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Evaluating Changes in Knowledge, Beliefs, and Behaviors Associated with HPV Following an Educational Intervention among Women

Crystal Sheaves

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**Evaluating Changes in Knowledge, Beliefs, and Behaviors Associated with HPV Following
an Educational Intervention among Women**

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Dissertation submitted to

School of Nursing at West Virginia University

In partial fulfillment of the requirements for the degree of

Doctor of Philosophy in Nursing

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2015

Keywords: human papillomavirus (HPV), knowledge, beliefs, behaviors

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Abstract

Evaluating Changes in Knowledge, Beliefs, and Behaviors Associated with HPV Following an Educational Intervention among Women

Crystal Sheaves, MSN, APRN, FNP-BC

Background: Prevalence of HPV is estimated to be 10-15% among Americans. HPV is recognized as the causative agent in 99.7% of all cervical cancers. In 2006, a vaccine was released to prevent specific types of HPV that cause cervical cancer. Despite demonstrated vaccine safety and efficacy, vaccine rates are still low at less than 20% among women 18-26 years old. Vaccine uptake may be impacted by women's HPV knowledge and beliefs.

Aims: The purpose of this study was to evaluate changes in women's knowledge, beliefs, and behaviors associated with HPV following an educational intervention study. Specifically, the study was designed to evaluate the effectiveness of a video-based HPV prevention education intervention as compared to the standard of care written HPV educational material on improving women's knowledge, beliefs, and behaviors regarding HPV prevention.

Methods: This study used a quasi-experimental pre-test/post-test design with delayed intervention treatment for the control group. Recruitment included women 18-26 years of age who had not yet had the HPV vaccine.

Results: Both the control and intervention group had low HPV knowledge prior to education. Knowledge scores increased significantly for both groups following education. Type of education had no significant impact on HPV knowledge. Women's willingness to accept the vaccine for themselves and their children increased for both groups over time, while the women in the video-based intervention were significantly more willing to accept the vaccine for their adolescent sons at time 2. Health beliefs related to HPV infection and HPV prevention also

positively changed for both groups over time. Furthermore, health beliefs were a significant predictor of participants' willingness to accept the vaccine for themselves at time 2.

Conclusion: Despite the majority of women having regular contact with health care providers for pap testing in this study, participants had overall low HPV knowledge scores at study enrollment, which improved following both educational approaches. The women in this study had an increased willingness to accept the vaccine for themselves and their adolescent children following education and women receiving the video-based intervention were significantly more willing to accept the vaccine for their adolescent sons at time 2. Why this happened is unclear, but perhaps the video-based educational information regarding eligibility for the vaccine was more gender neutral than the CDC written fact sheet used in this study. Future studies need to explore why women who have access to regular pap testing are not receiving the HPV knowledge that would facilitate their ability to make informed decisions regarding HPV primary prevention. Additionally, future research should investigate the impact of gender neutral language in HPV educational materials as a means of increasing HPV vaccine uptake among adolescent males.

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Chapter 1

Human Papillomavirus (HPV) is the most common sexually transmitted infection (STI) in the United States (US), causing many serious physical and psychological health concerns for those infected (Weinstock, Berman, & Cates, 2004). Recent advances in HPV screening and prevention have the potential to positively impact the incidence of disease. However, lack of HPV knowledge is a barrier to utilization of prevention measures (Bynum Brandt, Friedman, Annang, & Tanner, 2011; Juraskova, Obrien, et al., 2011). Creative, evidence based, HPV educational interventions are needed to correct this problem. This study proposes to evaluate the effectiveness of an innovative and novel video-based HPV educational intervention on participants' HPV knowledge, beliefs, and behaviors.

Background of the Problem

Pathophysiology

HPV is one of many papillomaviruses found in different animal species (Gearhart, 2011). Each papillomavirus is species specific, and cross species infection does not occur. Thus only human papillomavirus is found in the human species (Stanley, 2010). HPV is transmitted between humans via skin to skin contact (Brandt et al., 2006). Transmission of the virus was not well understood until the late 20th century. In 1949, HPV genital warts were first recognized as being contagious and transmitted via a virus, although not until the 1970s did scientists' hypothesize HPV was associated with cervical cancer (Sarid & Gao, 2011). The first evidence to support this hypothesis was discovered by Harald zur Hausen in 1983 when HPV types 16 and 18 were identified in association with cervical cancer (Oliveira, 2007; Sarid & Gau, 2011). HPV is now recognized as the causative agent in 99.7% of all cervical cancers (Ault, 2006). Research continues to uncover the number of types of HPV and their effect on the human body. To date

science has identified over 130 subtypes of HPV. Of these 40 are known to infect the genital tract of humans, 15 of which are known to be oncogenic high-risk types (Stanley, 2010). The additional 25 types are non-oncogenic low-risk types of HPV, including HPV types 6 and 11 commonly understood to cause genital warts (Stanley, 2010).

HPV is a genome of double stranded DNA, which infects the squamous and glandular epithelium. Currently there are 8000 base pairs of the genome identified. It is believed the HPV E6 and E7 oncoproteins play a major role in cervical cell mutations. These oncoproteins from high-risk HPV types activate cell oncogenesis, while simultaneously suppressing tumor suppressor genes found in the host cells (Ault, 2006; Oliveira, 2007). This results in uninhibited replication of the HPV genes in host cells causing cell dysplasia. These oncogenic HPV types have been identified as causative organisms in cervical, penile, anorectal, and head and neck cancers in humans (Sarid & Gao, 2011).

Not all persons infected with HPV will be chronic carriers of the virus or develop symptoms of the disease. For most infected (90%) with HPV the immune system will clear the virus from their body within two years of infection (Centers for Disease Control [CDC], 2012; Ault, 2006). A lack of understanding still exists as to why the immune response is not successful in clearing the virus from all persons infected. There is evidence that secondary bacterial and viral infections, viral load, parity, oral contraceptives, and cigarette smoking all play a part in the lack of immune response in those who go on to develop HPV related symptoms (Ault, 2006; Villa et al., 2002). Also unknown is the exact incubation period from contraction of HPV to either clearing of the disease or evidence of symptoms. Originally, HPV was thought to cause oncogenesis slowly over a period of ten years or more, but recent research suggests oncogenic changes can occur in as little as three years (Ault, 2006). An important fact is that immune

clearing of the virus does not appear to confer immunity to HPV. People whose immune system has cleared a specific HPV type can still be infected with other HPV types, and can even be re-infected with the same HPV type (Villa et al., 2002). For this reason even persons previously diagnosed with HPV should be encouraged to utilize additional HPV prevention (condoms, vaccination, and pap screening).

Incidence/prevalence

HPV is recognized as one of the most common STIs worldwide, but precise worldwide prevalence is difficult to obtain due to differences in access to screening technology and frequency of screening (World Health Organization [WHO], 2009). The 2009 WHO report showed that only 5% of women in low-income developing countries have received screening for HPV, compared to 75% of women in high-income developed countries. Therefore, worldwide reporting of cervical cancer incidence is the most accurate way to determine probable infection with high-risk HPV types. Worldwide estimates suggest cervical cancer incidence is 16.2 per 100,000 women (Castellsague et al., 2007), and is the second most common cancer worldwide (Heymann as cited in Stanhope & Lancaster, 2012). The WHO (2009) reports that the highest incidence of cervical cancer is seen in the poorest and least developed countries.

In America, HPV is estimated to be the most common STI among adults (Weinstock et al., 2004). Approximately 26-29 million Americans are infected with HPV, resulting in a prevalence rate of 10-15% of Americans (Tyring, 1997), consistent with WHO (2007) estimates of 13.1 % in the United States. The CDC (2009) estimate there will be six million new cases of HPV each year and at least 50% of people will contract HPV in their lifetime.

Estimates from the National Health and Nutrition Examination Survey (NHANES) conducted by the CDC examined the prevalence of high-risk and low-risk types of HPV among

females aged 14-59 years. Overall HPV prevalence was 26.8% (23.3%-30.9%) among females 14-59 years (n=1,921) (Dunne et al., 2007). Prevalence estimates show the total prevalence of HPV types 6, 11, 16, and 18 to be 18.5%. Findings suggest both high-risk and low-risk types are more prevalent among 20-24 year old women (55.3% and 36.3% respectively) with overall prevalence for this age group being 44.8% (95% confidence interval) (Dunne et al., 2007). Both the 14-19 year olds and the 20-24 year olds had more high-risk than low-risk types of HPV and higher viral loads than older women. There was a higher prevalence rate of HPV among women 14-24 years (33.8%), compared to older women 25-59 years (25-29 years = 27.4%; 30-39 years = 27.5%; 40-49 years = 25.2%; 50-59 years = 19.6%) (Dunne et al., 2007).

