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Attitudes Toward the HPV Vaccine among University Students: Identifying Barriers to Vaccine Uptake

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ATTITUDES TOWARD THE HPV VACCINE AMONG UNIVERSITY STUDENTS: IDENTIFYING BARRIERS TO VACCINE UPTAKE

by

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ABSTRACT

Background: In the United States, the Centers for Disease Control and Prevention (CDC) estimates that 32,000 cancers occur annually that can be directly attributable to the acquisition of the Human Papilloma Virus (HPV). Gender specificity data posits that 21,000 of the annual cancer cases are female and the remaining 11,000 cases occur among males. However, because the implementation and trajectory of HPV vaccination and prevention programs have been historically aimed toward women, vaccination rates for men remain significantly lower. The purpose of this study was to assess how gender differences in knowledge attitude, subjective norms and perceived behavioral control about HPV and the intention to be vaccinated among a sample of university students. The Theory of Planned Behavior was employed as the theoretical framework for the study. Methods: a stratified proportional random sample of students attending one university with multiple campuses was utilized to collect data. Each campus site constituted a stratum, with two or more classes of an undergraduate level randomly selected from each campus. Results: A total of 383 usable surveys were obtained, which is consistent with obtaining a final sample size of 380 based on the power analysis of $p \leq 0.05$. A response rate of 84% was obtained which included face to face and on-line administrations. Overall results indicate a significant difference in male and female vaccination rates with females 1.945 times (1.450, 2.607) more likely to have been vaccinated against HPV than males (received all three doses); Males were less knowledgeable than females on specific facts about HPV and the vaccination; were less likely to be influenced by family or peers to receive the vaccination and less likely to perceive their ability (perceived behavioral control) to obtain the HPV vaccine as high. Best practices for health education emphasize skill acquisition however, the results of this study suggest university health education programs need to include a strong knowledge component

along with self-efficacy skills and positive awareness messages on the benefits of receiving the HPV vaccine.

INDEX WORDS: Human Papillomavirus, Gardasil, Gender bias, Feminization

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ATTITUDES TOWARD THE HPV VACCINE AMONG MALE UNIVERSITY STUDENTS: IDENTIFYING BARRIERS TO VACCINE UPTAKE

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DEDICATION

I would like to dedicate my dissertation to my family. First and foremost, I would like to thank my parents for their unwavering support throughout my academic journey. I love you and I could not have done it without you. To my children, I would like to thank you for your words of encouragement when I felt overwhelmed. I love you both. Last but not least, I would like to thank my beloved Micaela for keeping me on track to become "Doc McStuffins." You are wise beyond your years and I love you dearly.

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CHAPTER 1

INTRODUCTION

Background

The human papillomavirus (HPV) is the most common sexually transmitted infection affecting both males and females worldwide. In the United States alone, the Centers for Disease Control and Prevention (CDC) estimate that 44,000 cancers are directly attributable to the acquisition of HPV occurring annually (CDC, 2019). Gender specificity data posits that 25,000 of the annual cancer cases are female with the remaining 19,000 cases occurring among males (CDC, 2019). Empirical evidence indicates that HPV infection is the cause of nearly all cervical cancers worldwide; however, emerging data suggests that acquiring an oral HPV infection is a catalyst to the acquisition of a subset of oropharyngeal cancers as well (Levesque, 2011).

Oral HPV is more common in men than women (CDC, 2017), with the incidence among males of oral HPV acquisition approximately three times higher than in females (Levesque, 2011). In the past, most incidences of throat and mouth cancers were primarily attributed to tobacco and alcohol abuse and most of these cancers occurred among men between the ages of 60 and 80, were difficult to treat, and had high mortality rates. However, recent data suggest that about 70% of all oropharyngeal, head and neck cancer acquisition is primarily attributable to oral HPV infections, with HPV type 16 causing 60% of all oropharyngeal cancers (CDC, 2019).

Although the link between oral HPV infection among men and oropharyngeal cancer has been wholly under-researched, the etiologic role of oral HPV infection in oropharynx cancer has been recently established. In the United States, oral HPV infection is directly linked to the majority of oropharynx cancer among men, and the total number of cases is expected to surpass the number of cervical cancers by the year 2025, if the current trend of increasing trajectory of oropharynx cancer continues to rise (Levesque, 2011).

Because HPV replicates well in a warm, moist environment, the incidence of penile and anal cancer can also be attributable to prolonged infection with the virus in men (CDC, 2016). Cancer of the penis and anus occurs similarly to cancer of the cervix; if an infection of HPV is untreated in some people with persistent high-risk HPV infections, the virus damages the cells' DNA and causes them to start dividing and growing out of control. Although the incidence of cervical cancer in under-developed countries far exceeds penile and anal cancer rates, in the United States, the number of HPV related cancer rates in men, including penile, oral, and anal cancer is increasing and is becoming comparable to the rates of cervical cancer in women (CDC, 2016).

Historically, the responsibility for contraception and prevention of sexually transmitted infections (STIs) have largely fallen on women (Daley, 2017). In 2006, Gardasil, also known as Silgard or recombinant human papilloma vaccine, was introduced as a revolutionary breakthrough vaccine to prevent the occurrence of cervical cancer caused by HPV infection. The vaccine specifically targeted the strains of Human Papillomavirus (HPV types 16 and 18) that were identified through viral typing to be responsible for cervical cancer; (Harper, et.al., 2010). Following the approval of the Gardasil vaccine, Merck Pharmaceuticals, the vaccine's creator, funded a multimedia national campaign in the United States to educate the public on the relationship between HPV infection and cervical cancer. Merck emphasized the vaccine's effectiveness against cervical cancer development to women through media campaigns, even though both men and women contribute inextricably to the spread of HPV and HPV related cancers (Harper, et al., 2010).

In the United States, the HPV vaccination is recommended for adolescents ages 11 to 12, with catch-up vaccinations recommended through age 26. Two doses of vaccine, given 6 to 12 months apart, are recommended if the series is started before age 15. Three doses, to be completed within 6 months, are recommended for those who started vaccination at age 15 or older (CDC, 2019). In 2019, the CDC reported that 21.5% of all young adults received the recommended number of doses of the HPV vaccination. The percentage of females who received the

recommended number of doses of the HPV vaccine was 35.3% and the percentage of men was 9.0% (CDC, 2019).

The developmental and implementation trajectory of the HPV vaccine since its introduction, targeted at women, (especially young adolescent women), is suggested to have created a gender bias. This artificial perception that males are not susceptible to acquiring HPV, and therefore bear no responsibility in preventing its spread, has resulted in significantly lower vaccination rates for males, thus increasing morbidity and mortality rates (Daley, 2017). Repeated targeting of the vaccine toward women has impeded male awareness of their vulnerability to the consequences of an HPV infection. As a result, the HPV vaccination awareness campaign has led to the social construction of HPV and cervical cancer as a "women-only problem". This has led to the feminization of the HPV and ultimately may be responsible for a lower vaccine trajectory for males.

Resulting gender biases have negative implications for stakeholders in public health as well. The incidence of anal cancer in HPV positive men is quickly becoming comparable to the incidence of cervical cancer, with at least 90% of all anal cancers attributed to prolonged HPV infection (Hu, 2014). As a result, the economic burden associated with non-cervical HPV-related cancers occurring in individuals living in the United States was approximately $418 million in 2014 (Hu, 2014). The social awareness campaign directed toward the female population has led to the social construction of and ultimately the feminization that HPV infection is a "women-only problem". It has been suggested that this has contributed to a lower vaccine trajectory for males (Daley, 2017).

Purpose of the Study

The purpose of this study was to assess whether gender differences existed in knowledge, attitudes, beliefs, subjective influences and perceived behavioral control about HPV, and the intention to obtain the HPV vaccine among a sample of university students.

This study sought to understand whether lack of awareness about the consequences of HPV (including knowledge, attitudes, effect of peer social norms) would predict lower intention to obtain the HPV vaccine specifically for males. It was important to include females in the study to compare whether there was higher knowledge, more positive attitudes and higher influence of peer social norms that would validate whether the lower vaccine trajectory in male in college students is a result of less awareness of the efficacy of the vaccine for preventing HPV.

The Theory of Planned Behavior was selected as the theoretical framework to address the purpose of the study because the constructs of the model that examine attitudes toward a behavior, influences on attitude such as subjective norms and perceived behavioral control (the belief in one's ability to perform a behavior) on behavioral intention. In the present study, the intent to behave was measured by the the number of "yes" responses to obtain the HPV vaccine. The current study is comparable to a study performed by Fisher, et al. (2016) in that intention was studied as a key determinant for whether or not college students were vaccinated against HPV. *Statement of the Problem*

Although the Human Papillomavirus (HPV) vaccine has the potential to prevent mortality and morbidity from male reproductive organ cancers, the implementation trajectory of the vaccination has focused on females, potentially creating gender biases about HPV prevention through obtaining the HPV vaccine.

The theoretical framework used to guide the current study was the Theory of Planned Behavior (TPB) (1991).The Theory of Planned Behavior (TPB) is a behavioral theory that is used to predict behaviors across a wide variety of domains, including health behaviors such as vaccine uptake (Glanz, 2011). TPB was developed by Icek Ajzen (1985) as an extension of the Theory of Reasoned Action (TRA) which posits that the most important determinant of behavior is behavioral intention (Ajzen & Fishbein, 1980). TPB adds an additional dimension of perceived control over a behavior. The TRA and TPB further assert that direct determinants of an individual's behavioral intention are subjective norms associated with a behavior, as well as the individual's attitude

concerning a behavior (Ajzen & Fishbein, 1980). Other studies that used the TPB with college populations will be examined as well as studies that specifically used TPB to examine HPV knowledge and intention to be vaccinated.

The constructs of the theory and their specificity to HPV vaccine uptake are listed below:

1. Behavioral Intention: The motivational factors that influence behavior or, in other words, the intentions to obtain the HPV vaccine. The stronger the intentions of the individual to get vaccinated, the more likely they will do so.
2. Attitude Toward a Behavior: The extent in which a person will have a favorable or unfavorable outcome about HPV vaccine uptake. A person's attitude, in this case, consists of behavioral beliefs that obtaining the HPV vaccine would prevent him from acquiring HPV and developing cancer.
3. Subjective Norm: Social pressure to perform a behavior or not. In the case of HPV vaccination uptake among males, the ideology of the feminization of the Human Papilloma Virus as a barrier to vaccination uptake among males will be assessed.
4. Perceived Behavioral Control: Refers to perception of the ease or difficulty of obtaining an HPV vaccination.

1. Is there a difference in knowledge about HPV between male and female college students?
2. Is there a difference in attitude between males and females toward obtaining the HPV vaccine?
3. Is there a difference in influence of others between males and females toward obtaining the HPV vaccine?
4. Is there a difference between males and females on their perceived behavioral control to receive the HPV vaccine?
5. Is there a difference between males and females on their intentions to receive the HPV vaccine?

Delimitations

The study will be delimited to students attending a university with multiple campuses in Southeast Georgia. The study will be conducted during one semester. The surveys will be completed during class time in the presence of peers, therefore, there is a risk of response bias due to self-reporting. The study may not be indicative of attitudes and intentions regarding HPV of the entire college student population in Southeast Georgia due to difference in the location of the two campuses that will provide the sample. One campus is rural and the other urban which may demonstrate differences in attitude and intentions regarding HPV. It will be assumed by the researcher that all students completing the survey understood all questions and answered honestly about sexual activities and beliefs about HPV and HPV testing.

Definition of Terms

HPV- (human papillomavirus) is a virus that can cause certain cancers and diseases in both males and females.

Gardasil- (Human Papillomavirus 9-valent Vaccine, Recombinant) helps protect girls and boys ages 9 to 26 against cervical, vaginal, vulvar, and anal cancers and genital warts caused by nine types of HPV.

Feminization of a health issue-The strong social and cultural perception of a health topic as a “women’s only” issue.

Gender Bias-unfair difference in the treatment of men or women because of their sex .

Cervical cancer-A type of cancer that occurs in the cells of the cervix (the lower part of the uterus that connects to the vagina).

Theory of Planned Behavior-The Theory of Planned behavior is a theory-based framework for understanding the multifaceted and interactive effects of personal and environmental factors that determine behaviors, and for identifying behavioral and organizational leverage points and intermediaries for health promotion within organizations.

Significance of the Study

The study replicated previous studies using the TPB to understand barriers to obtaining the vaccine that prevents HPV among both male and female university students. By conducting research on the knowledge, attitudes, and perceived behavioral control toward HPV and HPV vaccinations among male college students, health educators will gain insight into perceived barriers to vaccination in this population. Findings from the study will assist health education and promotion efforts on college campuses by developing educational strategies that address barriers to students to obtaining the HPV vaccine.

Chapter 1 Summary

The purpose of this study is to assess knowledge and attitudes toward the HPV vaccination and their influence to serve as a barrier to HPV vaccine acquisition among a sample of university students. In Chapter 2, a literature review will be presented including a historical perspective of cervical cancer and the introduction of Gardasil. The studies reviewed also include research on the feminization of HPV and HPV related cancers. Chapter 3 contains methodology used to accomplish the purpose of the study. The results of the study will be discussed in Chapter 4. Chapter 5 will contain a discussion of the results, conclusions drawn as a result of the study, and implications and recommendations for further study.

CHAPTER 2

REVIEW OF LITERATURE

The purpose of this study was to assess gender differences in knowledge and attitudes about HPV and how these constructs influence the intention to be vaccinated among a sample of university students.

