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Genital Human Papillomavirus Infection:
A Comparison of Risk Behaviors, Attitudes, and Knowledge in a Cohort of Female University Students

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2009

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Abstract

Genital Human Papillomavirus Infection:
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By Brittney Romanson

Human Papillomavirus (HPV) is estimated to be one of the most common sexually transmitted infections (STIs) in the United States with over 50% of all sexually active adults acquiring HPV at least once in their lifetime. This study seeks to determine if a relationship exists between HPV knowledge and HPV risk factors, preventative measures, sexual attitudes and beliefs, and sexual risk behaviors. The purpose of exploring theses relationships is to identify whether the HPV knowledge level, the main dependent variable, one has attained is associated with the independent variables listed such as age of first sexual intercourse, frequency of condom use, or HPV vaccination status.

A 50 item, self-administered, paper and pencil questionnaire completed by 207 undergraduate females ages 17 to 27 assessed the students' responses to sexual history, sexual attitudes and behaviors, and current HPV knowledge items. Overall HPV awareness was relatively high, with 91.6% of study participants indicating that they had heard of HPV. However, a lack of understanding in the prevalence and effects of the virus on fertility were evident. Moreover, although half reported hearing about HPV from a healthcare professional, the most significant correlate to increased HPV knowledge is when data are received from social media. Multivariate linear regression models showed that sexual attitudes and beliefs were marginally significant in predicting HPV knowledge levels. More specifically, believing that one should tell her sexual partner about a current STI prior to engaging in sexual intercourse and believing that one should inquire about her partner's and a significant other's sexual health history prior to engaging in sexual intercourse all significantly predicted HPV knowledge.

Based on the current study findings, it is vital that researchers and practitioners develop education curricula and messages appropriate for the undergraduate student population. Although many college institutions incorporate STI prevention into their health education curriculum, the content needs to be revised in order to include the implications of an HPV diagnosis. Public health professionals are encouraged to continue research on predictive factors effecting HPV knowledge and developing materials aimed to decrease the stigmatization of HPV and increase preventative measures.

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This study seeks to determine if a relationship exists between Human Papillomavirus (HPV) knowledge and HPV risk factors, preventative measures, sexual attitudes and beliefs, and sexual risk behaviors. The purpose of exploring theses relationships is to identify whether those with low versus high HPV knowledge differ in regards to their sexual risk behaviors and attitudes or preventative sexual health practices.

Problem Definition

The Human Papillomavirus (HPV) is an important issue to address within the college student population. Currently, HPV is estimated to be one of the most common sexually transmitted infections (STI) in the United States (Daley, Cheryl, Buhi, Kolar, McDermott, Hernandez, & Fuhrmann, 2010; Dunne, Unger, Sternberg, McQuillian, Swan, Patel, & Markowitz, 2007; Friedman & Shepeard, 2007; Gerend & Magloire, 2008; Klug, Hukelmann, & Blettner, 2007; Lambert, 2001; Licht, Murphy, Hyland, Fix, Hawk, Mahoney, & Martin, 2010; Sandfort & Pleasant, 2009; Yacobi, Tennant, Ferrante, Pal, & Roetzheim, 1999) With approximately 20 million Americans aged 15 to 49 years of age infected, epidemiological studies indicate the highest incidence occurs among sexually active young adults under the age of 25 (Allen, Mohllajee, Shelton, Othus, Fontenot, & Hanna, 2009; Daley et al., 2010; Friedman & Shepeard, 2007; Moscicki, 2005; Rubin & Tripsas, 2010; Tropy, Burke, & Glass, 2007; Sandfort & Pleasant, 2009). Recent data now show that nationally, over 50% of sexually active adults will acquire one or more of the 35 genital HPV infections at least once in their lifetime (Manhart, Holmes, Koutsky, Wood, Kenney, Feng, & Kiviat, 2006).

Due to the asymptomatic nature of the virus, many persons will not seek medical intervention until a more consequential health ailment arises (Allen et al., 2009; Daley et

al., 2010; Friedman & Shepeard, 2007; Gerend & Magloire, 2008; Tropy, Burke, & Glass, 2007). Low risk infection types can cause dysplasia in the cervix, genital warts, and recurrent respiratory papillomatosis which causes warty growths to obstruct the upper airway (Dunne et al., 2007; Friedman & Shepeard, 2007; Gerend & Magloire, 2008; Sandfort & Pleasant, 2009; Tropy, Burke, & Glass, 2007). High risk HPV types are known to be associated with 99% of all cervical cancer diagnoses.

On top of the potentially severe health consequences, STIs pose an enormous economic burden to society. Recent estimates found that diagnosis and associated health ailments from STIs caused annual, direct medical costs estimated as high as $15.5 billion (Chesson, Blandford, Gift & Irwin 2004). Furthermore, in addition to the estimated 9,710 women diagnosed with cervical cancer and the 3,700 cases resulting in death in 2006, a loss of $1.3 billion total productivity was estimated (Department of Economic Statistics, 2006; Friedman & Shepeard, 2007).

The college student population is at particular risk of HPV infection as they are often thought of as a high risk population in regard to sexual behavior and sexually transmitted infections (Licht et al., 2010; Sandfort & Pleasant, 2009). The sexual habits such as initial age of onset of sexual intercourse, frequency of sexual risk behaviors, and number of partners greatly dictates the risk of an HPV infection. Furthermore, it has been documented that the majority of college students trust in what their partner discloses to them; however, college students stated that they were willing to lie about their sexual histories in order to engage in sexual behavior (Cochran & Mays 1990).

Due to the trust in partner disclosure in addition to the asymptomatic nature of the majority of HPV infections, most persons may believe they have a clean sexual health

history, but may indeed have an undiagnosed STI. This feeds into the cycle that perhaps partner are not intentionally lying, but rather do not disclose their status because they do not know their status. Thus, accurate and full self-disclose of one's sexual health history can only occur if that partner has been clinically diagnosed with an infection of some sort.

Preventative behaviors that address the sexual risk factors associated with human papillomavirus are the best defense against contracting HPV infections. There are three main prevention methods for HPV infections: (1) the HPV vaccine, (2) gynecological testing, and (3) condom use. Although the HPV vaccine is recommended for women aged 9-26 years, with girls aged 11-12 years as a primary focus, college aged women may be uniquely at risk for HPV due to high rates of sexual activity, and thus, serve as an important "catch-up" population for the HPV vaccine (Daley et al., 2010; Licht et al., 2010). In 2009, the CDC found that 27% of females aged 13 to 26 had received three or more doses of the HPV vaccine (CDC, 2010). This is a relatively low adoption rate that may hold economic consequences to society. A 2008 study found that vaccination against HPV types 16 and 18 was economically attractive with a $50,000 per quality-adjusted life-years if high coverage can be achieved in the primary target population (Kim & Goldie, 2008). Although a strong preventative method, the vaccine will not work for all genital HPV types. This means that vaccinated women will continue to need routine cervical cancer screening and should continue to practice protective sexual behaviors (Friedman & Shepeard, 2007).

Both the Pap and HPV tests screen for early detections of cervical cancer. In November 2009, the American College of Obstetrics and Gynecology (ACOG) and the

U.S. Prevention Services Task Force (USPRSTF) released new recommendations increasing the age of onset and decreasing the frequency of Pap test screening in United States females (CDC, 2007; National Center for Chronic Disease Prevention and Health Promotion, 2010). In terms of HPV testing protocol, the HPV test is not recommended by all expert organizations and the test criteria indicates that a female should only have the test if (1) she is 21 years or older and her Pap test result is unclear, or (2) if the female is 30 years or older (CDC, 2010). Both of the updated recommendations clearly eliminate the college aged population, therefore putting the age bracket at greater risk of HPV related ailments.

Although STI prevention is routinely discussed within the university setting, a 2000 survey found that less than one third of males and females had heard of HPV with only 2% being able to identify HPV as a STI (Sandfort & Pleasant, 2009). Many of the studied populations have indicated that they believed the virus to be a relatively minor health threat and they held minimal risk for contracting HPV. Research on HPV knowledge primarily found that broad gaps exist in knowledge concerning HPV transmission and prevention, the meaning of Pap smear test results, and risk factors for cervical cancer (Sandfort & Pleasant, 2009).

Prior studies have focused on the cumulative incidence of HPV infection and potential characteristics that may increase the risk of infection to women. Currently studies examining HPV knowledge among college students solely inspect where the knowledge gap exists and which topic areas, such as prevention or consequences, require more emphasis in interventions or health communication projects. Presently, there has

been no comparative study on the association between one's HPV knowledge level as it relates to sexual risk behaviors and sexual attitudes and beliefs.

This study examined the HPV knowledge of a cohort of female university students who engaged in sexual risk behaviors specifically related to HPV diagnosis. It aims to observe whether female university students understand the implications of genital HPV infections and alter their sexual risk behaviors to avoid spread. More specifically, the study aims to explore whether those with higher levels of HPV knowledge take more preventative measures against HPV infection such as increased condom use, Pap and HPV test initiation, and HPV vaccination adoption. Moreover, the study aims to assess whether those with higher levels of HPV knowledge have a later onset of sexual intercourse, fewer sexual partners, and higher rates of partner disclosure. By gaining insight into these findings, an intervention may be created that will address the implications of an HPV diagnosis and how to prevent acquiring the infection.

The current study seeks to examine the relationship between HPV knowledge and HPV risk factors, preventative measures, sexual attitudes and beliefs, and sexual risk behaviors through the following questions:

1. What is the association between HPV knowledge and HPV risk factors?
2. What is the association between HPV knowledge and HPV preventative measures?
3. What is the association between HPV knowledge and sexual attitudes and beliefs?
4. What is the association between HPV knowledge and sexual risk behaviors?

The answers to these questions will help inform future HPV prevention interventions on the implications of how all of the listed factors are associated with HPV knowledge.

Theoretical Framework

By applying a theory to research, it enables predictions to be tested and choices to be made about action, such as an intervention. Theory has the advantage of explaining the results of the research study as well as provide a clearer understanding of the context surrounding the data. In order to help examine the relationship between HPV knowledge and HPV risk factors, preventative measures, sexual attitudes and beliefs, and sexual risk behaviors this study employs Everett Rogers' theory, Diffusion of Innovations.

The Diffusion of Innovations model derived from an array of strategies aimed to increase the spread of new ideas centered on disease prevention (Haider & Kreps, 2004). Public health is concerned with the promotion and maintenance of health within a community; therefore, it seems practical to place an emphasis on the preventative measures. This focus on preventative measures calls for effective health education messages throughout all social systems. Preventive innovations are new ideas that require action at one point in time in order to avoid unwanted consequences at some future time. This means that the measures are relatively low in relative advantage, compared to non-preventive innovations (Haider & Kreps, 2004).

The Diffusion of Innovation serves as a model to effectively produce and spread the new ideas that researchers have for health education and disease prevention promotion. Overall, prevention is less expensive than treatment. Diffusion is the process through which (1) an innovation (2) is communicated through certain channels (3) over time (4) among the members of a social system. For this study, the innovation is the protection of oneself against contracting a HPV infection and decreasing the spread of the virus. The innovation includes using condoms, decreasing the number of sexual partners, getting

vaccinated against the virus, partner disclosure of sexual histories, and getting yearly Pap smears.

The measure of innovation is compromised of five different components: (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability, and (5) observability (Haider & Kreps, 2004). Relative advantage is the degree to which an innovation is perceived better than the one that came before it. In this stage, the individual is first exposed to an innovation, in this case, measures to protect against HPV or the spread of HPV, but lacks the information needed to make a decision. At this stage, the individual may not have a want to find more information about the innovation.

Compatibility is the degree to which an innovation is perceived as being consistent with the existing and past values. The stage of compatibility is the one at which the individual is interested in the innovation and actively seeks details about the innovation. Individuals diagnosed with a past or current human papillomavirus infection may be more apt to taking on the innovation of protecting themselves and others from other STIs. Furthermore, individuals who may not be diagnosed with HPV but have increased knowledge surrounding the STI may also take on the innovation.

Complexity is the degree to which an innovation is perceived as difficult to understand and use. The individual takes the concept of the innovation and weighs the advantages and disadvantages of using the innovation. It is at this point that the individual decides whether to adopt or reject the innovation. The stigmatization of having a sexually transmitted infection, perceived HPV risks, and gaps in knowledge come into play during this stage. If a person has a low perceived risk of contracting HPV, he or she may be less willing to use a condom during sexual intercourse. Additionally, if there is

stigmatization regarding having a human papillomavirus infection, individuals may be less likely to disclose their sexual history to their partners.

Trialability is the degree to which an innovation may be experimented with during a particular time frame. If the individual decides to adhere to the innovation, he or she employs it to a varying degree depending on the situation. During this time period, the individual determines whether the innovation is useful for them. At this time point an individual may decide to receive the HPV vaccine and have yearly gynecological tests, but they may still be wary to consistently use condoms and disclose their histories to all partners.

Finally, observability is the degree to which the results of the particular innovation are able to be shown to others (Haider & Kreps, 2004). The individual finalizes their decision to continue using the innovation and may fully take on the innovation.

Specific Aims and Significance

The significance of the current observational, cross-sectional study is to inform future HPV research and sexual health curricula created for the college student population. Due to the recent changes in Pap smear and HPV testing recommendations, many female college students will not see a gynecologist until post-graduation. This places a large responsibility on university student health services and outside resources to provide accurate and relatable educational materials encompassing the recent research about the virus. This study will examine the current gaps in HPV knowledge among undergraduate females. Further, the study will examine what type of relationship exists between HPV knowledge and HPV risk factors, preventative measures, sexual attitudes and beliefs, and sexual risk behaviors. Below are the aims and hypotheses specific to the current study:

Aim 1: To explore the association between HPV knowledge and HPV risk factors.

Hypothesis 1: Women with higher HPV knowledge will have a higher age of first sexual intercourse, a lower incidence history of sexually transmitted infections, and a lower number of sexual partners.

Aim 2: To evaluate how the level of HPV knowledge differentiates the HPV preventative behaviors of college aged women.

Hypothesis 2: Women with higher levels of HPV knowledge will have increased condom use, received a Pap smear/test in the past year, and have completed or are in the process of completing the HPV vaccination regiment.

Aim 3: To analyze how attitudes of protection during sexual intercourse and partner disclosure vary by level of HPV knowledge.

Hypothesis 3: Women with higher HPV knowledge will believe that they should use protection during intercourse and disclose sexual health histories to their partners.

Aim 4: To evaluate differences in sexual risk behaviors between those with low versus high HPV knowledge.

Hypothesis 4: Women with higher levels of HPV knowledge will engage in less sexual risk behaviors.