Extrapolation of exact prevalence estimates of HPV by state are not possible given the current reporting practices in America (Weinstock et al., 2000). HPV is currently not a reportable disease in most states. However, inferences can be made based on the incidence of cervical cancer by state (Horner, Altekruse, Zou, Wilderoff, Katki, & Stinchcomb, 2011). In a recent CDC report, the incidence of cervical cancer was the highest at 8.5-11.2% among West Virginia (WV), Kentucky, Maryland, Delaware, New Jersey, Arkansas, Oklahoma, Texas, Louisiana, Mississippi, Alabama, and Florida (CDC, 2007).

A study sponsored by the CDC and the WV Bureau of Public Health assessed the prevalence of high-risk HPV (hrHPV) among 814 women in the state using provider collected and self-collected samples (Reed, et al., 2004). For women younger than 40 years of age the prevalence of hrHPV types was 25.5%. While women older than 40 years of age had a prevalence of 12.5% for hrHPV types (Reed, et al., 2004).

These findings of high prevalence rates of hrHPV are consistent with high incidence rates of cervical cancer found in a study of Appalachian states (Hopenhayn, King, Christian, Huang, &

Christian, 2008). Out of five Appalachian states, WV was noted to have the highest incidence rates of cervical cancer (10.9 per 100,000 women) (listed in order of incidence: West Virginia, Kentucky, Alabama, Pennsylvania, and Ohio). The states with the highest incidence were also found to be those with the highest levels of poverty and lowest levels of education, factors that are relevant to WV, an entirely rural Appalachian state (Hopenhayn et al., 2008).

Psychosocial Burden of HPV

Several studies have highlighted the psychological burden of HPV (Bertram & Magnussen, 2008; Daley et al., 2008; Daley et al., 2010; Kahn et al., 2005; Lagro-Janssen & Schijf, 2005; McCaffery & Irwig, 2005; Perrin et al., 2006; Sandfort & Pleasant, 2009 ; Waller et al., 2007). Women diagnosed with HPV have been shown to experience negative emotions of shame and stigma associated with the diagnosis. These negative emotions are compounded by the lack of knowledge regarding HPV prevalence among the population. Stigma associated with HPV has implications for disease prevention in the future. Studies have identified stigma associated with HPV as a barrier to prevention seeking behaviors, partner notification, and social support (Friedman & Sheppard, 2007; Perrin et al., 2006). Addressing the psychosocial stigma attached to HPV diagnosis is important to facilitate successful prevention programs.

The lack of knowledge regarding HPV and cervical cancer screening is associated with increased feelings of stigma and psychological distress over subsequent positive diagnosis with HPV (Bertram & Magnussen, 2008; Daley et al., 2008; Daley et al., 2010; Lagro-Janssen & Schijf, 2005). A study of women's knowledge and experience of stigma associated with diagnosis of HPV found women's HPV knowledge was low, and that lower knowledge was associated with higher levels of anxiety and stigma over receiving the diagnosis of HPV (McCaffery & Irwig, 2005). Regular contact with health care personnel during annual pap

testing presents an opportunity to increase knowledge and decrease adverse emotional responses to subsequent diagnosis of the disease (Waller, Marlow, & Wardle, 2009).

Prevention

Primary prevention. Prevention of cervical cancer, a result of infection with HPV, involves primary prevention through HPV vaccination and secondary prevention through **Papanicolaou (pap)** smear screening. Until recently, secondary prevention was the mainstay of cervical cancer prevention, and was cited as a major factor in the reduction of cervical cancer in America (Hawkins, Cooper, Saraiya, Gelb, & Polonec, 2011). However, in 2006, the US Federal Drug Administration (FDA) and the European Union approved the first HPV vaccine for girls and young women ages 11-26 years (Wheeler, 2007). The first vaccine approved was a quadrivalent vaccine, marketed as Gardasil[®], which provides protection against two oncogenic types of HPV (types 16 and 18 and two non-oncogenic types of HPV known to cause genital warts, types 6 and 11). Cervarix[®], a bivalent HPV vaccine which protects against oncogenic types 16 and 18, was approved later that same year (Wheeler, 2007). Most recently the Advisory Committee on Immunization Practices (ACIP) added the recommendation to vaccinate young boys ages 11-12 with the quadrivalent HPV vaccine (CDC, August 2011).

Studies show HPV vaccines to be safe and effective at preventing HPV infections, with both vaccines demonstrating efficacy of 100% for intended HPV types (Wheeler, 2007). Vaccine side effects appear to be minimal with the most common side effects being pain and irritation at the injection site (Wheeler, 2007). Because first generation HPV vaccines do not include all oncogenic types, the possibility for future research to include other HPV types in vaccine formulations is likely. Additional research is ongoing to determine long-term immunity

provided by currently approved vaccines, alternate dosing schedules, and the need for and timing of booster immunizations (Wheeler, 2007).

A problem with prevention has been the low rates of current vaccination. According to the CDC's National Immunization Survey data (MMWR, February 3, 2012), only 48.7% of adolescents aged 13-17 years in the US have received ≥ 1 dose of the HPV vaccine, and only 32% have received the recommended ≥ 3 doses of the vaccine series. Rates for WV from the National Immunization Survey are slightly lower than the national rates at 42.4% of adolescents receiving ≥ 1 dose of HPV vaccine, and only 25.3% receiving ≥ 3 doses of the vaccine series. HPV vaccination rates are also low among women 19-26 years old, with only 20.7% of women having received at least one dose of HPV (MMWR, February 3, 2012). In comparison to other states, WV ranked in the middle on HPV immunization rates for adolescents with Idaho having the lowest rates of ≥ 1 and ≥ 3 HPV doses (28.8% and 17.6% respectively), and Rhode Island having the highest rates of 73.0% and 55.1% respectively (CDC, December 2011).

Lack of HPV knowledge has been cited as a barrier to immunization (Bynum et al., 2011; Juraskova, Bari et al., 2011). Several studies have demonstrated support for increasing vaccine knowledge by addressing health beliefs with educational initiatives as a way of increasing vaccine intentions (Brewer et al., 2011; Cates, Brewer, Fazekas, Mitchell, & Smith, 2009; Fazekas, Brewer, & Smith, 2008; Gerend, Cruz, & Shepherd, 2007; Gerend & Magloire, 2008; Kahn, Rosenthal, Hamann, & Bernstein, 2003; Kahn et al., 2008). A review of HPV vaccine studies, supports using the Health Belief Model (HBM) to guide future educational endeavors for HPV vaccine promotion (Mishra, 2011). Included in the model based education are promotional messages emphasizing efficacy, official's recommendations, and susceptibility to cancer as major

facilitators of intention to vaccinate. Future HPV vaccine educational efforts should focus on these facilitators, while eliminating barriers to vaccination.

Secondary Prevention. According to the National Cancer Institute (NCI) 2005 report 78% of sexually active women over the age of 18 years have received a pap test within the past 3 years. This number is relatively high for secondary prevention of HPV related cervical cancer. Similarly, the CDC (2009) reported a rate of 83.6% for women 18-44 years, 80.6% for women 45-64 years, and 54.9% for women 65 years and older with an average of 73% of women 18 years and older having a pap smear test within the past 3 years.

Pap smear technology has evolved in recent years, relying on thin-prep method of collection, and utilizing hybrid capture technology to isolate HPV genomes for typing on abnormal pap smears (Roland, Larkins, Benard, Berkowitz, & Saraiya, 2010). This has led to fewer false-positive and false-negative pap smear results (Agorastos, Sotiriadis, & Chatzigeorgiou, 2010).

Pap smear education of women has not kept pace with changes in pap smear technology. While most women have heard of and have undergone pap smear testing in the US, they do not fully understand the purpose of pap test screening (Hawkins et al., 2011; Panagopoulou, Giata, Montgomery, Dinas, & Benos, 2011; Vasconcelos, 2011). In fact, women most often report other reasons (contraception, pelvic pain or symptoms) for attending clinics for pap smear testing, not related to HPV or cervical cancer screening (Bayer, Nussbaum, Cabrera, & Paz-Soldan, 2011; Bertram & Magnussen, 2008; Daley et al. 2010; Friedman & Sheppard, 2007; Perrin et al., 2006; Vasconcelos, 2011). Contributing to the lack of knowledge, women reported a lack of education by health care providers during routine pap test visits with 71.6% of them reporting never receiving information about HPV during the visit. This study highlights the

need for more HPV and cervical cancer education of women during routine gynecologic pap visits (Cermak, Cottrell, & Murnan, 2010).

Impact

Despite advances in HPV prevention and screening technology, there remains underutilization and lack of knowledge regarding preventive services. Those least likely to access vaccination as a means of prevention (poor, less educated) are the same people at highest risk of morbidity and mortality associated with HPV. Evidence supports women seeking pap smear screening have unmet information needs (Daley et al., 2008; Kwan et al., 2010; McCaffery & Irwig, 2006; Rosen et al., 2010). These unmet educational needs provide evidence of a major gap in nursing practice that can be addressed through research. This study was designed to have a direct impact on educational needs of women at high-risk for increased HPV morbidity and mortality. The aim was to educate in order to change knowledge and beliefs about HPV, thus promoting behaviors toward increased utilization of HPV prevention (vaccination).

