ABSTRACT

Title of Thesis: **EXPLORING HPV KNOWLEDGE, UNDERSTANDING AND ITS ASSOCIATION WITH HEALTH BELIEFS, HEALTH LITERACY AND VACCINATION STATUS IN A SAMPLE OF COLLEGE STUDENTS**

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A cross-sectional survey was administered electronically to assess University of Maryland students' knowledge and awareness about HPV and its association with their vaccination status, health literacy, and their health beliefs. Generally, the participants had high levels of HPV awareness and moderate mean knowledge score. However, the results suggested gaps in HPV knowledge. Chi-square test of independence revealed statistically significant difference in knowledge scores between those who had received the vaccine and those who had not. Pearson correlation analysis revealed a positive association between health literacy and HPV knowledge. Perceived susceptibility was found to have no significant association with HPV knowledge and awareness. There was a negative significant correlation between HPV knowledge and awareness and perceived benefit, and a negative correlation between HPV knowledge and awareness and perceived

severity. There was also a significant positive correlation between HPV knowledge and awareness and perceived barrier.

EXPLORING HPV KNOWLEDGE, UNDERSTANDING AND ITS ASSOCIATION WITH HEALTH BELIEFS, HEALTH LITERACY AND VACCINATION STATUS IN A SAMPLE OF COLLEGE STUDENTS

by

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Chapter 1: Introduction

1.1 Statement of the research problem

The Human Papilloma Virus (HPV), is one of the most common sexually transmitted viruses in the United States (Gerend & Magloire, 2008; Sandfort & Pleasant, 2009). The Centers for Disease and Prevention Control (CDC) estimates 79 million people are currently infected and about 14 million are newly infected each year in the United States (White et al., 2016). There are many types of HPV, of which 14 are considered to be high risk (McQuillan, Kruszon-Moran, Markowitz, Unger, & Paulose-Ram, 2017). Generally, HPV infection is asymptomatic but, in some cases, it is associated with genital warts, cervical, vulvar, vaginal, penile, anal, and oropharyngeal cancers (Unger et al., 2015). Currently, about 41,000 HPV-associated cancers occur in the United States each year as reported by CDC using 2010-2014 data (Centers for Disease Control and Prevention, 2017). About 70% of all cervical cancers, 95% of all anal cancers, 70% of all oropharyngeal cancers, 50% of all vulvar cancers, 35% of all penile cancers and 65% of all vaginal cancers are attributed to HPV. HPV also can cause recurrent respiratory papillomatosis (National Cancer Institute, 2016). Currently, there is no treatment for HPV infection, but rather the medical management of specific manifestation of the disease such as genital warts or abnormal cervical cell (Centers for Disease Control and Prevention, n.d.-a). Therefore, regular screening and vaccinations are significant methods of lessening the burden of HPV infections and its related morbidities.

In the past, the FDA approved three prophylactic human papillomavirus (HPV) vaccines; Gardasil®, Cervarix®, and Gardasil 9® (FDA). Gardasil® was first licensed by the Food

and Drug Administration (FDA) in 2006 for females and approved in 2009 for males. It protects against HPV types 6,11,16,18 and can be used in both males and females aged 9 through 26 years. Cervarix® was approved in 2009 for females aged 10 through 25 years and protects against HPV types 16 and 18 (Hariri, Dunne, Saraiya, Unger, & Markowitz, 2011). Currently, as of October 2016, Gardasil 9® is the only approved vaccine currently available in the United States for both females and males and protects against HPV types 6, 11, 16, 18, 31, 33, 45, 52, and 58 (National Cancer Institute, 2016). CDC recommends the vaccine to young females from age 9 through 26, and young males through age 21. It also recommends the vaccine to males who have compromised immune systems, who are transgender or identify as gay or bisexual through the age of 26 (Centers for Disease Control and Prevention, 2016). Different from CDC, the makers of Gardasil 9® Merck Sharp & Dohme Corp recommends the vaccine to both males and females from age 9 through 26 years of age (Merck Vaccines, n.d.). Two doses of the vaccine are recommended for anyone who initiates vaccination before the age of 15, and three doses for those who begin vaccination at the age of 15 (Meites, Kempe, & Markowitz, 2016). Despite the availability of the vaccine, its use remains relatively low (Berkowitz, Malone, Rodriguez, & Saraiya, 2015; National Vaccine Advisory Committee, 2016). Vaccination completion rates were less than 40% for girls and 15% for boys in 2013 (National Vaccine Advisory Committee 2015). Among college-aged women and men between the ages of 19-26 years, 41.6% and 10.1% respectively have reported receiving at least one dose of the HPV vaccine in 2015 (Williams, 2017). Unfortunately, the vaccination completion rates fall below the Healthy People 2020 priority of achieving 80% completion rate (National Vaccine Advisory Committee, 2016). The Advisory

Committee on Immunization Practices (ACIP) recommends "catch-up" vaccination for females and males ages 13-26 who did not receive the vaccine or did not receive all doses (Berkowitz et al., 2015). This catch-up vaccine recommendation is viewed as the final opportunity to get the vaccine (Unger et al., 2015). Young college students who fall into this age category can benefit from ACIP recommendations.

Unger et al. (2015) proposed that the decision to receive vaccination may be swayed by the target populations' knowledge about the virus and the vaccine. A review of literature suggests varying levels of knowledge and awareness about HPV and misconceptions about the virus among college-aged adults (Dillard & Spear, 2010; Grace-Leitch & Shneyderman, 2016; Unger et al., 2015) (**See section 2.2.3**). Research suggests that low levels of knowledge can influence perceived susceptibility. In Krawczyk et al. (2012), participants that had low HPV knowledge erroneously identified themselves as being at low risk for HPV infection, even though 75% of them had already engaged in sexual intercourse. Even so, studies that assess the influence of knowledge on health beliefs and behaviors are sparse.

A review of literature also links health knowledge to health literacy (Hom et al., 2012; Lindau et al., 2002; Schulz & Nakamoto, 2013)**(See section 2.2.4)**. Hom et al. (2012) point out that health literacy affects health knowledge through its influence on information seeking behavior and the lack of adequate health education and communication techniques by health care providers. The prevalence of limited health literacy can be found in almost all populations which includes young adults (Wang et al., 2014). According to a report by the Institute of Medicine (IOM), about 90 million Americans have difficulty understanding health information and making health decisions

(Ickes & Cottrell, 2010). Health literacy is defined in the 2004 Institute of Medicine Report as "the degree to which people have the capacity to obtain, process and understand basic health information and services that are needed to make appropriate health decisions" (Nielsen-Bohlman, Panzer, & Kindig, 2004). Health literacy is essential for access to and utilization of healthcare services, interacting with health care professionals, being concerned and advocating for one's health as well as taking part in one's health decisions (Batterham, Hawkins, Collins, Buchbinder, & Osborne, 2016). As noted by Lindau et al. (2002), health literacy is an important factor that is often overlooked but has tremendous influence on preventive behaviors such as cancer screenings. It is essential that we explore the knowledge gaps in HPV research and expand available literature to make significant progress to improve awareness, increase vaccination rates among college students, reduce the prevalence of HPV, and thus eliminate multiple types of cancers later in life.

1.2 Research questions and hypotheses

This study aimed to answer the following research questions:

1. How knowledgeable are college students about HPV and its vaccine?
2. Is there an association between HPV knowledge and HPV vaccination status?
3. Is there an association between HPV Knowledge and awareness with Health literacy?
4. Is there an association between knowledge of HPV and awareness with their health beliefs (perceived benefit, perceived susceptibility, perceived barriers, and perceived severity)?

Hypotheses:

1. College students in this study will demonstrate moderate levels of HPV general knowledge and high level of awareness. Female students will be more aware of HPV and will have higher mean scores than males.
2. Greater HPV knowledge will be associated with being vaccinated.
3. Higher levels of knowledge/awareness will be associated with higher levels of health literacy.
4. High levels of HPV knowledge/HPV and vaccine awareness will be associated with higher perceived benefits of the vaccine, higher perceived severity of HPV infections, and higher perceived susceptibility to HPV infections. Higher levels of HPV knowledge/HPV and vaccine awareness will be associated with lower perceived barrier of the vaccine.

1.3 Definition of terms

The following terms apply to the entirety of this proposal:

Knowledge: is defined as the ability to answer factual information accurately regarding HPV. For example, knowledge is measured when an individual is asked whether a fact about HPV is accurate (Fishman, Taylor, & Frank, 2016).

Awareness: is defined as the recognition of a subject. For example, awareness is assessed when an individual is asked whether they have heard about HPV. Some level of awareness is necessary to acquire knowledge (Fishman et al., 2016).

Understanding: is defined as the ability to comprehend a particular subject (Merriam-Webster, n.d.).

High-risk sexual behavior: is defined as having one or more of the following risk factors: early age of sexual intercourse, multiple sexual partners, history of unprotected sex with

multiple partners and history of other sexually transmitted infections (Sánchez-Alemán et al., 2011; Wigfall et al., 2012).

High risk HPV: defined as a positive sample test to one or more of 14 high-risk HPV types (16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 66, or 68)(McQuillan et al., 2017).

Asymptomatic: is defined as the absence or clinical manifestation of an infection such as HPV (Hariri et al., 2011).

Genital warts: a highly infections benign growth that occurs in the genital area as a result of HPV infection (Anic & Giuliano, 2011).

Oropharyngeal cancer: cancers that occur in the middle part of the throat, soft palate, tonsils area and the base of the tongue (National Cancer Institute, 2016).

Recurrent respiratory papillomatosis: growth of benign tumors in the air passage from the nose to the lungs (National Cancer Institute, 2016).

1.4 Significance of the project

College students are a priority population because they fall into the recommended age category for the vaccine and are the future decision-makers and parents of the next generation of children who will be susceptible to HPV infections (Bynum, Brandt, Friedman, Annang, & Tanner, 2011). Moreover, previous studies have shown that college students display high risk sexual behaviors for the human papillomavirus (HPV)− early age of first sexual intercourse (Fontenot et al., 2014; Sandfort & Pleasant, 2009) history of multiple sexual partners, unprotected sex, and history of sexually transmitted infections (STIs) (Katz et al., 2015; Sánchez-Alemán et al., 2011). Based on CDC findings, the peak age for HPV infection is the early 20's (Centers for Disease Control and Prevention, n.d.-b). This finding is supported by other studies results−almost half of

all HPV infections occur in adults ages 15–25 years (Fontenot et al., 2014), and as noted by Sanford et al. (2009), sexually active women under twenty-five years of age consistently had the highest rates of genital HPV infection. According to Thompson et al. (2016), 20–24-year-old females had the highest prevalence of genital HPV (59.8%), HPV types 6, 11, 16, and 18 (19.9%) and the highest prevalence of genital warts. Men under the age of 30, also displayed the highest rates of genital warts (Thompson et al., 2016). As a result of the high-risk factors, low vaccination rates, and high infection rates affecting adults under the age of 30, college students represent a significant population for HPV surveillance, hence an important topic in public health.