Literature Review

Human Papillomavirus (HPV)

Human Papillomavirus (HPV) is estimated to be one of the most common sexually transmitted infections (STIs) in the United States (Daley, Cheryl, Buhi, Kolar, McDermott, Hernandez, & Fuhrmann, 2010; Dunne, Unger, Sternberg, McQuillian, Swan, Patel, & Markowitz, 2007; Friedman & Shepeard, 2007; Gerend & Magloire, 2008; Klug, Hukelmann, & Blettner, 2007; Lambert, 2001; Licht, Murphy, Hyland, Fix, Hawk, Mahoney, & Martin, 2010; Sandfort & Pleasant, 2009; Yacobi, Tennant, Ferrante, Pal, & Roetzheim, 1999). Current research has shown that over 50 types of HPV have been identified, with an estimation of 30 strains that specifically target and infect the genital system (Daley et al., 2010; Klug, Hukelmann, & Blettner, 2007; Vail-Smith & White, 1992). When examining genital tract HPV strains, the primary transmission route of the virus is found to occur through skin-to-skin contact during sexual activity (Baer, Allen, & Braun, 2000; Friedman & Shepeard, 2007; Tropy, Burke, & Glass, 2007). The natural history of HPV has been inspected with current research dictating that between 60% to 80% of all HPV infections become undetectable over an 8- to 10- month time period, with an average of 90% clearing within two years (Daley et al., 2010; Dunne et al., 2007; Shew, Fortenberry, Tu, Julair, Batteiger, Qadadri, & Brown, 2006).

As a result of the highly contagious character of the virus, an infection rate of 50% to 70% can be seen in conjunction with the possibility of developing long term health consequences (Vail-Smith & White, 1992). In the United States alone, approximately 20 million persons aged 15 to 49 years are currently infected with one or more strains of HPV. Moreover, although it is not mandatory for healthcare providers to

report new cases of the virus, an estimated 6.2 million new cases occur annually. This yearly estimate is much higher than the prevalence of other common STIs required to be reported and tracked such as Chlamydia, which, in 2006, had over 1 million reported cases (Allen et al., 2009; Daley et al., 2010; Friedman & Shepeard, 2007; Rubin & Tripsas, 2010; Sandfort & Pleasant, 2009; Tropy, Burke, & Glass, 2007).

Health Consequences

As mentioned, although the majority of HPV infections are largely asymptomatic and generally resolve without seeking medical intervention, many negative health ailments may result post infection (Allen et al., 2009; Daley et al., 2010; Friedman & Shepeard, 2007; Gerend & Magloire, 2008; Tropy, Burke, & Glass, 2007). As a categorization method, the 30 genital tract HPV types are classified according to their epidemiological association with cervical cancer. Low risk infection types, such as strands 6 and 11, are most commonly linked to causing benign or low grade dysplasia in a female's cervix, genital warts, and recurrent respiratory papillomatosis, an infection characterized by warty growths in the upper airway (Dunne et al., 2007; Friedman & Shepeard, 2007; Gerend & Magloire, 2008; Sandfort & Pleasant, 2009; Tropy, Burke, & Glass, 2007). Among all of the low risk infection types, the most common clinical manifestation of an HPV infection is genital warts. It has been documented that 90% of all cases of genital warts are due to HPV (Daley et al., 2010; Klug, Hukelmann, & Blettner, 2007; Vail-Smith & White, 1992).

High risk strains of HPV, specifically 16 and 18, have been indicated to cause cervical, anal, and other genital cancers, such as penile, vulvar, and vaginal, by the National Institutes of Health (Dunne et al., 2007; Friedman & Shepeard, 2007; Gerend &

Magloire, 2008; Sandfort & Pleasant, 2009; Tropy, Burke, & Glass, 2007; Yacobi et al., 1999). In addition to genital cancers, HPV type 16 has recently found to account for more than 90% of cases of HPV positive oropharynageal cancers, cancers of the throat and neck (D'Souza, Kreimer, Viscidi, Pawlita, Fakhry, Koch, Westra, & Gillison, 2007).

The most prevalent cause of concern to women is the fact that high risk strands of HPV, HPV 16 and 18, have been well documented as the most indicative causal factor of a cervical cancer diagnosis (Baer, Allen, & Braun, 2000; Friedman & Shepeard, 2007; Klug, Hukelmann, & Blettner, 2007; Lambert, 2001). Research has shown that 99% of cervical cancers are connected to HPVs 16 and 18, 60% of which is due primarily to HPV 16 (Baer, Allen, & Braun, 2000; Dunne et al., 2007; Friedman & Shepeard, 2007; Gerend & Magloire, 2008; Sandfort & Pleasant, 2009; Tropy, Burke, & Glass, 2007; Vail-Smith & White, 1992;Yacobi et al., 1999). A persistent infection of one or more high risk HPV strands is almost always the sole linkage to developing cervical cancer (Manhart et al., 2006). Approximately 10% of women who are infected with a high risk HPV develop persistent infections, making this association to cervical cancer a genuine concern (Allen et al., 2009; Baer, Allen, & Braun, 2000; Manhart et al., 2006).

Cervical cancer ranks among the top ten causes of cancer mortality for women in the United States. Moreover, in conjunction with breast cancer, it is among the top two causes of cancer mortality globally (Baer, Allen, & Braun, 2000; Burk, Ho, Beardsley, Lempa, Peteres, & Bierman, 1996; Manhart et al., 2006). The American Cancer Society estimated that in 2006, 9,710 women were diagnosed with an invasive cervical cancer and 3,700 of which resulted in death (Friedman & Shepeard, 2007). These facts are quite

eye opening once coupled with the prevalence of all HPV strains among the United States, female population.

Prevalence and Incidence Among Females

High risk HPV types are most commonly found in young women whose cytology is normal (Moscicki, 2005). An analysis of data from the 2003-2004 National Health and Nutrition Examination Survey (NHANES) displayed that the seroprevalence of HPV types 6, 11, 16, and 18 among American females was 32.5% (Daley et al., 2010). Furthermore, Manhart et al. (2006) revealed that HPV type 16 was the most common strain of the virus found in roughly 20% of the women studied.

This high prevalence of the virus is not a new development, early studies examining HPV in the 1980s showed that HPV was extremely common. During that time period, a woman was said to have a 70% chance of exposure over her sexual life (Lambert, 2001; Moscicki, 2005). Current data now show that in the United States, over 50% of all sexually active adults acquire one or more of the genital tract HPV infections at least once in their lifetime, usually within 5 to 7 years after sexual debut (Lambert, 2001; Manhart et al., 2006; Moscicki, 2005). When Manhart (2006) examined urine specimens from 3,262 women ages 18 to 25 in the Wave III data of the National Longitudinal Study of Adolescent Health, the study found an overall prevalence of HPV of 26.9% among sexually active women (Manhart et al., 2006).

In another study, Dunne et al. (2006) used the 2003-2004 National Health and Nutrition Examination Survey (NHANES) to determine the prevalence of HPV among females in the United States. They found the overall HPV prevalence to be 26.8% among US females aged 14 to 59 years (n=1921). However, the highest HPV prevalence (44.8%)

was among women 14 to 19 years old. This is incorporated with the finding of an overall prevalence of the virus among females aged 14 to 24 years of 33.8%. The main outcome of the study found that the prevalence of HPV infection increased from 14 years through 24 years, but then steadily decreased as the age of the study participants increased (Dunne et al., 2007).

Studies looking at the epidemiology of the virus have found that the highest incidence of HPV infection occurs among sexually active young adults under the age of 25. The HPV incidence rate of women in this age bracket is four times that of women over the age of 35 years (Moscicki, 2005). Young women between the ages of 15 and 24 make up half (50%) of the infected population (Allen et al., 2009; Baer, Allen, & Braun, 2000; Lambert, 2001; Gerend & Magloire, 2008). Notably, HPV rates increase with the number of sexual partners one has, with the highest incidence rate in younger populations with multiple sexual partners (Moscicki, 2005). As a result of these findings, college students are often thought of as a high risk population in regards to HPV infections due to their engagement in sexual risk behaviors and other incidences of STI diagnoses (Licht et al., 2010; Sandfort & Pleasant, 2009).

Age of sexual debut has been shown to affect the HPV infection rate among young women. Dunne (2007) found that rates of HPV infection tend to be highest among young adults within the first few years after sexual debut (Dunne et al., 2007). This result places college age students at an extremely high risk as the average age of the American male at the time of first vaginal intercourse is 16.3 years and of the American female, 17.0 years (Feldman, Turner, & Araugo, 1999). With this concern in mind, the self-reported HPV prevalence in young college women was found by Manhart et al. (2006) to

be 46% in clinic based settings, but as high as 64% in total reported prevalence (Manhart et al., 2006).

Risk Factors

A risky behavior may be defined as a behavior which may result in negative consequences in regards to an individual's health (Doherty, Appel, & Murphy 2004). When young adults enter into the college setting, they have an increased opportunity to participate in risky behaviors, principally, sexually risky behaviors. The risk factors specific to HPV infections that may be developed during the college years include: (1) early age of first sexual intercourse, (2) history of STI diagnoses, (3) number of sexual partners, and (4) partner and partnership characteristics (Gerend & Magloire, 2008; Rubin & Tripsas, 2010; Manhart et al., 2006; Vail-Smith & White, 1992).

In terms of the population of interest, the sexual habits such as onset, frequency, and number of partners greatly dictates the risk of an HPV infection. It is noted that 75% to 90% of college students are sexually active, indicating having had vaginal intercourse, anal intercourse, or both. In terms of the number of sexual partners, nearly 14% of 18 to 24 year old college students reported engaging in sexual intercourse with four or more sexual partners in their lifetimes (CDC, 2003). In comparison to other age groups, adolescents aged 10 to 19 years and young adults aged 20 to 24 years are more likely to have multiple sexual partners as opposed to engaged in a monogamous, long term relationships (CDC 1999).

In terms of partner characteristics and disclosure, Civic (2000) found that most college students believe and trust in what their partners disclose to them regarding their sexual history. The students will then make decisions about how to protect themselves

during sexual intimacy based on these self-reported assumptions (Civic, 2000). However, concurrent research has shown that a vast majority of college students are willing to disclose false information, alluding to a more positive background, about their sexual histories in order to engage in sexual behaviors (Cochran & Mays 1990). These findings dictate that relying on a partner's self-disclosed history regarding infection status, number of sexual partners, and commitment in a relationship is not always the best strategy.

Due to the trust in partner disclosure in addition to the asymptomatic nature of the majority of HPV infections, most persons may believe they have a clean sexual health history, but may indeed have an undiagnosed STI. This feeds into the cycle that perhaps partner are not intentionally lying, but rather do not disclose their status because they do not know their status. Thus, accurate and full self-disclose of one's sexual health history can only occur if that partner has been clinically diagnosed with an infection of some sort.

Many studies assessing potential risk of contracting an HPV infection were conducted detailing the sexual risk behaviors unique to the college age population. Vail-Smith (1992) surveyed 263 sexually active college women from a public university in the Southeast. The study found that 46 (17.4%) of the respondents reported having been diagnosed by a health care provider with at least one STI. Approximately 68.9% (n = 181) reported having had more than one sex partner, with 33.1% (n = 47) having had more than 4 partners. Finally, the study indicated that 90 (34.1%) have engaged in their first sexual intercourse at or before the age of 15 years (Vail-Smith & White, 1992). Risk level of contracting HPV is of particular concern because almost 1/3 of the subjects had

never had a Papanicolaou (Pap) smear and 3/4 reported they did not always use condoms when engaging in sexual behaviors. This high risk was accompanied by low levels of preventive behaviors and knowledge relative to HPV infection (Vail-Smith & White, 1992).

The risk factors for genital tract HPV infections were also investigated by Burk et al. (1996) studying 604 college women from a state university. HPV was detected in 168 (27.8%) of the subjects by gynecological testing specified as Pap smears. This study identified a number of significant independent sexual risk factors associated with a high HPV prevalence (>50%), including the number male sex partners and the male partner's number of sex partners. The study provided information displaying that the sexual behaviors of women indicated that cervical HPV infection is associated with vaginal intercourse and not oral or anal sex (Burk et al., 1996). A number of characteristics of the surveyed women that were not associated with sexual behaviors were described as risk factors for contracting an HPV infection. The subject's age, ethnicity, duration of sexual relationship, and if the male partner was currently enrolled in college were all significant independent risk factors for HPV. Finally, the research displayed that year in school had an impact of the prevalence of HPV because the percentage increased from approximately 25% in the first two years of college to 46% in the later years (Burk et al., 1996).

Additional studies found similar risk factors among female, sexually active college students. In Manhart et al. (2006), 14% of women who reported only having engaged in vaginal intercourse with one sex partner were diagnosed with a genital HPV infection (Manhart et al., 2006). Being infected with the virus was independently

associated with having sex while under the influence of alcohol, having racially Black partner, having three or more sex partners, being single, and engaging in illegal drug use (Manhart et al., 2006). The Dunne et al. (2006) study found that independent risk factors for having HPV detected in one's body included sexual behaviors, such as the number of sex partners in the last year and number of lifetime partners, and demographic variables, including age and marital status (Dunne et al., 2007).

Prevention

Preventative behaviors that address the sexual risk factors associated with human papillomavirus are the best defense against contracting HPV infections. There are three main prevention methods to HPV infections: (1) HPV vaccination, (2) gynecological screening, and (3) condom use.

Vaccine.

The main preventative measure to decrease the risk of four strains of HPV came about with the creation of an HPV vaccination. In June 2006, the US Food and Drug Administration (FDA) approved a prophylactic HPV vaccine named Gardasil, for girls and women ages 9-26 years that protects against HPV types 6, 11, 16, and 18 (Gerend & Magloire, 2008). This was a great stride in research as the strains that Gardasil protects against are responsible for more than 90% of all genital warts and 70% of all cervical cancers. Thus far, the conducted clinical trials have documented that the vaccine proved to be effective and is well tolerated among those vaccinated (Allen et al., 2009; Dunne et al., 2007; Friedman & Shepeard, 2007; Gerend & Magloire, 2008).

The Centers for Disease Control and Prevention's Advisory Committee on Immunization Practices (ACIP) published its recommendations for use on March 23,

2007 (Sandfort & Pleasant, 2009). The Centers for Disease Control and Prevention (CDC) recommends routine vaccination with three injections administered over a six month interval for girls 11 to 12 years of age (Licht et al., 2010; Tropy, Burke, & Glass, 2007). However, it is also recommended as a "catch up" for girls and women between the ages of 13 and 26 who have not yet been vaccinated or are in need of boosters (CDC, 2010; Tropy, Burke, & Glass, 2007). Although the HPV vaccine is recommended for women aged 9-26 years, with girls aged 11-12 years as a primary focus, college aged women may be uniquely at risk for HPV due to high rates of sexual activity, and thus, serve as an important population for the HPV vaccine (Daley et al., 2010; Licht et al., 2010). Although a strong preventative method, the vaccine will not work for all genital HPV types. This means that vaccinated women will continue to need routine cervical cancer screening and should continue to practice protective sexual behaviors (Friedman & Shepeard, 2007).