Significance of the Study

Contribution to Nursing Knowledge and Practice

While nursing knowledge has supported a link between lack of HPV knowledge, increasing HPV stigma, and underutilization of HPV prevention, the best method of delivery of HPV information has yet to be identified (Bertram & Magnussen, 2008; Carpenter, 2010; Daley et al., 2010; Kahn et al., 2005, McCaffery & Irwig 2005, Perrin et al., 2006, Sandfort & Pleasant, 2009). Previous research suggests people can be either positively or negatively affected by the method of delivery and type of HPV information (McCaffery & Irwig, 2005; McCree, Sharpe, Brandt, & Robertson, 2006). To date, no particular HPV educational program has been shown to

be most effective in increasing patient knowledge of HPV, decreasing associated stigma, and changing patient beliefs and behaviors toward HPV prevention.

Understanding which educational interventions are most effective is important to nursing practice, because nurses have direct access to patients attending primary care clinics, and are often the first health care providers to provide health specific information for patients. Nurses as patient educators need access to evidence based effective educational tools. Identification of an effective educational program, with the potential for wide acceptance by nursing staff as a pre-pap smear educational tool, is important for nursing practice. Understanding the effectiveness of such a tool will add to nursing's knowledge and contribute to future interventions by the profession to decrease the morbidity and mortality associated with HPV.

Potential Impact on Health and Quality of Life

HPV is associated with significant morbidity and mortality. HPV morbidity is related to the chronic potential recurrence of genital warts, the psychological experience of stigma related to HPV diagnosis, and fear of cancer associated with HPV related cervical dysplasia. While HPV mortality has decreased among developed countries utilizing secondary prevention, lives saved could be greater with increased awareness and acceptance of HPV primary prevention (vaccination). Currently there is an underutilization of available HPV primary prevention services. Identification of superior HPV prevention education programs to decrease morbidity and mortality from HPV is necessary for the continued health and quality of life of our population.

Social Significance

Socially the video-based HPV educational intervention has the potential for changing normative views about HPV among the study population. In addition, the evaluation of best

practice for HPV education delivery could positively impact health care delivery practices.

Improved education regarding HPV has the potential to contribute to decreasing HPV morbidity and mortality, especially in the rural state of WV where risk factors for HPV and prevalence rates are relatively high. Therefore, this study sought to provide evidence to support policy decisions regarding funding to support HPV educational programs that facilitate HPV primary prevention vaccination, as well as, informing policy decisions to support funding that would remove the barrier of cost associated with access to vaccination for this age group.

Major Constituents of the Study

Statement of Purpose

The purpose of this research was to evaluate changes in knowledge, beliefs, and behaviors following an HPV educational intervention among rural women 18-26 years old. It was hypothesized that video-based first account stories of persons diagnosed with HPV and clear messages about prevention and treatment measures are more powerful educational tools for increasing patients' perceptions of susceptibility and severity of HPV than written information alone (Rosen et al., 2010; Waller, Marlow, & Wardle, 2007). By increasing perceived susceptibility and severity of HPV among the study population, there will be increased knowledge of HPV, decreased HPV stigma, increased perceived benefits to prevention, and decreased perceived barriers to prevention, resulting in increased intention toward HPV vaccination uptake.

The decision to use a video-based educational medium along with written material in the intervention group was made as a way to increase learner engagement in the material. Based on previous literature, written material alone might not be sufficient to change health beliefs (Rosen et al., 2010; Waller et al., 2007). Story telling has previously been used in health education of

patients as a means of increasing the patients' engagement in the material being presented (Comas-Diaz, 2012). By augmenting the written information with the addition of video-based stories the learner will be engaged both visually and auditorily with the information presented in a way that will increase learning. In addition, the decision to use video-based first account stories from persons diagnosed with HPV was made on the basis that the information might be more meaningful when received from persons with similar backgrounds as the patients receiving the education. This could be construed as using a form of "cultural brokerage" (the use of culturally competent strategies to reach patients) (Alexander, Uz, Hinton, Williams, & Jones, 2008). In this instance, patients were believed to be more open to hearing about the disease from women like themselves who have had the disease.

Ultimately, the increased engagement in the educational material was designed to foster increased perceived susceptibility and severity of HPV among the study population. In addition, there will be increased knowledge of HPV, decreased HPV stigma, increased perceived benefits to prevention, and decreased perceived barriers to prevention, resulting in increased HPV primary prevention (vaccination) utilization behaviors.

Research Question

1. How effective is a video-based HPV prevention education intervention compared to written HPV educational material at improving women's knowledge, beliefs, and behaviors regarding HPV prevention?

Hypothesis: The video-based HPV prevention education intervention will be superior to the written material at improving women's knowledge, beliefs, and behaviors regarding HPV prevention.

Sub-questions:

- i. How effective is a video-based HPV prevention education intervention compared to written HPV educational material at improving women's knowledge of HPV?

Hypothesis: The video-based HPV prevention education intervention will be more effective than the written HPV educational material at improving women's knowledge of HPV.

- ii. How effective is a video-based HPV prevention education intervention compared to written HPV educational material at improving health belief model (HBM) constructs (perceived susceptibility, perceived severity, perceived benefit, perceived barriers) regarding HPV prevention among women?

Hypothesis: The video-based HPV prevention education intervention will be more effective than written HPV educational material at improving HBM constructs (perceived susceptibility, perceived severity, perceived benefit, perceived barriers) regarding HPV prevention among women.

- iii. How effective is a video-based HPV prevention education intervention compared to written HPV educational material at improving women's behaviors regarding HPV primary prevention?

Hypothesis: The video-based HPV prevention education intervention will be more effective than written HPV educational material at improving women's behaviors regarding HPV primary prevention.

- iv. How effective is a video-based HPV prevention education intervention at decreasing women's perceived stigma associated with HPV?

Hypothesis: The video-based HPV prevention education intervention will result in decreased perceived stigma among women in this study.

Definition of Terms

There are four HBM constructs to define in this study; perceived susceptibility, perceived seriousness, perceived benefit, and perceived barrier. Perceived susceptibility is the likelihood that participants will understand the prevalence of HPV and will believe themselves to be susceptible to the disease. Perceived severity is the likelihood that participants will believe HPV to be personally life threatening if they contract the disease. Perceived benefit is the net positive effect participants will believe the HPV vaccine will have on protecting them from HPV. Perceived barriers are any obstacles participants believe will impede their access to the HPV

vaccine. Additionally, a fifth term, "cue to action", is defined as either an intrinsic or extrinsic motivator to change participants' health beliefs. In this study, "cue to action" refers to the educational intervention. However, other "cues to action" are also assessed as part of the study instrument sub-scale titled cues to action. Lastly, the term HPV behavior is defined as participants' intentions toward acceptance of the HPV vaccine at follow-up.

Additional term definitions include, video based HPV prevention education intervention, defined as video first account stories of persons diagnosed with HPV and factual information about HPV; written HPV material, defined as a written paper educational handout; HPV knowledge, defined as awareness or understanding of HPV, that can be gained through personal experience or association; and perceived stigma, defined as a stereotypical designation based on a socially undesirable attribute.

Method of Study

The method of study was a quasi-experimental intervention study using pre-test/post-test design with delayed intervention treatment administered to the control group at study completion. Women who presented for care at several family planning clinic sites in southern WV were recruited. The clinics had similar patient demographics, and provided women's health care services through the family planning program, WV Breast and Cervical Cancer Screening program (BCCSP), and private insurance. Patients from half the clinics were assigned to the control group who received the written HPV educational material only, while the other half of the clinics were assigned to the intervention group and received the video-based oral educational intervention and written HPV educational material. Care was taken to avoid spill over between clinics by separating the control and intervention clinic assignments geographically within the

region. Additional participants were recruited on line. Online participants were randomized to either the intervention or control group.

After consent, both groups of women were given pre-tests (instrument is described in Chapter 3) to assess demographics, HPV knowledge, stigma, health belief model constructs, and behaviors toward HPV prevention. Following pre-tests, all participants were given a written HPV educational handout. The intervention participants also watched a short video, which contained a first account story of a woman diagnosed with HPV. The video also provided a segment of factual HPV and HPV vaccine information. Information in the DVD was specifically directed toward changing patient perceptions of the health belief model constructs. All participants were then encouraged to get the HPV vaccine. Patients requesting the vaccine who were uninsured or could not afford the vaccine were provided the Merck Patient Assistance Program Application to seek coverage for the vaccine. At follow-up visits scheduled two month after the initial assessment, participants in both groups took a post-test measuring the same variables as the pre-test including a question regarding intention to get the HPV vaccine (but excluding demographics). Chart audits were conducted at six months post-enrollment in the study to determine the extent that participants completed the HPV vaccine series.