This chapter reviews literature on the Human Papilloma Virus (what it is, how it is transmitted), differences of HPV prevalence in males and females, male reproductive cancers that result from HPV infection, a brief history of cervical cancer, studies addressing use of Gardasil, the vaccine available to prevent HPV, studies addressing gender bias in promoting the vaccine primarily to women, leading to the feminization of HPV and the vaccine, which may have impacted vaccine uptake, and studies examining sexual behavior that have used the Theory of Planned Behavior to explain vaccine uptake in adolescents and young adults.

What is Human Papillomavirus (HPV) and How it is Transmitted?

The clinical definition of HPV states that it is a virus that can cause abnormal tissue growth and other changes to cells in humans (CDC, 2017). More than 40 types of the virus are spread by sexual contact from the skin, mucous membranes of an infected individual to the skin, and mucous membranes of their sexual partners. Any individual who is sexually active can be exposed to HPV through skin or membrane contact of the mouth and throat, anus, vulva, or penis (CDC, 2017). This makes HPV particularly dangerous as it can be spread even in the context of what are traditionally considered "safe sex" behaviors, such as using condoms or engaging in outercourse (CDC, 2017).

Over 150 types of HPV viruses, ten have been identified as oncogenic (CDC 2016). From these 150, at least 40 are spread through sexual contact (Cutts, 2007). The acquisition of HPV is common; most sexually active individuals in the United States are infected with HPV at some point. About 90% of the individuals infected with HPV do not present with any clinical symptoms after two years and thus, do not develop cancer (Cutts, 2007). However, some HPV

infections can progress for years and, if left untreated, can lead to the development of cancer (Cutts, 2007).

In 2010, the Human Papillomaviruses (HPV) were the most common cause of reproductive tract cancers which includes, penile, anal and vulvar cancers (CDC, 2011). HPV has also been linked to oropharyngeal cancers for both men and women. Thought to be the most prevalent type of sexually transmitted disease in the United States, most HPV infections do not lead to cancer. The CDC estimates that the prevalence of genital infection with any HPV type annually is 42.5% among United States adults aged 18–69 (CDC, 2014). Most of these infections are asymptomatic and appear to resolve spontaneously within a few years. However, almost of all cervical and anal cancers are caused by exposure to HPV (CDC, 2014).

HPV can be categorized into two groups: low-risk HPVs and high-risk HPVs. Low-risk HPVs can cause condylomata acuminate, or skin warts, but do not cause cancer. Two low-risk HPVs, types 6 and 11, can also cause recurrent respiratory papillomatosis, a less common disease in which benign tumors grow in the air passages leading from the nose and mouth into the lungs (CDC, 2017).

Two types of HPVs that are oncogenic and specifically related to the development of cervical cancer are types 16 and type 18 are also known as High Risk HPVs. (Thompson, 2014). The spread of HPV occurs through contact with infected skin of the genitals, mucous membranes, and bodily fluids. The virus lives in the body's epithelial cells located on the skin's surface, as well as on the surface of the vagina, mouth, anus, cervix, penis, and the back of the throat (Thompson, 2014). The World Health Organization (WHO), states that early infections of HPV can be detected by slight changes in the epithelium that are discovered by using virologic and cytological techniques screening (WHO, 2014).

History of Cervical Cancer Detection

In 1941, Georgios Papanicolaou, a Greek gynecologist in collaboration with Herbert Frederick Trau, developed a test using exfoliative cytology in which the examination of vaginal

smears could be completed. As a result, they determined that cervical cancer could be detected by inspecting cervical cells (Harper, 2010). The test was named the Pap smear after Papanicolaou. This revolutionary breakthrough in women's health was enthusiastically adopted by gynecologists for use with their female patients. As a result, the cervical cancer rate in the United States dropped to about half of what it was at the turn of the century. In terms of precancers and early cancers detected, it remains the most successful screening test ever introduced for preventing serious malignancies. Since the 1950s, mortality rates for cervical cancer have fallen approximately by 60%. However, it would be another forty years before the correlation between HPV and cervical cancer was established (Harper, 2010).

For decades, the epidemiological profile of women with cervical cancer was recognized as a direct result of a sexually transmitted process, and several infectious agents were proposed over the years as a catalyst to cervical cancer: syphilis, gonorrhea, and type 2 herpes simplex virus (Bosch, 2002). In a recent article, the researchers stated that the persistence of a genital infection generated by high-risk oncogenic HPV in cervical cells induces precancerous cervical lesions, regardless if women have normal immune systems or not (Anouar et al., 2020). Another recent study posited that certain genotypes of HPV are not only the necessary cause of cervical cancer, they are also the etiological cause of some anogenital and head and neck carcinomas (Guimera, Alemany, Bruni, & Muñoz, 2020).

The story of Henrietta Lacks, a young Black woman who was diagnosed with cervical cancer in 1951, drew attention to the quick progression of late diagnosed cervical cancer. At the time of Mrs. Lacks's diagnosis, the etiological correlation between HPV infection and cervical cancer had not yet been established. However, the cells that were removed from Mrs. Lacks's biopsy of the tumor found in her cervix would be instrumental to the discovery that HPV was the oncogenic agent in almost all cervical cancer cases worldwide (Bosch, 2002). In fact, the cells labeled HeLa (the first two initials of her first and last name) became the first human cell line that was successfully grown in culture (Bosch, 2002). From this initial sample, The HeLa cell line has

been in continual use in labs around the world for 65 years and has been instrumental for disease eradication and the production of vaccinations (Bustamam, 2017).

Heralded as the first ever identified “necessary cause” of a human cancer, the correlation between HPV infection and cancer was thought to be as important as the association between smoking and lung cancer that was proposed by Harald zur Hausen, a German virologist and professor (Bustamam, 2017). In other words, the concept of a cause and a consequence (cervical cancer) implies that cervical cancer does not, and will not, develop in the absence of the persistent presence of HPV. In the early 1990s, the International Biological Study on Cervical Cancer group was set up to look at cervical cancer cases worldwide. After obtaining samples from women diagnosed with cancer in 22 countries, HPV was found in at least nine out of every ten cervical cancer samples, and this figure was consistent across the globe (Bustamam, 2017). In the study by Anouar Tadlaoui, et. al., it was also established that two types of the HPV virus (HPV16 and HPV18) was found in 82% of the cervical cancer cases as causative agents (Anouar Tadlaoui.et.al., 2020).

Following the discovery in the 1980s by Harald zur Hausen that most cervical cancer cases were caused by prolonged HPV infection, researchers at the National Cancer Institute discovered that the proteins that form the outer shell of HPV could form particles that closely resemble the original virus and create high levels of potentially protective antibodies. The particles were not infectious, because they lacked the necessary viral genes. The virus-like particles subsequently became the basis for Gardasil, a new vaccine that was in development (Bustamam, 2017). In recent times, the virus-like particles that are based on L1 proteins have been considered as the best candidate for vaccine development against HPV infections (Namvar, Bolhassani, Javadi, & Noormohammadi, 2019).

The Introduction of Gardasil

Introduced and licensed by the United States on June 8, 2006, Gardasil was a new vaccine to prevent the acquisition of HPV and the first vaccine designed to guard against cervical

cancer (Lexchin, 2010). According to the CDC, the Food and Drug Administration (FDA) first approved first-generation Gardasil, which prevented infection of four strains of HPV: 6, 11, 16, and 18. In December 2014, Gardasil9 was approved by the FDA. This vaccine protects against 9 strains of HPV: the four strains approved in the previous Gardasil vaccine, as well as 31, 33, 45, 52, and 58. The FDA recommended the vaccine for girls aged 9–13 years, or before the onset of sexual intercourse, and women aged 14–26, even if they had previous abnormal Pap smears or HPV infections (Lexchin, 2010). Uptake of the Gardasil vaccine consists of a three dose, quadrivalent process. The vaccine is currently approved in 123 countries, is prophylactic and contains virus-like particles of HPV types that stimulate type-specific neutralizing antibodies (CDC, 2011).

A systematic review was performed by Rambout and colleagues to test the efficacy of the vaccine among women aged 15-25 years not previously infected with vaccine-type HPV strains. Because HPV is known as the necessary cause for cervical cancers and prophylactic HPV vaccines are designed to prevent genital warts, precancerous cervical lesions and cervical cancer, the researchers wanted to gauge the potential impact of vaccine uptake on disease burden in the United States. The researchers conducted a systematic search of literature obtained through an online database search to identify all randomized controlled trials of prophylactic HPV vaccination between 2006 and 2007. Findings from the systematic review showed that prophylactic HPV vaccination was associated with a reduction in the frequency of high-grade cervical lesions caused by vaccine-type HPV strains when compared with control groups. It was concluded that the efficaciousness of the vaccine appeared to be high, and the incidence of adverse effects from the vaccine were low (Rambout, 2007).

Markowitz, et.al., (2013) examined HPV vaccine uptake comparing data from the time the vaccine was introduced (2007-2010) with data collected in the pre-vaccine era (2003-2006) in a National Health and Nutrition Examination Survey (NHANES). NHANES reported that in a group of females between the ages of 14-19, only 34% were vaccinated during 2007-2010, an 11.6% decrease in comparison to females in the same age group that were vaccinated between 2006-2007.

However, the type of HPV prevalence that are covered by vaccinations decreased by approximately 56%, a phenomenon that was examined by the researchers in the study (Markowitz, 2013)

Because there were no mitigating factors such as changes in sexual behavior among the participants, the researchers suggested that an early uptake impact of the vaccination could be the reason behind low HPV prevalence among this age group due to herd immunity, vaccine effectiveness of a series involving <3 doses, and/or changes in sexual behavior that was not measured (Markowitz, 2013). However, because the data was self-reported, under or over reporting could have skewed results in the study. Considering the substantial health and economic burden of HPV associated diseases, this study is encouraging in that it reinforces the effectiveness of the vaccine (Markowitz, 2013)

The Human Papillomavirus Infection in Men

There is empirical evidence that male HPV infection contributes significantly to the transmission of the virus in women which subsequently can lead to cervical cancer. In a case-controlled study of women with cervical cancer by Giuliano, et. al., it was established that a woman's husband's sexual behavior affects her risk of cervical neoplasia, even when controlling for female sexual activity (Giuliano, 2008). More recently, however, researchers have ascertained that HPV contributes to men's burden of diseases such as anal, penile, and oropharyngeal cancers. Many men are unaware of the HPV related cancers that are exclusively developed as a direct result from a prolonged infection with the Human Papilloma Virus (Daily, 2017).

Along with penile, anal, and oropharyngeal cancers, there are other HPV related diseases such as condylomata acuminata (genital warts) and recurrent respiratory papillomatosi that are of clinical significanc to men. It is important to note that per Giuliano, an HPV infection in men may increase the risk of acquiring human immunodeficiency virus (HIV) infection as well, because their inflammatory response to HPV may make their target cells more receptive to HIV (Giuliano, 2008).

Per Giuliano, it was noted that while relatively little is known about the epidemiology of HPV infection in heterosexual men, an understanding of HPV infection and associated disease in these men has assumed increasing importance because the efficaciousness of the vaccine Gardasil (Giuliano, 2008). It has been proven to be highly effective in preventing HPV types 6, 11, 16 and 18 which most frequently affect men. However, despite the vaccine's availability for men, only a few countries have implemented vaccination programs for men. In 2013, Australia became the first country to initiate government funded universal HPV vaccination programs for boys and began including boys in a national school-based HPV vaccination uptake (Newman, et. al, 2014). As Giuliano points out, lack of knowledge about the transmission of HPV, as well as the severity of the types of subsequent cancers specific to men, can be the catalyst to low male vaccination uptake and implementation of HPV vaccination programs for boys (Giuliano, 2008). A study by Pitts, et.al., (2017) also pointed out that the lack of males' knowledge about their role in the spread of HPV, as well as lack of awareness about the HPV vaccination continue to be significant barriers to males receiving the vaccination.

The cost-effectiveness of HPV vaccination in males

While research has established a strong causal link between specific types of HPV infection and cervical cancer, fewer studies have been conducted on HPV infection in male reproductive organ cancers. Yet, the incidence of anal cancer in HPV positive men is quickly becoming comparable to the incidence of cervical cancer, with at least 90% of all anal cancers being a direct result of prolonged HPV infection (Hu, 2014). According to the Centers for Disease Control and Prevention (CDC) in 2019, about 6,810 men were diagnosed with anal cancer and about 91% of those cancers were thought to be caused by HPV. The resulting economic burden associated with non-cervical HPV-related cancers occurring in individuals living in the United States was approximately $418 million in 2014 (Hu, 2014). In another study by Wu, et.al., in 2018, it was found that the first two year per patient adjusted mean cost associated with anal cancer treatment was $127,531. Interestingly, because most economic studies to date of HPV related

conditions have focused primarily on cervical cancer, there are substantially fewer costing studies of noncervical HPV associated sequelae, or male cancer development (Hu, 2014).

In 2013, there were approximately 500,000 new cases of anogenital warts reported to the Centers for Disease Control and Prevention (CDC) (CDC, 2015). In a study conducted by the CDC the researchers sought published estimates of the cost per episode of newly diagnosed genital warts because a single episode of anogenital warts is often associated with the use of a combination of different therapies, and there is wide variation in cost among the different treatment options. A study conducted during the introduction of the HPV vaccination found that women enrolled in a United States health care plan estimated that an average of $26,415 per 1000 women was spent on annual cervical screening and treatment for HPV-related diseases (Soper, 2006). In 2019, according to the CDC, about $1 billion was reported for cancer related treatments, including $0.4 billion for cervical cancer and $0.3 billion for oropharyngeal cancer. Furthermore, the treatment for anogenital warts in 2019 was approximately $0.4 billion in the United States alone. Taking into consideration all the combined therapies, in the United States the estimated lifetime total medical cost of HPV infection for men and women ages 15–24 is $2.9 billion, which makes HPV the second most expensive STI after human immunodeficiency virus (HIV) (Soper, 2006).