In the months following the release of the HPV vaccine, researchers examined how college students fell within the stages of adoption. In 2009, the CDC found that only 27% of females aged 13 to 26 had received three or more doses of the HPV vaccine (CDC, 2010). Allen (2009) examined the correlates of stage of vaccine adoption among 1,401 female students at a New England University in 2007. In the 6 to 8 months following FDA approval of the HPV vaccine, the study found that the overall awareness of both HPV and of the HPV vaccine was high among the sample of college women. However, specific knowledge regarding transmission mode, Pap smears as a preventative measure, and the lack of available treatment for the virus was low. In terms of vaccination adoption, about half (53%) were planning to be vaccinated with only 12%

having already received the vaccine (Allen et al., 2009). Similar findings were observed in studies conducted by Jain et al. and Caskey et al. who reported that only 10% and 9%, respectively, of women aged 18-26 years, had initiated the HPV vaccine schedule (Daley et al., 2010). The factor which was most strongly associated with the intention to become vaccinated was social norms. The study discussed that each standard deviation increase in the social norms score of the survey measure was associated with more than four times the odds of intending to be vaccinated within the next 30 days (Allen et al., 2009).

After assessing adoption practices, numerous studies examined vaccination acceptability and factors associated with adoption. Freidman & Shepeard (2007), in a qualitative study using 35 focus groups with members of the general public stratified by gender, race, and location, found that participants expressed concerns about appearing to be promiscuous if they were to receive an HPV vaccine. Additionally, participants were concerned that by vaccinating younger generations, the action would be considered as condoning promiscuity among the youth. Overall acceptability of an HPV vaccination was high when parents were informed about the prevalence and potential consequences of HPV and the importance of becoming vaccinated before sexual debut (Friedman & Shepeard, 2007). This finding was mirrored in a study conducted by Klug, Hukelmann, & Blettner (2007) which found that acceptance of the HPV vaccination increased when parents or young women were fully informed and comprehended the potential risks and benefits of the virus (Klug, Hukelmann, & Blettner, 2007).

Daley et al. (2010) also examined the factors associated with HPV vaccination with a study sample of 256 undergraduate females enrolled in a large, public, urban university in the Southeastern United States. Altogether, 43% of women reported that

they had received the HPV vaccine by the time of the survey administration. Vaccination status did not differ significantly by age or by self-reported race and ethnicity. However, those who were vaccinated did have significantly higher HPV knowledge scores when compared with those who were not vaccinated. Compared with non-vaccinated women, HPV vaccinated women were more likely to report knowing someone who had already received the vaccine, to rate importance of recommendation of the vaccine by their healthcare provider as very important, and to believe that the HPV vaccine was safe with little to no subsequently consequences (Daley et al., 2010).

In another study, Licht et al. (2010) examined whether knowledge and risk perceptions regarding HPV were associated with HPV vaccine acceptance and adoption among a sample of 406 female students recruited from two universities. Overall, 43.6% of the students reported having received at least one dose of the HPV vaccine. In terms of dosage completeness, of those that indicated being vaccinated, 15% reported having one dose, 33% reported two doses, and 53% reported having completed the full three doses in the series (Licht et al., 2010). Predictors of vaccination adoption included age and race of the female. For example, female students between the ages of 19 and 26 years were 1/4 as likely to be vaccinated. Additionally, African Americans and Asians were each less likely to be vaccinated when compared with Whites in the study. In terms of HPV knowledge levels, respondents who correctly indicated that HPV caused genital warts were 1.85 times more likely to have received at least one HPV vaccination dose (Licht et al., 2010). A similar study indicated that greater interest in obtaining the HPV vaccine was observed among women who were sexually active, had multiple sexual partners, and felt vulnerable to being infected with the virus (Gerend & Magloire, 2008).

Gynecological Testing.

Due to the fact that HPV is often asymptomatic, routine screening tests are an important secondary preventative measure for controlling possible consequences that result from HPV such as cervical cancer (Vail-Smith & White, 1992). Both the Pap and HPV tests screen for early detections of cervical cancer. The Pap test is a screening test that looks for early signs examines for cell changes in a female's cervix. Most notably, pap tests can detect precancerous states, called dysplasia, in the cells of the cervix (Tropy, Burke, & Glass, 2007). Yacobi et al. (1999) found that cervical cancer mortality has declined due to early detection by Pap smears (Yacobi et al., 1999). The HPV tests is a DNA tests that detects certain types of HPV on a female's cervix. The HPV test only checks for the high risk HPV types (types 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, and 68) that are associated with cervical cancer (CDC, 2007). It must be noted that there is no general test for men or women to check one's overall "HPV status." Moreover, there is no existence of an HPV test which locates HPV on the genitals or in the mouth or throat (CDC, 2010).

During the Pap test examination, the gynecologist using a speculum to widen the vagina in order to vagina and cervix to collect cells and mucus for laboratory inspection. If a female is receiving an HPV test at the same time as the Pap, the cells collected during the Pap test are tested for HPV in the laboratory. Although the Pap and HPV tests may find early issues that may potentially lead to cervical cancer, there are various issues that the two tests do not examine. Most notably, they do not check for early signs of other cancers, for other sexually transmitted infections (STIs), or fertility (CDC, 2010).

Abnormal Pap smear results indicate that cells in the cervix have changed. Typically, gynecologists document these changes are as LSIL, low-grade squamous intra-epithelial lesions, or HSIL, high-grade squamous intra-epithelial lesions (CDC, 2010). A positive HPV test indicates that a high risk HPV type has been found in the cervix. At this point in time, the test is not able to differentiate which type is evident in the cervix, rather solely that an HPV type associated with cervical cancer is present (CDC, 2010). Although both tests denote medical ailments, the HPV test results are only meaningful in conjunction with the Pap smear results. For example, if both tests are found to be abnormal, it means that the cells in the cervix are abnormal and the female has HPV (CDC, 2010). In this case, more tests will be taken and treatment may be administered. However, if the HPV test is positive and the Pap smear is abnormal, it signifies that the female may fight off HPV naturally and never have cervical cell changes (CDC, 2010). It is recommended that the female should receive a follow-up Pap test and HPV test in a year because cell changes occur slowly (CDC, 2010).

In November 2009, the American College of Obstetrics and Gynecology (ACOG) and the U.S. Prevention Services Task Force (USPRSTF) released new recommendations regarding Pap test screening in United States females. The main changes, as it pertains to this study, include that Pap smears should be conducted: (1) no later than 21 years of age or three years after the onset of sexually activity, whichever comes first, and (2) that women aged 21 to 30 years should be screened every 2 years (CDC, 2007; National Center for Chronic Disease Prevention and Health Promotion, 2010). In light of the recent criteria, the ACOG noted that women that are faced with certain risk factors may be in need of more frequent screening tests. These risk factors include women who are

infected with Human Immunodeficiency Virus (HIV0, immunosuppressed, have been exposed to diethylstilbestrol before birth, and were treated for certain cervical abnormalities or cancer (CDC, 2007).

Prior to 2009, the American Medical Association (AMA) and the National Cancer Institute (NCI), in addition to the ACOG and USPRSTF recommended that screening began at an early age with a higher frequency. These organizations indicated that Pap smears should be conducted with the onset of sexual activity or at age 18, whichever event occurred first, or if the sexual history of the individual was deemed unreliable (Moscicki, 2005). Once the screening was initiated, a female was advised to have three consecutive Pap smears yearly and if all three were normal, the frequency may be change to every two or three years (Moscicki, 2005).

The changes in recommendations came about due to review of data regarding the prevalence and unique characteristics of HPV. Although adolescents and young women have a high prevalence and incidence of HPV, the majority of HPV relapses spontaneously leaving no need for treatment (Moscicki, 2005). Moreover, the prevalence rates of the high risk HPV types linked to the development of cervical cancer are extremely low in the 18 to 21 year age group (Moscicki, 2005). Based off of these observations, the American Cancer Society (ACS) and the USPSTF reviewed the past guidelines and make new recommendations of when to initiate screening (Moscicki, 2005).

In terms of HPV testing protocol, the HPV test is not recommended by all expert organizations. However, of those that do recommend the test, the criteria includes: (1) if the female is 21 years or older and her Pap test result is unclear, or (2) if the female is 30

years or older (CDC, 2010). The rationale for these guidelines are that because HPV is very common in women under the age of 30, it is not particularly useful to mandate testing in all young women since most HPV that is found will never progress into adverse health ailments (CDC, 2010). However, because HPV is less common in women over the age o 30, it is more likely to signal a health concern. At this point in time, the U.S Preventative Services Task Force (USPSTF) concludes that insufficient evidence exists to recommend for or against the routine use of HPV testing as a primary screening test for cervical cancer. Currently, clinical trials are underway to clarify the role of HPV testing should play in cervical cancer screening (National Center for Chronic Disease Prevention and Health Promotion, 2010).

In studies assessing gynecologist testing behaviors, Vail-Smith & White (1992) indentified that only 32.7% of the respondents knew that a woman under the age of 18 should have her first Pap test soon after having sexual intercourse. The study also found that 58.0% of the study's participants had a Pap test in the last year and of those 22.8% had been told that their results were "abnormal" (Vail-Smith & White, 1992). Disappointingly, current research reveals that 17% to 29% of women do not follow up with their healthcare provider after an abnormal Pap test (Rubin & Tripsas, 2010).

To get to the root of these practices, Burak & Meyer (1997) used the constructs of the Health Belief Model (HBM) to examine the beliefs and behaviors of gynecological screening for a sample of 400 undergraduate female students at a New England state college. The study found that nearly 90% of the participants (n=357) strongly agreed or agreed that regular gynecological exams were essential for reproductive health (Burak & Meyer, 1997). In terms of feelings, 62% (n=236) of the students though that

gynecological exams were embarrassing or very embarrassing. Furthermore, gynecological exams were believed to be expensive or very expensive by 42% (n=147) of the respondents, although more than 90% had health insurance. The women who had exams and Pap tests before were more likely to believe that the benefits of the exam outweighed the barriers than did the women who had not had exams (Burak & Meyer, 1997).

Condom Use.

Due to the skin-to-skin transmission mode of genital HPV infections, the CDC acknowledges that the use of condoms is not a full proof method for the prevention of the spread of HPV (Sandfort & Pleasant, 2009; Tropy, Burke, & Glass, 2007). However, condom use may have a protective effect on HPV diagnosis, reduce the risk for HPV associated health consequences, and lessen the adverse health ailment resulting from an HPV infection (Friedman & Shepeard, 2007).

Although the use of condoms may be viewed as a preventative measure from many STIs, studies have consistently shown that college students are categorized as sporadic condom users (CDC, 1997; Gilbert & Alexander, 1998; Seidman & Reider, 1994). Additionally, condom use among sexually active young adults is shown to decrease with age. This trend is evident due to the fact that older adolescents tend to rely more on female contraceptive methods, such as the birth control pill, which only protect against pregnancy and do not have the same defense against STIs like condoms (Moore, Driscoll & Lindberg, 1998). However, limited studies have examined the adoption practices of condom use post-STI diagnosis. Current data displays that diagnosis is not

indicative of an individual altering his or her condom use while engaging in sexual behaviors.

While condom use has increased since earlier studies among adolescents engaging in sexual intercourse for the first time, only 18% of college men and 13% of college women consistently use condoms when engaging in sexual behaviors with multiple partners (Seidman & Reider, 1994). Similar statistics were found with various studies examining the sexual risk behaviors of college students. Vail-Smith & White (1992) found that the majority of study participants reported limited use of condoms during sexual intercourse. Thirty-one percent reported condom use 1% - 33% all of the time, with an additional 26.2% reported never using condoms during sexual intercourse (Vail-Smith & White, 1992). In a nationwide survey conducted by the CDC assessing condom use among college students, only 28% of college students reported that either they or their partners used condoms always or most of the time during sex (Turchik, Garske, & Ogles, 2007).

Stigma

When examining the lack of uptake for measures used to prevent both HPV infections and the virus' possible consequences, studies explored feelings around the stigmatization of HPV. Current and previous research has held consistent with the findings that participants who partook in risk behaviors that predicted risk of acquiring HPV, such as being sexually active and increased number of sexual partners, felt had a high perceived risk and felt more vulnerable to the virus (Gerend & Magloire, 2008). Although the United States has quite a high prevalence of STIs, Burak & Meyer (1996) found that more than 81% of their participants believed that it was "very unlikely" or

"unlikely" they would be diagnosed with STI. However, only 44% responded that it was "unlikely" or "very unlikely" that they would be diagnosed with cervical cancer in their lifetimes. The fact that four times as many respondents believed that they were likely to get cervical cancer than those who believed they were likely to get an STI suggests that students may not know the association between HPV and cervical cancer (Burak & Meyer, 1997). Echoing this thought, the study by Freidman & Shepeard (2007), shows that the stigma associated with STIs can be a dictating barrier to a respondent's seeking information about the infections, screening measures, and possible treatment courses (Friedman & Shepeard, 2007).

Correlates between HPV and STI stigma and HPV knowledge levels were assessed in a study conducted by Sandfort & Pleasant (2009). The study found that a negative correlation existed between stigma surrounding HPV and a participant's HPV knowledge, detailing that the associated stigma decreased as individuals comprehended more about the virus. For example, the study found that men exhibited a high level of stigma and had a decreased knowledge level when compared with their female counterparts. Furthermore, the study indicated that the anxiety produced by the thought of acquiring an HPV infection and actual diagnosis seemed to be linked to lower level of understanding about the virus (Sandfort & Pleasant, 2009). Similar to these findings, Gerend & Magloire (2007) found that younger participants, men, and those with less HPV knowledge stated that they would feel ashamed if diagnosed with HPV (Gerend & Magloire, 2008). Comparatively, in a qualitative study conducted by Mosciki (2005), when the college women were asked how they would hypothetically feel if diagnosed

with HPV, predominant answers included scared, angry, confined, dirty, and regretful (Moscicki, 2005).

HPV knowledge

Due to the high prevalence of HPV, specifically among female college students who have the largest evidence of risk factors contributing to HPV infection, studies explored the associated HPV knowledge levels. In 2000, a national Kaiser Family Foundation survey found that less than 1/3 of Americans had heard of HPV with only 2% able to identify HPV as an STI (Sandfort & Pleasant, 2009). Research suggests that many of the studied populations consider an HPV infection as a relatively minor health threat and that participants had minimal perceived risk for contracting the virus. For example, Dell et al. found that only 15% of high school seniors believed that they were at risk for contracting HPV. However, HPV risk perceptions tended to increase when the study questioned sexually active individuals (Gerend & Magloire, 2008).

In terms of knowledge levels, researchers have consistently found low levels of knowledge concerning HPV in college age and older populations. Broad knowledge gaps exist around HPV transmission mode, prevention measures, and the link between HPV and cervical cancer (Sandfort & Pleasant, 2009). Additionally, studies suggest much confusion centers around the differences between genital warts and genital herpes, the asymptomatic nature of HPV, and the purpose of Pap smears, and what the results of a Pap smear indicate. Studies have depicted that greater levels of HPV knowledge are typically observed in older, sexually active females in addition to individuals with a history of genital warts or cervical dysplasia (Gerend & Magloire, 2008).