Chapter 2: Background

2.1 Theoretical model and/or conceptual framework

The theoretical framework used in this study was the Health Belief Model (HBM). HBM was developed in the 1950's and is one of the most widely used theoretical frameworks that examines and explains health-related behavior. This model posits that as people understand the risk that unhealthy behaviors present and feel threatened by its consequences, they become more interested in taking preventive actions to reduce their risk and counteract and reduce existing barriers (Meyer 1997). HBM has six constructs: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy, and cues to action (Mehta 2012). Perceived susceptibility is the belief that a person has about the risk of acquiring a disease or reaching a harmful state as a result of participating in a particular behavior. 2) Perceived severity is a person's perception of the extent or seriousness of the impact of acquiring a disease clinically or socially. 3) Perceived benefit is the belief in the advantages that could result from participating in a particular behavior that lessens the seriousness of a disease. 4) Perceived barrier is a person's belief in the difficulties and negative outcomes associated with executing a particular behavior. 5) Cue to action is the triggering force that compels a person to take an action. 6) Self-efficacy is the confidence a person has to perform a specific behavior (Daddario, 2007; Glanz et al., 2008). The model also suggests that other variables such as knowledge and socioeconomic status can have indirect effects on the four major perceptions of susceptibility, severity, benefits, and barriers **(Figure 1.)** (Glanz et al., 2008). This study used HBM constructs to explore the relationship between HPV knowledge and health beliefs.

Figure 1. Health Belief Model

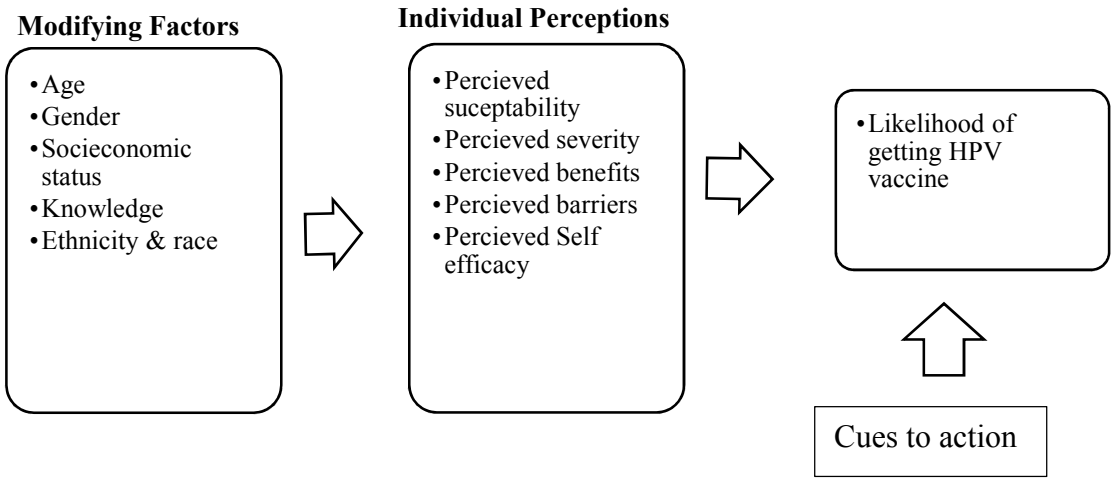

Figure 1. Displays the components and constructs of the Health Belief Model (Glanz et al., 2008)

2.2 Review of relevant literature

2.2.1 HPV knowledge and awareness among college students

A review of findings from studies that assessed HPV and vaccine knowledge, among college-aged students, reveal mixed results. In a sample of racially diverse young adults ages 18–26 from two southeastern universities, 78% (n=97) of the students had heard of HPV, with a majority of the respondents (87%) scoring highly on the knowledge score (Gerend & Magloire, 2008). Similarly, Sanford et al. (2009) conducted a study in a large, public university in the Northeast United States (N=1282). Findings revealed that only about 8% of the sample reported never having heard of the human papillomavirus. Interestingly despite the moderate to high levels of awareness, some misunderstanding of

HPV was observed in both studies- association between HPV and genital warts (Gerend & Magloire, 2008); and modes of transmission (Sandfort & Pleasant, 2009).

When comparing females and males, females tend to be more aware of HPV. The proportion of females who had heard of HPV ranged from 77% (n=365) (Unger et al., 2015) to 96% (n=396) (Dillard & Spear, 2010). When looking at the male population, Grace-Leitch & Shneyderman, (2016) found 74.8% (n=120) of their male sample had heard of HPV, and 62% in Gerend & Magloire, (2008). Women also demonstrated generally higher knowledge levels. For example in Gerend & Magloire (2008), women had a mean score of 4.33 while males had a mean score of 2.65 out of 6. The gender disparity in knowledge and awareness may be attributed to the fact that prior research and health promotion efforts focused on the link between HPV and cervical cancer (Mehta, Sharma, & Lee, 2012). In addition, HPV vaccines were first developed for females, then later for males. Gardasil® was first approved in 2006 for females and in 2009 for males; Cervarix® was approved in 2009 for only females and; Gardasil 9® was approved for both females and males as recent as 2014 (Food and Drug Administration).

Among minority groups, HPV awareness levels differed greatly. In a study focusing on African American college students, the knowledge mean score was 5.39 ± 2.46 out of a possible 10. When asked if they had heard of HPV, awareness levels ranged from 36% (n=224) (D'Urso, Thompson-Robinson, & Chandler, 2007) to 85% (n=58) (Sledge, 2015). Similar gender disparities as discussed earlier were noted in Bynum et al. (2011) study (n=575), were males (56.6%) were less likely than females (85.9%) to have heard of HPV. Knowledge mean scores were also less for males (4.73) compared to females

(5.63) out of 10. HPV misconceptions were noted in these studies and are discussed in **section 2.2.2.**

2.2.2 Misconceptions about HPV

Despite the moderate to high levels of HPV awareness and knowledge, several common misconceptions about the virus existed. Two studies found varying levels of understanding about the asymptomatic nature of HPV infection. The percentage ranged from only 16% (n=66) (D'Urso et al., 2007) to 77% (n=97), answering correctly about the asymptomatic quality of HPV (Gerend & Magloire, 2008). Incorrect information about the consequence of HPV infection and its relation to other sexually transmitted infections was demonstrated in several studies. For example 36% of the entire sample (n=351) (D'Urso et al., 2007) and 53% (n=365) of women sampled (Unger et al., 2015) believed that HPV caused herpes; about 36% of women inaccurately believed that HPV can cause Human Immunodeficiency Virus (HIV) infection (Unger et al., 2015); only 21.2 % (n=165) believed that HPV causes genital warts (Katz et al., 2015); and 42% (n=196 vaccinated) to 45% (n=176 unvaccinated) of the sample in Dillard & Spear, (2010) believed that HPV and HIV have similar effects on the human body.

Significant gaps were also noted regarding mode of HPV transmission. For example 72% (n=1208) and 89.6% (n=365) incorrectly believed that the exchange of bodily fluids transmits HPV (Sandfort & Pleasant, 2009; Unger et al., 2015 respectively); about 37% (n=365) did not know HPV was transmitted by genital skin-to-skin contact, as the primary mechanism of transmission (Unger et al., 2015); only 29.7% (n=165) and 49.6% (n=1208) knew that HPV may spread from person to person by having oral sex (Katz et al., 2015; Sandfort & Pleasant, 2009 respectively). The different misconceptions about

HPV moreover demonstrate the complex nature of HPV and the need for more tailored educational efforts to address them (Gerend & Magloire, 2008).

2.2.3 Application of health belief constructs in HPV research

The HBM constructs have been used varyingly in several studies to predict and understand preventive behavior in HPV-related research. *Perceived susceptibility* was relatively low in studies that used the construct. Mean score in Gerend & Magloire, (2008) was 2.29 out of 5 with 56% of the participants (n=60 women who had not received the vaccine) strongly or moderately, disagreeing when asked about their perceived susceptibility to HPV infection (five-point scale 1- strongly disagree to 5- strongly agree). A different study with a population of African American students found even lower mean scores of 1.73 in males and 1.79 in females (n=551) when asked a similar question (Bynum et al., 2011). Katz et al. (2015) study revealed that participants were more willing to receive the vaccine if they perceived themselves susceptible to HPV infection if they had high numbers of sexual partners (n = 123; 74.6%), and if they had multiple partners (n = 108; 65.5%). Similarly, in Gerend & Magloire, (2008), being sexually active and having a higher number of sexual partners, were predictors of perceived susceptibility. In Grace-Leitch & Shneyderman, (2016), the study demonstrated that individuals with high perceived susceptibility, who worried more about contracting the infection, were more likely to accept the HPV vaccine ($B=0.57$, $SE=0.20$, $p < 0.01$). Perceived susceptibility was also believed to motivate information seeking behavior which in turn can bring about increased knowledge of the virus (Dillard & Spear, 2010).

Perceived severity was not discussed extensively in most studies. In their qualitative study, Mehta et al. (2012) attributed the lack of depth when analyzing different HBM constructs to the repeated lack of knowledge about HPV demonstrated by their participants. For instance, when asked about the seriousness of HPV and its consequences, common responses fell into assumptions such as "it could be serious" or "I don't really know much."

In some studies, *perceived benefit* was used to assess vaccine acceptability. In a study of African-American college students assessing their acceptability of HPV4 vaccine (Gardasil), perceived benefit was a unique significant predictor of intention to accept the vaccination. It had a statistically significant contribution of about 62.5% (Sledge, 2015). Bynum et al. (2011) found male respondents in their study scored significantly lower on the perceived benefit of HPV Vaccination ($p < .01$) and therefore were less likely to get the vaccination.