Penile and Anal Cancer

The acquisition of anal cancer primarily caused by an HPV infection is comparable to that of HPV associated cervical cancers (Bennett, 2015). Because there is a similarity of the tissue of the anal canal, including a transformation zone that is bounded on each side by squamous and columnar epithelium, HPV induced carcinogenesis leading to cervical cancer is comparable to the process that leads to anal canal cancer (Levesque, 2011). About 91% of all anal squamous cell carcinoma cases in the United States can be directly attributed to HPV infections. There are approximately 693 women and 377 men diagnosed with HPV associated anal cancers each year (Bennett, 2015). Although anal cancer is less common than cervical cancer, its incidence in men

residing in the United States is increasing and is expected to be the most commonly diagnosed anogenital HPV associated cancer in 2020 (Bennett, 2015).

Penile cancer is a rare malignancy of the genitourinary tract, with 0.58 per 100,000 men in the United States affected by the disease. However, exposure to HPV has been detected in nearly one half of all cases of penile cancer (Fernandez, 2014). Because penile cancer is rare in the United States, it is wholly under-researched. However, it has been established that the disease is associated with high mortality and significant adverse effects after treatment. Because treatment of penile cancer often leads to genital disfigurement, psychological and emotional distress are common side effects. Depression and anxiety are common after-effects post-treatment as well (Fernandez, 2014). *The Epidemiology of Oral HPV Transmission*

The findings by Sonawane, et.al, (2017) that oral HPV begins with sexual debut, supports the idea that the acquisition of oropharyngeal cancer is strongly associated with sexual behavior beginning at adolescence. Per Sonawane et.al., (2017) the transmission of oral HPV occurs after performing oral sex on infected genitals. The research is unclear as to whether oral HPV can be spread through deep kissing. Through a study performed on a couple who both presented with oral cancer, identical HPV strains were identified, supporting the hypothesis of oral HPV transmission between the couple (Sonawane et.al., (2017). It was further discovered that partners of women with cervical cancer have a higher incidence of oropharyngeal cancer than the general population, supporting the hypothesis that the transmission of HPV from the genital region of an infected woman is possible to a partner during oral sex (Sonawane, 2017).

Because sexual behavior is strongly associated with oral HPV acquisition, Sonawane, et.al., sought to examine a link between adolescent sexual behavior and oral HPV. Most of the surveys the researchers conducted on a sample of teen-aged participants about adolescent sexual behavior, indicated that a significant proportion of the adolescents engaged in oral sex prior to vaginal intercourse, and perceived oral sex as less risky (Sonawane, 2017). The participants indicated that they had more oral than vaginal sex partners as well. According to data from a 2016

survey performed by the National Survey of Family Growth, 38.8% of males and 43.6% of females aged 15 to 19 years residing in the United States have performed oral sex. In addition, approximately 12% of males and 10% of females in this age group have had oral sex but not vaginal intercourse (Sonawane, 2017).

The incidence of HPV positive oropharyngeal squamous cell carcinoma (OPSCC) is disproportionately higher among men residing in the United States in comparison to women (Sonawane, 2017). There are approximately 11 million men residing in the United States with OPSCC and 3.2 million women. Men also have a 5.4% greater probability of high-risk oral HPV infection than women. The incidence of high-risk oral HPV infection is exacerbated by men who smoke more than 20 cigarettes daily and are current marijuana users. There is also a higher prevalence rate among African American males and those who report 16 or more lifetime vaginal or oral sex partners (Sonawane, 2017).

No data is available on the costs for anal cancer rates in the United States, however, the researchers used a comparable study for anal cancer conducted in Canada to ascertain the economic burden for anal cancer in the United States (Hu, 2014). There are approximately 693 women and 377 men diagnosed with HPV associated anal cancers each year in the United States (Bennett, 2015). About 91% of all anal squamous cell carcinoma cases in the United States can be directly attributed to HPV infections. Because the rates for developing anal cancer are increasing at a rapid pace each year in the U.S., the study that was done in 2015 is not quite indicative of the actual economic burden in the United States for anal cancer. However, the researchers estimated the total lifetime cost of all HPV attributable incident cases of anal cancer occurring in 2015 to be $92 million with a range of $44 to $178 million (Hu, 2014).

The cost estimates for penile cancer are of interest for the current study about barriers to male vaccination because the American Cancer Institute (ACI) estimates that there are at least 2,120 new cases of cancer to the penis diagnosed annually, resulting in 360 deaths each year. Nearly all cases of penile cancer can be directly attributable to HPV infection (ACI, 2017). The

costs related to penile cancer include a primary care physician visit, surgery, anesthesia, hospitalization, radiation, chemotherapy, and visits with a specialist (Hu, 2014). Reconstructive therapies were not addressed. Taking all the therapies combined into consideration, the cost of penile cancer per year in the United States is approximately $8.6 million (Hu, 2014).

The results of the study of cost analysis by Hu prove that there is a substantial economic burden in the United States due to HPV acquisition and related cancers for males. However, the study did not take into consideration non-clinical costs to the public, such as transportation costs to healthcare facilities or the value of work time lost receiving health care. There is also the issue of HPV positive males transmitting the virus to females, subsequent disease acquisition and economic burden for females that was not addressed in this study as well. A study performed by Gargano, et. al. gave a more thorough statistical analysis of health outcomes for females who were exposed to HPV and were diagnosed with invasive cervical cancer. In 2012, there were over 500,000 new cases and 265,000 deaths attributable to cervical cancer. The study discussed other significant, non-cervical health outcomes for females that had been exposed to HPV as well. The largest proportion of cancers for females directly attributable to exposure to HPV between 2009-2013 were anal cancers (about 90%), followed by vaginal cancers (about 75%), oropharyngeal cancers (about 70%), vulvar cancers (about 70%), and penile cancers (about 60%) (Gargano, 2017).

Vaccine Efficacy for Males

It was not until 2011, that recommendations by the advisory Committee on Immunization Practices recommended routine vaccinations for males (Markowitz et al., 2013). There are two significant categories related to the importance of HPV vaccine uptake in men: reduction of disease burden for males and reduced transmission of the virus to women (Quinn, 2015). Because it has been empirically established that HPV is spread through sexual contact, vaccination of males has the advantage of reducing the risk of HPV transmission to sexual partners, as well as reducing the spread of HPV in the general population and ultimately, HPV related cancers for both men and women (Quinn, 2015).

Although the most common cause of mortality related to HPV is cervical cancer, the disease burden for HPV-related cancers for men is becoming significant. Anal cancer rates are rising due to an increase in HPV acquisition and have more than tripled since the 1970s. Although males who have sex with other males (MSMs) are at a higher risk for the development of anal cancer, the incidence of anal cancer in heterosexual men is increasing, with about 2% more cases diagnosed each year (Quinn, 2015). Because acquisition of HPV is directly responsible for the development of at least 90% of all anal cancers, HPV vaccine uptake among males is imperative to prevent HPV infection (Quinn, 2015). Despite eligibility to receive catch-up doses up to age 26 years, low HPV vaccination rates leave a large population of college-aged males unprotected.

The incidence of genital HPV infection among men is similar to that among women (Quinn, 2015). The transmission of HPV is common, and the median clearance time of infection is approximately six months. The peak rise of any HPV infection is approximately ten years from the first sexual experience for both men and women. There are at least 40 types of the more than 100 types of HPV that have been identified that affect the genital tract; however, as in the case of cervical cancer for women, types 18 and 16 are the oncogenic types that cause nearly all anal, penile, and oropharyngeal cancers in men (Quinn, 2015). An article by Senkomago, et.al., (2019) stated that recently, it has been discovered that oncogenic HPV types 16, 18, 31, 33, 45, 52, and 58 are causally attributable to nearly all cervical cancers and some cancers of the vagina, vulva, penis, anus, and oropharynx

Long term infection for both men and women can cause both benign and malignant anogenital disease, as well as head and neck lesions (Quinn, 2015). However, in clinical trials, HPV vaccinations were safe and are 90% to 100% effective against persistent infection with HPV types 6 and 11 and genital warts in women and men. Furthermore, although Gardasil uptake was first recommended for individuals between the ages of six and eleven, the Food and Drug Administration (FDA) approved a prophylactic quadrivalent HPV vaccine in 2006 for females between the ages of 9–26 years and in 2009, approved the same vaccine for males of the same age

group. Individuals receiving the prophylactic quadrivalent vaccine found the vaccine efficacious in reducing more than 90% of external genital lesions and approximately 90% efficacious in preventing persistent infections caused by the HPV types covered in the vaccine, including the oncogenic types 16 and 18 (Quinn, 2015). This information is critical to the current study in that our sample contains college-aged individuals.

Gender Norms Influential in Male Vaccine Uptake

Prior to Gardasil being approved, Merck pharmaceuticals narrativized the vaccine as a women's only health issue through awareness campaigns linking the vaccine to cervical cancer, even though medical research has ascertained the role of men in HPV transmission (Stanley, et.al., (2017). Misperceptions of men about their role in HPV acquisition and transmission disproportionately affects decisions concerning vaccine uptake, as well as causes gender discourse in responsibility for prevention in sexual matters (Stanley, 2017).

In the book "The Vulnerable Empowered Woman: Feminism, Postfeminism, and Women's Health," Tasha Dubriwny discusses the dynamics of public discourse concerning HPV and public history of burdening women with the responsibilities of providing preventative measures regarding STIs and pregnancy (Dubriwny, 2012). Dubriwny agrees with Stanley in that the initial trajectory of the Gardasil vaccination aimed at eradicating cervical cancer, further ingrained the notion of HPV prevention as a "women's only issue," even though the nature of the commercials were supposed to empower women. Even the inclusion of young men into HPV vaccination campaigns would have little or no effect on public discourse about the overall message concerning HPV and sexuality according to Dubriwny. The idea that women will not be thought of as having high moral standards if they contract a sexually transmitted disease such as HPV has historically been considered a social norm. Even if they lessen their chances by becoming vaccinated, their reputations are still at the mercy of their "risky" sexual behavior and the "dangerous" men with whom they associate (Dubriwny, 2012).

Stanley (2017) discusses the constructs of the self-categorization theory; particularly, the social shift of social identity that is built on contrasting one's ingroup with a relevant outgroup and its meaningful consequences for group member's perceptions, attitudes, and behaviors. In the case of HPV prevention and vaccine uptake, men adhere to perceived social perceptions and norms concerning responsibility of sexual issues, simply because men value gender as a social identity more than women do, as reflected in stereotypical gender norms pertaining to masculinity and public health issues (Stanley, 2017). Men who adopt a stronger, traditional role of masculinity, and who perceive other men of not engaging in health promoting behavior, typically perform fewer healthy behaviors themselves (Stanley, 2017).

Low male HPV vaccination uptake illustrates the influence of gender discourses and norms, as well as identifies concerns that males may have about emasculation towards vaccine uptake (Stanley, 2017). Misperceptions among males who recognize HPV vaccination uptake as a women's issue can cause them to reject inquiring about HPV and other feminized sexual health issues with their healthcare provider. Male perceived denial of vulnerability, compounded by the fact that more women seek medical advice than men, can create provider bias and consequently, healthcare provider preference for vaccinating women (Stanley, 2017).

Even though discourse identifies women as the most vulnerable when it comes to negative outcomes of sexual activity, most college men envision an ideology that women and men are equal concerning sexual health (Stanley, 2017). However, most men recognize that, realistically, women are more responsible, even though most men agree that men are more sexually active and engage in higher risk sexual activities. Perceived knowledge about sexual health was cited in Stanley's study as well. Most men believed that women have a greater access to sexual knowledge through their mothers, and that fathers felt too much discomfort to discuss sensitive sexual material with their sons. Because there are discrepancies in the parental knowledge afforded to sons and daughters, resulting normative referents among male peers dictate a lack of accountability of men concerning sexual health (Stanley, 2017).

Intentions of Men to Receive the HPV Vaccine

While the incidence for cervical cancer has decreased, the incidence of HPV positive anal cancer has been rising in men who have not participated in vaccine uptake (Gilbert, 2010). Because the early marketing of Gardasil specifically targeted females, gender bias toward HPV and HPV related cancers has become the perceived norm, causing the "feminization" of HPV (Daley, 2017). Even though clinical trials of Gardasil indicate that the vaccine can significantly prevent anal cell changes acquired by prolonged HPV infections, the perceived feminization of HPV and HPV related cancers could cause lower vaccination rates for men when compared to women (Gilbert, 2010).

In a study performed with a university sample by Gilbert, et.al., a comparison was made between heterosexual and gay men toward receiving an HPV vaccine. The authors sought to glean information about HPV vaccine awareness, knowledge, and attitudes in comparable samples of heterosexual and gay men. The researchers had hypothesized that most of the male participants would not have heard of HPV or related cancers for men (Gilbert, 2010). As expected, most of the participants had not heard of male roles in the spread of HPV, and most males were unaware of a vaccine for the prevention of HPV (Gilbert, 2010). These findings further corroborate our hypothesis that knowledge among males about HPV and related cancers is limited.

After extensive exposure to information about HPV and related cancers among men, receptiveness of the vaccine varied substantially among the groups examined; 94% of gay males who had significant exposure to HPV related information through the study intended to vaccinate against HPV, regardless of whether a safe and effective vaccine was available, compared to 62% of heterosexual university males who were willing to consider HPV vaccination (Gilbert, 2010). Our hypothesis about negative attitudes towards HPV vaccination among heterosexual males appears to be substantiated by the lower willingness for vaccine uptake among this group.