Theoretical Underpinnings

Rosenstock (1966) described the Health Belief Model (HBM) as a theoretical framework to understand why people adopted preventive health measures (Figure 1). The model consists of four constructs (perceived susceptibility, perceived seriousness, perceived benefit, and perceived barriers) to predict how people will behave toward preventive health care (Carpenter, 2010). Assumptions of the model are: 1) the stronger people perceived susceptibility and perceived seriousness of illness, the stronger their behavior toward prevention, 2) the stronger their

perceived benefit and the weaker their perceived barrier, the stronger their behavior toward prevention (Carpenter, 2010). Another component of the model is the "cue to action" prompting people to change their health beliefs. "Cues to action" can be extrinsic (health education activities) or intrinsic (decreasing health status). To date little is known about which cues to action are most pertinent to people's health beliefs (Carpenter, 2010). Previous HPV studies used written educational material as the "cue to action" (Bynum et al., 2011; Gerend & Shepherd, 2007; Juraskova, Bari et al., 2011; Mishra, 2011). In this study, the "cue to action" is a video-based first account of persons diagnosed with HPV and cervical cancer survivor stories, along with factual HPV and HPV vaccine information, designed to change participants perceived susceptibility, perceived seriousness, perceived benefit, and perceived barriers to prevention. As written educational handouts alone will be administered to the control group, comparisons can be made about the most effective "cue to action" regarding HPV prevention following this study.

Strengths of the HBM include the substantial evidence in the literature demonstrating the model's use among various populations and disease states (Cummings, Jette, & Rosenstock, 1978). While originally constructed as a way to predict a person's desire to avoid disease, the model has also been used to evaluate general health motivations in the absence of disease, and even beliefs and behaviors associated with the sick-role (Becker & Maiman, 1975).

Additionally, the model has demonstrated reliability in measuring health beliefs (Maiman et al., 1977), and psychometric validity of Likert and multiple choice techniques for measuring the model constructs (Cummings et al., 1978). Despite the different ways in which constructs have been operationalized in study questionnaires the model has remained predictive, which is a testament to the strength of the model variables (Becker & Maiman, 1975).

Weaknesses of the model include having greater utility in prospective studies as opposed to retrospective study designs (Janz & Becker, 1984). In addition, as a psychosocial model the HBM can only assess an individual's behavior as the behavior relates to current attitudes and beliefs. Janz and Becker also point out that the premise of the model is that health is valued by individuals and there are multiple cues to action. The authors maintain that unless studies take into account cues to action and other moderator variables, like behaviors that are habitual rather than cognitive, and economic and environmental barriers to such action, then the model may not be as good at explaining and predicting behaviors. Additional weaknesses of the model have been the tendency for studies to operationalize the model constructs in different ways. While the model has remained predictive despite these variances, developing standardized tools to measure the model constructs so that comparisons could be made more easily across studies would be important (Janz & Becker). Lastly, there is a need to assess the model's predictive value over time, with the need for additional long-term studies utilizing the HBM (Becker & Maiman, 1975).

Early research of the model suggests the perceived barriers construct is the most predictive of behaviors, and therefore should receive special attention when operationalizing the construct. Aspects to consider when operationalizing the construct of perceived barriers are the social influences and self-efficacy toward behavior change, as both have been shown to be important components of this construct (Becker & Maiman, 1975; Janz & Becker, 1984). While the model can be predictive when only one or two models constructs are assessed, the model has been found to be most predictive when the joint influence of the entire model constructs are assessed together (Becker & Maiman, 1975).

Figure 1.
Health Belief Model

Summary

In summary, HPV is the most common STI in the US, and has serious health consequences for those infected. The morbidity and mortality associated with the disease can be decreased with increasing utilization of available HPV prevention through vaccination. Addressing the most effective education ("cues to action") to facilitate HPV prevention uptake among the population is important to nursing practice. This study evaluated the effectiveness of a video-based "cue to action" upon participant's knowledge, beliefs, and intended behavior toward HPV prevention.

Chapter 2

This chapter will synthesize the existing literature evaluating changes in knowledge, beliefs, and behaviors associated with HPV. Any studies addressing HPV knowledge, beliefs, and behaviors in relation to HPV participant vaccination are included in this review, with special attention given to those evaluating HPV educational interventions designed to increase participant vaccination rates. Emphasis is placed on the relevance of findings to future research designed to change HPV knowledge, beliefs, and behaviors of women. Conclusions were drawn to inform the design, population choice, and intervention type chosen for the proposed study.

Literature Search Process

A systematic search of health science databases (Academic Search Premier, Women's Health International, CINAHL, MEDLINE, and PubMed) was performed. Keywords of HPV, knowledge, beliefs, behaviors, education, information, stigma, shame, prevention and intervention were used to identify the state of the science in current research surrounding HPV prevention behaviors. A total of 4,906 articles were found on the initial search. Limits were then placed for English language, scholarly peer reviewed research studies, interventions aimed at female participants' ages 13-64 years old and published since 1999. This year was selected as a starting point for this search because the most recent Cochrane Review (Shepherd, Frampton, & Harris, 2011) indicated there were no educational intervention studies reported in the literature prior to 1999.

After limits were applied, a total of 570 abstracts were reviewed for any studies evaluating changes in participants' HPV knowledge, beliefs, or behaviors. Several studies were found evaluating HPV knowledge, beliefs, and behaviors, but relatively few studies (i.e. seventeen) included an educational intervention to promote HPV vaccination among women (Table 1). Because of the paucity of educational intervention studies, the decision was made to

include any studies discussing HPV knowledge, beliefs, and behaviors in relation to HPV vaccination (Table 2 & 3). The inclusion of these studies provides additional background for the proposed study constructs, with the discussion of educational intervention studies illuminating gaps in the intervention literature that are addressed in the current study (Table 1).

While limits were set for studies of female gender, several recent studies were found to include men among the female population. Studies containing both men and women were included in this review if the researchers specified results pertaining to women participants. A total of 74 studies were synthesized to draw conclusions about HPV knowledge and beliefs, the educational needs of women, and the types of educational interventions found to be effective at increasing HPV prevention behavior, specifically vaccination.

Literature Review

Prior to Federal Drug Administration's release of the HPV vaccine there were relatively few studies evaluating participants' HPV knowledge, beliefs, and behaviors. However, since the introduction of the HPV vaccination, greater emphasis has been placed on studying participants' knowledge and beliefs surrounding HPV, HPV prevention intentions, and actual HPV prevention behaviors. This review will describe the research related to knowledge, beliefs, and behaviors associated with HPV, including a discussion of the educational interventions that have been used to promote HPV vaccination among women.

Knowledge

Knowledge can be described as the awareness or understanding of something, that can be gained through personal experience or association (Merriam Webster's Collegiate Dictionary, 2004). There have been several efforts to measure HPV knowledge in the last twelve years, with studies utilizing both qualitative and quantitative methods to describe levels of HPV knowledge

among participants. The most common qualitative methods used have been phenomenology, content analysis, constant comparative analysis, and framework analysis with both individual interviews and focus groups. Most qualitative studies have evaluated HPV knowledge among female participants, who ranged in age between 14-83 years old (Table 2), while a few have evaluated HPV knowledge among men and women (Bertram & Niederhauser, 2008; Friedman & Sheppard, 2007; Sandfort & Pleasant, 2009).

Quantitative studies have included descriptive, correlational, experimental, and quasi-experimental designs, and have measured HPV knowledge with a variety of measurement instruments, many of which were developed by the study authors to meet the purposes of the particular study. While similar knowledge questions are used in all study instruments, none of the studies utilized the same instrument more than once among different populations as a way of increasing instrument psychometric data.

Regardless of study methodology or population addressed, each study invariably identified deficiencies in HPV knowledge (Table 2 & Table 3). The most frequent knowledge deficits identified are associated with modes of transmission, prevalence, relationship of HPV to cancer, and lack of knowledge regarding prevention methods. While some study participants had heard of HPV, others reported never hearing of HPV. This was true even for participants who had regular contact with health care providers. For example, many studies showed women had good attendance for pap screenings, but still had a lack of HPV knowledge (Fry, Ferries-Rowe, Learman, & Haas, 2010; Kahn et al., 2005; Waller et al., 2009; Warren, 2010).

Continued lack of HPV knowledge among women with regular health care provider contact appears to be related to a lack of provision of HPV education by health care providers (Bayer et al., 2011). Despite the deficiencies in HPV knowledge among those having regular contact with

health care providers, these participants were more knowledgeable than those not having regular health care provider access (Mills, Vanderpool, & Crosby, 2011).

Significant consequences have been reported in the literature in relation to participant lack of HPV knowledge. For instance, lack of HPV knowledge has been identified as negatively impacting HPV beliefs and intentions toward HPV prevention behaviors. Participants with less HPV knowledge were reported to be more likely to believe HPV is a stigmatizing illness, related to promiscuous and morally corrupt behavior by those afflicted (Bertram & Magnussen 2008, Daley et al. 2008, Daley et al. 2010; Friedman & Shepeard 2007; Perrin et al., 2006). In connection with this finding, participants who were subsequently diagnosed with HPV themselves were more likely to experience stigma, shame, and anxiety over the diagnosis (Kahn et al., 2005; Perrin et al., 2006). Participants were also less likely to report intentions toward partner notification, and expressed a lack of social support related to internal and external experiences of stigma when disclosing their diagnosis to family and friends (Perrin et al., 2006). These negative perceptions of HPV as being a disease that only afflicts those who are sexually promiscuous can be corrected with increasing knowledge of HPV prevalence among the general population. Subsequently, understanding the prevalence of HPV can also have a positive impact upon participants' knowledge and beliefs toward HPV vaccination as a prevention measure.