When examining *Perceived barriers,* lack of understanding of HPV and the vaccine was evident in research findings. For example in the 2008 study done at a University in Pennsylvania, 46% of respondents sighted lack of research to justify not getting the vaccine, and 35% stated that they were not convinced that the vaccine is effective (n=146). Concerns about the cost of getting vaccine was also a significant perceived barrier with about 24% stating that they could not afford to get the vaccine (Dillard & Spear, 2010). Similarly, in a different study, qualitative data (n=89) indicated similar cost concerns among participants that were aware of the vaccine. Representative responses such as “I think it costs a lot” or “I don’t want to pay the copayment” were noted (Fontenot et al., 2014).

The association between HPV knowledge and *self-efficacy* to predict vaccine acceptability was examined in a cross-sectional survey of students at a community college in New York City. Results demonstrated high levels of self-efficacy with mean ranges of 3.56 to 4.69 out of 5. Most participants agreed that they are able to discuss with their partners about sexually transmitted diseases and contraceptives. Self-efficacy was also positively associated with vaccine acceptability ($B = 1.10$, $SE = 0.56$, $p < 0.05$). This finding suggested that HPV vaccine acceptability can be a predictor of self-efficacy to receive the vaccination (Grace-Leitch & Shneyderman, 2016).

2.2.4 Health literacy

In their study, Schulz & Nakamoto (2013) examined the association between health literacy and health outcomes. The study demonstrated that individuals with low health literacy had lower levels of health knowledge, poorer self-reported health status, lower comprehension of available preventive services and lower utilization of health resources, poor rates of compliance, difficulty understanding health materials, high hospitalization rates, higher health care costs and consequently had worse health outcomes. Health literacy also can be a predictor of health knowledge (Quinlan et al., 2013). However, research that explores this relationship are limited and equivocal. Among the available limited research, is a study done by Bynum (2013), to assess the effects of health literacy on HIV positive women cervical cancer screening knowledge and behaviors. The study found that there was no significant difference in HPV knowledge between low and high literacy women. However, the study did find that health literacy had a greater influence on behaviors such as screenings. It was suggested that the pathway through which health literacy influences knowledge and behaviors is complex and requires further exploration

(Bynum et al., 2013). In a different health focus, the authors in Hom et al. (2012) conducted an observational cohort study to assess the levels and associations of oral health literacy and oral health knowledge in low-income first-time pregnant women. The study found a significant positive correlation between the health literacy test scores and the oral health knowledge scores and therefore concluded that higher levels of knowledge was associated with higher levels of oral health literacy ($p < .01$).

Chapter 3: Methods

3.1 Study sample and design

A cross-sectional survey design was used to assess the knowledge and health beliefs of undergraduate students about HPV and its vaccine. The study aimed to recruit an estimated maximum sample size of 570 undergraduate male and female students from the University of Maryland College Park (UMCP) between the ages of 18-26. The purpose of the selected age range was to recruit participants who were within the recommended age range (ages 9-26 years) of receiving the vaccine (Meites et al., 2016). The sample size was calculated using G-Power analysis with an alpha level of .05 and desired power of .80 to compare the means between two independent groups. The estimated total sample size was determined by averaging the total sample size n= 352 and n=788 necessary to observe an effect size of d=0.20 and d=0.30 respectively. Participants were recruited by posting recruitment flyers around campus and contacting the different program administrators and sorority advisors on campus to request emailing of the recruiting announcement to their student's emails. In addition, participants were recruited by sending recruitment emails directly to the University of Maryland student email list using a listserv established by the registrar. Students on the aforementioned recruitment efforts received three emails, and over 5,000 students were sent recruitment emails. The first email directed participants to the survey administered electronically using Qualtrics Research Suite software through a link that was embedded in the email. The email informed participants about the purpose of the study, assured anonymity and confidentiality, researchers contact information and participants' right. A second follow-up reminder email was sent two weeks after the initial email and contained similar

information. The third follow-up reminder email was sent one month after the original, and also contained similar information as the previous emails. The study was approved by the University of Maryland, College Park Institutional Review Board (IRB).

To encourage participation, participants who completed the online survey were given the option to be transferred to a different site separate from their survey responses, where they could sign up for an opportunity to randomly win one of 10 twenty-five-dollar electronic gift cards of their choice. Ten survey participants were randomly selected and awarded a $25 electronic gift card of their choice at the end of the data collection period.

3.2 Measurement

The survey developed for this study contained 39 items. It collected information on demographic characteristics including age, gender, college level, race/ethnicity, relationship status and insurance status. Participants' source of health information was assessed using one item adapted from the Health Information National Trends Survey (HINTS). Health literacy was assessed using one item that asked for participants' confidence level in filling out medical forms. It was developed and validated by Sarkar, Schillinger, López, & Sudore (2011).

Sexual behavior was assessed with four items asking about: the number of sexual partner's −adapted from The Youth Risk Behavior Survey (YRBS); and frequency of condom use−adapted from the Safe Sex Behavior Questionnaire (SSBQ) developed by Dilorio, Parsons, Lehr, Adame, and Carlone (1992). Nineteen items on the HPV virus and vaccine knowledge were adapted from HINTS, The National Health and Nutrition Examination Survey (NHANES), and the National Health Interview Survey (NHIS).

Health beliefs items measuring the HBM constructs were developed and adapted from previous HPV studies (Gerend & Magloire, 2008; Kim & Nan, 2015). The items were scored using a Likert five-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). Perceived susceptibility was assessed using three items. An example of an item on the scale that measured perceived susceptibility is "There is a possibility that I will get HPV." Two items were used to assess perceived severity. An example of an item that measured perceived severity is "I believe that the HPV virus can result in serious health problems." Perceived benefit was assessed using two items. An example of an item is "I believe that getting the HPV vaccine can protect me against serious health problems." Finally, perceived barrier was assessed using four items. An example of an item measuring perceived barrier is "I do not want to get the vaccine because I don't know enough about the vaccine."

3.3 Reliability and validity

A Pilot test was conducted using a convenient sample of nine students to assess face validity of the questionnaire. Participants were asked to comment if the questions were clear and sensible. An expert in the field also reviewed the survey to assure the content validity of the survey. Revisions were made to the questionnaire based on the findings. Reliability was assured by adapting items from previous surveys discussed in section 3.2. Cronbach's alpha and items correlation were also calculated and are discussed in section 4.5.

3.4 Analysis

The analysis for this study was done using SPSS software. Descriptive statistics were calculated to describe the mean, standard deviation, frequency, and proportion, as

appropriate for the following variables: age, race/ethnicity, college level, sexual behavior, health literacy, source of health information, insurance status and knowledge levels. Responses were coded and scored to determine knowledge total scores. To test Hypothesis 1, a two-tailed t-test was used to examine differences in HPV mean knowledge scores by gender. Chi-square test of independence was done at a significance level of $p \leq .05$ to test hypothesis 2 to examine the relationship between knowledge level and vaccination status. Pearson's R correlation coefficient was used to examine the correlation and strength of association between HPV awareness and knowledge score and the health belief constructs, and HPV awareness and knowledge and health literacy at a significance level of $p \leq .05$ to test hypothesis 3 and hypothesis 4 respectively.

Chapter 4: Results

4.1 Overview of data collection and data analysis

The online survey was first disseminated on February 14, 2018 and was deactivated on March 22, 2018. A total of 420 students responded to the survey, resulting in a response rate of 8.4%. Three participants did not consent to take the survey. Of the 417 students who consented to participate, 31 did not respond to any items on the survey and were excluded from data analysis. Two students did not meet the age requirement to participate in the study and were excluded from analysis – they were 28 and 35 years respectively. Another participant did not indicate his or her age and also was excluded from data analysis. As a result of the exclusions, the responses for 383 participants were used in this data analysis.

4.2 Demographic characteristics

Table 1. summarizes demographic characteristics of the study participants and compares it to the most recent demographic profile of undergraduate students at the University of Maryland College Park (UMCP) as reported by the Institutional Research, Planning and Assessment (IRPA) (2017). Majority of the participants 256 (66.8%) identified themselves as females while 127 (33.2%) identified themselves as males. The gender distribution in this study differed from that of UMCP as the proportion of female participants was higher by approximately 20% and that of male participants was lower by approximately 20%.

The participants (N=383) age ranged from 18-26 with a mean of 19.26 (SD= 1.344). The mean age of males (N=127) was 19.73 (SD=1.417) and 19.57 (SD=1.306) for females (N=256). Majority of the participants were 18-20 years of age. Nearly 33% of the

respondents were 19 years of age, (23.8%) 20 years of age, (20.9%) 18 years of age, and (13.3%) 21 years of age. The remaining age categories (22-26) were less than 10% (In addition to Table 1, see **Figure 2.** for age frequency graph in years, and **Table 2.** for a crosstabulation of age and gender displaying frequency and statistical summaries). When comparing the age distribution of UMCP student body and study participants, only the 19-year-old age group were overrepresented by over 10%. The remaining age groups were either underrepresented or overrepresented by no more than 6%.

Only 11.5% of the participants identified themselves as Latino/Hispanic. Nearly 60% of the participants identified themselves as white, 18.3% Asians, 10.4% African American/Black, 8.6% selected more than one race and were categorized as Multiracial, 1% Native American/American Indian, 1% Pacific Islander/Native Hawaiian and 4.4% as Other. A comparison of the race and ethnic distribution of the study participants and the UMCP student body demonstrated an overrepresentation of less than 9% for the different racial and ethnic groups except for African Americans. African Americans were underrepresented by about 2%. Freshmen formed the largest segment of participants 32.4 %, followed closely by sophomores 31.1%, 24.5% juniors and 12% were seniors. This class distribution differed with UMCP student body as seniors were underrepresented by over 15%, juniors by less than 2%. Freshmen were overrepresented by nearly 18% and sophomores by about 8%.