Klug, Hukelmann, & Blettner (2007) performed a systematic review of the literature and included 39 studies published between 1992 and 2006, examining the HPV knowledge levels of 19,986 participants. The study reported that 75% of women with an abnormal Pap smear had no or very little knowledge about the association between HPV and its potential development into cervical cancer (Klug, Hukelmann, & Blettner, 2007). Women had better knowledge about HPV than men and indicated significantly more often that HPV was a risk factor for cervical cancer. In the 39 studies of the systematic review, three predictors for knowledge about HPV infections were identified. The first was the type of question asked. With closed-ended questions, HPV was identified as a risk factor for cervical cancer by 8-68% of participants, while in open-ended questions, only 0.6-11% participants answered correctly. The second predictor was gender, displaying that women had an overall better knowledge score than men. The final predictor of HPV knowledge was the subject's profession. The review found that between 59% and 100% of physicians could identify the link between HPV and cervical cancer (Klug, Hukelmann, & Blettner, 2007).

Differences in knowledge levels may be observed pre- and post- HPV vaccine availability. Studies assessing knowledge before the HPV vaccine was available in 2006 display extremely low rates of knowledge, while more current studies show higher levels. The higher knowledge scores may have been attributed to the media campaigns closely surrounding the vaccine after its release. Vail-Smith & White (1992) suggested low awareness about HPV among university students with 87% of the respondents indicating that they had never heard of the virus. For students that had previously been diagnosed with at least one HPV infection, the majority (74%) had never heard of HPV before their

diagnosis. Only 5% of participants knew HPV caused genital warts, only 8% knew HPV was linked to cervical cancer, only 14% knew Pap smears could help detect an infection, and only 10% knew HPV had an asymptomatic nature (Vail-Smith & White, 1992).

Yacobi et al. (1999) evaluated the knowledge, attitudes, and behaviors regarding HPV in 289 students attending a public university in Florida. This study demonstrated significant HPV knowledge deficits among university students displaying that only 37% of respondents reported they had ever heard of the virus. Along similar lines, 60% of respondents indicated that they knew nothing about HPV and 31% indicated they only knew a little (Yacobi et al., 1999). The only predictors that the study found indicative of lower knowledge HPV were if the participant was a male and the types of sexual behaviors the subject partook in, particularly having multiple partners and limited condom use (Yacobi et al., 1999).

Baer, Allen, & Braun (2000) assessed HPV knowledge among 322 first year students attending a private university in New England. The study found that the majority of male and female first year students knew little about HPV infection, specifically how the virus was transmitted and the prevalence of HPV infection in relation to other STIs. For example, 96.2% of males and 95.4% of females had heard of genital warts, but only 4.2% of males and 11.6% of females knew that HPV caused genital warts. In general, women were more informed about the biology of HPV infection, but both sexes indicted equal perceived risk of being infected with an STI (Baer, Allen, & Braun, 2000).

The CDC's Division of STD Prevention (DSTDP) offers a qualitative perspective when it conducted a series of HPV focus groups with general audiences aged 25 to 45 years in 2003. Friedman & Shepeard (2007) found that participants' knowledge of HPV

was low across all groups, regardless of sex or ethnicity. Even among participants that were aware of what HPV was, knowledge regarding its link to cervical cancer and high national prevalence were low. The focus groups showed that specifically women were the one's motivated to learn about HPV, especially after learning its association to cervical cancer (Friedman & Shepeard, 2007).

When examining studies post vaccine availability, research demonstrates that most of the participants had heard of HPV; however, correct knowledge concern transmission mode and prevalence were still low. Gerend & Magloire (2008) included a total of 124 students between 18-26 years of age from two southeastern universities who completed a survey assessing current levels and correlates of awareness, knowledge, and beliefs about HPV infections. Awareness was found to be high, with more than 75% of study participants indicating that they had heard of HPV. Knowledge about HPV infection was good, with a high proportion of students understanding the causal relationship between certain high risk types of HPV and cervical cancer (Gerend & Magloire, 2008). However, the data suggested that there were still areas in which knowledge levels were still low. A majority of the students surveyed did not fully comprehend how transient HPV infections can be, how, although a person may be infected with the virus, symptoms are typically not apparent, and how HPV causes 90% of all genital wart cases (Gerend & Magloire, 2008).

Sandfort & Pleasant (2009) assessed HPV knowledge, attitudes, and behaviors among 1,282 students attending a large, public university in the Northeast. The study found that a majority of students had heard of HPV, but they did not understand the high national prevalence of the virus. Three quarters of the participants believed that the HPV

prevalence among those who engage in sexual intercourse was less than 35%, while the actual prevalence rate is 50% (Sandfort & Pleasant, 2009). Participants generally could not indicate that women are disproportionately affected by HPV. Knowledge of transmission mode was still low, with 50% of the participants not understanding that HPV can be transmitted via oral sex and skin-to-skin contact. Participants were also largely unaware that HPV causes genital warts. The majority of participants (65.7%) reported that they had heard about HPV from television commercials and a positive correlation existed between hearing about the vaccine on television and overall HPV knowledge (Sandfort & Pleasant, 2009).

Licht et al. (2010) found that respondents demonstrated high levels of knowledge for select items regarding the virus' mode of transmission between partners, the consequential outcomes of an HPV infection, and the availability of a vaccine. The majority of respondents recognized that HPV is associated with development of cervical cancer. Additionally, participants were able to identify that abnormal Pap smears could indicate that an individual may have an HPV infection. However, respondents were less knowledgeable about HPV causing genital warts and penile cancer, its transmission via skin-to-skin contact, and that prevalence rates among men and women (Licht et al., 2010).

After exploring the knowledge levels, comprehension around various key aspects of the virus still remain lacking, even after the initiation of vaccination among young girls and women and the many media campaigns following the implementation. The changing recommendations for initiation of gynecological testing, such as Pap smears and HPV testing, and the decreased use of condoms among sexually active young adults arises

concern regarding the spread of HPV infections. Moreover, college students are at a heightened risk for infection and possible long term consequences being that they fall within the recommended vaccination age and engage in numerous sexual risk behaviors that are most often associated with the virus. Comprehension around various key aspects of the virus still remains lacking.

This study seeks to determine if a relationship exists between Human Papillomavirus (HPV) knowledge and HPV risk factors, preventative measures, sexual attitudes and beliefs, and sexual risk behaviors. The purpose of exploring theses relationships is to identify whether the HPV knowledge level, the main dependent variable, one has attained is associated with the independent variables listed such as age of first sexual intercourse, frequency of condom use, or HPV vaccination status. By gaining insight into these results, health promotion educators may alter their intervention efforts to focus more on the associated predictors of HPV knowledge level.

Sample and Recruitment

Undergraduate, female students attending Emory University were selected as the target population for this study. Emory University was chosen due to the accessibility of the undergraduate student population to the primary investigator.. Eligibility criteria for the study included (1) English speaking, (2) female, (3) student enrolled at Emory University, and (4) age 18-24 years. A total sample of 207 students who were enrolled in the Spring semester of 2011 were selected via convenience sampling of the student population. The total sample fell well within the minimum *n* of 134 female students as recommended by the use of a Cohen's table. The initial population consisted of 302

students, of whom 207 submitted completed surveys for an overall response rate of 68.5%.

Convenience sampling was used to gain individuals for the self-administered, paper and pencil questionnaire. The primary means of initial contact and sampling was made by gaining access into various campus-related areas and approaching the potential participants after lecture or meeting times to elicit recruitment. The primary investigator met with two Women's Studies lecture professors, one Psychology lecture professor, both the Women's Studies and Psychology department chairs, the Emory Athletic Director, specific athletic team's head coach, the president and faculty mentor of the Feminist student organization, the Director of Greek Life, and all ten sorority presidents. After meeting and explaining the current study and the survey to be distributed, access was granted to approach all students in three lecture courses, one women's athletic team, one student organization, and six sorority houses.

Procedure

An observational, cross-sectional study was conducted to assess the sexual risk behaviors and attitudes about HPV infections of a cohort of female university students. All members of this research team, including committee members and thesis chair, completed the IRB Human Subjects research training. No training for outside interviewers was conducted as the primary investigator was be the sole survey administer for this study. Additionally, the primary investigator was the only person to analyze the data underneath the supervision of the thesis chair. The current study was approved by the Emory Institution Review Board (IRB00047141) and was exempt on November 29, 2010.

During the Fall 2010 and Spring 2011 semesters, the primary investigator contacted professors, department directors, and club presidents requesting access to the student population in order to recruit for the study. Permission was granted to recruit during the Spring 2011 semester from two Women's Studies lecture course, one Psychology lecture course, one women's athletic team, one student organization centered around women's rights, and six sorority houses.

The informed consent of the participant was obtained following recruitment of the participant and prior to the administration of the survey (see Appendix A). In all instances, the primary investigator presented a brief synopsis of the survey and the informed consent in a time frame from ten to fifteen minutes during either the lecture, athletic or club meeting, or a sorority chapter meeting. The primary investigator detailed the informed consent document to the participants and required that each individual participant verbally consent to participation in the study. Verbal consent was decided in order to ensure that no identifiers linking the subject to her questionnaire would exist. The primary investigator signed and dated the informed consent form once verbal consent from the participant was granted. Once completed, the informed consent documents were collected and later placed in a locked file cabinet in the privacy of the investigator's home.

Following the collection of the informed consent, the surveys were administered in a classroom on the Emory University campus or in the sorority houses on campus depending on which sample was being collected at that time. Once in a private setting where the seating ensured that participants may not view one another's survey, the survey packet was then distributed to the study participant in an unmarked manila envelope.

The 50 item, self-administered, paper and pencil questionnaire included questions on demographics, sexual history, sexual attitudes and behaviors, and current HPV knowledge of the participant. Participants put no identification information on the survey and sequential numbers were assigned to the completed surveys during data entry and analysis. The survey took an average of 10 to 15 minutes to complete. The primary investigator was present in the room in all instances to monitor and answer questions as needed. Once participants completed the surveys and returned them in the manila envelope directly to the primary investigator, they were given CDC developed Human Papillomavirus information sheet and the answers to the HPV Knowledge portion of the survey.

Measures

Demographic Information

Demographic data were collected on personal information regarding basic participant characteristics such as age, ethnicity and race, current year in school, sexual orientation, and relationship status (see Appendix C).

Current year in school. The current year in school was measured by the question, "What is your current year in school?" Response choices included First year, Second year, Third year, Fourth year, Fifth year, and Other.

Sexual orientation. Sexual orientation was measured with the question, "What is your sexual orientation?" Responses included: only attracted to people of the opposite gender (heterosexual), only attracted to people of the same gender (homosexual), attracted to both genders (bisexual), and Other.

Relationship status. Relationship status was measured with three separated questions assessing marital status, dating status, and if the participant was looking. Respondents checked Yes or No indicating whether they were Married, Dating, and Looking. The response choices were not mutually exclusive. If a responded indicated that she was dating, she was prompted to answer two subsequent questions, "If yes, number of people currently dating," and "If one person, length of monogamous relationship?"

Sexual Health and History

The Sexual Health and History portion of the survey is an 11 item measure designed for this study to assess sexual intercourse onset and lifetime number of partners, birth control methods, condom use, health consequences, and Pap smear assessment (see Appendix C). Although the majority of this measure was designed for this study, questions 12 and 13 were adapted from two survey studies. Question 12, "have you ever had an abnormal Pap test/smear" was taken from Sandfort & Pleasant (2009), Knowledge, Attitudes, and Informational Behaviors of College Students in Regard to the Human Papillomavirus ($\alpha = 0.835$) (Sandfort & Pleasant, 2009). Additionally, Question 13, "have you ever heard of the Human Papilloamvirus (HPV)" was taken from Gerend and Magloire (2008), Awareness, Knowledge, and Beliefs about Human Papillomavirus in a Racially Diverse Sample of Young Adults, as well as Sandfort and Pleasant (2009). (Sandfort & Pleasant, 2009; Gerend & Magloire, 2008).

Sexual debut. Sexual debut was measured by the question, "Have you ever had sexual intercourse (vaginal sex)? If yes, how old were you when you first engaged in sexual intercourse (vaginal sex)?" The participant will mark Yes or No to whether they have had sex and at what age it occurred.

Number of partners. Number of partners was measured by the question "How many partners have you had sexual intercourse (vaginal sex) with?" The participant marks how many partners the participant has had sexual intercourse with over the course of her lifetime.

Birth control. Birth control methods was measured with the question, "What type of birth control method (if any) did you use the last time you engaged in sexual intercourse?" The participant recounts what birth control measure she used with her last sexual partner. Responses included: None, I am abstinent (do not have sexual intercourse), Male Condoms (regular condoms that cover the penis), Female Condoms (condoms for women that are inserted into the vagina), Withdrawal method (take out penis from vagina before ejaculation—"pulling out"), Diaphragm, Birth Control Pill/Patch, Norplant implant, Depo-Provera (an injected hormonal birth control), IUD, Cervical Cap, Spermicide (only), Contraceptive Sponge, Vaginal Cap, and Other.

Condom use. Condom use was measured with the question, "Have you ever had sexual intercourse (vaginal intercourse) without a condom with a person you were not in a committed relationship with?" The participant checked Yes or No as a result choice.

Pap smear. Pap smear was measured by the question, "A Pap test/smear is done by a gynecologist to look for changes in the cells of the cervix. Have you ever had a Pap test/smear?" Pap smear assessment involved a skip pattern in that if the participant answered Yes to a Pap smear she continued on to when the last Pap test was conducted and if she ever had an abnormal Pap test. Abnormal Pap smear was measured with the question, "Have you ever had an abnormal Pap test/smear?" The participant checked Yes or No as a result choice. If a respondent had an abnormal Pap smear, they were prompted

with the question, “If yes, what did your health care profession say was the cause?” Response options included: Dysplasia or cervical dysplasia, An infection (ie. yeast infection, herpes, trichomonas), HPV infection, and I don’t know.

Ever hear of HPV. Ever heard of HPV was measured with the question, “Have you ever heard of the Human Papillomavirus (HPV)?” The participant checked Yes or No as a result choice. If a the respondent had an abnormal Pap smear, they were prompted with the question, “If YES, where have you heard about HPV?” Response choices included: Parents, Friends, Family doctor Television/Radio/Magazines, Internet, Gynecologist, School course, and Other.

HPV vaccination. HPV vaccination was measured with the question, “The HPV vaccination is taken at three time periods. The first dose is on a date you and your health professional choose. The second dose is two months after your first dose. The third dose is taken six months after your first dose. Have you had the HPV vaccination and if so, to which dosage point have you completed?” Participants indicated to which dosage they received for the HPV vaccination with the response choices I have never had the HPV vaccination, am in the process of receiving my HPV vaccination, I have not completed my HPV vaccination, and I have been fully vaccinated (3 doses) in the appropriate time frame. If respondents indicated that they had not completed their HPV vaccination, they were prompted with the question, “At which dose did you stop?” and asked to indicate either the 2^{nd} or 3^{rd} dosage.

STI diagnosis. STI diagnosis was measured with the question, “How many times have you been diagnosed by a doctor with a sexually transmitted infection (STI)?” The

participant wrote in the specific number correlating to the frequency she was diagnosed with an STI.

