.81)	27(18.24)	81(31.89)	(1.300-3.139)
Physician					
No	156(86.19)	116(57.43)	127(85.81)	109(42.91)	8.045
Yes	25(13.81)	86(42.57)	21(14.19)	145(57.09)	(4.762-13.590)
Other Health					
No	144(76.56)	162(80.20)	127(85.81)	212(83.46)	1.198
Yes	37(20.44)	40(19.80)	21(14.19)	42(16.54)	(0.679-2.115)
Friends					
No	135(74.59)	167(32.67)	121(81.76)	183(72.05)	1.738
Yes	46(25.41)	35(17.33)	27(18.24)	71(27.95)	(1.055-2.864)
Parents					
No	166(91.71)	177(87.62)	143(96.62)	206(81.10)	6.664
Yes	15(8.29)	25(12.38)	5(3.38)	48(18.90)	(2.589-17.153)
School					
No	155(85.64)	166(82.18)	106(71.62)	204(80.31)	0.619
Yes	26(14.36)	36(17.82)	42(28.38)	50(19.69)	(0.386-0.992)

Table 4.4: Number and Percent of Participants correctly answering each Knowledge question by institution

Knowledge Question	*Number (%) of participants answering correctly*			
	2-year college	*4-year college*	Total	p-value[a]
I have heard of human papillomavirus (HPV)	308(80.63)	363(89.63)	671(85.26)	0.0004
HPV can be transmitted by kissing	287(75.13)	328(81.19)	615(78.24)	0.0398
HPV infection is relatively uncommon	296(79.14)	346(85.64)	642(82.52)	0.0172
HPV can cause herpes	170(45.82)	230(57.21)	400(51.75)	0.0020
HPV can cause serious health problems for women	353(92.41)	376(93.07)	729(92.75)	0.7212
HPV can cause infertility	74(19.73)	64(15.76)	138(17.67)	0.1464
HPV can cause serious health problems for men	242(64.19)	227(56.61)	469(60.28)	0.0309
HPV can cause genital warts	234(61.74)	230(57.21)	464(59.41)	0.1981
HPV infection can be treated	86(22.75)	91(11.64)	177(22.63)	0.9397
HPV can be transmitted by genital skin to skin contact	213(27.13)	265(33.75)	478(60.89)	0.0055
Most people with HPV have no visible signs or symptoms	281(35.84)	345(44.01)	626(79.85)	<0.0001
There is a vaccination to protect against HPV infection	311(39.67)	338(43.11)	649(82.78)	0.6044
Most women with HPV will not develop cervical cancer	127(16.30)	114(14.63)	241(30.94)	0.0799

[a] Mentel-Haenszel Chi-square comparing those who attend the 2-year college and those who attend the four-year college

Table 4.5: Number and Percent of Participants correctly answering each Knowledge question by institution and vaccination status

	Number (%) of participants answering correctly					
	2 year college		*4 year college*			
Knowledge Question	*Non-vaccinated*	*Vaccinated*	*Non-vaccinated*	*Vaccinated*	Total	p-value[a]
I have heard of human papillomavirus (HPV)	237(77.70)	94.37%	263(86.51)	98(100)	671(85.26)	.0004
HPV can be transmitted by kissing	227(74.67)	55(76.39)	244(80.26)	82(84.54)	615(78.24)	0.0398
HPV infection is relatively uncommon	227(75.92)	65(94.20)	259(85.48)	86(87.76)	642(82.52)	0.0172
HPV can cause herpes	134(45.58)	33(45.83)	173(57.28)	55(56.70)	400(51.75)	0.0020
HPV can cause serious health problems for women	279(91.78)	69(95.83)	280(92.41)	93(94.90)	729(92.75)	0.7212
HPV can cause infertility	68(22.82)	5(6.94)	50(16.39)	14(14.29)	138(17.67)	0.1464
HPV can cause serious health problems for men	203(67.22)	36(52.17)	181(59.74)	44(46.32)	469(60.28)	0.0309
HPV can cause genital warts	185(61.46)	47(65.28)	166(54.79)	63(65.63)	464(59.41)	0.1981
HPV infection can be treated	67(22.26)	17(23.94)	69(22.70)	22(22.68)	117(22.63)	0.9397
HPV can be transmitted by genital skin to skin contact	166(54.79)	44(61.11)	196(64.47)	68(70.10)	478(60.89)	0.0055
Most people with HPV have no visible signs or symptoms	219(72.28)	56(77.78)	255(84.44)	89(90.82)	626(79.85)	<.0001
There is a vaccination to protect against HPV infection	239(79.14)	68(95.77)	245(80.59)	91(92.86)	649(82.78)	0.6044
Most women with HPV will not develop cervical cancer	98(33.00)	25(35.21)	93(30.59)	20(20.41)	241(30.94)	0.0799

[a] Mentel-Haenszel Chi-square comparing those who attend the 2-year college and those who attend the four-year college

Table 4.6: Number and Percent of Participants correctly answering each Knowledge question by institution