Table 1. Students Demographic Characteristics Comparison

	Undergraduate Study Participants (N=383)	University of Maryland Students Fall 2017 (N=29,868)
Gender	**N (%)**	**N (%)**
Male	127(33.2%)	15,945 (53.4%)
Female	256 (66.8%)	13,923 (46.6%)
Race/ Ethnicity		
Asian	70 (18.3%)	5,011 (16.8%)
African American/Black	40 (10.4%)	3,738 (12.5%)
White	221 (57.7%)	14,900 (49.9%)
Native American/American Indian	1 (0.3%)	28 (0.1%)
Pacific Islander/Native Hawaiian	1 (0.3%)	25 (0.1%)
Other/Unknown	17 (4.4%)	501 (1.7%)
Multiracial	33 (8.6%)	1,267 (4.2%)
Latino/Hispanic	44 (11.5%)	2,871 (9.6%)
College Level Classification		
Freshman	124 (32.4%)	4,366 (14.6%)
Sophomore	119 (31.1%)	6,859 (23.0%)
Junior	94 (24.5%)	7,824 (26.2%)
Senior	46 (12%)	8,828 (29.6%)
Age Distribution		
18	80 (20.9%)	5133 (17.2%)
19	125 (32.6%)	6220 (20.8%)
20	91 (23.8%)	6235 (20.9%)
21	51 (13.3%)	5848 (19.6%)
22	25 (6.5%)	2446 (8.2%)
23	8 (2.1%)	984 (3.3%)
24	1 (0.3%)	540 (1.8%)
25 and older	2 (0.5%)	1786 (6.0%)

Note: Data on demographic characteristics of University of Maryland undergraduate students originated from the Institutional Research, Planning, and Assessment (IRPA)*Campus Counts* website. https://www.irpa.umd.edu/CampusCounts/Enrollments/stuprofile_allug.pdf

Figure 2. Age Frequency Distribution in Percentage

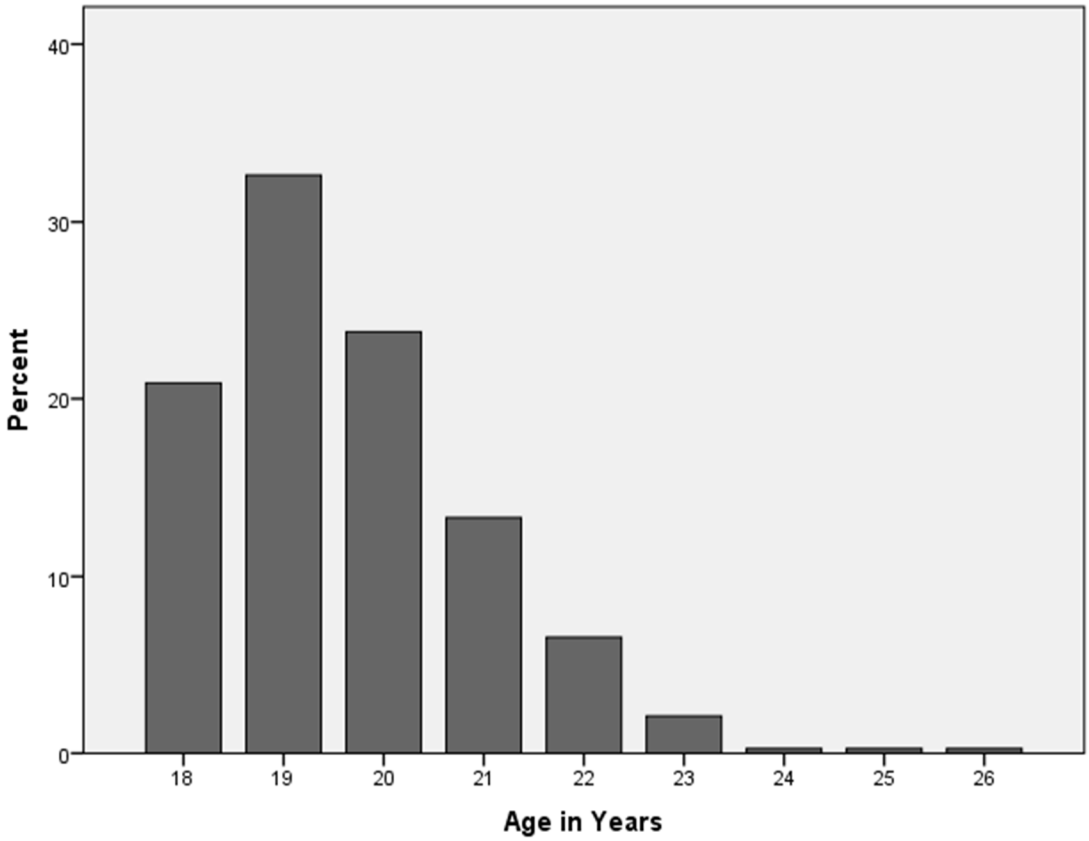

Table 2. Crosstabulation of Age and Gender Frequencies and Summary Statistics

		Gender		
		Female	Male	Total
Age	18	51 (63.8%)	29 (36.3%)	80 (20.9%
	19	90 (72.0%)	35 (28.0%)	125 (32.6%)
	20	66 (72.5%)	25(27.5%)	91 (23.8%)
	21	30 (58.8%)	21 (41.2%)	51 (13.3%)
	22	11 (44.0%)	14 (56.0%)	25 (6.5%)
	23	6 (75.0%)	2 (25.0%)	8 (2.1%)
	24	0 (0%)	1 (100%)	1 (0.3%)
	25	1 (100%)	0 (0%)	1 (0.3%)
	26	1 (100%)	0 (0%)	1 (0.3%)
Total		256 (66.8%)	127 (33.2%)	383 (100%)
Mean		19.57	19.73	19.26
Standard deviation		1.306	1.417	1.344
Median				19
Mode				19

4.3 Other demographic characteristics

Table 3. summarizes other demographic characteristics of the study participants discussed in this section. Majority of the participants 70.2% identified themselves as being single, 29.6% in a committed relationship, 0.3% as married. Almost all participants indicated that they had health insurance (98.7%), 0.8% had no insurance while 0.5% did not know if they had insurance. Majority of the participants (75.2%) got their health information from the internet, 13.3% from family members, 6% from health care providers, 6% were not sure, and less than 10% got their information from the television, books, friends and other sources. One item assessed health literacy: over 42% were quite a bit confident (33.5%) or extremely confident (8.9%) regarding filling out medical forms. Whereas nearly 36% of the participants were sometimes confident; 16.8% a little confident; and 5% were not at all confident in completing medical forms.

A moderate proportion of participants (63.4%), indicated that they had received the HPV vaccine, 19.9% did not know if they had received the vaccine and 16.8% of the participants reported that they had not received the vaccine. Statistically significant more females had received the vaccine compared to males, $\chi 2$ (2, n=382) =8.117, $p \leq .017$ (**see Table 4.**). For those who had received the vaccine, 55.6% indicated that they received three doses of the vaccine, 18.5% received two doses, and 9.9% received only one dose. Of those who did not receive the vaccine or did not know whether they received the vaccine (N=140), only 21.6% were either moderately interested or very interested in getting the vaccine, 30% were slightly interested in getting the vaccine, and 22.2% were either moderately uninterested or very uninterested in getting the vaccine.

Table 5. summarizes sexual behavior characteristics. About 33% of the participants reported that they had never had any sexual partners in their lifetime, 19.9 % indicated that they had one, 9.8% had two, 9.3% had three, 5.3% had four, and 20.4% had five or more sexual partners. Less than 10% of the participants indicated that they never use condoms when engaging in sexual intercourse (8.8%), 17.8% sometimes, 18.3% most of the time, 17.5% always, 2.1% did not want to answer this question, and 35.5% stated that this question was not applicable to them. When asked if they use protective barriers during oral sex, 57% indicated that they never use protective barriers, 5.3% sometimes, less than 2% most of the time, 1.3% always, 1.3% did not want to answer, and 33.2% stated that this question was not applicable to them. When asked about condom use when engaging in anal sex, most participants (81.7%) indicated that this question was not applicable to them, 7.7% indicated they never use condoms when engaging in anal sex, 3.4% sometimes, 1.9% most of the time, 3.4% always and 1.9% did not want to answer this question.

Table 3. Other Demographic Characteristics and Health Variables of Interest

		Frequency	Percent
Relationship Status (N=382)	Single	268	70.2%
	In a committed relationship	113	29.6%
	Married	1	0.3%
Health Insurance (N=382)	Yes	377	98.7%
	No	3	0.8%
	Don't know	2	0.5%
Source of Health Information (N=383)	Television	3	0.8%
	Internet	288	75.2%
	Books	3	0.8%
	Friends	3	0.8%
	Family	51	13.3%
	Doctor or healthcare provider	23	6.0%
	Other	4	1.0%
	Don't know	8	2.1%
Health Literacy (N=382)	Not at all	19	5.0%
	A little	64	16.8%
	Sometimes	137	35.9%
	Quite a bit	128	33.5%
	Extremely	34	8.9%
Vaccination Status (N=382)	Yes	242	63.4%
	Don't Know	76	19.9%
	No	64	16.8%
Number of Doses(N=243)	1 dose	24	9.9%
	2 doses	45	18.5%
	3 doses	135	55.6%
	Don't Know	39	16.0%
Interest in getting the vaccine (N=140)	Very interested (7)	10	7.1%
	Moderately interested (6)	20	14.3%
	Slightly interested (5)	42	30.0%
	Neither (4)	25	17.9%
	Slightly uninterested (3)	12	8.6%
	Moderately uninterested (2)	12	8.6%
	Very uninterested (1)	19	13.6%

Table 3 displays the frequency of vaccination status, doses received and the interest in getting the vaccine for those who have not been vaccinated or don't know if they have been vaccinated.

Table 4. Chi-square analysis of HPV vaccination by Gender

HPV vaccination	Yes	No	Don't Know	$\chi 2$	*Df*	P-value
Male	69 (54.8%)	22(17.5%)	35 (27.8%)	8.117	2	0.017
Female	173 (67.6%)	42(16.4%)	41 (16.0%)			

Chi-square significance test was done at $p \leq .05$.

Table 5. Sexual Behavior Frequency Distribution

Sexual Behavior (N=377)		Frequency	Percent
Number of Sexual Partners (Lifetime)	None	122	32.4%
	1 partner	75	19.9%
	2 partners	37	9.8%
	3 partners	35	9.3%
	4 partners	20	5.3%
	5 or more partners	77	20.4%
	Don't want to answer	11	2.9%
Condom Use (Sexual Intercourse)	Never	33	8.8%
	Sometimes	67	17.8%
	Most of the time	69	18.3%
	Always	66	17.5%
	Don't want to answer	8	2.1%
	Not Applicable	134	35.5%
Condom Use/Protective barrier (Oral Sex)	Never	215	57.0%
	Sometimes	20	5.3%
	Most of the time	7	1.9%
	Always	5	1.3%
	Don't want to answer	5	1.3%
	Not Applicable	125	33.2%
Condom Use (Anal Sex)	Never	29	7.7%
	Sometimes	13	3.4%
	Most of the time	7	1.9%
	Always	13	3.4%
	Don't want to answer	7	1.9%
	Not Applicable	308	81.7%

4.4 Analysis of research questions and hypotheses

4.4.1 Knowledge and awareness of HPV and the vaccine

Hypothesis 1: UMCP College students in this study will demonstrate moderate levels of HPV general knowledge. Female students will be more aware of HPV and will have higher mean scores than males.