HPV diagnosis. HPV diagnosis was measured with the question, Have you ever been diagnosed with one or more strands of the Human Papillomavirus (HPV)? If yes, what was the year of diagnosis?" The participant checked Yes or No as a result choice and wrote in the year of diagnosis if it was applicable.

Cervical cancer diagnosis. Cervical cancer diagnosis was measured with the question, "Have you ever been diagnosed with cervical cancer? If yes, what was the year of diagnosis?" The participant checked Yes or No as a result choice and wrote in the year of diagnosis if it was applicable.

Sexual Risk Behaviors

The Sexual Risk portion of the survey is a 6 item measure (see Appendix C), adapted from the 37 item Sexual Risk Survey of Turchik, Garske, & Ogles (2007) (α = 0.88) to examine the frequency of sexual risk behaviors in the past three months (Turchik, Garske, & Ogles, 2007). Participants were asked to indicate how many times or with how many partners a behavior has happened in the past three months. One question asked students to indicate the frequency of sexual intercourse before discussing sexual history using a 5-item Likert scale. A calendar of the last three months, including holidays and observances, was included to help enhance accurate recall. This scaled down version of the Sexual Risk Behavior Survey was modified by only taking into account the past three months, instead of the six month and 2 week time limit from the original survey. Additionally, many questions were excluded in an effort to only include questions pertaining to the risk behaviors associated with HPV. Although each risk

behavioral question was assessed independently, all questions were added together and recoded into a single Sexual Risk Behaviors scale score. Higher scale scores indicated participation in higher risk behaviors.

Sexual Attitudes and Beliefs

The Sexual Attitudes and Beliefs portion of the survey is a 12 item measure (see Appendix C) adapted from the 37 item Sexual Risk Survey ($\alpha = 0.88$) of Turchik, Garske & Ogles (2007), to measure a participant's attitudes towards protection during sexual intercourse and partner disclosure (Turchik, Garske, & Ogles, 2007). Participants indicated Yes or No to each question in this section. The themes from the Turchiek, Garske, & Ogles (2007) survey were taken and created into questions about believes regarding the sexual and preventative acts expressed. Although each attitude question was assessed independently, all questions were added together and recoded into a single Sexual Attitudes and Beliefs scale score. Higher scale scores indicated more positive attitudes and beliefs regarding protection and disclosure.

HPV Knowledge

Current knowledge on the Human Papillomavirus is assessed by a 15 item measure (see Appendix C). Participants indicate True or False to each HPV statement listed. Items 38, 39, 43, 44, and 50 were reversed coded. Although each knowledge question was assessed independently, all questions were added together and recoded into a single HPV knowledge scale score. Higher scale scores indicated higher levels of HPV knowledge.

Nine out the 15 items were designed specifically for this study using statements from fact sheets creating by the CDC and formulating them into True and False

statements. Six questions were taken from the two surveys developed by Gerend & Magloire (2008) and Sandfort & Pleasant (2009). More specifically, Question 39, "a person usually has symptoms when infected with HPV," Question 45, "HPV can cause genital warts," and Question 46, "certain types of HPV can lead to cervical cancer," were referenced in both surveys (Sandford & Pleasant, 2009; Gerend & Magloire, 2008). While Question 41, "a person's chances of getting HPV increases with the number of sexual partners they have," Question 47, "an abnormal Pap test/smear may indicate an HPV infection," were solely taken from Gerend and Magloire (2008) and Question 43, "HPV can cause HIV/AIDS," was taken from Sandfort and Pleasant (2009) (Sandford & Pleasant, 2009; Gerend & Magloire, 2008).

Hypotheses

This study incorporates four main hypotheses. The first states that women with higher HPV knowledge will have a higher age of first sexual intercourse, a lower incidence history of sexually transmitted infections, and a lower number of sexual partners. The questions used to assess this hypothesis are in the sexual health and history portion of the questionnaire. Specifically, the questions included are: Question 7, "Have you ever had sexual intercourse (vaginal sex)? If yes, how old were you when you first engaged in sexual intercourse (vaginal sex)?"; Question 8, "How many partners have you had sexual intercourse (vaginal sex) with?"; Question 12, "Have you ever had an abnormal Pap test/smear?"; and Questions 15, 16, 17, "How many times have you been diagnosed by a doctor with a sexually transmitted infection (STI), human papillomavirus (HPV), or cervical cancer," respectively.

The second hypothesis in this study is that women with higher levels of HPV knowledge will have increased condom use, received a Pap smear/test in the past year, and have completed or are in the process of completing the HPV vaccination regiment. The preventative measures will be assessed using the Sexual Health and History portion of the survey. Survey questions will include: Question 10, "Have you ever had sexual intercourse (vaginal intercourse) without a condom with a person you were not in a committed relationship with?"; Question 11, "Have you ever had a Pap test/smear?"; and Question 14, "Have you had the HPV vaccination and if so, to which dosage point have you completed?".

The third hypothesis predicts that women with higher HPV knowledge will believe that they should use protection during intercourse and disclose sexual health histories to their partners. The 12-item, Sexual Attitudes and Beliefs portion of the survey, questions 24 to 35, will be used to measure the women's attitudes towards protection during sexual intercourse and partner disclosure. The measure is a scaled down version from the original 37 item Sexual Risk Survey of Turchik, Garskem, and Ogles (2007).

The fourth hypothesis in the study suggests that women with higher levels of HPV knowledge will engage in less sexual risk behaviors. The Sexual Risk Behaviors portion of the survey, questions 18 through 23, will be used to assess this hypothesis and measure the frequency of sexual risk behaviors in the past three months. Participants were asked to indicate how many times or with how many partners a behavior has happened in the past three months.

Data Analysis

In the first stage of analyses, descriptive statistics were performed on the demographic, independent, and dependent variables. Frequencies and means were computed to summarize background characteristics, sexual history, sexual risk behaviors, sexual attitudes and beliefs, and HPV awareness and knowledge.

Bivariate analyses then conducted for continuous and categorical measures were examined to determine the relationship between study variables. Potential correlates of HPV knowledge level included: (1) demographic characteristics of age and grade, (2) sexual health and history components of ever engaging in sexual intercourse, age of sexual debut, STI or HPV diagnosis, ever having a Pap smear, condom use, and HPV vaccination status, (3) sexual risk behaviors, (4) sexual attitudes and beliefs.

Finally, a series of multivariate linear regression models were conducted to examine the relationship between components of HPV knowledge and risk factors. Significance level was set to 0.10 due to the exploratory nature of the study and the overall small sample size. It must be noted that several survey questions asked students to select multiple answers, therefore resulting in not all percentages reported summing to 100%. Likewise, students had the option to answer all questions due to the informed consent agreement, thus the final sample sizes vary from question to question. All statistical analyses were conducted using PASW Statistics V.18.0.

Results

Participants

The age range of the female, undergraduate students who participated in this study was between 17 to 23 years old. Participants were 19.6 years old on average and the

Table 1. *Demographics*

Participant Demographics	*N*	*%*
Age		
17	3	1.5
18	40	19.4
19	63	30.6
20	48	23.3
21	38	18.4
22	12	5.8
23	2	1.0
Grade		
First Year	59	28.5
Second Year	73	35.3
Third Year	42	20.3
Fourth Year	33	15.9
Race		
White	154	75.1
Asian	27	13.2
Black or African American	16	7.8
Middle Eastern	2	1.0
Multiracial	6	2.9
Ethnicity		
Hispanic or Latina	8	95.9
Not Hispanic or Latina	189	4.1
Sexual Orientation		
Heterosexual	204	98.6
Bisexual	3	1.4
Relationship Status		
Not Married	155	100.0
Dating	83	43.0
Looking	106	63.5

majority (n = 73, 35.3%) in their second year of college. The participants primarily self-identified as White (n = 154, 75.1%), 13.2% as Asian (n = 27), 7.8% as Black or African American (n = 16), 1.0% as Middle Eastern, and 2.7% self-identified as multiracial. A total of 4.1% (n = 8) reported Hispanic ethnicity. The majority (n = 204, 98.6%) noted that they were heterosexual in terms of sexual orientation. Of those that responded, 100.0% (n = 156) identified that they were single and never married. Additionally, 43.0% (n = 83) were dating, and 63.5% (n = 106) were looking for a partner. Of those that indicated they were dating and responded to the secondary question (n = 81), 96.3% (n = 78) were dating one person, 1.2% (n = 1) was dating two people, and 2.5% (n = 2) were dating three people creating a mean score of 1.06 persons (SD = 0.330, Range = 1-3). Of those that indicated they were in a monogamous relationship (n = 71), the average length of relationship was found to be 11.7 months (SD = 11.949, Range = 0-56). All demographic data in regards to the study participants are presented in Table 1.

Sexual Health and History

Of the participants, 69.6% (n = 142) had engaged in sexual intercourse. The average age of sexual debut was 17.4 (SD = 1.504; Range = 13 - 23) and the average number of lifetime sexual partners was 3.9 (SD = 3.477; Range = 1 - 27). The primary birth control measures include male condoms (n = 100, 70.4%), followed by birth control pills/patch (n = 92, 64.8%), and withdrawal (n = 19, 13.4%). Approximately 45.9% (n = 94) of female participants had received a Pap smear. Of these women, 85.7% (n = 78) had a Pap smear within the past year, 13.2% (n = 12) in the past two years, and 1.1% (n = 1) in the last three or more years. Ten respondents (11.0%) had had an abnormal Pap

Table 2. *Descriptive Characteristics of Sexual Health and History*

Sexual Health and History Item	*N*	*Mean*	*Standard Deviation*	*Range*	*% (Yes)*
Ever Sex					
Ever engaged in sexual intercourse	204	--	--	--	69.6
Age of Sexual Debut					
Age first engaged in sexual intercourse	135	17.4	1.504	13 - 21	--
Partners					
Number of lifetime sexual partners	142	3.9	3.477	1 - 21	--
Birth Control Method					
None	142	--	--	--	1.0
Male Condoms	142	--	--	--	70.4
Female Condoms	141	--	--	--	1.4
Withdrawal Method	142	--	--	--	13.4
Diaphragm	142	--	--	--	1.4
Birth Control Pill/Patch	142	--	--	--	64.8
IUD	142	--	--	--	2.1
Condom Use					
Sexual intercourse without a condom with a person didn't know or didn't know well	142	--	--	--	64.8
Ever Pap Smear					
Ever had Pap test/smear done by gynecologist	205	--	--	--	45.9
Last Pap Smear					
Within past year	78	--	--	--	85.6
Within past 2 years	12	--	--	--	13.2
3 or more years	1	--	--	--	1.1
Ever Abnormal Pap Smear					
Had an abnormal Pap smear result	10	--	--	--	11.0
Abnormal Pap Smear Cause					
An infection	5	--	--	--	55.5
HPV infection	2	--	--	--	22.2
I don't know	2	--	--	--	22.2
Ever Heard of HPV					
Ever heard of HPV	81	--	--	--	91.6

Table 3. *Descriptive Characteristics of Sexual Health and History (continued)*

Sexual Health and History Item	*N*	*Mean*	*Standard Deviation*	*Range*	*% (Yes)*
Where Heard of HPV					
Parents	114	--	--	--	63.3
Internet	62	--	--	--	34.4
Friends	97	--	--	--	53.9
Gynecologist	92	--	--	--	51.1
Family Doctor	114	--	--	--	63.3
School Course	73	--	--	--	40.6
Television/Magazine/Radio	125	--	--	--	69.4
Other	1	--	--	--	0.5
HPV Vaccination Status					
Never had	59	--	--	--	28.6
In the process of receiving	11	--	--	--	5.3
Not completed	12	--	--	--	5.8
Fully vaccinated	124	--	--	--	59.9
Vaccination Dose Stop					
2nd Dose	7	--	--	--	63.6
3rd Dose	4	--	--	--	36.4
STI Diagnosis					
Number of times diagnosed with an STI	3	--	--	--	1.5
HPV Diagnosis					
Ever diagnosis with one or more strains of HPV	3	--	--	--	1.4

smear in their lifetime. Of those that had an abnormal Pap smear, 55.5% (n = 5) indicated it was due to an infection, 22.2% (n = 2) due to HPV, and 22.2% (n = 2) did not know the reason behind the abnormal Pap smear. Three females (1.5%) indicated that they had been diagnosed with an STI. Three participants (1.4%) indicated that a health care provider told them that they had been infected with HPV. The majority (n = 92, 64.8%) of females indicted that they have not had vaginal intercourse without using a condom with someone when they were not in a committed relationship. All of the participants (n = 206) specified that they had never been diagnosed with cervical cancer by a health care provider. In reference to the HPV vaccination, more than half of the participants (59.9%, n = 124) were fully vaccinated against HPV, followed by 28.6% (n = 59) never having the vaccine, 5.8% (n = 12) did not complete the vaccine regiment, and 5.3% (n = 11) were in process of receiving the vaccination. Of those that did not complete the vaccine regiment, 63.6% (n = 7) stopped at before receiving the 2nd dose and 36.4% (n = 4) stopped at prior to receiving the 3rd dose.

HPV Awareness and Knowledge

The majority of respondents (n = 186, 91.6%) heard about HPV from numerous outlets, including television/radio/magazine (n = 125, 69.4%), from a family doctor and partners (n = 114, 63.3%), and friends (n = 97, 53.9%), gynecologist (n = 92, 51.1%), school course (n = 73, 40.6%), and the internet (n = 62, 34.4%). The mean overall HPV knowledge score was 11.299 out of 15 (SD = 1.370; Median = 11.0; Range = 7 – 15). When examining individual knowledge items, a total of 98.0% (n = 201) correctly identified the causal link between HPV and cervical cancer. The following two items, “HPV is a virus and a vaccine can prevent some types of HPV,” were both correctly

Table 4. *Individual HPV Knowledge Items*

HPV Knowledge Question	*Answer*	*N*	*% Correct*
HPV is a sexually transmitted infection (STI).	True	178	86.8
There are many types of HPV.	True	182	88.8
Only females can have HPV.	False	157	76.6
A person usually has symptoms when infected with HPV.	False	180	87.8
HPV is a virus.	True	199	97.1
A person's chances of getting HPV increases with the number of sexual partners they have.	True	188	97.1
The majority of people between ages 18 and 25 have HPV.	True	74	36.1
HPV can cause HIV/AIDS.	False	172	83.9
HPV can affect your ability to get pregnant.	False	28	13.7
HPV can cause genital warts.	True	125	61.0
Certain types of HPV can lead to cervical cancer.	True	201	98.0
An abnormal Pap test/smear may indicate an HPV infection.	True	197	96.1
A vaccine can prevent some types of HPV.	True	199	97.1
Only females can be tested for HPV.	True	50	24.4
An HPV vaccine gets rid of the need for Pap tests/smears.	False	185	90.2

identified by 97.1% (n = 199) of respondents. Of the participants, 96.1% (n = 197) correctly responded that an abnormal Pap smear may be indicative of an HPV infection, 91.7% (n = 188) were correct in a person's chances of getting HPV increases with the number of sexual partners they have, and 90.2% (n = 185) correctly answered that an HPV vaccine does not get rid of the need for Pap smears. Next, 88.8% (n = 182) identified that there were many types of HPV, 87.8% (n = 180) stated that HPV was largely asymptomatic in nature, 86.8% (n = 178) and knew that HPV was an STI. Additionally, 83.9% (n = 172) of the respondents understood that HPV could not cause HIV/AIDs and 76.6% (n = 157) knew that both males and females could be infected with HPV. The students were less knowledgeable when asked about the linkage between HPV and genital warts, with only 61.0% (n = 125) of participants being able to correctly identify the association. The greatest misunderstanding was observed for the statement asking whether HPV could affect one's ability to get pregnant with only 13.7% (n = 28) indicating that the statement was false. In addition, 75.6% (n = 155) were unaware that only females could be tested for the virus and 63.9% (n = 131) were unfamiliar with high prevalence of HPV infections among people between the ages of 18 and 25.