Beliefs

Attainment of new health knowledge can inform health beliefs, which are described as the personal convictions that function to motivate an individual's health behaviors (Mosby's Medical Dictionary, 2008). Health beliefs can be impacted by both internal and external forces and are likely to change over time as persons are exposed to new concepts regarding health and illness (Kidwell & Jewell, 2003). Aside from perceived stigma associated with HPV, the most

commonly measured beliefs in the HPV literature were associated with HBM constructs of perceived susceptibility, perceived severity, perceived benefits, and perceived barriers.

To date perceived stigma associated with HPV has only been described in the qualitative literature. HPV stigma beliefs are complex concepts with social and cultural dimensions, encompassing feelings of shame, guilt, and impropriety in relation to perceived acts of deviant social behavior (McCaffery & Irwig, 2005). Perceived stigma in the qualitative literature appears to be associated with a lack of HPV knowledge. Those participants with increased knowledge of HPV prevalence seemed to describe less perceived stigma associated with HPV, while those who only associated HPV with sexually transmitted disease information perceived more stigma associated with the disease (McCaffery & Irwig, 2005).

Other qualitative studies also support this finding, having documented the perception of stigma associated with HPV among participants with low levels of factual HPV knowledge (Bertram & Magnussen, 2008; Brown et al., 2007; Daley et al., 2008; Daley et al., 2010; Kahn et al., 2005; McCree et al., 2006; Perrin et al., 2006). Most found stigmatization was decreased with increasing knowledge of prevalence of the disease among the general population (Perrin et al., 2006; Friedman & Sheppard, 2007; Bertram & Magnussen, 2008; Daley et al., 2010). There was also a strong preference among most study participants to receive HPV information from health care personnel in a caring atmosphere. This was described as causing less perceived stigma associated with the disease among study participants (McCaffery & Irwig, 2005; McCree et al., 2006; Perrin et al., 2006; Brown et al., 2007; Friedman & Sheppard, 2007; Bertram & Magnussen, 2008).

No quantitative studies have been identified that have yet measured perceived stigma in association with HPV. Among the quantitative literature, the beliefs most commonly measured

were associated with the HBM constructs of perceived susceptibility, perceived severity, perceived benefits, and perceived barriers, with a few studies measuring beliefs associated with moral norms, social norms, behavior control, and attitudes. These constructs were associated with the use of other less commonly used theoretical models (Theory of Reasoned Action, Social Cognitive Theory, Theory of Planned Behavior) (Table 3).

Studies using the HBM have restricted measurement of health beliefs to include only part of the HBM constructs (Table 3). Many studies only included perceived susceptibility and severity, which have been described as weaker than perceived benefits and barriers, and weaker still than the HBM as a whole in predicting changes in prevention behaviors (Carpenter, 2010; Harrison, Mullen, & Green, 1992). Additionally, researchers have suggested that future HBM research include moderator variables (like “cues to action”) in addition to the four traditional model constructs (Carpenter, 2010). Currently, only two HPV studies demonstrated the use of all four HBM constructs and the moderator variable of “cues to action” (Bynum et al., 2011; Juraskova, Bari et al., 2011). While Carpenter’s meta-analysis suggest perceived susceptibility and severity are weaker health belief measures for predicting behavioral outcomes, some HPV studies utilizing perceived susceptibility and severity found them to be positive predictors of HPV intentions and behaviors (Table 3).

Behaviors

Behaviors are described as the actions manifested by persons in relation to some type of stimuli (Merriam-Webster’s Collegiate Dictionary, 2004). Health behavior changes are related to changes in knowledge and beliefs associated with disease and disease prevention, and are often reflected in a person’s intentions toward behavior change. However, intentions toward change alone are not entirely predictive of prevention behavior, therefore, whenever possible a

recommendation is to evaluate actual behavior rather than intentions toward behavior alone (Mills et al., 2011). A weakness of many of the studies in this review was the fact that studies only measured HPV prevention intentions, with few studies actually measuring HPV prevention behaviors, and those who did assess behaviors did so through participant self-report, rather than more rigorous methods (chart review) (Table 2 & Table 3).

In general, most of the reviewed HPV research studies supported some relationship between increasing HPV knowledge and prevention intentions and behaviors (Mills et al., 2011; Juraskova, Bari et al., 2011; Mock et al., 2007; Patel et al., 2012), however, one study demonstrated no link between intentions and behaviors following educational intervention (Juraskova, O'brien et al., 2011). The researchers believed that even though intentions were high among participants, unidentified barriers to vaccination were possible moderators of actual vaccine behaviors. Perceiving this to be true, Mills et al. (2011) removed the barrier of vaccine cost by providing vaccinations for free, and subsequently showed that intentions were related to behaviors when the barrier of cost was removed. This is contrary to other studies, where no association was found between cost and behavior (Juraskova, Bari et al., 2011; Patel et al., 2012). As most studies did not assess perceived barriers, drawing conclusions is difficult regarding the impact perceived barriers may have on actual HPV prevention behaviors.

In addition, aside from the barrier of cost, concerns over vaccine safety (Juraskova, Bari et al., 2011) and access to vaccination clinics might present real barriers to actual vaccine behaviors following education interventions (Mills et al., 2011). Studies also show a connection between behaviors and moderators of vaccine barriers (Juraskova, Bari et al., 2011; Mills et al., 2011; Patel et al., 2012). Examples of moderators of behavior include prevention

recommendation by health care providers, prevention education interventions, and financial support for prevention access.

Most studies were among urban populations, with few targeting low-income disadvantaged rural populations who are disproportionately impacted by HPV and cervical cancer. The universally low levels of HPV knowledge highlights the need for more intervention research aimed at increasing women's knowledge of HPV and HPV vaccination. A gap exists in the literature for assessing the efficacy of different types of theoretically grounded HPV educational material on women's HPV knowledge and prevention intentions.

Theoretical Frameworks Used

There is a lack of theoretical grounding among the HPV literature reviewed. In fact, few (17 out of 69) studies utilized a theoretical framework as part of the study design. Of the theoretical frameworks utilized, the HBM (10) was the most frequently cited in the HPV literature (Table 2 & Table 3). Of the studies using the HBM, only four evaluated the effectiveness of an educational intervention in changing women's health beliefs toward HPV prevention (Gerend & Shepherd, 2007; Gottvall, Tyden, Hodlund, & Larsson, 2010; Juraskova, Bari et al., 2011; Marlow, Waller, & Wardle, 2009). Three of the four evaluated a connection between changing health beliefs and prevention "intentions", and one theoretically grounded study evaluated connections between changing health beliefs and actual HPV prevention behaviors (Juraskova, Bari et al., 2011).

Educational Interventions as "Cues to Action"

There were a total of twenty-five educational intervention studies to promote HPV prevention behaviors found in the HPV literature. Among these, three addressed an educational intervention toward adolescents, with another eleven studies specifically targeting women (Table

1). Another six studies were found addressing college students, including both men and women (included in Table 1). Studies specifically directing educational intervention programs toward women alone included women ages 14 and older, with most studies targeting women 18-26 years old. Types of educational interventions used were written paper fact sheets or brochures (8), web delivered fact sheets (4), vaccine information videos (2), DVD of written power point information (1), face-to-face (5), and face-to-face augmented with written material (5). One of the face-to-face interventions was indirectly related to increasing women's knowledge by educating the physicians at the gynecology clinic regarding the importance of educating women at the time of their annual appointment regarding pap testing. While the educational intervention was targeted at physicians, the outcome measures of pap smear knowledge were assessed via the women attending the clinic (Fry et al., 2010). Another face-to-face/media augmented educational intervention utilized peer lay educators to deliver the content (Mock et al., 2007). Most educational intervention studies relied on immediate post-test measures as follow-up of knowledge retention and changes in health beliefs. Only three studies utilized a longer follow-up period to assess changes in HPV knowledge, beliefs, and behaviors. One of these utilized a one month follow-up (Doherty & Low, 2008), and two utilized a six-month follow-up (Juraskova, Bari et al., 2011; Patel et al., 2012).

While the majority of studies showed that educational interventions can increase prevention intentions (Crosby, Rager, Hanson, & Ribes, 2008; Fry et al., 2010; Juraskova, Bari et al., 2011; Kahn et al., 2005; Kwan et al., 2010; Mock et al., 2007; Papa, Moore-Simas, Reynolds, & Melnitsky, 2009), one study showed no change in prevention intentions after receiving the educational intervention (Patel et al., 2012), and another study showed less

participant self-intention to get vaccinated, but higher intentions to get the vaccine for their children following an educational intervention (Ferris, Waller, Owen, & Smith, 2007).