Majority of the participants 89.3% (N=341) had heard about HPV, and 10.7% reported that the did not know or had not heard about HPV. More females than males (90.2% vs. 87.3%) reported having heard of HPV, but there was no significant difference between gender and having heard of HPV $\chi 2$ (1, n=382) =.758, p=.384. Seventy percent of the participants (N=383) reported having heard about the HPV vaccine from their doctor or other healthcare providers. Female participants were significantly more likely than males to have heard about the vaccine from a doctor or other health care provider, $\chi 2$ (1, n=383) =15.951, $p < .001$ (**See Table 6. for Chi-square analysis of HPV and Vaccine Awareness**).

Items that assessed the knowledge level of UMCP student participants on **Table 7. and Table 8.** were scored out of a possible 11 points. Chi-square test was done at the $p \leq .05$ and revealed no significant differences between male and females for each knowledge item (**see Table 7.**). Also, a composite knowledge score was calculated. The mean knowledge score was 6.02 out of a possible 11 (SD=3.06) (**See Table 9.**). An independent sample t-test was performed to further test hypothesis 1 to determine whether female participants (N=255) demonstrated statistically significant higher knowledge mean scores than males (N=126). Levene's test for equality of variance was satisfied, p= 0.740. The results demonstrated that there was no statistical significant

difference in the mean knowledge score for females M= 6.59 (SD= 3.18) and males M= 6.67 (SD= 3.33), t (379) = -0.212, p= 0.832 **(See Table 10.**).

Table 6. Chi-square Analysis of HPV and Vaccine Awareness

Awareness of HPV and the vaccine	Males		Females		$\chi 2$	*Df*	P-value
	Yes	No/Don't Know	Yes	No/Don't Know			
Have you ever heard of HPV? HPV stands for Human Papillomavirus. It is not HIV, HSV, or herpes. (N=382)	87.3%	12.7%	90.2%	9.8%	0.758	1	0.384
Has a doctor or other health care provider ever talked with you about the HPV vaccine? (N=383)	56.7%	43.3%	76.6%	3.4%	15.951	1	<.0001

Chi-square significance test was done at $p \leq .05$

Table 7. Chi-square Analysis of Knowledge Items on HPV

Knowledge Items on HPV	Males		Females		$\chi 2$	*df*	P-value
	Yes	No/Don't Know	Yes	No/Don't Know			
1. Do you think HPV is a sexually transmitted disease?	76.40%	23.60%	77.70%	22.30%	0.089	1	0.765
2. Do you think that HPV infection is rare?	33.9%	66.1%	28.1%	71.9%	1.328	1	0.249
3. Do you think HPV can cause genital warts?	59.5%	40.5%	59.8%	40.2%	0.002	1	0.964
4. Do you think HPV can cause cervical cancer?	62.2%	37.8%	71.5%	28.5%	3.382	1	0.066
5. Do you think HPV can cause penile cancer?	37.0%	63.0%	40.0%	60.0%	0.319	1	0.572
6. Do you think HPV can cause anal cancer?	36.2%	63.8%	32.4%	67.6%	0.548	1	0.459
7. Do you think HPV can cause oral/throat cancer?	40.9%	59.1%	34.8%	65.2%	1.393	1	0.238
8. Do you think HPV can cause vaginal/vulva cancer?	49.6%	50.4%	49.2%	50.8%	0.005	1	0.943

Note: the correct answer for all items was "yes" except item #2, the correct answer was "No." Chi-square significance test was done at $p \leq .05$ (N=383).

Table 8. Multiple Response Knowledge item on HPV

Through which of the following sexual practices can HPV be transmitted? (Select all that applies)		Oral sex	Anal sex	Vaginal sex	Don't know	Don't want to answer	Total
	N	174	176	217	40	2	255
	% Females	68.2%	69.0%	85.1%	15.7%	.8%	
	N	95	100	108	18	2	127
	% Males	74.8%	78.7%	85.0%	14.2%	1.6%	
Total	N	269	276	325	58	4	382

Table 9. Composite Knowledge Score Summary Statistics

Summary statistics		Female	Male
N	381	255	126
Mean	6.0236	6.5922	6.6667
Median	6.0000	--	--
Mode	10.00	--	--
Std. Deviation	3.06199	3.17816	3.32506
Variance	9.376	--	--
Minimum	0	--	--
Maximum	11	--	--

Table 10. Independent Samples Test for Mean Knowledge Score

		Knowledge Mean Score	
		Equal variances assumed	Equal variances not assumed
Levene's Test for Equality of Variances	F	.110	
	Sig.	.740	
t-test for Equality of Means	T	-.212	-.209
	Df	379	239.328
	Sig. (2-tailed)	.832	.835
	Mean Difference	-.07451	-.07451
	Std. Error Difference	.35144	.35687
	95% Confidence Interval Lower	-.76553	-.77752
	of the Difference Upper	.61651	.62850

4.4.2 Vaccination status and HPV knowledge

Hypothesis 2: Greater HPV knowledge will be associated with being vaccinated

To assess the association between HPV knowledge and vaccination status, chi-square test of independence was done at the significance level of $p \leq .05$. Knowledge scores were transformed into binary variables (high score variable and low score variable). Any participant who scored at the median of 6 and above was assigned to the high score group, and those who scored less than 6 were assigned to the low score group. The analysis revealed a statistically significant difference in knowledge scores between those who had received the vaccine and those who did not receive the vaccine or those who did not know if they received the vaccine $\chi 2$ (2, n=380) =17.298, $p < .001$. From this result, we can infer that participants that had received the vaccine were more likely to have high knowledge scores (70.5% vs. 58.7%) and vice versa (**See Table 11.**).

Table 11. Chi-square Analysis of HPV Knowledge Score and Vaccine Status

Vaccine Status		High Knowledge	Low Knowledge	$\chi 2$	*df*	P-value
HPV vaccine is given to prevent cancers in females and males. Have you ever received one or more doses of the HPV vaccine? (N=380)	**Yes**	70.5%	29.5%	15.951	2	<.000
	No	58.7%	41.3%			
	Don't Know	44.7%	55.3%			

Note. Knowledge scores were transformed to binary variables–a score at the median of 6 or higher was assigned to high knowledge variable group, and scores below 6 were assigned to the low knowledge variable group. Chi-square significance test was done at $p \leq .05$.

4.4.3 Health literacy and knowledge

Hypothesis 3: Higher levels of awareness and knowledge will be associated with higher levels of health literacy.

The relationship between health literacy, HPV knowledge, and HPV and vaccine awareness among the respondents was examined by conducting a Pearson R correlation. As shown on the correlation matrix **Table 12**, the analysis demonstrated a weak, positive and statistically significant correlation between health literacy and HPV knowledge, r =.280, n=379, p =< .001. Students with higher HPV knowledge scores demonstrated higher levels of health literacy. Similarly, the analysis demonstrated a weak, positive and statistically significant correlation between health literacy and HPV awareness, r =.135, n=379, p =≤.008 and health literacy and HPV vaccine awareness, r =.205, n=379, p =< .001. Students who had higher levels of HPV and vaccine awareness also demonstrated higher levels of health literacy.

Table 12. Descriptive Statistics and Correlation Analysis for Health Literacy and HPV Knowledge and Awareness

			1	2	3	4	Mean	SD
1	Health literacy	R					3.24	1.00
		P-value						
2	HPV awareness	R	.135**				0.89	0.31
		P-value	.008					
3	Vaccine awareness	R	.205**	.327**			0.7	0.46
		P-value	.000	.000				
4	HPV knowledge score	R	.280**	.318**	.258**		6.63	3.23
		P-value	.000	.000	.000			

Note N=379 **. P< 0.01 (2-tailed)

4.4.4 Health belief and knowledge

Hypothesis 4: High levels of HPV knowledge/HPV and vaccine awareness will be associated with higher perceived benefits of the vaccine, higher perceived severity of HPV infections, and higher perceived susceptibility to HPV infections. Higher levels of HPV knowledge/HPV and vaccine awareness will be associated with lower perceived barrier of the vaccine.

The association between HPV knowledge, HPV and vaccine awareness and the four health belief constructs: perceived susceptibility, perceived severity, perceived benefits and perceived barriers were assessed among the respondents by conducting a Pearson R correlation. The findings are summarized in **Table 13**.

Perceived susceptibility to HPV was high (mean score=11.42 of 15 and SD=2.76). The correlation analysis revealed no significant correlation between HPV knowledge and perceived susceptibility, r =-.049, n=348, p = .362. Similarly, the analysis found no significant correlations between HPV awareness and perceived susceptibility, r =-.037, n=348, p = .492, and vaccine awareness and perceived susceptibility, r =-.016, n=348, p = .765.

Perceived severity of HPV among participants was low (mean score= 3.93 of 10; SD=2.76). There was a statistically significant weak negative correlation between HPV knowledge and perceived severity, r= -.175 n=348, $p = \leq .001$. Higher HPV knowledge correlated with lower perceived severity of HPV infection, albeit a weak statistically significant correlation. Likewise, the analysis also demonstrated a weak, negative and statistically significant correlation between perceived severity and HPV awareness, r =-.132, n=348, $p = \leq .014$ and perceived severity and HPV vaccine awareness, r =-

.197, n=348, p =< .001. Higher HPV and vaccine awareness correlated with lower perceived severity of HPV infection.

The perceived benefit of the HPV vaccine was low (mean score= 3.48 of 10; SD=1.63). The analysis revealed a statistically significant weak negative correlation between HPV knowledge and perceived vaccine benefit, r= -.157 n=348, p = ≤.003. Higher HPV knowledge was associated with lower perceived vaccine benefit. Similarly, the analysis also demonstrated a weak, negative and statistically significant correlation between perceived benefit and HPV awareness, r =-.179, n=348, p =≤.001 and perceived benefit and HPV vaccine awareness, r =-.178, n=348, p =≤ .001. Higher HPV and vaccine awareness correlated with lower perceived benefit of the vaccine.

Lastly, perceived barrier of vaccine uptake was high (mean score= 16.56 of 20; SD=3.25). The correlation analysis findings demonstrated a significant weak positive correlation between HPV knowledge and perceived barrier, r =.253, n=348, p = < .001; HPV awareness and perceived barrier, r =.211, n=348, p = < .001; and vaccine awareness and perceived barrier, r =.322, n=347, p = < .001. Higher levels of HPV knowledge, HPV awareness, and vaccine awareness were associated with higher levels of perceived barriers.