Gender Bias and HPV Infection

Gender bias towards HPV acquisition is exacerbated by the fact that there is not a screening test for HPV available for men; there is only a visual inspection for clinicians to check for lesions or warts on males (Daley, 2017). There is no specific way to test directly for HPV in men that is approved for clinical use. The only approved tests on the market for primary, preventative care for HPV are for screening women for cervical cancer, which further reinforces the ideology that women are responsible for HPV prevention. Because females are burdened with both the primary and secondary prevention of HPV, males fail to receive adequate preventative measures of HPV acquisition; further increasing the likelihood of acquiring HPV related diseases (Daley, 2017).

Males can suffer numerous consequences from gender bias that could mislead them about who is more likely to spread HPV. This type of bias, often referred to as the feminization of an issue, occurs when the social construction of the issue is directed toward females. Since the introduction of the HPV vaccine Gardasil, the implementation trajectory has been focused on the vaccine's usefulness in preventing cervical cancer, even though the burden of HPV acquisition does not disproportionately affect one gender over the other (Daley, 2017). Direct and indirect gender biases and inequities for HPV vaccine uptake can be partially attributed to the specific focus of Gardasil manufacturers on females.

In the case of HPV, the feminization of HPV and HPV related cancers was that if vaccination rates for HPV in females were adequate, herd immunity could be achieved, thus absolving males for HPV prevention responsibilities (Daley, 2017). However, HPV vaccination rates for females residing in the United States are nowhere near achieving herd immunity threshold. Furthermore, the herd immunity ideology does not take into consideration men who have sex with other men (MSM) (Daley, 2017). Per Daley, the sub-group of MSM does not receive enough protection from HPV, even though clinical trial data among MSM who have been vaccinated with 4vHPV demonstrate a reduced risk of anal cancer and oropharyngeal cancers. Because this

subgroup has a higher rate of these types of cancers, missed opportunities for vaccine uptake among can result in increased morbidity and mortality among HPV positive MSM (Daley, 2017).

The concept of gender bias occurring when the social constructs of an issue become feminized is not a new phenomenon. The historical concept of feminization can be traced back to the 1970s, when issues of equal pay for women, as well as complex social reconstruction issues such as women taking on new roles as breadwinners, has helped to shape the concept of gender bias (Daley, 2017).

The transmission of the virus can debunk the idea of gender specificity of HPV and related cancers itself. HPV acquisition can only occur through sexual contact, which includes skin to skin contact, genital to skin contact, and oral to genital contact, implying that it is necessary for an individual to have contact with another person to acquire the virus (Daley, 2017). Furthermore, it is estimated that nearly 85% of women and 91% of men, with at least one sexual partner from the opposite sex, will contract HPV infection during their lifetime. It is estimated that more men acquire HPV through heterosexual transmission than women as well (Daley, 2017).

The Theory of Planned Behavior Related to College Students and HPV Vaccination Rates The Theory of Planned Behavior (TPB) was chosen for this study because university students were studied to see if their decisions to be vaccinated or not against HPV was influenced by their knowledge about HPV, their attitudes toward HPV vaccination, their perceived behavioral control toward receiving the vaccine and their intention to do so.

The Theory of Planned Behavior (TPB) has been used to predict behaviors across a wide variety of health behaviors (Glanz, 2011). TPB was developed by Icek Ajzen (1985) as an extension of the Theory of Reasoned Action (TRA) which hypothesizes that the most important determinant of behavior is behavioral intention based on an individual's attitude and subjective norms toward a behavior (Ajzen & Fishbein, 1980). The additional dimension of perceived control is the perception of the difficulty of performing or completing a behavior.

A study performed in 2019 (Preston & Barrow) utilized the Theory of Planned Behavior (TBP) to examine differences in HPV related knowledge, attitudes, and practices among men and women attending college in south Florida. The researchers used the constructs of the TPB to make a direct correlation to vaccine uptake among males and knowledge and attitudes influencing positive intention toward receiving the vaccine (Preston & Barrow, 2019).

After assessing knowledge about HPV and HPV vaccination, the study found that male participants were significantly less aware of HPV vaccine age recommendations than the female participants were. The researchers stated that low awareness about HPV vaccination could be because Florida public schools have adhered to an abstinence only or abstinence-based sexual health curriculum (Preston & Barrow, 2019).

The study also examined differences in attitudes toward HPV vaccination among men and women. The study found that over 70% of men had not been vaccinated, and only 26% of women and 4% of men had received all three doses of HPV vaccine, despite men reporting similar knowledge about the vaccine as women (Preston & Barrow, 2019). The male participants with negative attitudes toward HPV vaccination were significantly less knowledgeable in comparison to their female counterparts about HPV and HPV vaccination and were less likely to have received the vaccine. This finding is consistent with other studies in which it was concluded that HPV knowledge is a predictor of favorable attitudes toward vaccination.

In another study by Catalano, et. al., the TPB's constructs were utilized to predict behavioral intentions of college-aged men toward receiving the HPV vaccination. The sample consisted of college men who were at least 18 years of age. Previous awareness and knowledge about HPV and HPV vaccination were reported as low by about one-third of the sample. Approximately one half of the respondents indicated that they had not heard of a vaccination against HPV until they participated in the study (Catalano, et. al., 2016).

Most of the respondents in the study indicated that they had engaged in oral, vaginal, or anal sex. However, most of the upperclassmen reported as unvaccinated for HPV. This is troubling

because the researchers suggested that most college men have increases in their sexual contacts over the duration of their collegiate career, putting them further at risk for an exposure to an HPV infection (Catalano, et. al., 2019).

Attitudes about HPV vaccinations were also assessed in the study by Catalano. The reported means scores were low, suggesting that the respondents had unfavorable attitudes about receiving the HPV vaccine series within the next 12 months. The researchers also found that attitude was a significant predictor in the respondents' behavioral intention to receive all three doses of the HPV vaccination within the following year (Catalano, et. al., 2019).

Subjective norm mean scores for the men in the study were reported as low, indicating that the participants did not perceive social pressure to be vaccinated against HPV. The researchers indicated that subjective norm was the strongest predictor of behavioral intention toward receiving the series of HPV vaccinations among the participants in the study (Catalano, et. al., 2019).

Although the means scores were slightly low for perceived behavioral control, it was not a significant predictor toward the intention of males to receive the HPV vaccination. The researchers suggested, however, that because respondents lacked enough knowledge about HPV and the HPV vaccination process, they would not be able to make an adequate assessment about what the vaccination process would entail (Catalano, et. al., 2019). Inadequate knowledge about HPV and HPV vaccination was also a factor in low means scores for behavioral intention to receive the HPV vaccination among the respondents. This finding is consistent with other studies in which insufficient knowledge about HPV is directly correlated with low vaccination rates among males (Preston & Barrow, 2019).

In a study performed by Johnson and Ogletree (2017), knowledge about HPV and behavioral intention toward HPV vaccination among college men was assessed. A little over half of the sample had not heard of HPV and 60% of the respondents indicated that they had not heard of HPV vaccinations for men prior to this study. Most of the participants reported that they had a positive attitude toward being vaccinated against HPV; however, attitudes proved not to be a

significant predictor of the intention to be vaccinated. Both perceived behavioral control and subjective norms were found to be significant predictors of behavioral intention among the men to receive the HPV vaccination, however, subjective norms, or where the men received their information about HPV and HPV vaccinations, proved to be the strongest predictor of behavioral intention for HPV vaccine uptake (Johnson & Ogletree, 2017).

Summary

The purpose of this study was to assess whether gender differences existed in knowledge, attitudes, beliefs, subjective influences and perceived behavioral control about HPV, and the intention to obtain the HPV vaccine among a sample of university students.

In Chapter 2, the literature on Human Papilloma Virus including differences of HPV prevalence, male and female reproductive cancers that result from HPV infection, studies addressing use of Gardisil (HPV vaccine), studies addressing gender bias in promoting the vaccine and studies examining sexual behavior that have used the Theory of Planned Behavior to explain vaccine uptake in adolescents and young adults was presented.

Chapter 3 will contain the methodology used to accomplish the purpose of the study. The results of the study will be discussed in Chapter 4. Chapter 5 will contain a discussion of the results, conclusions drawn because of the study, and implications and recommendations for further study.

CHAPTER 3

RESEARCH DESIGN AND METHODS

This chapter presents an overview of the research methodology utilized in this study. The setting of the study, research design, protection of human subjects, sample methodology, instrumentation and psychometric properties (validity and reliability), and data analyses are discussed.

Purpose

The purpose of this study was to assess knowledge and attitude about HPV, and how attitudes influence the intention among college students to be vaccinated among a sample of university students.

The following research questions guided the study:

1. Is there a difference in knowledge about HPV between male and female college students?
2. Is there a difference in attitude between males and females toward obtaining the HPV vaccine?
3. Is there a difference in the influence of others between males and females toward obtaining the HPV vaccine?
4. Is there a difference between males and females on their perceived behavioral control to obtain the HPV vaccine?
5. Is there a difference between males and females on their intentions to obtain the HPV vaccine?

Setting of Study

The study setting was on two campuses of Georgia Southern University (GSU) located in Southeastern Georgia. Georgia Southern University, Statesboro campus, is an institution with an enrollment of 20,418 students in 2017 (Georgia Southern University, 2017). The Armstrong campus is smaller, with approximately 7100 students enrolled in 2016 (Armstrong University,

2016). As of January 1, 2018, consolidated Georgia Southern University overall enrollment grew to approximately 27, 518 students.

For the 2017-18 academic year, the Statesboro campus's student body consisted of 43.7% males and 56.3% females, with the majority of students (94%) residents of Georgia while the remaining 6% came from out of state or international (Georgia Southern University, 2018). More than half (62%) of the students identify as Caucasian and 26% identify as African American (Georgia Southern University, 2018). For the same time period, the Armstrong campus body reported that 33.2% of students were male and 66.8% were female (Armstrong University, 2016). The majority of students (86%) of the students were from Georgia and 14% were from out of state or international. Almost 60% of the students self-identify as Caucasian and 25.5% self-identify as African American (Armstrong University, 2016). The purpose of conducting the study on both campuses is that one campus is rural, and one campus site is urban.

Study Design/Research Methodology

The study employed a quantitative approach to data collection. Specifically, a quasi-experimental, exploratory, cross-sectional research design in which data was collected. Rigorous quantitative sampling was employed.

A stratified proportional random sample of students attending one university with multiple campuses was implemented. Each campus site constituted a stratum, with two or more classes of an undergraduate level randomly selected from each campus. Intact classes were identified. To obtain a final sample size of 380 participants based on the power analysis of $p \leq 0.05$, an initial sample of 450 students was sought (Creswell, 1997). Proportional sampling between stratum necessitated that the Statesboro campus have at least 337 participants (74.8%) and Armstrong campus with 113 participants (25.2%) (Creswell, 1997).

Originally, the study was to include qualitative components consisting of individual interviews to further explore and validate the quantitative responses, particularly among male

students. Due to low participation and the inability to reach saturation required for meaningful qualitative results, the interviews were excluded from the final data analysis and results.

Data Collection

During the Spring 2018 semester, approximately 30 faculty members were contacted requesting permission to survey their classes. Out of the 30 contacted, 10 faculty members gave permission for in class surveys. During the initial contact timeframe, many faculty members indicated that their classes were online. Therefore, an electronic version of the survey was created via Qualtrics© and the link was shared with the online instructors. Fifteen faculty members were asked to share the online survey link with their classes; six faculty members granted permission to survey their classes face to face. Approval for the research study was received by the Institutional Review Board. Out of the 384 completed surveys, 95 were completed on-line; therefore, approximately 25% of the respondents completed the survey on-line and 75% completed the survey in person during the scheduled class time. (Appendix A). One questionnaire was excluded from analysis due to incompleteness (less than 20% of the survey completed), resulting in a sample size of 383. A survey was given face-to-face to the randomly selected classes of students. After contact was made with instructors requesting their permission to survey their classes over the summer, it was determined that many of the classes were online. This necessitated the creation of an online version of the survey instrument and an addendum to the IRB to reflect this additional mode of data collection. At the end of the survey instrument, participants indicated their willingness to participate in compensated interviews to complete the qualitative data collection. The researcher's email address was provided for interested participants. Numeric coding of participants was performed to maintain anonymity.

Population

The sample for this study was undergraduate students who attend a mid-sized university in the Southeast portion of the United States. Individuals were eligible to participate in the study if they are 18 years of age or older and a matriculated student at Georgia Southern University.

This study has met all criteria for the protection of human subjects and permission from the Institutional Review Board has been granted.

Instrumentation

Quantitative Instrumentation

The instrument consists of a modified 40-item questionnaire created from a previously established instrument (Caron, et.al., 2008 & Jasper, 2014). Content face validity was verified by committee members and previous substantiation while internal consistency was established by conducting a Cronbach's alpha coefficient analysis which was reported as .69. The amount of time to complete the questionnaire and comments of the mechanics of the questionnaire were also recorded. Specific items were revised based on calculated results and participant feedback. Ten questions assessed the participants' knowledge about HPV and HPV vaccination uptake with a closed choice response. Sample knowledge questions include: "How do you think HPV is spread?" and "Have you ever heard of Gardasil™, a vaccine to prevent cervical cancer that was approved by the FDA in June 2006?" Twelve questions assessed attitudes and beliefs toward the HPV vaccination. Sample questions included "It's not safe to get the HPV vaccine shots" and "Getting vaccine shots against HPV would be a good way for males to protect their health." Six questions assessed behavior related to transmission and contracting HPV. Sample of behavioral questions include: "What changes would you make if you found out that your partner has HPV?" and "Do you and your partner talk about STDs?" The next set of twelve items assessed perceived risk about the HPV vaccine and is presented on a Likert-type scale with responses ranging from strongly agree to strongly disagree. Sample perceived risk questions include: "It is not safe to get the HPV vaccine shots" and "HPV vaccine shots are dangerous." At the end of the quantitative portion of the instrument, participants were asked about their willingness to be contacted to participate in a telephone interview.