Knowledge Question	*Number (%) of participants answering correctly*			
	Number at 2-year college	*Number 4-year college*	Total	p-value[a]
I have heard of human papillomavirus (HPV)	308(80.63)	363(89.63)	671(85.26)	.0004
HPV can be transmitted by kissing	287(75.13)	328(81.19)	615(78.24)	0.0398
HPV infection is relatively uncommon	296(79.14)	346(85.64)	642(82.52)	0.0172
HPV can cause herpes	170(45.82)	230(57.21)	400(51.75)	0.0020
HPV can cause serious health problems for women	353(92.41)	376(93.07)	729(92.75)	0.7212
HPV can cause infertility	74(19.73)	64(15.76)	138(17.67)	0.1464
HPV can cause serious health problems for men	242(64.19)	227(56.61)	469(60.28)	0.0309
HPV can cause genital warts	234(61.74)	230(57.21)	464(59.41)	0.1981
HPV infection can be treated	86(22.75)	91(11.64)	177(22.63)	0.9397
HPV can be transmitted by genital skin to skin contact	213(27.13)	265(33.75)	478(60.89)	0.0055
Most people with HPV have no visible signs or symptoms	281(35.84)	345(44.01)	626(79.85)	<.0001
There is a vaccination to protect against HPV infection	311(39.67)	338(43.11)	649(82.78)	0.6044
Most women with HPV will not develop cervical cancer	127(16.30)	114(14.63)	241(30.94)	0.0799

[a] Mentel-Haenszel Chi-square comparing those who attend the 2-year college and those who attend the four-year college

Table 4.7: Attitudes about HPV and HPV vaccination among students in two and four colleges

Attitudes	Number of Non-HPV students in 2 year college (%)	Number of HPV vaccinated students in 2 years college (%)	Number of Non-HPV vaccinated students in 4 year college (%)	Number of HPV vaccinated students in 4 year college (%)
Severity				
0	2 (0.76)	56(100)	5(1.89)	90(100)
1	262(99.24)	____	259(98.11)	____
Benefits				
0	11(3.96)	2(3.23)	10(3.72)	2(2.11)
1	267(96.04)	60(96.77)	259(96.28)	93(97.89)
Barriers				
0	12(4.55)	5(8.47)	11(4.30)	6(6.38)
1	252(95.45)	54(91.53)	245(95.70)	88(93.62)
Susceptibility				
0	258(100)	59(100)	272(100)	91(100)
1	____	____	____	____

0= disagree and strongly disagree
1=strongly agree and agree

Table 4.8: Statistics from the Model Building Step and the PRESS Sum

No of Variables in Model	R-Square	Adjusted R-Square	C(p)	AIC	BIC	Variables in Model	PRESS SUM
5	0.0697	0.0613	6.1951	470.55418	472.6670	Age Institution HPV Vaccination TV Magazines	78.820
5	0.0695	0.0611	6.2813	470.6290	472.7524	Age Institution HPV Vaccination TV Barriers	83.696
*5	0.0612	0.0612	6.2214	470.5684	472.6930	Age Institution Sex HPV Vaccination TV	63.475
6	0.0710	0.0609	7.4275	471.7656	473.9313	Age Institution HPV Vaccination TV Physician Barriers	83.63
6	0.0709	0.0608	7.4776	471.8164	473.9808	Age Institution HPV Vaccination TV Physician Benefits	74.01
6	0.0709	0.0608	7.4808	471.8196	473.9839	Age Institution Sex HPV Vaccination TV Physician	78.47

*Final Model Selected

Appendix A: Informed Consent

Emory University- School of Public Health

Department of Behavioral Sciences and Health Education

Consent to be a Research Subject

- I am Ukwuoma O Ilozumba a 2nd year Masters in Public health candidate at Emory University, Atlanta, and I am conducting a study on the HPV knowledge among college students
- *Purpose*: The purpose of this research is to examine the knowledge and attitudes of students about HPV and the HPV vaccine
- *Procedures:* Participants will complete a short demographic questionnaire and two other questionnaires about HPV and the HPV vaccination
- *Discomforts and Risks*: There are no physical risks associated with the procedure. You may stop participation in the study at anytime without penalty. If you have questions about the study later on you may contact me at uilozum@emory.edu . If you would like to talk to someone in the counseling center the number is (two different numbers depending on what school this is being distributed to).
- *Benefits*: The study offers no direct benefit to the participant. However, the information gathered from this study will add to the current literature about college students knowledge of HPV and the HPV vaccination
- *Duration/Time*: This study will take no more than 20 minutes to complete.
- *Statement of Confidentiality*: No identifying information will be recorded when data are being entered and you will be identified by numbers only. All records will be stored in a locked drawer and only the principal investigator will have access to them
- *Right to ask questions:* Participants have the right to ask questions and have those questions answered. If you have questions about this study, please contact the researcher named above or the researcher's faculty advisor whose information is located at the end of the informed consent. For questions concerning your rights as a research participant, contact (school IRB's information)
- *Compensation:* Participants in this study will be eligible to be entered in a drawing for one of 15, $15 Visa gift cards. You do not need to complete the survey in order to be eligible for the raffle.
- *Voluntary Participation:* You do not have to participate in this study. You may end your participation at any time by telling the person in charge or not returning the questionnaires. You do not have to answer any questions which you do not want to.
- Penalty: There is no penalty for deciding not to participate in this research study.
- You must be 18 years or older to consent to participate in this research study.