Table 13. Descriptive Statistics and Correlation Analysis for Health Belief Variables, HPV Knowledge, and Awareness

	Variables		1	2	3	4	5	6	7	Mean	SD
1	HPV awareness	R								0.9	0.31
		P-value									
2	Vaccine awareness	R	.306**							0.7	0.46
		P-value	.000								
3	HPV knowledge score	R	.306**	.261**						6.62	3.12
		P-value	.000	.000							
4	Perceived susceptibility	R	-.037	-.016	-.049					11.42	2.76
		P-value	.492	.765	.362						
5	Perceived severity	R	-.132*	-.197**	-.175**	.113*				3.93	1.65
		P-value	.014	.000	.001	.036					
6	Perceived benefit	R	-.179**	-.178**	-.157**	.078	.492**			3.48	1.63
		P-value	.001	.001	.003	.147	.000				
7	Perceived barriers	R	.211**	.324**	.253**	.079	-.147**	-.375**		16.56	3.25
		P-value	.000	.000	.000	.141	.006	.000			

4.5 Reliability of health belief items

Reliability of the health belief scale variables was determined by calculating the Cronbach's alpha of variables with more than two items and the correlation coefficient was calculated for variables with two items. **Table 14.** presents the findings from this analysis. Perceived susceptibility and perceived barriers were found to have good internal consistency .830 and .891 respectively. The two items that assessed perceived benefit demonstrated a statistically significant positive and strong correlation, r =.755, n=359, p = <.001. Similarly, the two items that assessed perceived severity demonstrated a statistically significant moderate positive correlation, r =.536, n=357, p = <.001.

Table 14. Cronbach's Alpha (α) and Correlation Coefficient (R) of the Health Belief Items

Health Belief Construct	Responses(N)	Number of items	Cronbach's Alpha (α) or correlation coefficient	P-value
Perceived susceptibility	358	3	.830(α)	-
Perceived barrier	357	4	.891(α)	-
Perceived severity	357	2	.536**(R)	<.001
Perceived benefit	359	2	.755**(R)	<.001

Note. ** Correlation coefficients are reported for constructs with only 2 items; perceived severity and perceived benefits. Correlation is significant at the 0.01 level.
Cronbach's alpha is reported for constructs with more than 2 items; perceived susceptibility and perceived barrier

Chapter 5: Discussion

5.1 Summary of central findings

As demonstrated by the results in section 4.4.1, both male and female participants had high levels of HPV awareness (90.2% vs. 87.3%). The high level of awareness confirms previous research discussed in section 2.2.1– awareness levels ranged from 78% to 92% when participants were asked if they had heard about HPV. A statistically significant difference in levels of HPV vaccine awareness was only evident when participants were asked if they had heard about the HPV vaccine from their doctor or other healthcare providers. Female participants (76.6%) were more likely than males (56.7%) to have heard about HPV from their health care providers. The gender disparity in awareness may originate from the fact that the vaccine was initially recommended for only young females. Therefore, more educational and promotion efforts were initially emphasized for girls and young ladies. It is, however, concerning that more than 40% of males and 23.4% of females indicated that they had not heard about the vaccine from their health care providers/doctors. This finding suggests that healthcare providers may not be discussing HPV vaccination with eligible patients as they should. Berkowitz et al. (2015) conducted a study that examined health professionals (N=1753) knowledge about HPV effectiveness and their recommendation to eligible females ages 9-26 years. Their findings provided support for this study's findings and probable explanation concerning the rate of provider vaccine recommendations. They found that only 54.7% to 78.4% of providers across specialties recommended the HPV vaccine to females ages 18-26 years, despite most providers across specialties being highly knowledgeable about the effectiveness of HPV vaccine in preventing cervical cancer (96.9%). Further, providers

had lower levels of awareness about the effectiveness of the vaccine on other HPV related cancers. Knowledge about vaccine effectiveness for anal, vulvar, and vaginal cancers ranged from about 45% to 64% among obstetrics and gynecologists and 17% to 41% among internists. Knowledge about vaccine effectiveness for oropharyngeal cancer was even lower ranging from 20.3% to 38% across specialty groups. In a different study, Mohammed et al. (2016) examined provider recommendation of the human papillomavirus vaccination for U.S. adolescents using the National Immunization Survey for 2014. The study found a disparity in gender recommendation. About 54% and 50% of boys ages 13 and 17 respectively had health care providers recommend the HPV vaccine compared to 68.5% and 75.4% of girls ages 13 and 17 respectively.

The results in section 4.4.1 also provides support for hypothesis 1 showing that the participants had moderate levels of HPV knowledge scoring a mean knowledge score of 6.02 of 11. This finding corroborates Bynum et al. (2011) and Gerend & Magloire (2008) findings; they had similar moderate scores of 5.39 of 10 and 3.5 of 6 respectively. More than 75% of both males and females correctly identified HPV as a sexually transmitted disease, a moderate proportion of both males and female were able to identify sexual practices that can transmit HPV correctly- oral (68.2% vs 74.8%); anal (69% vs 78.7%); and vaginal (85.1%vs 85%) females vs males respectively. Although over 65% of participants were able to identify sexual practices that can transmit HPV, less than 40% of both males and females did not know that HPV can cause anal cancer and 40.9% of males and only 34.8% of females knew that HPV can cause oral cancer. This study failed to support the second part of hypothesis 1 that hypothesized higher HPV knowledge scores would be higher in females than males. Although not statistically significant,

males in this study had a higher mean score than females. Contrary to this finding, Bynum et al. (2011) reported significantly lower scores for males to females $t(396) = 3.20$, $p < .01$. Also, D'Urso et al. (2007) found in their study that females scored significantly higher than males (at $p < .05$) on knowledge items related to infection symptoms, $t(29) = 2.485$, $p = .019$; prevention of HPV, $t(48) = –4.317$, $p = .000$; and HPV risk factors, $t(38) = –2.362$, $p = .023$.

The results highlighted in section 4.4.2 provides evidence to support hypothesis 2 that higher HPV knowledge will be associated with being vaccinated. This association is supported by other studies. In Daley et al. (2010), a sample of female undergraduate student vaccinated participants (N= 256) had higher knowledge scores (mean=15.0) compared with nonvaccinated (mean = 13.8). Consistent results were also observed in Wilson et al. (2017) where a sample of college-age females (N=1,150) those that had completed the vaccination cycle had significantly higher HPV knowledge mean scores than those who had not initiated vaccination (8.32 vs. 7.91 of 11), $t=- 3.83$, $p < .001$.

The findings of this study and supporting studies highlighted in section 4.4.2 and 5.1 demonstrated a significant association between knowledge levels of college students and vaccination rates. However, this finding should be interpreted cautiously as knowledge is only one of the many factors that can affect vaccine uptake score (Gerend & Magloire, 2008). One of the many priorities of the Healthy People 2020 is to increase HPV vaccination. This recommendation also is supported by other organizations including the American College Health Association (ACHA) and National Association of School Nurses (NASN)(Wilson et al., 2017). According to Wilson et al. (2017), college-age students represent an estimated 73% of individuals that may not have received the

vaccine and are eligible for catch up vaccinations. Due to the positive association between HPV knowledge and HPV vaccination and the high representation rate of unvaccinated college students in the general population, increasing HPV knowledge in this group of potential vaccine recipients is paramount to improving vaccination rates.

Although a weak significant positive correlation, hypothesis 3 was supported by the results in section 4.4.3. This finding is consistent with the findings of Hom et al. (2012), who found a positive correlation ($p < .01$) between health literacy scores and the composite oral health knowledge that indicated an association between higher levels of knowledge with higher levels of oral health literacy. The variable of interest by Hom et al. (2012) is oral health literacy and may not be as favorable for comparison. However, research on HPV knowledge and health literacy is sparse, making this study even more necessary. In their study, Bynum et al. (2013) found a statistically significant difference in the proportion of women with low health literacy compared with high literacy who reported ever hearing about HPV, (52 vs. 76 %): $\chi 2=8.53$, $p<0.01$ and the vaccine (28% vs. 68 %), $\chi 2=12.42$, $p<0.01$.

The results discussed in section 4.4.4 failed to support hypothesis 4 for all four of the health belief constructs used in this study. Perceived susceptibility was found to have a nonsignificant association with HPV knowledge and awareness. There was a significant negative correlation between HPV knowledge and awareness and perceived severity. This finding may suggest that due to moderate to high level of knowledge and awareness, students may be more aware and knowledgeable of HPV and therefore felt less threatened by the severity of the infection (Ingledue, Cottrell, & Bernard, 2004). There also was a significant negative correlation between HPV knowledge and awareness and

perceived benefit. One possible explanation is that participants felt knowledgeable about HPV and believed in other ways of preventing themselves from getting the virus thus perceiving the vaccine as not beneficial. There was a significant positive correlation between HPV knowledge and awareness and perceived barrier. This finding may suggest that participants were moderately to highly knowledgeable and aware of the HPV and recognized the potential barriers that exist that can impede vaccine uptake.

Comparative studies using similar population and health topics are lacking, and therefore it is not possible to perform many direct comparisons. One close study was done by Ingledue et al. (2004), examining the HPV/cervical cancer knowledge and perceived seriousness and susceptibility and preventative behavior in a sample of college women ages 18 to 30. Perceived severity and seriousness were the only HBM constructs examined in their study. Similarly, the study found no significant correlation between HPV/cervical cancer knowledge and perceived susceptibility, r=.020, p=.680. Consistent with our study, the authors found a significant weak and negative correlation between HPV/cervical cancer knowledge with perceived severity, r= -0.242, p=.000, suggesting that higher HPV/cervical cancer knowledge, was associated with lower perceived severity. Another study examining the association between hepatitis C knowledge and correlations with health belief model constructs in a sample of adults ages 46 to 69, found conflicting results with our study. In their study, Rashrash et al. (2016) found moderate positive and significant correlation between knowledge and perceived benefits, r = 0.313. Contrary to our study, the authors reported a negative and significant correlation between knowledge and perceived barriers r = −0.436 and no significant correlation between knowledge and perceived severity. Similarly, Rashrash et al. (2016) found no significant

correlations between knowledge and perceived susceptibility. This finding may infer that increasing knowledge may not be a strong factor in increasing perceived susceptibility.