While all studies measuring HPV knowledge showed an increase post-intervention in knowledge scores, some studies noted knowledge increases were not sufficient following written educational interventions alone (Rosen et al., 2010; Waller et al., 2007). Few studies have evaluated the long-term gains in HPV knowledge and beliefs following an educational intervention, and the subsequent impact on changes in HPV prevention behaviors (Doherty & Low, 2008; Juraskova, Bari et al., 2011; Patel et al., 2012).

Gaps in the Literature for Future Research

Information from health care providers is cited in the literature as trustworthy and preferred by women (Bertram & Magnussen, 2008; Brown et al., 2007; Friedman & Shepeard, 2007; McCree et al., 2006; Perrin et al., 2006), and regular contact with health care personnel during annual pap testing is a good opportunity to increase knowledge and decrease adverse emotional responses to subsequent diagnosis of HPV (Waller et al. 2009). However, researchers have shown that women are often not afforded educational information about HPV nor the purpose of pap testing during routine annual well-woman exams with clinicians (Cermak et al., 2010; Waller et al., 2009). Reasons for this are complex and might involve clinician lack of awareness of patient information needs, lack of adequate educational tools, and lack of clinician time to provide adequate oral review of HPV and pap information. To address these needs, the current study tested the effectiveness of an educational packet designed for administration during well-woman exams. The educational packet included both a video delivered oral presentation and written information. Based on the findings, the educational packet could afford clinicians

with an effective, time-saving tool to address the educational needs of their female patients who present for health care visits.

As a result of this review, educational initiatives not based on theoretical principles may not be as effective at changing health beliefs toward prevention as those with a strong theoretical basis. In addition, using a strong theoretical framework provides guidance for measurement outcomes that might be compared across studies in the future. Having uniform, theoretically grounded intervention tools and outcome measures will contribute to nursing knowledge by generating research that is suitable for comparative effectiveness studies in the future. Currently, there are no comparative effectiveness studies evaluating HPV educational interventions across patient populations.

Only one HPV educational intervention study exists evaluating all HBM constructs to predict participant health beliefs and behaviors (Juraskova, Bari, et al. 2011). Results of this study were promising, and included all model constructs in outcome measures. However, the authors failed to design the actual educational intervention materials around the model constructs. Therefore, the educational intervention may not have adequately impacted behavior change outcomes, making it difficult to show a direct cause and effect connection between the educational intervention offered and the outcomes measured.

To address this lack, the current study proposed to develop a novel educational packet including video first account stories of persons diagnosed with HPV and written HPV educational material, which can easily be administered to patients at the time of well-woman exam visits. The proposed educational packet will be based on theoretical principles of the HBM intended to positively influence participant health beliefs toward HPV prevention behaviors (specifically vaccination). Outcome measures of the study will include HPV knowledge, beliefs,

and behaviors. To assess the effectiveness of the educational packet on behaviors, efforts were taken to remove barriers that might prevent access to HPV vaccination.

Summary

The literature demonstrates a lack of HPV knowledge and transmission of evidence based HPV information among the general population. This lack of knowledge has adverse psychological and physical consequences for those at risk of contracting HPV, as at risk persons with lower HPV knowledge are less likely to utilize available primary prevention HPV vaccination services. The proposed educational program will address participant HPV knowledge and beliefs in an effort to increase participant HPV prevention behaviors.

Table 1: Educational intervention studies among adult women (number of studies = 17)					
Author	Design	Theoretical Underpinnings	Intervention Type	Measures	Findings
Chang et al. 2013	Quantitative Quasi-Experimental Immediate post-test follow-up	None	Face-to-Face lecture based educational seminar	<ul style="list-style-type: none"> • HPV Knowledge • Vaccine intention 	<ul style="list-style-type: none"> • Low pre-intervention HPV knowledge • Knowledge increased post-intervention • Increased intention toward vaccination post-test
Kester, Shed-Steele, Dotson-Roberts, Smith, & Zimet 2013	Quantitative Quasi-Experimental Immediate post-test of intervention group	None	Face-to-Face 10 minute group education session for intervention group only	<ul style="list-style-type: none"> • HPV Knowledge • Vaccine Intention • Vaccine History 	<ul style="list-style-type: none"> • 62% of the seventy four individuals whose health care provider mentioned HPV vaccine had received the vaccine, whereas only 3% initiated vaccination without health care provider recommendation. • Intervention group had higher HPV knowledge scores • 38% had already had the HPV vaccine with 19% completion of the series. • Of those not already having the vaccine, the intervention group was more likely to have intentions toward vaccination (86%) than the control group (57%) (OR=2.09;95%CI = 1.02-9.36; p<0.05)
Vanderpool et al. 2013	Quantitative Quasi-Experimental	Theory of Planned Behavior (TPB) and Information motivation behavioral skills model (IMB) Framework	13 minute Video developed based on IMD Framework to promote completion of 3 dose series	<ul style="list-style-type: none"> • HPV attitudes • Subjective norms • Perceived behavioral control • Vaccine intentions • Vaccine behaviors 	<ul style="list-style-type: none"> • Increased intention for series completion predicted increased behavior for series completion
Krawczyk et al. 2012	Quantitative Experimental Immediate post-test follow-up	HBM	3 groups: <ul style="list-style-type: none"> • Written HPV information • Video HPV information • Control 	<ul style="list-style-type: none"> • Vaccine Intention • HPV and vaccine knowledge and awareness 	<ul style="list-style-type: none"> • Pre-intervention scores modest and intention to vaccination low • Both written and video group had higher knowledge than control group at pre and post intervention testing • Both written and video group had increased intentions to vaccinate post-test than did controls • No difference between type of educational material
Patel et al. 2012	Quantitative Experimental 6 month follow-up	TPB	Fact Sheet and mailed Vaccination Reminder Card to Intervention Group	<ul style="list-style-type: none"> • HPV Knowledge • Vaccine Intentions • Vaccine Behaviors 	<ul style="list-style-type: none"> • Baseline intentions to get vaccinated = 41% • Baseline no intentions to get vaccinated = 31.3% • Reasons for intentions to get vaccinated: worry over CC (65.7%), worry over genital warts (48.6%), physician recommendation (40%) • Reasons for no intentions to get vaccinated: safety concerns (48.8%), side effects (48.8%), cost (41.3%), long-term consequences (40.0%), not being at risk for HPV (28.8%) • HPV knowledge not correlated with vaccine intentions • Intervention was associated with vaccine behavior (5.5% had 1 dose of vaccine at 6 month follow-up) • Intentions associated with behavior (those with intentions to vaccine more likely to get vaccinated) • Cost and sexual risk taking not associated with intentions but not behavior
Gerend & Shepherd. 2011	Quantitative Quasi-Experimental	None	Vaccine Video	<ul style="list-style-type: none"> • HPV Knowledge • Health Beliefs (perceived barriers) • Vaccine Attitudes 	<ul style="list-style-type: none"> • Low initial HPV knowledge despite most hearing of HPV before • Gain frame or Loss Frame video had no effect on intentions to get vaccinated • 27% had intentions to get vaccinated post-intervention