Sexual Attitudes and Beliefs

The average score on the Sexual Attitudes and Beliefs scale was a 10.4 out of 12 (SD = 2.115; Range = 2 – 12), with higher scores indicating more positive attitudes and beliefs towards protection and disclosure. The individual Sexual Attitude and Belief items were also assessed. Of the respondents, 97.0% (n = 197) believed that a person should use a condom during sexual intercourse with every new partner. The majority (n = 192, 95.0%) indicated that they would tell their partner about a current STI before

Table 5. *Individual Sexual Attitudes and Beliefs Items*

Sexual Attitudes and Beliefs	*N*	*%*
Use a condom during sexual intercourse with every new partner		
Yes	197	97.0
No	6	3.0
Disclose current STI status before engaging in sexual intercourse		
Yes	192	95.0
No	10	5.0
Disclose a past STI status before engaging in sexual intercourse		
Yes	140	69.0
No	63	31.0
Sexual health before engaging in sexual behaviors		
Yes	150	73.9
No	53	26.1
Disclose HPV status before engaging in sexual behaviors		
Yes	165	81.7
No	37	18.3
Disclose HPV status before engaging in sexual intercourse		
Yes	189	92.6
No	15	7.4
Use a condom during sexual intercourse after one month of dating		
Yes	155	74.9
No	46	22.2
Disclose current STI status before engaging in sexual intercourse		
Yes	198	97.1
No	6	2.9
Disclose a past STI status before engaging in sexual intercourse		
Yes	160	78.8
No	43	21.2
Sexual health before engaging in sexual behaviors		
Yes	176	86.7
No	27	13.3
Disclose HPV status before engaging in sexual behaviors		
Yes	177	86.8
No	27	13.2
Disclose HPV status before engaging in sexual intercourse		
Yes	197	96.6
No	7	3.4

engaging in sexual intercourse. More than one-half (n = 140, 69.0%) would tell their sexual partner about a past STI before engaging in sexual intercourse. Three-fourths of the respondents (n = 150, 73.9%) would ask about a partner about sexual health prior to engaging in sexual behaviors. In terms of HPV, 81.7% (n = 165) would tell a partner their status prior to engaging in sex and 92.6% (n = 189) would inform a partner prior to sexual intercourse.

A slight increase in a variety of positive attitudes and beliefs was found when the questions referred to significant others. When questioned about condom use, 22.2% (n = 46) felt it was not necessary to use a condom during sexual intercourse after a month of dating. Similar statistics were found when asked about casual sex partners in that 97.1% (n = 198) of respondents would tell their significant other about a current STI before engaging in sexual intercourse. Less participants (n = 160, 78.8%) would tell a significant other about a past STI before sexual intercourse. More participants (n = 176, 86.7%) would ask a boyfriend about their sexual history before engaging in sexual intercourse compared to casual partners. In terms of HPV, 86.8% (n = 177) would tell their significant other her status prior to sexual behaviors and 96.6% (n = 197) would tell before sexual intercourse.

Sexual Risk Behaviors Scale

The average score on the Sexual Risk Behaviors scale was 10.7 (SD = 20.180; Range = 0 – 103) with higher scale scores indicating participation in higher risk behaviors. The individual Sexual Risk Behavior items were assessed and the average number of sexual partners that participants engaged in sexual risk behaviors with whom they did not know well was 1.1 (SD = 2.609; Range = 0-20). In comparison, the average

Table 6. *Descriptive Characteristics of Sexual Risk Behaviors*

	N	*Mean*	*Standard Deviation*	*Range*
Number of partners engaged in sexual behaviors with that didn't know or didn't know well	203	1.1	2.609	0 - 20
Number of sexual partners in past three months	205	0.7	0.826	0 - 4
Number of sexual partners in past three months that didn't know or didn't know well	203	0.1	0.369	0 - 3
Times engaged in sexual intercourse without a latex or polyurethane condom	202	8.7	22.088	0 - 150
Frequency of sexual intercourse with a new partner before discussing sexual history	198	0.3	0.779	0 - 4
Number of partners had sexual intercourse with who had been sexually active but had not been tested for STIs/HIV	196	0.3	0.636	0-4

number of partners with whom respondents had sexual intercourse with in the past three months was 0.7 (SD = 0.826; Range 0-4) with an average of 0.1 partners (SD = 0.369; Range 0-3) they didn't know or didn't know well. Respondents had sexual intercourse without a latex or polyurethane condom an average of 8.7 times (SD = 22.088; Range = 0 – 150). Respondents also had sexual intercourse with an average of 0.30 persons (SD = 0.636; Range = 0-4) of whom had not been tested for STIs/HIV.

Bivariate Associations

Age of sexual debut was positively associated with HPV knowledge (r = 0.166, p = 0.055). The number of partners a respondent engaged in sexual intercourse with over the past three months whom they didn't know or didn't know well was positively associated with HPV knowledge (r = 0.138, p = 0.051). Finally, the belief that one should tell a current sexual partner their HPV status before engaging in sexual intercourse had a marginal negative correlation with HPV knowledge (r = -0.130, p = 0.065).

Although hearing about HPV was not associated with increased HPV knowledge, the mode of learning the information was. Respondents learning about HPV from a school course (n = 61, 83.6%) had higher HPV knowledge than those who did not (n = 73, 68.2%). (χ^2 = 5.366, df = 1, p = 0.021) Those who heard about HPV from television, magazines, or the radio (n = 99, 79.2%) displayed higher levels of HPV knowledge than those who had not (n = 35, 63.6%). (χ^2 = 4.863, df = 1, p = 0.027) Next, it was found that if respondents learned about HPV from their parents (n = 91, 79.8%) they scored higher on the HPV knowledge scale than those who did not (n = 43, 65.2%). (χ^2 = 4.730, df = 1, p = 0.030) Those respondents who sought out information about the virus from the internet (n = 52, 83.9%) they had higher levels of HPV knowledge than those who did

not (n = 82, 69.5%). (χ^2 = 4.417, df = 1, p = 0.036) Finally, if female respondents heard about HPV from their group of friends (n = 78, 80.4%) they scored higher on the HPV knowledge scale than those who did not (n = 56, 67.5%). (χ^2 = 3.938, df = 1, p = 0.047) Hearing about HPV from a gynecologist or a family doctor and increased HPV knowledge was not associated.

Female participants who engaged in sexual intercourse (n = 110, 78.0%) reported significantly higher knowledge scores than those who have not engaged in sexual intercourse (n = 37, 60.7%). (χ^2 = 6.475, df = 1, P = 0.011) Respondents who were currently dating (n = 66, 80.5%) had significantly higher knowledge levels than those who were not (n = 71, 65.5%). (χ^2 = 5.040, df = 1, P = 0.025) Conversely, those who were currently not looking for a relationship (n = 49, 81.7%) had significantly higher knowledge scores than those who were (n = 70, 67.3%). (χ^2 = 3.940, df = 1, P = 0.047) Finally, female respondents who did not believe one should tell a sexual partner about a HPV diagnosis before engaging in sexual intercourse (n = 14, 93.3%) reported marginally significance in higher HPV knowledge than those who did belief one should disclose their HPV status (n = 134, 71.3%). (χ^2 = 3.421, df = 1, p = 0.064).

Multivariate Linear Regression Models

Multivariate linear regressions were conducted to examine the relationship between the respondent's sexual health and history, HPV risk factors, HPV preventative measures, sexual risk behaviors, sexual attitudes and beliefs as independent variables predicting HPV knowledge, the dependent variable. The variables measuring sexual health and history included: (1) age, (2) age of sexual debut, (3) relationship status, (4) number of lifetime sexual partners, (5) ever heard of HPV, (6) STI diagnosis. The overall

model was not significant (F = 1.654, p = 0.277). The variables measuring HPV risk factors included: (1) age of sexual debut, (2) number of lifetime sexual partners, and (3) history of STI diagnosis. The overall model was not significant (F = 2.099, p = 0.104).

The variables measuring HPV preventative measures included: (1) ever having a Pap smear, (2) condom use, and (3) HPV vaccination status. There were no significant associations between HPV knowledge and engaging in HPV preventative measures (F = 1.595, p = 0.193). Furthermore, the Sexual Risk Behaviors Scale was used to examine respondents engaging in sexual risk behaviors. The overall model was not significant (F = 0.892, p = 0.502).

The Sexual Attitudes and Beliefs Scale was used to examine the respondent's attitudes and beliefs regarding safe sex practices and partnership disclosure. The overall model was marginally significant (F = 1.707, p = 0.068). Believing that one should tell her sexual partner about a current STI prior to engaging in sexual intercourse significantly predicted HPV knowledge (β = -0.180, p = 0.041). Believing that one should inquire about her partner's sexual health history prior to engaging in sexual intercourse significantly predicted HPV knowledge (β = 0.202, p = 0.022). Finally, believing that one should ask her significant other about their sexual health history prior to engaging in sexual intercourse also significantly predicted HPV knowledge (β = -0.223, p = 0.013). The predictors accounted for 32.0% of the variance in HPV knowledge. There were no other significant associations between HPV knowledge level and the remaining sexual attitude and belief predictors.

Finally, a multivariate linear regression was performed using variables shown to be associated with HPV knowledge levels in bivariate statistical analyses, including: (1)

currently dating, (2) currently looking for a relationship, (3) ever engaging in sexual intercourse, (4) age of sexual debut, (5) frequency of sexual intercourse in the past three months with someone the respondent didn't know or didn't know well, and (6) the belief that a person should disclose her HPV status to her partner prior to engaging in sexual intercourse as independent variables predicting HPV knowledge, the dependent variable. The overall model was significant ($F = 3.180$, $p = 0.011$). Only one of the six predictors was significant in predicting HPV knowledge level. The belief that a person should disclose their HPV status to a sexual partner prior to engaging in sexual intercourse significantly predicted HPV knowledge ($\beta = -2.070$, $p = 0.041$). The entire regression model accounted for 39.7% of the variance in HPV knowledge. There were no other significant associations between HPV knowledge level and the remaining predictors.

Discussion

The present study is one of the first to assess the relationship between HPV knowledge and HPV risk factors, preventative measures, sexual attitudes and beliefs, and sexual risk behaviors among undergraduate female students. Contrary to previous findings, awareness of HPV was relatively high, with more than 90% (n = 81, 91.6%) of study participants indicating that they had heard of HPV. The top three modes of gaining knowledge concerning the infection included television, magazines, or the radio (69.4%), family doctors or parents (each 63.3%), and friends (53.9%). This is significant in that studies conducted in the early 1990s observing HPV knowledge in college students displayed that an average of less than 15% of the samples had heard of HPV. Results observed from the present study are consistent with the possibility that HPV awareness is on the rise, with current studies displayed rates between 30% and 75% in United States

undergraduate student samples. This rise in the level of awareness and knowledge in this sample may potentially be due to the result of the recent media attention given to the virus, particular with the television campaign for the vaccine, Gardasil. However, this study can neither prove nor disprove this as it was not included in the survey. Additionally, although knowledge level was correlated to learning about HPV from media outlets, vaccination adoption still remained low. A little over half (51.9%) of the study sample indicated that they had been fully vaccinated and 5.3% were in progress of receiving the full three dose requirement. These results display that although knowledge may be increased, acceptability or perceived risk of diagnosis still remains low.

Greater awareness, however, does not necessarily imply correct knowledge. Indeed the data suggest that the majority of students (98.0%) were able to identify the causal link between high risk HPV infection types and cervical cancer diagnosis. This is surprising in that previous studies have reported much poorer understanding of this relationship. However, a lack of understanding in the prevalence and effects of the virus on fertility were evident. For example, very few participants (36.1%) did not understand the prevalence of HPV infections among persons aged 18 to 25. This is cause for concern since the Centers for Disease Control and Prevention (CDC) report that at least 50% of sexually active individuals will acquire an HPV infection at some point in their life, but ¾ of the participants in this study believed that the prevalence rate was lower for those in their age group. In addition to lack of knowledge concerning prevalence, only 13.7% of respondents correctly answered that being diagnosed with an HPV infection does not adversely affect one's ability to get pregnant. This lack of understanding about HPV may

potentially result in unnecessary stress and concern if participants are diagnosed with HPV in the future.

In terms of hearing about the virus, a noteworthy, but troubling finding is that although a majority of participants (63.3%) reported hearing about HPV from a family doctor and 51.1% from a gynecologist, the most significant correlate to increased HPV knowledge is when data are received from the television, magazines, or radio. There was no correlation between heightened HPV knowledge and gathering the information from a health care profession. The fact that participants still displayed a lack of knowledge in certain areas reinforces the necessity of public health educational campaigns about HPV from certified health professions. Access to and dissemination of appropriate information regarding the virus is imperative to avoiding undue stress and increased stigmatization.

Discrepancies arose when respondents were asked to indicate the cause of an abnormal Pap smear and STI and HPV diagnosis history. Five participants indicted that they had an abnormal Pap smear due to an infection and two due to an HPV infection. However, when questioned about STI diagnosis, only three females (1.5%) stated that they had an occurrence of and infection. Furthermore, of all the respondents, only 1.4% indicated that they have been infected with HPV. The participants may be confused and not know what is categorized as a sexually transmitted infection. However, over 95% of the study sample correct responded that an abnormal Pap smear may be indicative of an HPV infection and over 85% correctly indicated that HPV is classified as an STI. This evidence postulates the question of whether social desirability bias was evident during the survey administration.

When reflecting back on the hypotheses of the current study, one can see that only one hypothesis was supported by the results produced. The first hypothesis stated that women with higher HPV knowledge will have a higher age of sexual debut, a lower incidence history of STIs, and a lower incidence of sexual partners. Multivariate linear regression models indicated that participating in HPV related risk factors did not significantly predict HPV knowledge level. The second hypothesis stated that women with high levels of HPV knowledge will have increased, condom use, received a Pap smear in accordance to recent regulations, and have completed or are in progress of completing the HPV vaccination regiment. The model displayed that there was adherence to HPV preventative requirements and behaviors did not significantly predict one's knowledge about the virus.