5.2 Implication of findings and direction for future research and intervention

Generally, the sampled student participants in this study demonstrated moderate to high levels of awareness and knowledge about HPV and its vaccine as discussed in the results section. It is however concerning that despite the moderate to high knowledge and awareness levels for cervical cancer both male and female participants scored about 40% or below when asked about the other HPV related cancers; anal, vaginal/vulvar, penial and oropharyngeal. This is particularly concerning because recent data shows an increase in the incidence of HPV related cancers. The CDC estimates about 41, 000 new HPV related cancers each year, which can be prevented by the vaccine. For example, oropharyngeal cancer cases have increased in recent years. It is the most common type of HPV related cancer among men. CDC data from 2004 to 2008 estimated 5,900 cases of HPV related oropharyngeal cancers, while the most current data shows 13,976 new cases of HPV associated cancer using the 2010 to 2014 CDC data. (Centers for Disease Control and Prevention, 2012, 2017).

The low level of knowledge of HPV related cancers may reflect existing gaps in HPV education campaigns that target adolescents and college-age students. Granted that education by itself is not sufficient to bring about behavior change, it is nonetheless vital that college-age students and those eligible to make health decisions understand the health effects of HPV infections and its related morbidities. An understanding of the existing gap in knowledge can also provide university health centers, health departments

and health care providers with the insight of where to target their educational efforts and resources as they provide health services to their target population. Since HPV related research and information is continuously evolving, future campaigns and educational interventions should keep the public informed especially those within the recommended age range, health care providers, and parents with the aim of raising knowledge, awareness and ultimately vaccination rates.

Health care providers play a critical role in HPV education, and the findings of this study also has significant implications for them. The results and other supporting research discussed in section 5.1 suggest that health care providers may not be discussing HPV vaccines with their patients as they should. Future research should focus on understanding HPV vaccine provider knowledge and explore the barriers that prevent providers from educating and recommending the vaccine to their patients. The role of dental providers in particular, has not been fully explored and utilized. Dental providers are well positioned to educate their patients regarding HPV and the vaccine. They see their patients frequently and already provide oral cancer screening as part of their regular preventative visits (Kline et al., 2018). With the increase in the incidence of oropharyngeal cancer, dental providers can play a significant role in patient education and vaccine recommendation. Unfortunately, research assessing dental health professionals' HPV knowledge and vaccine recommendation are limited.

Healthcare provider communication techniques should also be assessed. Dempsey et al. (2018) did a study to examine the effectiveness of a healthcare provider communication intervention for adolescents and the intervention effect of vaccine uptake. The intervention had five components; an HPV fact sheet, an educational website tailored for

parents, a set of HPV-related disease images, HPV vaccine decision aid, and several hours of communication training to improve vaccine uptake, which could be followed by motivational interviewing techniques for vaccine resistant parents. The most used components were communication training (72.2% to 90.0%) and fact sheets (51.5% to 84.4%). Increase in vaccine uptake was also significantly higher for the intervention group than for the control group (11.3% vs. 1.8% respectively). Such studies can provide scientific evidence for university health centers and healthcare providers to guide development and implementation of communication techniques.

The health belief model posits that knowledge and other factors can have indirect effects on the four major perceptions of susceptibility, severity, benefits, and barriers **(see Figure 1)**. The finding of this study assessing the association between HPV knowledge and the four health belief constructs: perceived susceptibility; perceived severity; perceived benefit; and perceived barrier, should cautiously be interpreted as there are few studies to support our findings. The dearth of research for comparison and conflicting findings with the few available has significant implications for HPV research. It suggests that more robust research is needed to investigate the association of HPV knowledge and health beliefs. Predicting behavior change such as vaccination uptake is complex in nature and therefore the health belief constructs in this study although important, may indicate that the health belief model may not be sufficient by itself to address the influence of HPV knowledge on vaccine uptake. For instance, parents play an essential role in the decision to get their children vaccinated or can potentially influence their children's beliefs about the vaccine. This study did not assess parental influence or knowledge of HPV and the

vaccine. Therefore, future research should explore other theoretical constructs that can assess social influence and other health modifying factors that can affect vaccine uptake. This study contributes to the paucity of research that explores the association between HPV knowledge and health literacy because it provides support for the positive association between health knowledge and health literacy albeit a weak association. This finding can have significant implications because the concept of health literacy goes beyond reading and writing skills. As suggested by hom et al. (2012), literacy level affects knowledge by impacting information seeking behavior and use of preventive services such as vaccines. As discussed in section 2.2.4 low health literacy has been associated with underutilization of health resources that can lead to poorer health outcomes such as low vaccination rates or higher infection rates. The complexity of navigating the universities or general health care system used by college students can negatively impact health literacy (Live Well NYU, 2012). With the ubiquitous use of technology, electronic health information is becoming more pervasive and more people are interfacing with healthcare providers through technology or use technology to access their health information (Stellefson et al., 2011). As highlighted by the results of this study, about 75% of our student sample most recently sought their health information through the internet. University health centers can maximize on the pervasive use of technology and use social media tools to promote educational interventions on HPV. Universities can utilize, if available, message boards and screens around campus to promote HPV awareness and vaccine. Freshman orientation week and other campus events that occur during the school year also provide an opportunity to promote HPV education. Health centers can take advantage of these events on campus by providing

attendees with printed educational information on HPV and vaccine services. They can also set up stations or booths where students can get more resources.

It is also critical that healthcare providers and university health centers provide health management tools and tailor their websites at the appropriate literacy level for their student and provide tutorials necessary to navigate these health management tools. Future research can explore which internet sources students use for sexual health and HPV information, how well students understand sexual health information available to them through various mediums and within their universities health center, frequency of their use and if and how they use this information when making health decisions. Both Bynum et al. (2013) and Hom et al. (2012) emphasize the important of building research to, expand available research that explore the influence of health literacy on health knowledge with the objective of creating health messages at the appropriate literacy levels that will increase levels of health knowledge and health care utilization.

5.3 Study limitations

Similar to most research projects, this study should be considered with a few limitations. Although various efforts were employed to recruit a large sample size, the response rate was less than 10% and limits the generalizability of the findings. Furthermore, the comparison of the demographic characteristics of the study participants and the University of Maryland student body were not similar and therefore the findings may not be generalizable to the entire student body. There was overrepresentation and underrepresentation of various demographic groups. For example, females were overrepresented, and males were underrepresented by about 20%. None of the compared

demographic characteristics were identical and therefore the results may not a be a true representation of the undergraduate body. The study was a cross-sectional survey where participants self-selected to participate. Therefore, it is likely that participants interested in the topic of HPV opted to participate and may have skewed the findings of the study. Furthermore, the study collected data from one university and therefore the results cannot be generalized to other colleges in Maryland or in the United States. In addition, the data analysis relied on self-reported data which may be subject to self-reported bias. The constructs of perceived severity and perceived benefit only utilized two items and may not have been sufficient to detect an effect. The items assessing the construct of perceived barriers did not explore all existing barriers such as misconceptions about vaccines, and fears that are driven by those misconceptions. Therefore, future studies can include other potential barriers. This study only utilized univariate analysis, future studies can use multivariate analysis such as structural equation modeling to assess interrelationships of health beliefs with other variables. Finally, there are other factors that were not considered in this study that may have an indirect or direct effect on the health belief constructs and vaccination uptake such as socioeconomic status, race, and sexual orientation. Future studies can explore the effects of such factors on HPV knowledge, vaccine uptake, and health beliefs.

5.4 Conclusions

The findings from this study expanded available research on HPV and the uptake of its vaccine. What is known about HPV and its vaccine is constantly evolving. Therefore, the continuous examination of HPV knowledge and identifying gaps in potential vaccine recipients is pivotal to promoting vaccine uptake. The association between HPV

knowledge and awareness and vaccination status was a significant finding. It provides support for public health professionals to continue their effort to promote and increase awareness, knowledge and understanding of HPV. The positive association between health literacy and HPV knowledge is a significant finding because it raises awareness for public health professionals regarding the importance of health literacy and its influence on college students access, understanding, and use of health information. This study is among the few that explores the association between HPV knowledge and health belief constructs. Although the findings did not support all the stated hypotheses, it provides a building block for future research. The complex nature of predicting behavior change such as vaccination uptake may also indicate that the health belief model, although important, may not be sufficient by itself to address the influence of HPV knowledge on vaccine uptake.

Appendices

A. University of Maryland Students Perception of HPV

Part A: Demographic Information and HPV Knowledge

Please complete the correct response(s) to the following questions.

1. **Are you:**
   a) Female
      or
   b) Male
2. **How old are you? _____ Years**
3. **Do you consider yourself to be Hispanic, Latino, or of Spanish origin?**
   a) Yes
   b) No
4. **What race or races do you consider yourself to be? Please select one or more**
   a) White
   b) Asian
   c) Black or African American
   d) Alaska Native or American Indian
   e) Native Hawaiian or Pacific Islander
   f) Other
5. **What is your college level classification?**
   a) Freshman
   b) Sophomore
   c) Junior
   d) Senior
6. **What is your relationship status?**
   a) Single
   b) In a committed relationship
   c) Married
   d) Divorced
   e) Other (Please specify)

7. Do you have Health Insurance?

a) Yes
b) No
c) Don't know

8. The most recent time you looked for information about health or medical topics, where did you go first?

a) Television
b) Internet
c) Books
d) Friends
e) Family
f) Doctors or health care provider
g) Television
h) Other (Please specify)
i) Don't know

9. How confident are you in filling out medical forms?

a) Not at all
b) A little
c) Sometimes
d) Quit a bit
e) Extremely

10. Have you ever heard of HPV? HPV stands for Human Papillomavirus. It is not HIV, HSV, or herpes.

a) Yes
b) No
c) Don't know

11. Do you think HPV is a sexually transmitted disease?

a) Yes
b) No
c) Don't know

12. Do you think that HPV infection is rare?

a) Yes
b) No
c) Don't know

13. Have you ever been told by a doctor or other health care provider that you had genital warts or HPV?

a) Yes
b) No

c) Don't know

14. Do you think HPV can cause genital warts?

a) Yes
b) No
c) Don't know

15. Do you think HPV can cause cervical cancer?

a) Yes
b) No
c) Don't know

16. Do you think HPV can cause penile cancer?

a) Yes
b) No
c) Don't know

17. Do you think HPV can cause anal cancer?

a) Yes
b) No
c) Don't know

18. Do you think HPV can cause oral/throat cancer?

a) Yes
b) No
c) Don't know

19. Do you think HPV can cause vaginal/vulva cancer?

a) Yes
b) No
c) Don't know

20. Through which of the following sexual practices can HPV be transmitted? (Select ALL that applies)

a) Oral sex
b) Anal sex
c) Vaginal sex
d) Don't know
e) Don't want to answer

21. Has a doctor or other health care provider ever talked with you about the HPV vaccine?

a) Yes
b) No
c) Don't know

22. HPV vaccine is given to prevent cancers in girls and boys. Have you ever received one or more doses of the HPV vaccine?