	Immediate Post-Test and 2 month Follow-up			<ul style="list-style-type: none"> Vaccine Intentions 	<ul style="list-style-type: none"> 30% had no intentions 44% undecided Perceived barriers to vaccine = safety (26%), cost (17%), fear of shots (11%), no need (9%), and no access (6%) Safety and low need were mentioned more often among non-intenders, other barriers mentioned more often among intenders
Juraskova, Bari et al. 2011	Quantitative Experimental 6 Month Follow-up	HBM	2 educational fact sheets Leaflet 1: Cervical Cancer (CC) information Leaflet 2: CC and Genital Wart (GW) information (delivered via computer)	<ul style="list-style-type: none"> HPV Knowledge Perceived Severity Perceived Susceptibility Perceived Barriers Perceived Benefits Cues to Action Vaccine Intentions Vaccine Behaviors 	<ul style="list-style-type: none"> ↓ HPV Knowledge pre-test [only 55% had heard of HPV, no group differences in pre-test knowledge ($\chi^2_1=1.12$; $p<0.05$)] Intentions ↑ post-intervention ($n=73$, 37% had received the vaccine post-intervention, and 76% reported sought information with intention to receive vaccine) Intentions to get vaccine predictor of behavior to get vaccine post-intervention (odds ratio [OR], 2.07; $p=0.23$; 95% confidence interval [CI], 1.11-3.89) Intentions to get vaccine predictor of information seeking behavior post-intervention CC+GW group (44%) more likely to get vaccine than CC only group (32%) Perceived barriers and Perceived benefits were the greatest predictors of vaccine intentions ($p<0.05$) Barriers = side effect concerns, access, pain, cost, multiple injections Note: vaccine provided free to this population, but cost was cited as barrier if they would have to pay for it Measured Actual Behaviors at 2 month follow up
Juraskova, O'Brien et al. 2011	Quantitative Experimental 2 month follow-up	TPB and moral norm constructs	2 different Fact Sheets <ul style="list-style-type: none"> One on HPV, cervical cancer One on HPV, cervical cancer, genital warts (delivered via computer)	<ul style="list-style-type: none"> Attitudes Normative Beliefs Perceived Behavior Control Intention Moral Norms Behavior 	<ul style="list-style-type: none"> Intentions, perceived behavior control, and moral norms were predictors of behavior (could be used to classify 67.1% of cases ($\chi^2=12.475$; $p=0.029$)) Model (TPB) predicted 54% of variance in intention to get vaccination ($R^2=0.54$ $F_{3,155}=61.580$, $p<0.001$) Intention predicted 9.6% of variance in behavior ($\chi^2=7.355$; $p=0.007$)
Mills et al. 2011	Quantitative Experimental	None	Brochure Free Vaccine Voucher	<ul style="list-style-type: none"> Sexual Behaviors Vaccine Behaviors 	<ul style="list-style-type: none"> Focus was on removing barrier of cost for vaccine to determine likelihood of vaccination Clinic participants more likely than college participants to get vaccinated (measured vaccine behavior through voucher receipts for shots given) Clinic population using condoms or oral contraceptive were more likely to get vaccinated ($p=0.0009$) and ($p=0.010$) respectively College women using IUD were more likely to get vaccinated ($p=0.30$) Those having previous pap test more likely to get vaccinated ($p=0.005$) Those with no doctor contact in last 12 months less likely to get vaccination ($p=0.036$) Those with hx of abnormal pap were less likely to get vaccination ($p=0.001$) Those participating in mutual masturbation less likely to get vaccination ($p=0.006$)
Stock,	Quantitative	None	Fact Sheet	<ul style="list-style-type: none"> HPV Knowledge 	<ul style="list-style-type: none"> Intervention ↑ knowledge, and perceived risk to HPV [$F(1,236)=31.62$,

Peterson, Houlihan, & Walsh 2012	Experimental			<ul style="list-style-type: none"> • Oral Sex Willingness • Risk Perception • HPV concern • Vaccine Intentions 	<p>$p < .001$ ($d = 0.78$; $M_s = 0.69$ vs. 0.49)</p> <ul style="list-style-type: none"> • Intervention ↓ intention to oral sex among women [$F(1,130) = 6.47$, $p > .02$ ($d = 0.50$)] • Men expressed ↑ likelihood to get vaccination after intervention (more so than women) [$F(1,176) = 16.85$, $p < .001$ ($d = 0.71$; $M_s = 5.49$ vs. 4.36)]
Warren 2010	Quantitative Quasi-Experimental 2 month post-test	None	Face-to-Face with written on HPV	<ul style="list-style-type: none"> • HPV Knowledge 	<ul style="list-style-type: none"> • ↑ knowledge post-intervention • ↓ HPV knowledge at pre-test
Yanikkerem, Piyan, Kavlak, & Karadeniz 2010	Quantitative Quasi-Experimental	None	Face-to-face	<ul style="list-style-type: none"> • Sexual behavior • HPV knowledge and awareness • Vaccine Attitudes • Vaccine Intentions 	<ul style="list-style-type: none"> • ↓ HPV knowledge pre-intervention (mean pre-test score was 11.6 (SD 1.76, range 10-20) • ↑ knowledge post-intervention (mean post-test score was 18.8 (SD 1.52, range 11-20) ($p < 0.001$) • ↑ positive attitude toward vaccine after intervention (62.4% wanted to be vaccinated post intervention)
Marlow et al. 2009	Quasi-Experimental	HBM	Educational fact sheet	<ul style="list-style-type: none"> • Vaccine Intentions • Vaccine Attitudes • Beliefs (benefits/barriers) 	<ul style="list-style-type: none"> • ↑ perceived susceptibility = ↑ acceptability of vaccine ($p < 0.001$) • ↑ perceived benefit = ↑ acceptability of vaccine ($p < 0.001$) • ↑ barriers (worry about side effects, afraid of needles) = ↓ acceptability of vaccine ($p < 0.001$) • Benefits and barriers = strongest predictors of acceptability • Culture & religion explained 6% of variance on vaccine acceptability, but was not significant ($F(6,301) = 1.43$; < the critical value of 2.13 for $p = 0.05$) • White, higher socioeconomic had ↑ acceptability over ethnically diverse, lower socioeconomic participants (94% vs. 86% OR=2.38, CI: 1.13-5.05)
Doherty & Low 2008	Quantitative Experimental	None	Fact Sheet (delivered via web)	<ul style="list-style-type: none"> • HPV Knowledge and Attitudes 	<ul style="list-style-type: none"> • Women had higher knowledge ($M = 5.03$, $SD = 1.77$) vs. Men ($M = 3.75$, $SD = 2.23$; $t(117) = -3.35$, $p < 0.05$), women ($M = 12.74$, $SD = 1.61$; $t(117) = -4.02$, $p < 0.05$) had higher positive attitudes toward vaccine than men ($M = 11.45$, $SD = 1.87$), women ($M = 18.31$, $SD = 3.58$) had higher perceived susceptibility to infection on pre-test than men ($M = 15.92$, $SD = 2.78$; $t(117) = -4.1$, $p < 0.05$) • ↑ positive attitudes to vaccine post-test for intervention group ($F(1,116) = 3.1$, $p = 0.08$) • ↑ perceived risk to HPV post-test for intervention group ($F(1,116) = 26.1$, $p < 0.001$) • ↑ knowledge of HPV post-test for intervention group ($F(1,116) = 71.4$, $p < 0.0001$) • Knowledge maintained at 1 month follow-up • Intervention group = clinical improvement, but not significant improvement on condom use at one month follow-up ($N = 78$) (intervention group $M = 61.19\%$ vs. control $M = 49.64\%$) on self-report of condom use post intervention ($F(1,15) = 0.79$, $p = 0.38$)
Ferris et al. 2007	Quantitative Quasi-Experimental	None	Pamphlet	<ul style="list-style-type: none"> • HPV Knowledge • Vaccine Attitudes 	<ul style="list-style-type: none"> • Attitudes toward getting self-vaccinated ↓ after intervention (59% pre-intervention vs. 50.2% post-intervention) (when removing neutral response option from analysis this was not as large and increased to 57% post-intervention) [main reason for not wanting vaccine post-

	Immediate Post-Test Follow-up				<p>intervention was report of not being at risk]</p> <ul style="list-style-type: none"> • Attitudes toward getting daughter vaccinated ↑ after intervention (65.8% post-intervention, $p=0.015$, Bowker test of symmetry) • Biggest reason for not wanting vaccine for self was monogamy and low perceived need (29% and 15% respectively) • Attitudes for those undecided on pre-test were more positive after intervention
Gerend et al. 2007	Semi-structured Interview Correlational	HBM	Face-to-Face education	<ul style="list-style-type: none"> • Sexual behavior • Vaccine Intentions • Beliefs (benefits/barriers) • Anxiety • Approach-Avoidance Motivation 	<ul style="list-style-type: none"> • Intentions to get vaccine generally high (mean = 5.40, SD=0.96) • ↑intentions correlated with ↑susceptibility, perceived safety, perceived effectiveness, and physician recommendation, and hx of previous HIV testing ($F[5,45]=14.169$, $p<0.001$)
Lambert 2001	Quasi-Experimental	None	Face-to-face education	<ul style="list-style-type: none"> • HPV Knowledge 	<ul style="list-style-type: none"> • Lower HPV knowledge pre-test (45% answered correctly pre-test vs. 79% correctly post-test) • PA students' knowledge > psychology students • Knowledge = between gender • ↑HPV knowledge at 3 month follow-up • Physician assistant (PA) students' knowledge still > psychology students • Psychology students had > overall improvement in knowledge (32% to 70%) vs. PA students' knowledge increase (60% to 89%)