Figure 3.1
Data Analysis and Procedures

#	Research Questions	Variables	Variable Classification	Statistical Test
Items 1-10	1. Is there a difference in knowledge about HPV between males and females?	Knowledge items Gender Year in School, Age of first sexual intercourse, Ever been vaccinated	Interval, Total knowledge score	Frequencies, Means, Standard Deviation Cross Tabulation ANOVA
Items 12-23	2. Is there a difference between males and females in attitudes toward HPV and obtaining the HPV vaccine?	Attitude items Gender, Year in School	Interval, Total attitude score	Frequencies, Means, Standard Deviation ANOVA
Items 24-28	3. Is there a difference between males and females on the influence of others toward HPV vaccination?	Subjective Norms Gender, Year in School	Interval, Total influence score	Frequencies, Means, Standard Deviation ANOVA
Item 29-48	4. Is there a difference between males and females in intention to obtain the HPV vaccine?	Behavioral intention items Gender Year in School Sexual Activity	Nominal Interval	Frequencies, Logistic Regression

Data Analysis

After all data was coded, frequencies were calculated for all items with additional comparative analyses performed for specific demographic characteristics and specific categorical variables. In order for reliable and valid measures of latent, theoretical constructs, the variables that are related to one another were used to compute composite, or total score (Creswell, 1997). A multiple-regression model assessed independent variables contribution to predict vaccination intention: age (continuous, in years), cumulative knowledge (as measured by the number of correct responses on the knowledge portion of the instrument), and attitudes towards HPV vaccination (*see Likert portions of instrument*).

There were three primary outcomes of interest in this study: a) knowledge about HPV and the HPV vaccination, b) attitudes toward HPV infection and the HPV vaccine and c) perceived behavioral control concerning obtaining the HPV vaccine. All statistical analysis was performed using the software IBM SPSS Statistics 25(v.28) (IBM Corp. Released 2017).

Summary

The purpose of this study was to assess knowledge and attitudes about HPV and how attitudes influence the intention to be vaccinated among a sample of university students. In Chapter 2, a literature review was presented relating to the perceived risk, attitudes and behaviors of men concerning HPV vaccine uptake and related cancers. Chapter 3 contains the methodology used to accomplish the purpose of the study. The results of the study will be discussed in Chapter 4. Chapter 5 contains a discussion of the results, conclusions drawn because of the study, and implications and recommendations for future studies.

CHAPTER 4

RESULTS

Chapter four presents the results of this study pertaining to the knowledge, attitudes, subjective norms, perceived behavioral control and intention of receiving the HPV vaccinations among college aged students. The Theory of Planned Behavior constructs guided the survey questions and framed the results of the study.

The data will be presented in the following order: Demographic variables that describe the study sample, and the results of the study will be presented by research questions. Statistical analysis performed included frequencies, descriptive statistics, one-way analysis of variance (ANOVA), correlation analysis, cross-tabulation and odds ratios.

Demographic variables

Demographic data collected included questions pertaining to gender, race, major/college within the university, year in school, self-report of sexual activity, age of first sexual intercourse, current relationship status and general health status. The majority of the respondents were female 252 (51.2%) and 131 (34.2%) were male. There were 51 respondents (14.6%) who did not respond to the question of gender. There were 216 (56.4%) who identified as White/Caucasian. The remaining respondents were broken down as follows: Black or African American, 118 (30.8%), 1 (.3%) respondent was American Indian or Alaskan Native, 7 (1.8%) respondents were Asian, 1 (.3%) respondent identified as Native Hawaiian or Pacific Islander, 22 (5.7%) identified themselves as two or more races, and 14 (3.7%) respondents identified as other race. Four respondents did not report their race. With respect to year in school, the sample was comprised of 82 (21.4%) Freshmen, 49 (12.8%) Sophomores, 108 (28.2%) Juniors, and 119 (31.1%) Seniors. Table 4.1 presents the demographic variables for this study.

Table 4.1
Descriptive Statistics of Demographic Variables of the Total Sample of College Students

Variable	Frequency (n)	Percentage (%)
Gender		
Female	196	51.2
Male	131	34.2
Race		
White/Caucasian	216	56.4
Black or African American	118	30.8
American Indian or Alaskan Native	1	.3
Asian	7	1.8
Native Hawaiian or Pacific Islander	1	.3
Two or more races	22	5.7
Other	14	3.7
College		
Jiann-Ping Hsu College of Public Health	77	20.1
College of Business Administration	41	10.7
College of Behavioral and Social Sciences	22	5.7
College of Arts and Humanities	62	16.2
Waters College of Health Professions	35	9.1
College of Education	81	21.9
College of Science and Mathematics	12	3.1
Other	50	13.1
Year in School		
Freshman	82	21.4
Sophomore	49	12.8
Junior	108	28.2
Senior	119	31.1

Respondents were asked about whether they had ever been sexually active and their age of first sexual intercourse. For the current sample, 88% reported that they have had sexual intercourse (anal, oral or vaginal). For both male and female students in the sample, the mean age at first sexual intercourse was in the 16-18 year age category with responses ranging from age 11 to 23. The mean number of sexual partners was 4.57 for female students (n=196) and 6.9 for male students (n=131). There were 55 students who did not respond to this question. Most of the respondents identified as being single, 111 (29.0%); with 66 (17.2%); 15 (3.9%) reported as being in a monogamous relationship; married and living with a partner and the same number not married but living with a partner. Only one respondent identified as divorced. Finally, respondents were

asked to report their general health status. More than half of the respondents reported their general health to be very good to excellent. It would be expected that most college students in the age range of this sample would be in good health. There were three responses that were missing for this variable. Data for these variables are presented in Table 4.2.

Table 4.2
Frequencies for sexual activity, Age at first intercourse, and perception of overall health of the total sample of college students

	N	%
Sexually Active		
Yes	337	88.0
No	36	9.4
Sexually Active		
Females		
Yes	170	88.1
No	23	11.0
Males		
Yes	115	89.0
No	13	10.2
Age of First Sexual Intercourse		
11-12	3	.9
13-15	50	14.2
16-18	190	54.0
19-22	80	22.7
23+	18	.8
Health Status		
Excellent	72	18.8
Very Good	138	36.0
Good	97	25.3
Fair	56	14.6
Poor	17	4.4
Ever been vaccinated		
Females		
Yes	115	59.0
No	53	27.2
Male		
Yes	37	30.0
No	34	27.9

Because HPV is primarily a sexually transmitted disease, the researcher was interested in seeing the relationship between year in school and self-report of ever having been sexually active.

A cross tabulation was performed for these variables. For the current sample of university students, those who were sexually active increased with year in school beginning in the sophomore year. It is interesting to note that in this study, more freshmen respondents reported being sexually active than sophomores. The results are presented in Table 4.3.

Table 4.3
Crosstabulation for Ever had sex by Year in school

Year in School	Have you ever had sex? No	Yes	Total
Freshman	9	66	75
Sophomore	6	43	49
Junior	10	96	106
Senior	11	108	119
Total	36	313	349

Participants were asked if they had ever been vaccinated against HPV. There were three choices of answers: Yes, I have received all three doses of the vaccine, No I either never received any dosage OR I received partial dosage, and not sure. Answers were coded as one for yes, zero for no or partial and two for not sure. Comparison of male to female vaccination rates found that females were 1.945 times (1.450, 2.607) more likely to have been vaccinated against HPV than males (received all three doses) (see Table 4.4). This is a significant finding ($p<0.005$).

Table 4.4
Odds Ratio Comparing Female to Male Vaccination Rates

Variable	N	OR	95% CI	Chi Square
Vaccinated	317	1.945*	1.450, 2.607	24.67

The remaining results will be reported by the research questions. Questions 2-4 in this study were formulated around the constructs of the Theory of Planned Behavior.

Research Question 1

Is there a difference in knowledge about HPV between male and female college students? Prior to the analysis of variables that align with the constructs of the Theory of Planned Behavior, a set of 10 questions (7 multiple response and 3 single response items) assessing the level of knowledge about HPV and the HPV vaccine were performed. For the single response questions, there was only one correct answer. Responses were coded as "0" for incorrect and "1" for correct. For the multiple response questions, each response was coded separately. A cross-tabulation of knowledge questions by gender was run to compare percentages by demographic characteristics. The results are presented in Table 4.5

Table 4.5
Crosstabulation of knowledge questions by gender

Variables	*Agree Males*		*Disagree Males*		*Agree Females*		*Disagree Females*		*Don't know*		*P value*
	%	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	
If you have ever heard of HPV, the symptoms of HPV include:											
Warts that sometimes itch or bleed	68.0	89	32.0	42	60.3	139	29.7	57			P<0.05
Sores of the penis or vagina that don't heal	53.4	70	46.6	61	55.6	109	44.4	87			
Discharge from genitals	50.3	66	49.7	65	45.9	106	54.1	90			
Warty growths	54.1	71	45.9	60	54.6	107	45.4	89			
Burning upon urination	50.4	66	49.6	65	50.0	98					
Reduction of urine flow	46.6	61	54.4	70	50.5	99	44.4	84			
No visible signs or symptoms	7.6	10	92.4	121	8.1	16	91.9	180			
Don't know									1.1	4	
If untreated, HPV can											
Cervical cancer	87.8	115	12.2	16	75.5	148	24.5	48			P<0.05
Infertility	78.6	103	21.4	28	69.4	136	30.6	60			
Pre-cancer	90.8	119	9.2	12	75.0	147	25.0	49			
Death	72.5	95	27.5	36	62.8	123	37.2	72			
Cause warts	89.3	117	10.7	14	75.0	147	25.0	49			
Will disappear	80.1	105	29.9	26	71.4	140	28.6	56			
Don't know									4.8	36	
How do you think HPV is spread?											
Vaginal sex	90.8	119	9.1	12	88.8	174	11.2	22			P<0.05

Anal sex	90.0	118	10.0	13	88.2	173	11.8	23	
Oral sex	70.2	92	29.8	39	69.3	136	10.7	60	
Don't know								5.1	19
Ways to help prevent the spread of HPV									
Abstinence	71.8	94	28.2	37	77.6	152	22.4	44	P<0.05
Proper condom use	85.5	112	14.5	19	82.7	162	17.3	34	
Don't know								7.8	29
Which of the following increases your risk for HPV infection									
Sex before the age of 18	77.0	101	23.0	30	73.0	143	27.0	53	P<0.05
You have many sexual partners	86.0	113	13.0	12	85.0	166	15.0	30	
Your partner has many sexual partners	88.5	116	11.5	15	82.7	162	17.3	34	
Excessive stress	44.0	58	56.0	73	50.0	98	50.0	98	
Poor nutrition	32.0	43	68.0	88	38.8	76	61.2	120	
Smoking	15.0	20	85.0	111	20.0	39	80.0	157	
Don't know								6.4	24
Have you ever heard of Gardasil™, a vaccine to prevent cervical cancer that was approved by the FDA in June 2006?									
Yes	66.0	86	34.0	45	70.0	138	30.0	58	P<0.05
No	30.0	90	68.2	25	65.0	127	35.0	67	
Not sure								17.4	65

The results show that 85.6% female respondents and 83.2% male respondents had heard of HPV. There were 70% of the female respondents and only 66% of the male respondents that had heard about the HPV vaccination. When asked if they believed that warts that sometimes itch or bleed are a symptom of HPV, 68% of the male respondents agreed and only 60.3% of the female respondents agreed. However, when asked if abstinence was a way to prevent the spread of HPV, 77.6% of the female respondents agreed and only 70.1% of the male respondents agreed.

Mean knowledge scores were also calculated by gender and an independent t-test was run to determine if there was a statistically significant difference between genders on the knowledge score. The results are presented in Table 4.6.

Table 4.6
Mean averages of HPV knowledge question responses by gender - test of significance by gender

Variable	*M*	*SD*	*t*	*df*	*p*
Knowledge about HPV vaccination			0.577	316	.564
Males	47.1679	13.78525			
Females	48.1230	15.01615			

Table 4.6 shows that there was no statistical difference between male and female students on their knowledge about HPV ($p = .564$). Closer inspection of the two group's means indicates that the male students ($\bar{x} = 47.1679$) scored lower than the female students on their knowledge of HPV ($\bar{x} = 48.1230$). Results indicate that knowledge about HPV was low for both male and female university students. This is especially troubling as HPV is the main risk factor for reproductive organ cancers in both men and women.

In comparison to the female respondents, the knowledge deficit for males was slightly higher regarding the importance of both genders receiving the vaccination. The results of the study indicate that both males and females had little or no knowledge about the male role in the spread of HPV infections (see Table 4. 13).

Research Question 2

Is there a difference in attitude between males and females toward obtaining the HPV vaccine?

The second construct of the Theory of Planned Behavior examines how attitudes/beliefs influence behavior. In the current study, how attitudes/beliefs about HPV and the HPV vaccine were examined. Respondents were asked 12 Likert-scale questions, coded as 5 for strongly agree, 4 as agree, 3 as not sure, 2 as disagree and 1 as strongly disagree. A mean score closer to five would indicate positive attitudes/beliefs about the HPV vaccine as protection against the virus and/or subsequent development of cancer. Table 4.7 reports the mean scores on attitudes and beliefs by gender.