a) Yes
b) No
c) Don't know

23. If you have had the HPV vaccine, how many doses of the vaccine have you received?

a) 1 dose
b) 2 doses
c) 3 doses
d) I don't know

24. If you have NOT had the HPV vaccine, how interested are you in getting the HPV vaccine?

1 Very Uninterested	**2 Moderately Uninterested**	**3 Slightly Uninterested**	**4 Neither**	**5 Slightly Interested**	**6 Moderately Interested**	**7 Very intereste d**

25. How many sexual partners have you had in your lifetime?

a) None
b) 1 partner
c) 2 partners
d) 3 partners
e) 4 partners
f) 5 or more partners
g) Don't want to answer

26. How often do you use condoms when engaging in sexual intercourse?

a) Never
b) Sometimes
c) Most of the time
d) Always
e) Don't want to answer
f) Not Applicable

27. I use protective barriers such as condoms or rubber dam when engaging in oral sex

a) Never
b) Sometimes

c) Most of the time
d) Always
e) Don't want to answer
f) Not Applicable

28. I use a condom when engaging in anal sex

a) Never
b) Sometimes
c) Most of the time
d) Always
e) Don't want to answer
f) Not Applicable

Part B: Please rate how strongly you agree or disagree with each of the following statements

	Health Beliefs	**Strongly agree**	**Agree**	**Undecided**	**Disagree**	**Strongly disagree**
29.	**I am at risk for contracting HPV infection**	5	4	3	2	1
30.	**I have a high risk of getting the HPV infection**	5	4	3	2	1
31.	**There is a possibility that I will get HPV**	5	4	3	2	1
32.	**I believe that the HPV virus can be a serious threat to my health**	5	4	3	2	1
33.	**I believe that the HPV virus can result in serious health problems**	5	4	3	2	1
34.	**I believe that getting the HPV vaccine can protect me against serious health problems**	5	4	3	2	1
35.	**I can reduce my chances of getting the HPV infection by getting the vaccine**	5	4	3	2	1
36.	**I do not want to get the vaccine because it is expensive**	5	4	3	2	1
37.	**I do not want to get the vaccine because I can't afford it**	5	4	3	2	1

38.	**I do not want to get the vaccine because I doubt its safety**	5	4	3	2	1
39.	**I do not want to get the vaccine because it may result in negative health consequences**	5	4	3	2	1

B. Recruitment emails

First recruitment email

Dear UMCP students:

You are invited to participate in a research study that I am conducting for partial fulfillment of my Masters in Public Health degree on the Human Papilloma Virus (HPV) and its vaccine.

The intent of this survey is to gain an understanding of the knowledge about HPV and vaccine status among UMD college students.

The online survey will take about **10 to 15 minutes.** Participation in this study is completely voluntary. Your responses will be kept confidential and anonymous, and therefore cannot be linked to you.

If you complete the survey, you will be transferred to a different site where you can enter into a raffle to win one of ten **$25** electronic gift cards of your choice of **Amazon**, **iTunes** or **Google Play**. If you are interested in participating, please click on the link below to begin.

https://umdsurvey.umd.edu/jfe/form/SV_4UhWONhuMUZ6SK9

Thank you for your time and participation. If you have any other question about the survey, please feel free to contact me.

Sincerely,

Harriet Kitur
University of Maryland School of Public Health
Masters Candidate
Department of Behavioral and Community Health
University of Maryland, College Park, MD
hlagat@terpmail.umd.edu

Second and Third Recruitment Email

Dear UMCP students:

You are invited to participate in a research study on the Human Papilloma Virus (HPV) and its vaccine. If you have already submitted your survey, thank you for your valuable input.

The intent of this survey is to gain an understanding of the knowledge about HPV and vaccine status among UMD college students.

The online survey will take about **10 to 15 minutes.** Participation in this study is completely voluntary. Your responses will be kept confidential and anonymous.

If you complete the survey, you will be transferred to a different site where you can enter into a raffle to win one of ten **$25** electronic gift cards of your choice of **Amazon**, **iTunes** or **Google Play**. If you are interested in participating, please click on the link below to begin.

https://umdsurvey.umd.edu/jfe/form/SV_4UhWONhuMUZ6SK9

Thank you for your time and participation. If you have any other question about the survey, please feel free to contact me.

Sincerely,

Harriet Kitur
University of Maryland School of Public Health
Masters Candidate
Department of Behavioral and Community Health
University of Maryland, College Park, MD
hlagat@terpmail.umd.edu

C. Consent document

Institutional Review Board
1204 Marie Mount Hall ● 7814 Regents Drive ● College Park, MD 20742 ● 301-405-4212 ● irb@umd.edu

CONSENT TO PARTICIPATE

Project Title	*Exploring HPV Knowledge, Understanding and its Association with Health Beliefs, Health literacy and Vaccination Status in a Sample of College Students.*
Purpose of the Study	*This research is being conducted by **Harriet Kitur** at the University of Maryland, College Park. You are invited to participate in this research project because you are currently enrolled as an undergraduate student at the University of Maryland and are between the ages of 18-26 years old. The purpose of this survey is to determine the knowledge and understanding of HPV and vaccine status among college students.*
Procedures	*The procedures involve your participation in an online anonymous survey that consists of 40 questions. The survey will take about 10 to 15 minutes to complete. You will be asked about your sexual behaviors, HPV knowledge, beliefs about HPV and its vaccine. One example of a survey question is: "Do you think that HPV infection is rare?"*
Potential Risks and Discomforts	*We do not foresee any major risk in participating in this survey. However, the survey contains questions about sexual behavior that may cause some discomfort. You may choose to not answer any question that makes you uncomfortable.*
Potential Benefits	*There are no direct benefits from participating in this research. However, we hope that the understanding gained from this study will be used in the future to influence promotional and educational interventions to increase the awareness and knowledge levels of HPV and its vaccine among college students.*
Confidentiality	*Any potential loss of confidentiality will be minimized by not using your name and no data will be reported by an individual. All survey responses will be downloaded into a password-protected computer, which will always be stored in a secure location. The survey data will only be accessible to the researchers involved in the project.* *If you choose to participate in the electronic gift card raffle, you will be directed to a different link where you can enter your name and email address. This information is kept separate from your survey responses to maintain anonymity. Once the electronic gift cards are awarded, all contact information will be destroyed.*

Medical Treatment	*The University of Maryland does not provide any medical, hospitalization or other insurance for participants in this research study, nor will the University of Maryland provide any medical treatment or compensation for any injury sustained as a result of participation in this research study, except as required by law.*
Compensation	*Once you complete the survey, you may choose to participate in an electronic gift card raffle, where you may enter your name and email address for a chance to win one of ten $25 gift card of your choice to **Amazon**, **iTunes** or **Google Play**.*
Right to Withdraw and Questions	*Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify.* *If you have questions, concerns, or complaints, please contact the investigator's faculty advisor:* ***Dr. Alice M. Horowitz*** ***School of Public Health*** ***University of Maryland College Park, MD*** ***Ahorowit@umd.edu*** ***(301) 405-9797***
Participant Rights	*If you have questions about your rights as a research participant or wish to report a research-related injury, please contact:* University of Maryland College Park Institutional Review Board Office 1204 Marie Mount Hall College Park, Maryland, 20742 E-mail: irb@umd.edu Telephone: 301-405-0678 *This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects.*

Statement of Consent	*By selecting the I agree option below indicates that you are at least 18 years of age; you have read this consent form, and you voluntarily agree to participate in this research study.* *If you DO NOT wish to participate, please select "I do not agree to participate."* *You may print a copy of this consent form.*

- o I agree to Participate
- o I do not agree to participate

D. Institutional review board approval

UNIVERSITY OF MARYLAND
INSTITUTIONAL REVIEW BOARD

1204 Marie Mount Hall
College Park, MD 20742-5125
TEL 301.405.4212 FAX 301.314.1475
irb@umd.edu
www.umresearch.umd.edu/IRB

DATE:	December 13, 2017
TO:	Harriet Kitur
FROM:	University of Maryland College Park (UMCP) IRB
PROJECT TITLE:	[1147500-1] Exploring HPV Knowledge, Understanding and its Association with Health Beliefs, Health Literacy and Vaccination Status in a Sample of College Students
REFERENCE #:	
SUBMISSION TYPE:	New Project
ACTION:	APPROVED
APPROVAL DATE:	December 13, 2017
EXPIRATION DATE:	December 12, 2018
REVIEW TYPE:	Expedited Review
REVIEW CATEGORY:	Expedited review category # *7*

Thank you for your submission of New Project materials for this project. The University of Maryland College Park (UMCP) IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

Prior to submission to the IRB Office, this project received scientific review from the departmental IRB Liaison.

This submission has received Expedited Review based on the applicable federal regulations.

This project has been determined to be a Minimal Risk project. Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of December 12, 2018.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Unless a consent waiver or alteration has been approved, Federal regulations require that each participant receives a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this committee prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others (UPIRSOs) and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office. Please use the appropriate reporting forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this office.

Please note that all research records must be retained for a minimum of seven years after the completion of the project.

If you have any questions, please contact the IRB Office at 301-405-4212 or irb@umd.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Maryland College Park (UMCP) IRB's records.

E. Recruitment Flyer

What do you know about the human papilloma virus (HPV)?

Image Source: CDC

LOOKING FOR

UMCP UNDERGRADUATE STUDENTS

TO PARTICIPATE IN A 10-15 MINUTE SURVEY ON HPV

The intent of this research study is to gain an understanding of the knowledge about HPV and vaccine status among UMD college students. Participation in this study is voluntary.

By completing survey, you can enter into a raffle to win one of ten **$25** electronic gift cards of your choice of **Amazon**, **iTunes** or **Google Play**

To participate please take a tab below or email me at hlagat@terpmail.umd.edu

https://umdsurvey.umd.edu/jfe/form/SV_4UhWONhuMUZ6SK9
Email:hlagat@terpmail.umd.edu

https://umdsurvey.umd.edu/jfe/form/SV_4UhWONhuMUZ6SK9
Email:hlagat@terpmail.umd.edu

https://umdsurvey.umd.edu/jfe/form/SV_4UhWONhuMUZ6SK9
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Email:hlagat@terpmail.umd.edu

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