The third hypothesis stated that women with high HPV knowledge will believe they should use protection during sexual intercourse and disclose sexual health histories to their sexual partners. This hypothesis was supported in that the multivariate linear regression model showed that sexual attitudes and beliefs were marginally significant in predicting HPV knowledge levels. More specifically, believing that one should tell her sexual partner about a current STI prior to engaging in sexual intercourse and believing that one should inquire about her partner's and a significant other's sexual health history prior to engaging in sexual intercourse all significantly predicted HPV knowledge. The fourth and final hypothesis stated that women with higher levels of HPV knowledge will engage in less sexual risk behaviors. The model indicated that participation in sexual risk behaviors was not significantly predictive of HPV knowledge among female, undergraduate students.

Limitations

The current study is cross-sectional in nature and therefore is not able to infer causation nor can it assess changes in sexual behaviors and attitude or HPV knowledge over time. In addition to the overall nature, components of the survey methodology proved to have limitations for the current study. Typically, it may be best to avoid questions of the agree-disagree format. Studies show that questions stated in the agree/disagree form tend to elicit a positive, agree response. Not only may the results be biased, using this format will not measure the intensity or strength of the opinion held. This survey chose to use the yes/no format during the Sexual Attitudes and Beliefs portion in order to elicit a quick and simple survey administration for the respondents.

A second limitation in methodology is that the year of the HPV vaccination was not explicitly asked. Results indicated that although a respondent may have stated that she had not heard of HPV, she may have dictated that she was fully vaccinated for the virus. Perhaps if the year was asked, respondents would have thought more carefully regarding their answer. Future studies should include more details in regards to the vaccination question, such as year and reasons for or for not being vaccinated.

In terms of generalizability, the current study included a modest sample size gained from convenience sample restricted to the female undergraduate students attending a single, medium-sized Southeastern university. As a convenience sample was conducted, the findings may not be generalizable to all United States university students or similarly aged peers not attending college. Moreover, the majority of the female students attending the surveyed university were middle-class, heterosexual, Christian, and

Caucasian. The lack of cultural diversity in the overall sample adds an additional challenge in generalizing the findings.

Awareness and knowledge of HPV are typically higher in university populations than found among the general public. Due to the fact that a higher educated population was the main focus, one must take into consideration that most other sections of the United States population would have either similar or decreased HPV knowledge. Moreover, in previous studies, results displayed that women held a higher level of HPV knowledge than men. As a result of this study solely examining female students, the study may overestimate HPV knowledge among university students. Larger, more comprehensive studies are recommended in order to thoroughly evaluate and to indicate whether HPV knowledge and awareness is increasing with the times in student populations as well as in the general population.

Finally, this study relied on participants to self-report their data with no attempt to verify the respondents' information. The use of a self-administered data collection relies fully on the participants' honest answers that are subject to participation bias, mistaken interpretations of survey questions, and inaccurate memory recall. Additionally, self-report is problematic as participants may be influenced by social desirability bias and attempt to answer questions in a format that presents themselves in more conservative and pleasing way.

Although these limitations exist, many precautions were taken to ensure the minimization of participant bias and social desirability bias. These methods include incorporating memory aids such as calendars for longer time limit questions (see Appendix C) and defining terminology prior to beginning the survey (see Appendix B).

In terms of decreasing social desirability, no personal identifiers were included and manila envelopes were used during data collection to increase privacy. Due to the sensitive nature of the questions, specifically when asking about sexual risk behaviors, self-administered survey have been shown to be a valid way for respondents to disclose information comfortably than in other methods such as face-to-face interviews.

Implications and Recommendations

There are several implications as a result of the findings of the current study. The results of the survey found suggest that similar studies should be done with larger, more diverse samples of students. Additionally, this study could examine risk behaviors, attitudes, and HPV knowledge among men in conjunction with women. The population examined by this study is important because of its rate of sexual behaviors. Moreover, these females fall outside the recommended primary vaccine priority audience of 11 to 12 year olds who are not sexually active so it is important to identify their HPV knowledge and vaccine acceptability. However, it is also important to study the younger populations because the current study found that initial onset of sexual activity often takes place before adolescents reach college age.

The most prominent implication of this research study is education curricula and messages regarding HPV must be modified and made more available to the female undergraduate students. The finding that students felt that if they had the HPV vaccine meant that they no longer needed Pap smears displayed the major deficits in HPV knowledge. Although many college institutions incorporated STIs into their health education curriculum, the content should be revised to include more information about HPV infections. Although some universities may already include information about the

virus into their education, the health literacy should be examined to make sure that the materials are not too clinical or scientific in its presentation. Educational materials that are not appropriate or relatable to the population it is aimed at may have the opposite intended effect and lead to increased stigma. Risk perception research shows that when messages and content are too in-depth and complex, confidence in the information will decrease and perceived ability to make informed decisions regarding the subject matter is minimized. Suitable HPV and other sexual health curricula are vital to increasing the public's ability to protect themselves and prevent the spread of HPV. HPV related messages should aim to empower, promote accurate HPV risk information, differentiate the effects of HPV from other STIs, and discuss the current gaps in HPV research and practices.

Prior studies have focused on the cumulative incidence of HPV infection and potential characteristics that may increase the risk of infection to women. Presently, there has been no comparative study on the association between being diagnosed with HPV and woman's subsequent sexual risk behaviors. Initially this study was intended to examine the sexual risk behaviors of a cohort of female university students who have and who have not had a positive HPV test result. It aimed to observe whether female university students understand the implications of genital HPV infections and alter their sexual risk behaviors to avoid spread. However, after data collection and analysis, only two persons indicated a past HPV diagnosis resulting in an alternative research question. Although past studies indicated a prevalence of 50-70% among college students, social desirability bias may have played a role during the survey completion. Future research should attempt to decrease bias, perhaps by implementing web-based surveys, and

increasing the sample size in order to explore whether those diagnosed with a HPV infection have higher levels of HPV knowledge, less unprotected sexual intercourse and fewer partners, and higher rates of partner disclosure as compared to students who have not been diagnosed. By gaining insight into these findings, an intervention may be created that will address the implications of HPV after diagnosis.

Conclusion

Since HPV is one of the most prominent sexually transmitted infections in the United States, it is imperative that public health officials address the issue within the college age community. Although awareness of the virus is high, gaps in knowledge areas still exist. It is vital that researchers and practitioners develop education curricula and messages appropriate for the undergraduate student population. Although many college institutions incorporate STI prevention into their health education curriculum, the content needs to be revised in order to include the implications of an HPV diagnosis. Public health professionals are encouraged to continue research on predictive factors effecting HPV knowledge and developing materials aimed to decrease the stigmatization of HPV and increase preventative measures.

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Appendices

Appendix A- Informed Consent Form

Emory University School of Public Health
Informed Consent to be a Research Subject

Title: Genital Human Papillomavirus Infection: A Comparison of Risk Behaviors, Attitudes, and Knowledge in a Cohort of Female University Students

Principal Investigator: Brittney Romanson

Introduction

You are being asked to be in a research study. This form is designed to tell you everything you need to think about before you decide to consent (agree) to be in the study or not to be in the study. It is entirely your choice. If you decide to take part, you can change your mind later on and withdraw from the research study. The decision to join or not join the research study will not affect in any way your class standing, course grade, or graduation status. You are being asked to volunteer to participate in this study because you are a female undergraduate student at Emory University. Eligibility criteria for the study includes (1) English speaking, (2) female, (3) student enrolled at Emory University, and (4) age 18-24 years. All students that meet eligibility criteria are welcome to participate in the study. The approximate total number of participants expected to take part in this study is 150 females. The expected duration of your participation in this study is 30 minutes.

Purpose

This study will be conducted to examine the attitudes, knowledge and sexual behaviors of female university students who have and who have not had a positive HPV test result.

Procedures

You will be asked to fill out a 50-item questionnaire that will include questions on demographics, sexual history, sexual attitudes and behaviors, and your current HPV knowledge.

Risks and Discomforts

There may be risks, discomfort or side effects from the study activities that are not known at this time. The most common risk expected in this study is discomfort in the discussion of personal information, especially information regarding sexual behaviors. This risk will be reduced as any disclosure is completely voluntary. Every effort will be made possible to protect the confidentiality of your individual responses.

Benefits

This study is not designed to benefit you directly. Participation in this study can help further research in the field of sexual health, specifically in the human papillomavirus. This study will add to our knowledge of the attitudes and behaviors of HPV infected females and may indicate potential areas where an intervention is needed. Potential benefits of participation in the study may include a greater awareness of your sexual behaviors. Additionally, you will have your HPV knowledge enhanced after completion of the survey as you will be given the answers to the HPV knowledge section of the survey. Participation may be educationally beneficial for you as it will expose you to how scientific research is conducted and will allow you to be a part of the research process.

Compensation

You will not be offered payment for being in this study.

Confidentiality

Certain offices and people other than the researchers may look at your study records. Government agencies and Emory employees overseeing proper study conduct may look at your study records. These offices include the Emory Institutional Review Board, the Emory Office of Research Compliance, and the Emory School of Public Health. Emory will keep any research records we produce private to the extent we are required to do so by law. A study number rather than your name will be used on study records. All questionnaires will have no identification information on the survey and sequential numbers will be assigned to the completed surveys during data entry and analysis. The investigator will not be able to connect your identity to the questionnaire.

Withdrawal from the Study

You have the right to leave a study at any time without penalty. This decision will not affect in any way your class standing, course grade, or graduation status.

The investigators have the right to stop your participation in this study without your consent if:

- They believe it is in your best interest;
- You were to object to any future changes that may be made in the study plan;
- or for any other reason.

Questions

Contact Brittney Romanson, the principal investigator, at bbroman@emory.edu or Dr. Jessica Sales at jmcderm@emory.edu:

- if you have any questions about this study or your part in it, or
- if you have questions, concerns or complaints about the research

If you have questions about your rights as a research subject or if you have questions, concerns or complaints about the research, you may contact the Emory Institutional Review Board at 404-712-0720 or 877-503-9797 or irb@emory.edu.

Consent

We will give you a copy of this consent form to keep. Do not agree to this consent form unless you have had a chance to ask questions and get answers that make sense to you.

Nothing in this form can make you give up any legal rights. By verbally consenting to this form you will not give up any legal rights. You are free to take home an unsigned copy of this form and talk it over with family or friends.

Please verbally agree and the primary investigator will sign and date below if you agree to participate in this study.

_____

Participant Number

_____ _____

Signature of Person Conducting Informed Consent Discussion Date
Time

Appendix B- Glossary of Terms

Glossary

The following is a list of definitions for terms used in the following survey. Please read this before starting- especially the definitions of "sex" and "sexual behaviors." The terms in this survey may be used differently than the way you typically use them.

Birth Control: Methods used to prevent pregnancy which may include taking birth control pills, norplant implants, etc.
Note: Only latex and polyurethane condoms protect against STIs.

Condom: A male condom is a sheath, typically made of latex, that is placed on the outside of the penis and covers the entire shaft of the penis to aid in the protection against pregnancy and STIs.
Note: Only latex and polyurethane condoms protect against STIs.

Hooking up: Engaging in sexual behaviors, such as making out or fondling.

HPV: Human Papillomavirus infection.

Oral Sex: The act of using a person's mouth to stimulate or touch the genitals of a man or a woman (ie. fellatio, "blow job," "going down on someone")

Pap Test/Smear: A Pap test is done to look for changes in the cells of the cervix. During a Pap test, a small sample of cells from the surface of the cervix is collected by your gynecologist. The sample is then spread on a slide (Pap smear) and sent to a lab for examination.

Sex/Sexual Intercourse: Vaginal sex, where a man's penis penetrates a woman's vagina.

Sexual behavior: Includes passionate kissing, fondling, petting, oral stimulation, and hand-to-genital stimulation.

Sexual partner: A person with whom you have had sexual intercourse with or engaged in sexual behaviors with.

STI: Sexually transmitted infection (ie. herpes, chlamydia, syphilis, HIV, etc.).

Vaginal sex: Sexual intercourse where a man's penis penetrates a woman's vagina.

Appendix C- Women's Health Survey

Basic Demographics

Directions: The following are questions concerning how you identify yourself. Please answer the questions by circling the letter or writing in the answer that describes you the best.

1. What is your age (in ***years***)?

_____ years

2. What is your current year in school?

❑First Year ❑Third Year ❑Fifth Year
❑Second Year ❑Fourth Year ❑Other _____

3. What is your race?

❑White ❑ Asian ❑Black or African American
❑Middle Eastern ❑Native Hawaiian or Pacific Islander
❑American Indian or Alaska Native ❑Multiracial
❑Other _____

4. What is your ethnicity?

❑Hispanic or Latino ❑Not Hispanic or Latino

5. What is your sexual orientation?

❑Only attracted to people of the opposite gender (heterosexual)
❑Only attracted to people of the same gender (homosexual)
❑Attracted to both genders (bisexual)
❑Other _____

6. What is your current relationship status?

Married ❑Yes ❑No
Dating ❑Yes ❑No
If **YES**, number of people currently dating?
_____ person(s)

If **ONE** person, length of monogamous relationship?
_____ month(s)

Looking ❑Yes ❑No

Sexual Health and History

Directions: The following are questions concerning your sexual health. Answer the questions by either circling the letter that corresponds to the number of times each item is true for you, the letter that describes you the best, or Yes or No. Please consider **your whole lifetime** when you are answering these questions. ***Please be honest and remember that all of your answers are kept confidential.***

7. Have you ever had sexual intercourse (vaginal sex)? If yes, how old were you when you **first** engaged in sexual intercourse (vaginal sex)?

❑No, I have never had sexual intercourse → **Go to Question 11**

❑Yes, _____ years old

8. How many partners have you had sexual intercourse (vaginal sex) with?
(Please fill in a ***number***)

_____ person(s)

9. What type of birth control method (if any) did you use **the last time** you engaged in sexual intercourse?
(Check ***all*** that apply)

❑None
❑I am abstinent (do not have sexual intercourse)
❑Male Condoms (regular condoms that cover the penis)
❑Female Condoms (condoms for women that are inserted into the vagina)
❑Withdrawal method (take out penis from vagina before ejaculation—"pulling out")
❑Diaphragm
❑Birth Control Pill/Patch
❑Norplant implant
❑Depo-Provera (an injected hormonal birth control)
❑IUD
❑Cervical Cap
❑Spermicide (only)
❑Contraceptive Sponge
❑Vaginal Cap
❑Other _____

10. Have you ever had sexual intercourse (vaginal intercourse) without a condom with a person you were not in a committed relationship with?

❑No
❑Yes

11. A Pap test/smear is done by a gynecologist to look for changes in the cells of the cervix. Have you ever had a Pap test/smear?

❑No → **Go to Question 13**

❑Yes

If **YES**, how long has it been since you had your **last** Pap test/smear?

- ❑Within the past year
- ❑Within the past 2 years
- ❑3 or more years ago

12. Have you ever had an abnormal Pap test/smear?

❑No

❑Yes

If **YES**, what did your health care profession say was the cause?