Table 4.7
Mean Scores and Standard Deviation on Attitudes toward obtaining the HPV vaccine

Variable	Males *M*	Males *SD*	Females *M*	Females *SD*
HPV shot not safe	2.68	1.069	2.02	1.076
HPV vaccines give one the disease	2.71	1.078	2.35	1.057
HPV shot protects males' health	3.51	1.098	3.87	1.022
Vaccine protects against oral cancer	3.01	.916	2.87	.770
Vaccine protects against anal cancer	2.96	.854	2.93	.832
Vaccine protects against genital warts	3.17	.876	3.04	.890
Vaccine protects sexual partners	3.47	1.077	3.53	1.057
Asking for vaccine would be embarrassing	2.54	1.307	1.88	1.075
Getting infected with HPV concerns me	3.13	1.234	3.44	1.326
Worried about HPV causing cancer	3.58	1.243	3.44	1.326
Worry about spreading to someone	2.97	1.559	2.46	1.454
HPV responsibility of women	2.53	1.338	2.04	1.183

For the attitudes and beliefs about HPV mean scores ranged from $\bar{x}$ =2.54-3.58 for males and $\bar{x}$=2.02-3.53. The lowest mean score for males was $\bar{x}$= 2.53 for the statement "HPV is the responsibility of women" indicating that male students were not sure that this should be true. For the female students the lowest mean score was $\bar{x}$=1.88 was for the statement "Asking for vaccine would be embarrassing," indicating their disagreement that they would be embarrassed to ask for the vaccine. The mean scores for the set of questions assessing attitude/beliefs about obtaining the HPV vaccine indicated very unsure attitudes/beliefs for both males and females about the protectiveness of the HPV vaccine to prevent HPV infection and cancer development. An independent t-test was run to determine if statistically significant gender differences existed for mean scores on attitudes/beliefs about obtaining the HPV vaccine. Table 4.8 shows that male students differed significantly from female students on their attitudes/beliefs about obtaining the HPV vaccination ($p = .000$), indicating the males have a more negative attitude toward obtaining the vaccination.

Table 4.8
Means Scores and Standard Deviation of attitude responses concerning HPV vaccination by gender-test of significance by gender

Variable	M	SD	t	df	p
Attitude about HPV vaccination			4.681	308	.000*
Males	3.1880	.51304			
Females	3.4505	.46384			

Research Question 3

Is there a difference in the influence of others between males and females toward obtaining the HPV vaccine?

The influence of others, the subjective norms construct of the Theory of Planned Behavior, examines how important people in a person's environment may influence decisions about behavior (the world around them, friends, family, peer group behavior), specific to this study, the decision to obtain the HPV vaccine. This construct was assessed by five questions from a five-point Likert scale. Responses were coded as 5 for strongly agree, 4 as agree, 3 as not sure, 2 as disagree and 1 as strongly disagree. A mean score closer to 5 would indicate that the individual would be more likely to be influenced by subjective norms in their decision to receive the HPV vaccination. Mean scores for each item were calculated for both male and females and are presented in Table 4.9.

Means scores for all items in this subscale yielded mixed results. Mean scores ranged from $\bar{x}$ = 2.66-3.41 for males and $\bar{x}$ =2.36-4.05 for females, closer to being influenced by people rather than social pressure; with female students agreeing that their doctor would support them getting the vaccine.

Table 4.9
Means Scores and Standard Deviation of Influence of others as a barrier to HPV vaccination by gender

	Males		Females	
Variable	M	SD	M	SD

Important people want shot for me	3.14	1.043	3.54	1.127
It is expected that I get shot	3.13	1.119	3.51	1.164
I am under social pressure to get shot	2.66	1.161	2.36	1.115
My doctor would support getting shot	3.41	1.159	4.05	1.054
People like me are getting shot	2.98	0.818	3.46	1.016

The mean scores for female students were higher than for male students on all response items on this subscale, except for the item "I am under social pressure to get the shot". A test of the overall means for the scale found a significant difference between male and female students on their influences toward receiving the HPV vaccination (p =0.000). This suggests that males were less likely to be influenced by people close to them compared to females to obtain the HPV vaccination. The results are presented in Table 4.10.

Table 4.10

Means Scores and Standard Deviation of the influence of others in obtaining the HPV vaccination test of significance by gender

Variable	*M*	*SD*	*t*	*df*	*p*
Influence toward HPV vaccination			3.798	323	0.000*
Males	3.0615	.66068			
Females	3.3856	.75614			

*p<0.05

Research question 4

Is there a difference between males and females on their perceived behavioral control to obtain the HPV vaccine?

In the Theory of Planned Behavior attitude toward behavior, subjective norms, and perceived behavioral control, shape an individual's behavioral intentions that lead to a behavior. The final construct that was assessed prior to examining overall intention to obtain the HPV vaccine, was Perceived Behavioral Control. Perceived behavioral control measured a person's belief in their ability to be successful and perform a behavior.

For this study, the construct Perceived Behavioral Control was measured by four items: "Can get shot if want to"; "Confident that I can get shot"; "Vaccination beyond my control"; "Getting shot is up to me"; and "It would be easy to get shot". The mean scores for these items are presented in Table 4.11.

Table 4.11
Mean scores and Standard Deviation on Perceived Behavioral Control to receive the HPV vaccine

	Males		Females	
Variable	M	SD	M	SD
Can get shot if want to	3.62	1.255	4.29	.947
Confident that I can get shot	3.56	1.216	4.29	.958
Vaccination beyond my control	2.50	1.218	1.95	1.049
Getting shot is up to me	3.55	1.377	4.17	1.039
It would be easy to get shot	3.55	.854	4.28	.950

Table 4.12 shows that male students ($\bar{x}$=3.04) were significantly different from female students ($\bar{x}$=3.8) on their overall perception of behavioral control for obtaining the HPV vaccine (p=0.000). Inspection of the two groups indicates that perceived behavioral control is a strong indicator of whether an individual will be vaccinated or not.

Table 4.12
Mean scores of perceived behavioral control responses concerning HPV vaccination by gender-test of significance by gender

Variable	*M*	*SD*	*t*	*df*	*p*
Perceived Behavioral Control HPV vaccination Males	3.3557	.81043	5.712	324	0.000*
Perceived Behavioral Control HPV vaccination Females	3.7938	.57433	5.712	324	0.000*

*p<0.05

The final analysis performed was a binomial logistic regression to create a prediction model that included the knowledge, attitude/beliefs, influences on behavior (subjective norms) and perceived behavioral control on intention to receive the HPV vaccine. The question "The information you have about the vaccine has caused you to" was recoded from 6 responses to 2 where the first response "be vaccinated" was the reference. The analysis for logistic regression did not differentiate between participants who were not vaccinated and those who had received at least one shot in the series. The results of the logistic regression are presented in Table 4.13.

Research Question 5

Is there a difference between males and females in intention to obtain the HPV vaccine?

Table 4.13
Summary of Logistic Regression Analysis for Variables Predicting Decisions to Vaccinate Against HPV

Predictor	B	SEB	ß
Female			
Attitude	1.775	0.183	1.040
Influences	5.492	0.003	1.356*
Perceived behavioral control	3.127	0.010	2.834
Male			
Attitude	2.101	0.147	1.059
Influences	3.063	0.070	2.119
Perceived Behavioral Control	2.205	0.007	1.930*

Note. R^2 = .52: $F(186,131) = 12.23$
*p<0.05 **p<0.01 ***p<0.001

The logistic regression was performed to ascertain the effects of gender, attitudes, influences, and perceived behavioral control on the likelihood that participants intend to obtain the HPV vaccine. The analysis did not differentiate whether participants had been vaccinated or not. The logistic regression model was statistically significant for the construct scores of perceived behavioral control and influences on intention to obtain the HPV vaccine. The results found that females in the study had a 2.834 times higher perception of their ability to obtain the HPV vaccination compared to the males (1.930). For social norms influence on obtaining the HPV

vaccine, male respondents were 2.119 times more likely to be influenced by family or friends compared to female respondents, suggesting that the males believe that people who are important to them would want them to receive the vaccination.

Logistic regression determines the likelihood value or predicted probability of getting a desired result, therefore, the data suggests that attitudes were not a strong predictor for HPV vaccination among the participants. However, the data does suggest that gender, perceived behavioral control and influence of others were predictors for the participants' intentions to receive the HPV vaccination. These findings are consistent with the overall means scores for perceived behavioral control in that male participants ($\overline{x}$=3.04) scored significantly lower than female participants ($\overline{x}$=3.8) in the study.

Summary

The results of the study were presented in this chapter. Overall results indicate that males are less knowledgeable than females on specific facts about the HPV virus and the vaccination. Both male and female students had little knowledge about the role of males in the spread of HPV. Embarrassment about asking a physician about the vaccination was listed as a factor in obtaining the vaccination for both males and females. Male participants scored significantly lower than the score for female participants when asked if they are influenced by family or peers to receive the HPV vaccination, indicating that males are not being influenced by significant others to get vaccinated. Finally, the results show that male students were significantly different from female students on their overall perception of behavioral control for obtaining the HPV vaccine.

CHAPTER 5

DISCUSSION

The purpose of this study was to assess the attitudes toward the HPV vaccination and its influence to serve as a barrier to HPV vaccine acquisition among a sample of rural university students. Specifically, this study investigated whether knowledge about HPV, attitude toward HPV, the influence of others, and perceived behavioral control predicted the intention to receive HPV vaccination and whether the pattern of these influences differed by gender. The subjects for the study were 383 matriculated students, enrolled at a university in Southeast Georgia. This chapter contains the summary and discussion of the quantitative results as they relate to existing literature, the conclusions of the study, the limitations of the study, implications for community-based public health practice and recommendations for future study on how HPV vaccination uptake is influenced.

Summary and Discussion

The current study utilized the Theory of Planned Behavior as a framework for data analysis and understanding of college aged students' knowledge, attitudes, influences of others, and perceived behavioral control about HPV, and the intention to be vaccinated to prevent HPV. Overall, males were less knowledgeable about HPV including risk factors, treatment, and prevention compared to females. This is similar to results found in a study by Stanley (2017) in which it was found that while most of the men in the study envisioned an ideology that men and women share equal knowledge about sexual health, realistically, most of the men agreed that women have better access to knowledge about sexual health through their mothers . The study also found that men believed that their fathers felt too much discomfort to discuss sensitive sexual material with their sons. Because there is a discrepancy in the parental knowledge afforded to sons and daughters about sexual health, there is a significant knowledge deficit for males concerning HPV risk factors, treatment, and prevention (Stanley, 2017).

The results of the study indicate that a higher percentage of males had also not heard of Gardasil. One reason that might explain this is that advertisements and recommendations from health care providers were until recently were targeted towards young women. This result is consistent with another study in which respondents were asked about Gardasil (Gilbert, 2010). Even before the HPV vaccination Gardasil was approved, Merck Pharmaceuticals touted the vaccine as a women's only health issue through their awareness campaigns that linked the vaccine's effectiveness in decreasing incidence of cervical cancer, though research has proven a positive link in the transmission of HPV to both men and women.

The study demonstrated that male and female university students have different perceptions about the role they play in acquiring HPV and preventing the spread. More female than male students strongly agreed that HPV prevention should be the responsibility of women. The results of the current study are similar to findings from a study performed by Ott (2010) in which it was posited that the cultural norms and attitudes toward males' perception of sexual health can stem from interpersonal relationships. Cultural views of masculinity and gender roles about sexual health are well defined by the time men enter college (Ott, 2010). In another study, it was hypothesized that most of the male participants in the study would report that they had not heard of Gardasil as a vaccination for the prevention of HPV and related cancers for men. As expected, most of the male participants indicated that they were unaware of the male role in the spread of HPV and were unaware of a vaccination for the prevention of HPV (Gilbert, 2010). In the study performed by Catalano (2017), insufficient knowledge about HPV was directly correlated with low vaccination rates among males (Catalano, et.al, 2017).

Attitudes/Beliefs toward HPV and HPV vaccine

Overall, attitudes and beliefs about HPV and obtaining the vaccine among the males in the study showed that they had more negative attitudes and beliefs about HPV vaccination uptake. Because the Theory of Planned behavior posits that the key component to the model is behavioral intent in that behavioral intentions are influenced by the attitude about the likelihood that the

behavior will have the expected outcome, this finding is significant in determining why male vaccination rates for HPV are low (Thompson, et.al., 2016).

The current study suggests that attitudes toward HPV vaccination and the ability to perform them were strong predictors of whether male students would be vaccinated. The findings are consistent with a study performed by Gilbert (2010) in which the contextual development about sexual issues for males, as well as sexual health, were studied in familial and institutional environments to gain a better understanding about their relationship to HPV vaccine uptake among males (Gilbert, 2010). Gilbert's study suggested that perception of the "feminization" of sexual issues dictates the male role in responsibility toward sexual health and prevention measures, including HPV vaccine uptake.

The Theory of Planned Behavior also asserts that subjective norms, or what an individual is exposed to socially or familiarly, has a considerable impact on his or her intention to perform a behavior. The mean scores for female students were higher than for male students on all response items about the influence of others to receive the HPV vaccine except for the item "I am under social pressure to get the shot." This is consistent with a study by Stanley which asserts that because men have consistently not been the target of ad campaigns for HPV prevention, perceived norms for male vaccination may not be established yet (Stanley, 2017).