You will be given a copy of this consent form to keep for your records

Title of Project: Knowledge and Attitudes about HPV vaccines

Principal Investigator: Ukwuoma O Ilozumba, 912-481-2861, uilozum@emory.edu

Faculty Advisor: Dr Ralph Diclemente

Appendix B: Knowledge and Attitudes Questionnaire

Survey: HPV Knowledge and Attitudes

Introduction: You are invited to complete a survey about HPV vaccinations. The survey has 41 items some of which require more thought than others. The entire survey should take no more than 20 minutes to complete. The results of this survey are completely confidential and will be identified only by numbers. The results of this survey will inform my Master's in Public Health thesis. If you have any questions at any point while completing the survey, please alert the interviewer. By completing this survey you are consenting to your participation in this study.

Below are 12 demographic questions, please read through them carefully, and either enter the appropriate answer or darken completely the appropriate circles.

1. Age

0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

2. Sex

Ⓜ Ⓕ

3. Institution

_____

4. Race

- ◯ American Indian or Alaska Native
- ◯ Hawaiian or Other Pacific Islander
- ◯ Asian or Asian American
- ◯ Black or African American
- ◯ Hispanic or Latino
- ◯ Non-hispanic White
- ◯ Other (please specify on line below)

_____

5. Marital Status

- ◯ Single
- ◯ In a relationship
- ◯ Married
- ◯ Divorced
- ◯ Widowed

6. **Have you been sexually active in the last 3 months?**
   Ⓨ Ⓝ
7. **Do you use a condom during sex?**
   ◯ Never ◯ Sometimes ◯ Most of the time ◯ All the time
8. **Have you ever been diagnosed with a Sexually Transmitted Infection?**
   Ⓨ Ⓝ
9. **Have you ever been diagnosed with HPV?**
   Ⓨ Ⓝ
10. **Have you ever received a HPV vaccination?**
    Ⓨ Ⓝ
11. **If you answered yes to Question 10, how many shots did you receive?**
    ① ② ③
12. **I have heard about HPV vaccinations from: (Mark All That Apply)**
    Ⓐ TV Ⓑ Magazines Ⓒ Physician Ⓓ Other health professionals Ⓔ Friends Ⓕ Parents
    Ⓖ School classes Ⓗ Other _____
    (for Other, please specify on line above)

Continued on Back

Instructions: Please read the following 13 statements carefully, and choose the option you consider correct.

True	False		
Ⓣ	Ⓕ	13.	I have heard of human papillomavirus (HPV).
Ⓣ	Ⓕ	14.	HPV can be transmitted by kissing.
Ⓣ	Ⓕ	15.	HPV infection is relatively uncommon.
Ⓣ	Ⓕ	16.	HPV can cause herpes.
Ⓣ	Ⓕ	17.	HPV can cause serious health problems for women.
Ⓣ	Ⓕ	18.	HPV can cause infertility.
Ⓣ	Ⓕ	19.	HPV can cause serious health problems in men.
Ⓣ	Ⓕ	20.	HPV can cause genital warts.
Ⓣ	Ⓕ	21.	HPV infection can be treated.
Ⓣ	Ⓕ	22.	HPV can be transmitted by genital skin to skin contact.
Ⓣ	Ⓕ	23.	Most people with HPV have no visible signs or symptoms.
Ⓣ	Ⓕ	24.	There is a vaccination to protect against HPV infection.
Ⓣ	Ⓕ	25.	Most women with HPV will not develop cervical cancer.

Instructions: Please read the following 16 statements carefully, and choose the option you consider correct.

		Strongly Disagree	Disagree	Agree	Strongly Agree	Refuse to Answer
26.	I have the ability to avoid HPV infection.	①	②	③	④	⑤
27.	I believe that HPV causes cervical cancer.	①	②	③	④	⑤
28.	The HPV vaccination is not safe.	①	②	③	④	⑤
29.	I believe HPV is curable with proper medical treatment.	①	②	③	④	⑤
30.	Having HPV would make it difficult for me to get a long-term sexual partner.	①	②	③	④	⑤
31.	Getting vaccinated may help me stay healthy.	①	②	③	④	⑤
32.	My chances of getting HPV in the future are low.	①	②	③	④	⑤
33.	I would be very worried about the side effects of the HPV vaccine.	①	②	③	④	⑤
34.	The vaccination will help me protect other people.	①	②	③	④	⑤
35.	Having HPV would be upsetting to me.	①	②	③	④	⑤
36.	I believe I am at risk for getting HPV.	①	②	③	④	⑤
37.	Getting vaccinated could be risky.	①	②	③	④	⑤
38.	I believe that HPV can have serious negative health consequences.	①	②	③	④	⑤
39.	Receiving the vaccination is against my religion.	①	②	③	④	⑤
40.	I do not worry about getting HPV.	①	②	③	④	⑤
41.	Getting the HPV vaccination will reduce my chances of getting the HPV infection.	①	②	③	④	⑤

Thank you for completing this survey.