- ❑Dysplasia or cervical dysplasia
- ❑An infection (ie. yeast infection, herpes, trichomonas)
- ❑HPV infection
- ❑I don't know

13. Have you ever heard of the Human Papillomavirus (HPV)?

❑No

❑Yes

If **YES**, where have you heard about HPV? (Check ***all*** that apply)

- ❑Parents ❑Friends ❑Family doctor
- ❑Television/Radio/Magazines ❑Internet
- ❑Gynecologist ❑School course ❑Other _____

14. The HPV vaccination is taken at three time periods. The first dose is on a date you and your health professional choose. The second dose is two months after your first dose. The third dose is taken six months after your first dose. Have you had the HPV vaccination and if so, to which dosage point have you completed?

- ❑I have never had the HPV vaccination.
- ❑I am in the process of receiving my HPV vaccination.
- ❑I have not completed my HPV vaccination.
  - At which dose did you stop?
  - ❑2nd dose ❑3rd dose
- ❑I have been fully vaccinated (3 doses) in the appropriate time frame.

15. How many times have you been diagnosed by a doctor with a sexually transmitted infection (STI)? *If you have had the same STI, such as gonorrhea, more than once, count each incident.*
(Please fill in a ***number***)

_____ times

16. Have you ever been diagnosed with one or more strands of the Human Papillomavirus (HPV)? If yes, what was the **year** of diagnosis?

❑No

❑Yes, _____ (*year*)

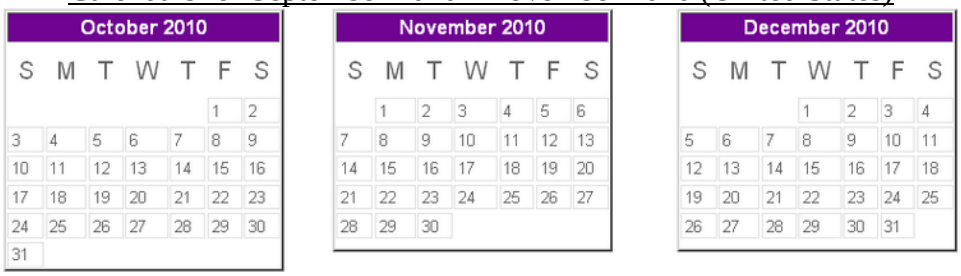
17. Have you ever been diagnosed with cervical cancer? If yes, what was the **year** of diagnosis?

❑ No

❑Yes, _____ (*year*)

Sexual Risk Behaviors

Calendars for September 2010 - November 2010 (United States)



October 2010						
S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

November 2010						
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

December 2010						
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Holidays and Observances

October 10: Columbus Day

October 11 – October 12: Fall Break

October 31: Halloween

November 25: Thanksgiving

November 25- November 28: Thanksgiving Break

December 1- December 9: Hanukkah

December 15 – January 12: Christmas Break

December 25: Christmas Day

December 31: New Year's Eve

Directions: Above are calendars of the last three months. Please read the following statements and record the number that is true for you **over the three months** for each question on the blank. If you do not know for sure how many times a behavior took place, try to estimate the number as close as you can. **If the question does not apply to you or you have never engaged in the behavior in the question, put a "0" on the blank. Please do not leave items blank.** Refer to the Glossary for any words you are not sure about. ***Please be honest and remember that all of your answers are kept confidential.***

18. In the past **three months**, how many partners have you engaged in sexual behaviors with, but did ***not*** have sexual intercourse (vaginal sex) with, that you didn't know or didn't know well? (Please fill in a ***number***)

_____ person(s)

19. In the past **three months**, how many people did you have sexual intercourse (vaginal sex) with?
(Please fill in a ***number***)

_____ person(s)

20. In the past **three months**, how many partners have you had sexual intercourse (vaginal sex) with that you didn't know or didn't know well?
(Please fill in a ***number***)

_____ person(s)

21. In the past **three months**, how many times have you had sexual intercourse (vaginal sex) without a latex or polyurethane condom?
(Please fill in a ***number***)

_____ times

22. In the past **three months**, how frequently have you had sex intercourse (vaginal sex) with a new partner before discussing sexual history?
(Please circle ***one*** number)

Never	Rarely	Sometimes	Often	Always
1	2	3	4	5

23. In the past **three months**, how many partners (that you know of) have you had sexual intercourse (vaginal sex) with who had been sexually active before you were with them but had not been tested for STIs/HIV?
(Please fill in a ***number***)

_____ person(s)

Sexual Attitudes and Beliefs

Directions: The following are questions concerning your attitudes and beliefs about partner disclosure and protection during sexual intercourse. Answer the questions by circling Yes or No. ***Please be honest and remember that all of your answers are kept confidential.***

Note: Questions 24 – 29 Refer to Causal Sexual Partners

24. Do you believe a person should use a condom during sexual intercourse (vaginal sex) with every new partner?

❑ Yes ❑ No

25. If you had a current sexually transmitted infection (STI) would you tell your partner ***before*** engaging in sexual intercourse (vaginal sex)?

❑ Yes ❑ No

26. Would you tell your sexual partner about a past sexually transmitted infection (STI) ***before*** engaging in sexual intercourse (vaginal sex)?

❑ Yes ❑ No

27. Would you ask a sexual partner about their sexual health ***before*** engaging in sexual behaviors?

❑ Yes ❑ No

28. Would you tell a sexual partner if you had Human Papillomavirus (HPV) ***before*** engaging in sexual behaviors?

❑ Yes ❑ No

29. Would you tell a sexual partner if you had Human Papillomavirus (HPV) ***before*** engaging in sexual intercourse (vaginal sex)?

❑ Yes ❑ No

Note: Questions 30 – 35 Refer to Significant Others (ie. Boyfriends)

30. If a person has been dating her partner for more than one month, do you believe she should still continue to use a condom during sexual intercourse (vaginal sex)?

❑ Yes ❑ No

31. If you had a current sexually transmitted infection (STI) would you tell your significant other ***before*** engaging in sexual intercourse (vaginal sex)?

❑ Yes ❑ No

32. Would you tell your significant other about a past sexually transmitted infection (STI) ***before*** engaging in sexual intercourse (vaginal sex)?

❑ Yes ❑ No

33. Would you ask your significant other about their sexual health ***before*** engaging in sexual behaviors?

❑ Yes ❑ No

34. Would you tell your significant other if you had Human Papillomavirus (HPV) ***before*** engaging in sexual behaviors?

❑ Yes ❑ No

35. Would you tell your significant other if you had Human Papillomavirus (HPV) ***before*** engaging in sexual intercourse (vaginal sex)?

❑ Yes ❑ No

HPV Knowledge

Directions: The following are questions concerning your current knowledge on the Human Papillomavirus (HPV). Please answer the questions by circling True or False.

36. HPV is a sexually transmitted infection (STI).

❑ True ❑ False

37. There are many types of HPV.
❑ True ❑ False

38. Only females can have HPV.
❑ True ❑ False

39. A person usually has symptoms when infected with HPV.
❑ True ❑ False

40. HPV is a virus.
❑ True ❑ False

41. A person's chances of getting HPV increases with the number of sexual partners they have.
❑ True ❑ False

42. The majority of people between ages 18 and 25 have HPV.
❑ True ❑ False

43. HPV can cause HIV/AIDS.
❑ True ❑ False

44. HPV can affect your ability to get pregnant.
❑ True ❑ False

45. HPV can cause genital warts.
❑ True ❑ False

46. Certain types of HPV can lead to cervical cancer.
❑ True ❑ False

47. An abnormal Pap test/smear may indicate an HPV infection.
❑ True ❑ False

48. A vaccine can prevent some types of HPV.
❑ True ❑ False

49. Only females can be tested for HPV.
❑ True ❑ False

50. An HPV vaccine gets rid of the need for Pap tests/smears.
❑ True ❑ False

Thank You!

This completes the questionnaire. Thank you for your participation, the information provided is extremely valuable!

Please hand in your completed survey and receive your Human Papillomavirus (HPV) fact sheet.

You can find more information about Human Papillomavirus (HPV) at: http://www.cdc.gov/std/hpv/default.htm

Appendix D- Demographic Data

Table 1. *Demographics*

Participant Demographics	*N*	*%*
Age		
17	3	1.5
18	40	19.4
19	63	30.6
20	48	23.3
21	38	18.4
22	12	5.8
23	2	1.0
Grade		
First Year	59	28.5
Second Year	73	35.3
Third Year	42	20.3
Fourth Year	33	15.9
Race		
White	154	75.1
Asian	27	13.2
Black or African American	16	7.8
Middle Eastern	2	1.0
Multiracial	6	2.9
Ethnicity		
Hispanic or Latina	8	95.9
Not Hispanic or Latina	189	4.1
Sexual Orientation		
Heterosexual	204	98.6
Bisexual	3	1.4
Relationship Status		
Not Married	155	100.0
Dating	83	43.0
Looking	106	63.5

Appendix E- Sexual Health and History Scale Descriptives

Table 7. *Descriptive Characteristics of Sexual Health and History*

Sexual Health and History Item	*N*	*Mean*	*Standard Deviation*	*Range*	*% (Yes)*
Ever Sex					
Ever engaged in sexual intercourse	204	--	--	--	69.6
Age of Sexual Debut					
Age first engaged in sexual intercourse	135	17.4	1.504	13 - 21	--
Partners					
Number of lifetime sexual partners	142	3.9	3.477	1 - 21	--
Birth Control Method					
None	142	--	--	--	1.0
Male Condoms	142	--	--	--	70.4
Female Condoms	141	--	--	--	1.4
Withdrawal Method	142	--	--	--	13.4
Diaphragm	142	--	--	--	1.4
Birth Control Pill/Patch	142	--	--	--	64.8
IUD	142	--	--	--	2.1
Condom Use					
Sexual intercourse without a condom with a person didn't know or didn't know well	142	--	--	--	64.8
Ever Pap Smear					
Ever had Pap test/smear done by gynecologist	205	--	--	--	45.9
Last Pap Smear					
Within past year	78	--	--	--	85.6
Within past 2 years	12	--	--	--	13.2
3 or more years	1	--	--	--	1.1
Ever Abnormal Pap Smear					
Had an abnormal Pap smear result	10	--	--	--	11.0
Abnormal Pap Smear Cause					
An infection	5	--	--	--	55.5
HPV infection	2	--	--	--	22.2
I don't know	2	--	--	--	22.2
Ever Heard of HPV					
Ever heard of HPV	81	--	--	--	91.6

Table 8. *Descriptive Characteristics of Sexual Health and History (continued)*

Sexual Health and History Item	*N*	*Mean*	*Standard Deviation*	*Range*	*% (Yes)*
Where Heard of HPV					
Parents	114	--	--	--	63.3
Internet	62	--	--	--	34.4
Friends	97	--	--	--	53.9
Gynecologist	92	--	--	--	51.1
Family Doctor	114	--	--	--	63.3
School Course	73	--	--	--	40.6
Television/Magazine/Radio	125	--	--	--	69.4
Other	1	--	--	--	0.5
HPV Vaccination Status					
Never had	59	--	--	--	28.6
In the process of receiving	11	--	--	--	5.3
Not completed	12	--	--	--	5.8
Fully vaccinated	124	--	--	--	59.9
Vaccination Dose Stop					
2nd Dose	7	--	--	--	63.6
3rd Dose	4	--	--	--	36.4
STI Diagnosis					
Number of times diagnosed with an STI	3	--	--	--	1.5
HPV Diagnosis					
Ever diagnosis with one or more strains of HPV	3	--	--	--	1.4

Appendix F- Individual HPV Knowledge Item Scores

Table 3. *Individual HPV Knowledge Items*

HPV Knowledge Question	*Answer*	*N*	*% Correct*
HPV is a sexually transmitted infection (STI).	True	178	86.8
There are many types of HPV.	True	182	88.8
Only females can have HPV.	False	157	76.6
A person usually has symptoms when infected with HPV.	False	180	87.8
HPV is a virus.	True	199	97.1
A person's chances of getting HPV increases with the number of sexual partners they have.	True	188	97.1
The majority of people between ages 18 and 25 have HPV.	True	74	36.1
HPV can cause HIV/AIDS.	False	172	83.9
HPV can affect your ability to get pregnant.	False	28	13.7
HPV can cause genital warts.	True	125	61.0
Certain types of HPV can lead to cervical cancer.	True	201	98.0
An abnormal Pap test/smear may indicate an HPV infection.	True	197	96.1
A vaccine can prevent some types of HPV.	True	199	97.1
Only females can be tested for HPV.	True	50	24.4
An HPV vaccine gets rid of the need for Pap tests/smears.	False	185	90.2

Appendix G- Sexual Attitudes and Beliefs Scale Items

Table 4. *Individual Sexual Attitudes and Beliefs Items*

Sexual Attitudes and Beliefs	*N*	*%*
Use a condom during sexual intercourse with every new partner		
Yes	197	97.0
No	6	3.0
Disclose current STI status before engaging in sexual intercourse		
Yes	192	95.0
No	10	5.0
Disclose a past STI status before engaging in sexual intercourse		
Yes	140	69.0
No	63	31.0
Sexual health before engaging in sexual behaviors		
Yes	150	73.9
No	53	26.1
Disclose HPV status before engaging in sexual behaviors		
Yes	165	81.7
No	37	18.3
Disclose HPV status before engaging in sexual intercourse		
Yes	189	92.6
No	15	7.4
Use a condom during sexual intercourse after one month of dating		
Yes	155	74.9
No	46	22.2
Disclose current STI status before engaging in sexual intercourse		
Yes	198	97.1
No	6	2.9
Disclose a past STI status before engaging in sexual intercourse		
Yes	160	78.8
No	43	21.2
Sexual health before engaging in sexual behaviors		
Yes	176	86.7
No	27	13.3
Disclose HPV status before engaging in sexual behaviors		
Yes	177	86.8
No	27	13.2
Disclose HPV status before engaging in sexual intercourse		
Yes	197	96.6
No	7	3.4

Appendix H- Sexual Risk Behavior Scale Descriptives

Table 5. *Descriptive Characteristics of Sexual Risk Behaviors*

	N	*Mean*	*Standard Deviation*	*Range*
Number of partners engaged in sexual behaviors with that didn't know or didn't know well	203	1.1	2.609	0 - 20
Number of sexual partners in past three months	205	0.7	0.826	0 - 4
Number of sexual partners in past three months that didn't know or didn't know well	203	0.1	0.369	0 - 3
Times engaged in sexual intercourse without a latex or polyurethane condom	202	8.7	22.088	0 - 150
Frequency of sexual intercourse with a new partner before discussing sexual history	198	0.3	0.779	0 - 4
Number of partners had sexual intercourse with who had been sexually active but had not been tested for STIs/HIV	196	0.3	0.636	0-4

Appendix I- Total Scale Score Descriptives

Table 6. *Descriptive Characteristics of Scale Scores*

Scale	*N*	*Mean*	*Standard Deviation*	*Range*
Total HPV Knowledge Score	204	11.3	1.340	7 - 15
Total Sexual Risk Behavior Scale Score	186	10.7	20.180	0 -103
Total Sexual Attitudes and Beliefs Scale Score	194	10.4	2.115	2 - 12