Perceived Behavioral Control

Perceived Behavior Control, or the belief that an individual can perform a certain behavior, was a weak predictor of intention to obtain the vaccine. Because the data in the current study is consistent with results in the study by Catalano, et.al., (2017) finding that perceived behavioral control adds only slightly to the overall predictive power of the TPB and HPV vaccination, suggesting that attitudes, knowledge, and influence may be more important predictors for HPV vaccination. In the study by Catalano et.al., (2017) it was suggested that because respondents lacked enough knowledge about HPV and the HPV vaccination process, they would not be able to make an adequate assessment about what the vaccination process would entail

(Catalano, et. al., 2017). Inadequate knowledge about HPV and HPV vaccination was also a factor in low means scores for behavioral intention to receive the HPV vaccination for both male and female respondents in the current study.

Because the initial approach by Merck Pharmaceuticals for the HPV vaccination was focused on attaining higher vaccination rates among females, males have been at a disadvantage in gaining the knowledge and awareness necessary to achieve perceived ability to receive the HPV vaccination within the context of perceived barriers.

Intention to Obtain the HPV Vaccination

Although most men had heard of HPV, they knew relatively little about the HPV vaccination, the risks for infection, and their role in the spread of HPV. The results are consistent with the study by Johnson and Ogletree (2017) in that perceived knowledge about HPV vaccination may be part of the males' belief systems, which would motivate them in their intention to receive the vaccination. The females in the in the study scored slightly higher for both knowledge about HPV and the HPV vaccination. However, because the HPV vaccine was initially approved for and marketed to women by Merck Pharmaceuticals, it is not surprising that the females in the study knew more about it than the males did.

Among the female respondents who had not received the vaccine (N= 79), most of them reported greater perceived behavioral control in their intention to one day be vaccinated. Although most of the men believed that they could get the vaccination if they wanted to, the majority of the males in the study indicated that they had not heard of Gardasil prior to the current study, suggesting that there are still significant gaps in the marketing of Gardasil for men that need to be addressed. These findings are similar to the study by Catatlano, et. al., (2017), in that most of the males in their study had heard HPV but 60% of the respondents indicated that they had not heard of HPV vaccinations for men. (Catalano, 2017)

Limitations

Limitations were taken into consideration when presenting the findings from the study. Attempts were made to recruit a diverse sample by using random sampling. Since the instrument was administered as a self-reported questionnaire, information collected may not be accurate. The questions in the survey may have been a limitation in that they have predetermined response categories, thus limiting the range of responses. Because the HPV vaccine has been approved for young men and women ages 9 to 26, another limitation of the study could be that only college students ages 18 to 26 are being examined. Efficacy of vaccine uptake in future trials should be performed with a larger cohort, with a more diverse age group in the sample.

The sample size for qualitative studies was small and the findings necessary for this in-depth exploratory research study was limited and may have confounded the data because qualitative research tends to have less statistical power than quantitative research when it comes to verifying trends. Although the quantitative analysis minimized confounding, a quantitative approach for research analysis is limited in providing an adequate explanation for social or cultural phenomena. The utilization of a mixed-method study may have potentially counterbalanced the weaknesses of the study, however time constraints were a factor as well, because data was only collected in classes during times that were approved by the instructor.

Recommendations for Future Studies

Because HPV is commonly thought of as a women's health issue, males are at a disadvantage concerning accurate information given to them about HPV and HPV vaccinations from peers, family members and the media. A multi-level approach, such as utilizing the Social Ecological Model (SEM), can assist researchers in determining the personal and environmental factors that influence behaviors; in this case, what factors determine whether males will be vaccinated against HPV or not. At the individual level, researchers can look at male participants' level of education, socioeconomic status, or their lack of knowledge about the HPV vaccination program. At the interpersonal level, parental and peer influence toward HPV vaccination can be

assessed, as well as cultural or religious influences about sexual issues. The organizational, community and policy levels of the SEM can be studied by researching the lack of communication and education concerning HPV vaccination in neighborhoods, schools and workplaces.

The lack of dissemination of information about the importance of receiving the HPV vaccine from healthcare providers to male patients is wholly under-researched. Interventions to stress the importance of healthcare providers acknowledging the HPV vaccination as genderless is imperative to increase male vaccine uptake.

To achieve more in-depth and robust findings, future studies should employ a mixed methods approach. Because research about barriers to male HPV vaccination is wholly under-researched, adding a qualitative piece would allow researchers gains in breadth and depth of an understanding of this phenomenon, while offsetting the weaknesses inherent to using a quantitative approach by itself.

To get a more definitive result from logistic regression analysis for perceived behavioral control, future researchers should differentiate between participants who have never received the HPV vaccination and those who have had at least one shot in the series.

Implications for Public Health Practice

The current findings have several important implications for public health education to promote HPV vaccine uptake and the prevention of HPV-related cancers among men and women. It appears that knowledge about HPV and HPV prevention is a strong predictor of HPV vaccination among males. This finding provides opportunities for public health programs in that they can be designed specifically to increase knowledge and awareness among males about HPV acquisition and their role in the spread of the disease. A partnership could be formed with the university and local health departments to implement HPV and HPV vaccination programs; particularly among male students.

Strong familial and social support for HPV vaccination influence both females' and males' intention for HPV vaccination in the current study. To increase vaccination rates among

males, it is imperative that ad campaigns continue to target parents of adolescents. Based on the findings from this study, it is clear that public health programs are necessary to educate men about the importance of receiving the HPV vaccination and the efficaciousness of the HPV vaccination. Without HPV vaccination programs to educate males about the severity of HPV related cancers specific to men, rates for male vaccination uptake continue to be significantly lower than those for women.

Because it was concluded from this study that social norms (family and friends) from specific sources is a strong indicator for men's intentions to receive the HPV vaccination, public health educators can develop programs that prioritize broad social support to enhance male vaccination uptake, including forming social support networks consisting of physicians, family, friends and peers.

The economic burden associated with non-cervical HPV-related cancers occurring in individuals living in the United States was approximately $418 million in 2014. It would be financially advantageous for the United States to implement programs promoting the use of 9vHPV vaccines to protect males against contracting oncogenic HPV types to decrease morbidity and mortality rates due to HPV related cancers. Practitioners, universities and Health Departments can provide basic information about HPV to the public that includes information about the route of transmission, prevalence of HPV-related cancers among men and women and the safety and efficaciousness of the vaccine as protection against HPV acquisition.

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APPENDIX A

KNOWLEDGE AND ATTITUDES TOWARD THE HUMAN PAPILLOMAVIRUS (HPV) VACCINE AMONG COLLEGE STUDENTS

My name is Kristina Harbaugh and I am a doctoral student at Georgia Southern University Jiann-Ping Hsu College of Public Health. You are invited to participate in a research study that is assessing the knowledge about and attitudes toward the Human Papillomavirus (HPV) vaccine. Results from the study will be used to develop strategies to increase the participation rate among males in obtaining the HPV vaccine as a cancer prevention measure. Please **DO NOT** write your name or any other identifying information anywhere on the questionnaire. Responses will be kept confidential and will only be seen by myself and the dissertation committee. Your participation is voluntary. Completing the survey in its entirety indicates consent to participate. You may choose to withdraw from completing the survey or to not answer a specific question. Thank you for your help in learning more about the knowledge, attitudes and intention to obtain HPV vaccine. This project has been reviewed and approved by the GSU Institutional Review Board under tracking number **H18352**. For questions concerning your rights as a research participant, contact Georgia Southern University Office of Research Services and Sponsored Programs at 912-478-5465.

Section I: In this section, you are being asked about your knowledge about the Human Papillomavirus (HPV). Please check all that apply

1. From which of the following sources, have you ever heard about HPV? **(Please check all that apply)**

_____Doctor
_____Friends/Acquaintances
_____Health education program (i.e. at school or business)
_____Magazine, newspaper, or another periodical
_____Radio or TV
_____Have never heard of HPV (Human papillomavirus) until today

2. If you have ever heard of HPV, the symptoms of HPV include: **(Please check all that apply)**
_____Warts that sometime itch or bleed
_____Sores of penis or vagina that don't heal.
_____Discharge from genitals (watery, yellow, white discharge)

_____Warty growths
_____Burning upon urination
_____Reduction of urine flow
_____No visible signs or symptoms
_____Don't know

3. If untreated, HPV can: **(Please check all that apply).**

_____Cause cervical cancer _____Can cause warts _____Cause infertility _____Will usually disappear by itself _____Can cause pre-cancer _____Can cause sterility _____Can cause death
_____Don't know

4. How do you think HPV is spread**? (Please check all that apply).**
_____Vaginal sex _____Kissing
_____Anal sex _____Coughing
_____Oral sex _____Toilet seat
_____Casual contact (Hug, handshake) _____Don't know

5. HPV is more likely to be spread by the: **(Please check one).**
_____Male
_____Female
_____Male or female
_____Don't know

6. HPV can be passed from the mother to her baby during birth **(Please check one answer).**
_____True
_____False
_____Don't know

7. Ways to help prevent the spread of HPV are: **(Please check all that apply).**
_____Abstinence _____Douching
_____Proper condom usage _____Withdrawal of penis before ejaculation
_____Washing after sex _____Don't know

8. Which of the following increases your risk for HPV infection **(Please check all that apply).**
_____Sex before the age of sixteen _____Birth control pills
_____You have many sexual partners _____Smoking
_____Your partner has had many sexual partners
_____Excessive stress
_____Poor nutrition
_____Don't know

9. HPV is mainly a disease of **(Please check one).**
_____Male homosexuals _____Females
_____Female homosexuals _____Males
_____Bisexual individuals _____Anyone having sexual contact
_____Heterosexuals _____Don't know

10. Have you ever heard of Gardasil™, a vaccine to prevent cervical cancer that was approved by the FDA in June 2006? **(Please check one).**

_____Yes
_____No
_____Not Sure

11. Have you ever been vaccinated against HPV?
_____Yes, I received all three dosages of the vaccine
_____No, I either never received any dosage OR I received partial dosage (1 of 3 or 2 of 3)
_____Not Sure

For Sections II through IV, choose the level of agreement that best matches your beliefs, attitudes, or opinion

Section II: The following questions assess your attitude & beliefs toward the HPV vaccine. Select ONE answer for each item below:

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
12. It is not safe to get the HPV vaccine shots.					
13. You can get infected with HPV from HPV vaccine shots.					
14. Getting vaccine shots against HPV would be a good way for males to protect their health.					
15. The vaccine would protect me against oral cancer.					
16. The HPV vaccine would protect me against anal cancer.					
17. The HPV vaccine					

would protect me against genital warts.					
18. Getting the HPV vaccine would protect sexual partner(s) against HPV infection.					
19. Asking for the HPV vaccine would be embarrassing for me.					
20. The possibility of getting infected with HPV concerns me.					
21. I would be more worried about contracting or spreading HPV if it could cause cancer.					
22. If I had HPV I would worry about spreading it to my partner only if my partner is someone I really care about.					
23. HPV prevention should be the responsibility of women					

Section III: The following questions assess the degree to which I value other people's opinions concerning the HPV vaccination. <u>Select ONE answer for each item below</u>:

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
24. Most people who are important to me think that I should get vaccinated against HPV.					
25. It is expected of me that I get vaccinated against HPV.					
26. I am under social pressure to get vaccinated against HPV.					
27. My doctor would support my getting vaccinated against HPV.					
28. Most people like me are getting vaccinated against HPV.					

Section IV: The following questions assess the degree to which you would intend to obtain the HPV vaccination. <u>Select ONE answer for each item below</u>:

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
29. If I want to, I can get vaccinated against HPV.					
30. I am confident that I can get vaccinated against HPV.					
31. Getting vaccinated against HPV is beyond my control.					
32. Whether I get vaccinated against HPV is entirely up to me.					
33. I believe that it would be easy for me to get the HPV vaccination if I wanted to.					

Section V: Please select all that apply.

34. From which of the following sources have you ever received information about Gardasil™? (Check all that apply)

_____"One Less" Commercial
_____Talk Show
_____News Show
_____Magazine Advertisements

_____Merck Website
_____General Practitioner
_____University Health Services
_____Family
_____Other

35. If you have not received the vaccine, what influenced you to not get vaccinated? (Check all that apply)
_____Religious beliefs
_____Safety concerns
_____Cost
_____Do not think it is important
_____Do not think you are at risk
_____Need more information
_____Do not believe in vaccinations
_____Other_____
_____Not Applicable

36. If the HPV vaccine was offered for free, would you get it?
_____Yes
_____No
_____Not Sure

37. The information you have about the vaccine has caused you to: (Check all that apply)
_____Be vaccinated
_____Speak to your physician or other health professional about the vaccine
_____Share your knowledge with family or friends
_____Do further research on your own about the vaccine and the link between cervical cancer and HPV
_____Visit Merck's website
_____I have no information about the vaccine

38. How likely are you to recommend others receive the vaccine?
_____Very likely
_____Somewhat likely
_____Somewhat unlikely
_____Not likely
_____Don't know/not sure

Section VI: Background Information
This set of questions tells us a little more about who is completing the questionnaire. Please check only one answer for each question.
39. What is your gender?
_____Male
_____Female

40. What is your race?
_____ White/Caucasian
_____ Black or African American
_____ American Indian or Alaska Native
_____ Asian

_____ Native Hawaiian or Pacific Islander
_____ Two or more races
_____ Other

41. In which college are you enrolled?
_____Jiann-Ping Hsu College of Public Health (COPH)
_____College of Business Administration (COBA)
_____College of Behavioral and Social Sciences (CBSS)
_____College of Arts and Humanities (CAH)
_____Don & Cindy Waters College of Health Professions (DCWCHP)
_____College of Education (COE)
_____College of Science and Mathematics (COSM)
_____Other_____

42. What is your year in school?
_____Freshman
_____Sophomore
_____Junior
_____Senior

43. Have you ever had sexual intercourse (anal, oral, vaginal)?
_____ Yes
_____ No

44. Please mark the category that includes the age at which you first had sexual intercourse.
_____ (11-12) _____ (19-22)
_____ (13-15) _____ (23+)
_____ (16-18)

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

46. How often do you wear a condom when you are having sexual intercourse?
_____ Every time
_____ Most of the time
_____ Sometimes
_____ Hardly ever
_____ Never

47. What is your current relationship status?
_____ Single
_____ Dating
_____ Monogamous relationship
_____ Married and living with partner
_____ Not married but living with a partner
_____ Divorced

48. In general, would you say your health is:
_____ Excellent
_____ Very Good
_____ Good
_____ Fair

_____ Poor

THANK YOU!

In order to gain a more in-depth understanding of attitudes toward both HPV and the vaccine to prevent long-term health consequences, you are invited to participate in a compensated personal interview. If you are interested, please contact the principal investigator, Kristina Harbaugh in the following way: (Email) kh03140@georgiasouthern.edu

APPENDIX B

FREQUENCY STATISTICS OF KNOWLEDGE, AWARENESS, SYMPTOMS, SPREAD, RISK AND CAUSES OF HPV AMONG FEMALE COLLEGE STUDENTS

Variables		**Frequency (n)**	**Percentage (%)**	**Missing**
Heard of HPV				56
	Doctor	35	17.9	
	Friends or Acquaintance	51	26.0	
	Health Education Program	50	25.5	
	Magazine, Newspaper or other Periodical	37	18.9	
	Radio or TV	22	11.2	
	Haver never heard of HPV until today	1	.5	
Symptoms of HPV				1

	Warts that itch or bleed	28	14.3	
	Sores of penis or vagina that do not heal	23	11.7	
	Discharge from genitals	17	8.7	
	Warty growths	23	11.7	
	Burning upon urination	7	3.6	
	Reduction of urine flow	1	.5	
	No visible signs or symptoms	9	4.6	
	Don’t know	88	44.9	
Untreated HPV can cause				1
	Cervical cancer	26	13.3	
	Infertility	34	17.3	
	Pre-cancer	28	14.3	
	Death	20	10.2	

	Warts	20	10.2	
	Disappears by itself	18	9.2	
	Sterility	1	.5	
	Don’t know	48	24.5	
HPV is spread by				2
	Vaginal sex	32	19.4	
	Anal sex	38	25.5	
	Oral sex	48	36.7	
	Don’t know	72	16.3	
HPV more likely spread by				2
	Male	1	.5	
	Female	7	3.6	
	Male or female	74	37.8	
	Don’t know	112	57.1	
HPV passed from				

mother to child during birth				
	True	91	46.4	
	False	6	3.1	
	Don't know	98	50.0	
Ways to prevent spread of HPV				10
	Abstinence	50	25.5	
	Proper condom use	91	46.4	
	Don't know	43	21.9	
What increases risk for HPV infection				1
	Sex before age of sixteen	6	3.1	
	Many sexual partners	86	43.9	
	Partner has many sexual partners	50	25.5	
	Excessive stress	5	2.6	

	Poor nutrition	5	2.6	
	Birth control pills	4	2.0	
	Smoking			
	Don’t know	39	19.9	
HPV mainly a disease of				1
	Anyone having sexual contact	91	46.4	
	Don’t know	104	53.1	
Heard of Gardasil				
	Yes	133	67.9	
	No	41	20.9	
	Not sure	20	10.2	
Ever been vaccinated against HPV				1
	Yes	115	58.7	
	No	53	27.0	

Not sure	27	13.8

APPENDIX C

FREQUENCY STATISTICS OF KNOWLEDGE OF AWARENESS, SYMPTOMS, SPREAD, RISK AND CAUSES OF HPV AMONG MALE COLLEGE STUDENTS

Variables		**Frequency (n)**	**Percentage (%)**	**Missing**
Heard of HPV				26
	Doctor	34	26.0	
	Friends or Acquaintances	33	25.2	
	Health Education Program	34	26.0	
	Magazine, Newspaper or other Periodical	15	11.5	
	Radio or TV	14	10.7	
	Haver never heard of HPV until today	1	.8	
Symptoms of HPV				1

	Warts that itch or bleed	10	7.6	
	Sores of penis or vagina that do not heal	13	9.9	
	Discharge from genitals	19	14.5	
	Warty growths	18	13.7	
	Burning upon urination	7	5.3	
	Reduction of urine flow	4	3.1	
	No visible signs or symptoms	5	3.8	
	Don’t know	54	41.2	
Untreated HPV can cause				1
	Cervical cancer	13	9.9	
	Infertility	21	16.0	
	Pre-cancer	19	14.5	
	Death	16	12.2	
	Warts	11	8.4	

	Disappears by itself	5	3.8	
	Sterility	1	.8	
	Don’t know	44	33.6	
HPV is spread by				3
	Vaginal sex	22	16.8	
	Anal sex	31	23.7	
	Oral sex	44	24.4	
	Don’t know	31	23.7	
HPV more likely spread by				1
	Male	51	38.9	
	Female	4	3.1	
	Male or female	12	9.2	
	Don’t know	63	48.1	
HPV passed from mother to child during birth				4
	True	61	46.6	

	False	4	3.1	
	Don't know	62	47.3	
Ways to prevent spread of HPV				12
	Abstinence	25	19.1	
	Proper condom use	53	40.5	
	Don't know	38	29.0	
What increases risk for HPV infection				1
	Sex before age of sixteen	4	3.1	
	Many sexual partners	64	48.9	
	Partner has many sexual partners	26	19.8	
	Excessive stress	5	3.8	
	Poor nutrition			
	Birth control pills			
	Smoking	1	.8	

	Don’t know	30	22.9	
HPV mainly a disease of				1
	Anyone having sexual contact	55	42.0	
	Don’t know	75	57.3	
Heard of Gardasil				4
	Yes	41	31.3	
	No	60	45.8	
	Not sure	26	19.8	
Ever been vaccinated against HPV				9
	Yes	37	28.2	
	No	34	26.0	
	Not sure	51	38.9	

APPENDIX D

FREQUENCY STATISTICS OF FEMALE COLLEGE STUDENTS' ATTITUDES AND BELIEFS TOWARD OBTAINING THE HPV VACCINE

Variable		Frequency (n)	Percentage (%)	Missing
It is not safe to get the HPV vaccine				0
	Strongly disagree	80	40.8	
	Disagree	56	28.6	
	Not sure	43	21.9	
	Agree	10	5.1	
	Strongly agree	7	3.6	
You can get infected with HPV from HPV vaccine shots				1
	Strongly disagree	53	27	
	Disagree	47	24	
	Not sure	74	37.8	

	Agree	15	7.7	
	Strongly agree	6	3.1	
Getting vaccine shots against HPV would be a good way for males to protect their health.				0
	Strongly disagree	61	31.1	
	Disagree	73	37.2	
	Not sure	44	22.4	
	Agree	12	6.1	
	Strongly agree	6	3.1	
The vaccine would protect me against oral cancer.				2
	Strongly disagree	7	3.6	
	Disagree	16	8.2	
	Not sure	124	63.3	
	Agree	38	19.4	

	Strongly agree	9	4.6	
The HPV vaccine would protect me against anal cancer.				1
	Strongly disagree	11	5.6	
	Disagree	18	9.2	
	Not sure	123	62.8	
	Agree	33	16.8	
	Strongly agree	10	5.1	
The HPV vaccine would protect me against genital warts.				2
	Strongly disagree	15	7.7	
	Disagree	29	14.8	
	Not sure	104	53.1	
	Agree	40	20.4	
	Strongly agree	6	3.1	

Getting the HPV vaccine would protect sexual partner(s) against HPV infection.				1
	Strongly disagree	36	18.4	
	Disagree	72	36.7	
	Not sure	53	27.0	
	Agree	27	13.8	
	Strongly agree	7	3.6	
Asking for the HPV vaccine would be embarrassing for me				1
	Strongly disagree	91	46.4	
	Disagree	63	32.1	
	Not sure	21	10.7	
	Agree	13	6.6	
	Strongly agree	7	3.6	
The possibility of getting infected with HPV concerns me.				3

	Strongly disagree	49	25.0	
	Disagree	61	31.1	
	Not sure	31	15.8	
	Agree	30	15.3	
	Strongly agree	22	11.2	
I would be more worried about contracting or spreading HPV if it could cause cancer.				1
	Strongly disagree	13	6.6	
	Disagree	31	15.8	
	Not sure	37	18.9	
	Agree	58	29.6	
	Strongly agree	56	28.6	
If I had HPV I would worry about spreading it to my partner only if my partner is someone I really care about.				1
	Strongly disagree	67	34.2	

	Disagree	54	27.6	
	Not sure	24	12.2	
	Agree	18	9.2	
	Strongly agree	30	16.3	
HPV prevention should be the responsibility of women				1
	Strongly disagree	88	44.9	
	Disagree	46	23.5	
	Not sure	35	17.9	
	Agree	17	8.7	
	Strongly agree	9	4.6	

APPENDIX E

FREQUENCY STATISTICS OF MALE COLLEGE STUDENTS' ATTITUDES AND BELIEFS TOWARD OBTAINING THE HPV VACCINE

Variable		Frequency (n)	Percentage (%)	Missing
It is not safe to get the HPV vaccine				0
	Strongly disagree	21	16.0	
	Disagree	29	22.1	
	Not sure	62	47.3	
	Agree	9	6.9	
	Strongly agree	10	7.6	
You can get infected with HPV from HPV vaccine shots				0
	Strongly disagree	23	17.6	
	Disagree	23	17.6	
	Not sure	62	47.3	
	Agree	15	11.5	
	Strongly agree	8	6.1	

Getting vaccine shots against HPV would be a good way for males to protect their health.				0	92
	Strongly disagree	22	16.8		
	Disagree	51	38.9		
	Not sure	42	32.1		
	Agree	4	3.1		
	Strongly agree	12	9.2		
The vaccine would protect me against oral cancer.				0	
	Strongly disagree	12	9.2		
	Disagree	10	7.6		
	Not sure	85	64.9		
	Agree	15	11.5		
	Strongly agree	9	6.9		
The HPV vaccine would protect me against anal cancer.				0	

	Strongly disagree	9	6.9	93
	Disagree	9	6.9	
	Not sure	90	68.7	
	Agree	14	10.7	
	Strongly agree	9	6.9	
The HPV vaccine would protect me against genital warts.				2
	Strongly disagree	10	7.6	
	Disagree	27	20.6	
	Not sure	72	55.0	
	Agree	15	11.5	
	Strongly agree	5	3.8	
Getting the HPV vaccine would protect sexual partner(s) against HPV infection.				0
	Strongly disagree	27	20.6	
	Disagree	34	26.0	

	Not sure	50	38.2	94
	Agree	14	10.7	
	Strongly agree	6	4.6	
Asking for the HPV vaccine would be embarrassing for me				1
	Strongly disagree	35	26.7	
	Disagree	37	28.2	
	Not sure	23	17.6	
	Agree	23	17.6	
	Strongly agree	12	9.2	
The possibility of getting infected with HPV concerns me.				2
	Strongly disagree	20	15.3	
	Disagree	33	25.2	
	Not sure	34	26.0	
	Agree	28	21.4	
	Strongly agree	14	10.7	

I would be more worried about contracting or spreading HPV if it could cause cancer.				
	Strongly disagree	21	16.0	
	Disagree	19	14.5	
	Not sure	23	17.6	
	Agree	31	23.7	
	Strongly agree	36	27.5	
If I had HPV I would worry about spreading it to my partner only if my partner is someone I really care about.				0
	Strongly disagree	36	27.5	
	Disagree	20	15.3	
	Not sure	19	14.5	
	Agree	24	18.3	
	Strongly agree	32	24.4	
HPV prevention should be the responsibility of women				0

Strongly disagree	37	28.2	
Disagree	33	25.2	
Not sure	32	24.4	
Agree	12	9.2	
Strongly agree	17	13.0	

APPENDIX F

FREQUENCY STATISTICS OF FEMALE COLLEGE STUDENTS' INTENTIONS TOWARD HPV VACCINATION

Variable		Frequency (n)	Percentage (%)	Missing
If I want to, I can get vaccinated against HPV				1
	Strongly disagree	4	2.0	
	Disagree	10	5.1	
	Not sure	13	6.6	
	Agree	67	34.2	
	Strongly agree	101	51.5	
I am confident that I can get vaccinated against HPV				1
	Strongly disagree	5	2.6	
	Disagree	7	3.6	
	Not sure	18	9.2	
	Agree	62	31.6	
	Strongly agree	103	52.6	

Getting vaccinated against HPV is beyond my control				
	Strongly disagree	83	42.3	
	Disagree	62	31.6	
	Not sure	33	16.8	
	Agree	11	5.6	
	Strongly agree	6	3.1	
Whether I get vaccinated against HPV is entirely up to me				1
	Strongly disagree	6	3.1	
	Disagree	14	7.1	
	Not sure	13	6.6	
	Agree	70	35.7	
	Strongly agree	92	46.9	
I believe it would be easy for me to get the HPV vaccination if I wanted to				1
	Strongly disagree	4	2.0	

Disagree	8	4.1	99
Not sure	20	10.2	
Agree	61	31.1	
Strongly agree	102	52.0	