↑ = increased, ↓ = decreased

Table 2: Qualitative HPV knowledge, beliefs, and behaviors studies						
Adolescent						
Hilton & Smith 2011	United Kingdom	N = 87 Female Ages: 12-18 years Purposive Sample				<ul style="list-style-type: none"> • 78 were vaccinated against HPV at time of study • ↓ HPV knowledge of transmission • ½ knew HPV caused CC • Although most were vaccinated, they didn't really understand what the vaccine protected against – stating mothers made the decision to vaccinate • Only ½ aware of pap test for CC
Scarinci, Barces-Palacio, & Partridge 2007	Birmingham & Anniston Alabama	N = 28 Latina N = 17 Afr. Amer. Female Cross-sectional of Latina Immigrants and African American Women	Qualitative Focus Groups	None	Brief HPV information provided after initial discussion of STI knowledge	<ul style="list-style-type: none"> • Lack of knowledge re: STI transmission among Latina; AA women more knowledgeable • Most had never heard of HPV • After HPV information: AA felt all women at risk, whereas Latina felt only those with risk factors presented in presentation • Both groups willing to accept HPV vaccine • Skeptical about vaccine effectiveness, side effects, cost • Latina had fewer vaccine concerns than AA
Racktoo & Coverdale 2009	UK	Female Age: 12-13 years	Qualitative Focus Groups Framework Analysis	None	None	<ul style="list-style-type: none"> • ↓ HPV knowledge • Barrier = fear of vaccine, pain from shot, concern over side effects • + attitude toward acceptance of vaccine despite vaccine concerns • Preference for education materials (face-to-face or video augmented by written)
College Students						
Sandfort & Pleasant 2009	Urban	N = 1500 male and female health professions college students	Quantitative			<ul style="list-style-type: none"> • ↑knowledge overall of HPV • ↑knowledge = ↓stigma associated with disease • Males = ↑stigma and ↓knowledgeable than females • 75% knew HPV was STD, info source TV, friends, school, internet • Preferred info. source = health care professional and internet
Women						
Author	Setting	Population	Study Design	Theory	Intervention	Findings
Rosenthal, Dyson, Pitts, & Garland 2012	Australia Diverse population from women's health and educational institutions in the country	N = 34 Female Age: 22-77 yo	Qualitative Focus Group	None	None	<ul style="list-style-type: none"> • Overall knowledge of vaccines assessed with most being positive toward vaccines in general • More controversy over HPV vaccine in particular because of negative association with STI • Information needs before getting vaccine included more info on side effects, effectiveness, and whether pap test were still needed • In general women said that if information presented the vaccine was safe, effective and was doctor recommended they would get the vaccine

						<ul style="list-style-type: none"> and give it to their children Nurses in the study felt it was important to educate patient more and noted they often have more time for this than physicians Nurses also expressed some lack of information re: vaccine...needed more info on how long it would last, should women who are sexually active still get the vaccine, etc.
Francis et al. 2011	South Africa Clinic	N = 24 Female Age: 18-44 years	Qualitative Focus Groups	None	None	<ul style="list-style-type: none"> ↓HPV and CC knowledge Barriers to vaccine (access, concern over side effects)
Short et al. 2010	University based gynecologic clinic	N= 38 Female Age: 27-55 yo Mean age 40 yo	Qualitative Framework Analysis	None	None	<ul style="list-style-type: none"> Many had heard of the vaccine, but HPV knowledge facts were not always accurate Women felt all women should have access to the vaccine Women felt reasons for vaccine were previous sexual exposure or future exposure if not in a monogamous relationship Barrier to vaccine was cost, access, concern over side effects, negative opinions of others, and lack of endorsement by physician Women did not see vaccine status as affecting their pap smear screening behavior
Waller et al. 2009	Nationally representative of England, Scotland, Wales	N = 1081 women 25-64 year	Quantitative			<ul style="list-style-type: none"> ↓ awareness of HPV prior to study, ↓ knowledge HPV cancer link large number reported regular pap screening, regular screening = less shame/worry than rare/never screened Knowledge of HPV as STD = ↑ anticipated shame General HPV Education on prevalence = ↓shame Women with college education reported less shame/worry than those with less formal education
Daley et al. 2008 2010	Urban clinic	N = 52 (qualitative phase) N = 154 (quantitative phase) women 18-45 years	Mixed methods	None	None	<ul style="list-style-type: none"> ↑HPV knowledge overall, ↓understanding high-grade vs. low grade HPV, transmission, effect on fertility Internet common source for info Dx = stigma, fear, anxiety, self-blame, powerlessness, anger, ↑knowledge = ↑ power/control over Dx
Bertram & Magnussen 2008	Urban	N = 10 women 18-35 years with Dx abn. pap in last 5 years	Qualitative Phenomenology	None	None	<ul style="list-style-type: none"> ↑Stigma associated with STD nature of HPV ↓Knowledge of HPV, misinformation, misunderstanding common Like internet info for privacy, but too much STD info, hard to find HPV specific info, prefer health care provider for info
Bertram & Niederhauser	Urban	N = 492, cross- sectional, both male	Quantitative			<ul style="list-style-type: none"> Female with ↑ risk and those with Hx abn. pap had ↑ knowledge

2008		and female				<ul style="list-style-type: none"> • ↓knowledge overall, ↓knowledge among male population
Brown et al. 2007	Urban	N = 20 women, 25-83 years	Qualitative	None	Face-to-Face Brief information re: new HPV pap test as opposed to old pap test	<ul style="list-style-type: none"> • ↑stigma associated with sexual transmission of HPV • + attitude toward HPV testing • lacked awareness of HPV overall • Education improved resulted in positive attitude toward HPV testing
Friedman & Sheppard 2007	Nationally representative of US	N = 314 35 Focus groups adults age 25-45 years old	Qualitative	None	None	<ul style="list-style-type: none"> • ↓knowledge overall of HPV, women more knowledgeable than men • Stigma associated with STD nature of disease
Waller et al. 2007	Urban	N = 909 women	Quantitative			<ul style="list-style-type: none"> • ↑stigma and shame in those who knew HPV was a STD • knowledge of prevalence = ↓stigma, shame, and anxiety • Written ed. material did not translated into adequate knowledge of HPV, Need more research communicating HPV information
McCaffery & Irwig 2005	Rural	N=44 Women 19-63 years Dx with High Risk HPV within the last year, 68% African American	Qualitative			<ul style="list-style-type: none"> • Health care provider most trusted source of information and preferred source overall • Some prefer privacy of written material (brochures in doctors office), Lack trust/preference for TV, magazine ads, internet • Prefer easily understandable information, ↓ preference for large amounts to sort through • All expressed need for more HPV/abnormal pap information overall
McCree et al. 2006	South Carolina Clinics Rural Predominantly poor and largely African American population	N = 50 Female Ages: 19-63 years	Qualitative Focus groups Constant comparison analysis Purposive sample (HPV positive)	None	None	<ul style="list-style-type: none"> • Written information felt to be adequate, but some said brochures contained too much information to be clearly understood • Video was felt to be a positive means of information delivery, preferred free video from trusted source...downside was no ability to interact with live person • Most preferred method of information delivery was from health care worker in face-to-face setting • Most felt TV and radio were too commercialized to be trusted • Access to internet hindered preference for this media type • ***Although all women dx with abnormal pap and HPV as identified by clinic, only half reported hearing of HPV
Perrin et al. 2006	Urban	N = 52 women 18-44 years recently Dx with HPV	Qualitative Content Analysis	None	None	<ul style="list-style-type: none"> • ↓ HPV knowledge overall • Dx of HPV = feelings of stigma, powerlessness, fear, and anger • Disclosure limited due to fear of stigma, when

		75% white, 9.6% black, 11.5% hispanic, 3.8% asian				disclosing emphasized cancer risk rather than STD association <ul style="list-style-type: none"> • ↑knowledge of prevalence = normalizing = ↓ negative emotions
McCaffery et al. 2005	Urban	N = 19 Women	Qualitative			<ul style="list-style-type: none"> • ↓ HPV knowledge overall • Knowledge of prevalence = ↓ stigma, ↓ distress • Follow up only for abnormal results = ↑psychological distress, Prefer routine follow up to receive pap results, gives opportunity for dialogue with health care provider, and avoids singling out HPV + patients • Health care provider best source of information, internet sources increased confusion and stigma as HPV info is lumped with other STD's

Table 3:
Quantitative HPV knowledge, beliefs, and behavior studies

ADOLESCENT						
Author	Setting	Population	Study Design	Theory	Intervention	Findings
Merzouk et al. 2011	Rural WV High Schools	N = 626 Male & Female Age: 15-16 yo Prospective	Quantitative Experimental	None	DVD of power point	<ul style="list-style-type: none"> • ↑ knowledge of condoms • ↑ overall HPV knowledge in intervention group ($p > 0.05$), but both groups had good knowledge prior to intervention (82% knew HPV related to CC) • Lack of knowledge re: smoking connection
Brabin et al. 2010	Manchester England	N= 2817 pre-test N= 814 post-test Female Age: 12-13 yo Cross-sectional	Quantitative Quasi- Experimental	Elaboration Likelihood Model	Film	<ul style="list-style-type: none"> • Intervention ↑ intention to get vaccinated • HPV factual recall assessed 6 months after viewing film was limited (only 34% recalled what film was about, only 60% answered fact questions correctly, 18% answered incorrectly) • N=29 recalled seriousness of HPV/CC at 6 months • ↓ knowledge of condoms for protection • Film ↑ perceived seriousness of HPV (short-term) and ↓ fear of vaccine
Gottvall et al. 2010	Sweden High school	N = 276 Male & Female Age: 16 yo Prospective	Quantitative Quasi- Experimental	HBM	Face-to-Face with Website/Folder provided	<ul style="list-style-type: none"> • Baseline low HPV knowledge for all students, • Intervention ↑ HPV knowledge • Intervention did not change attitudes toward vaccine • Positive attitudes to pap testing and condom use pre- and post-test • Student preference for face-to-face rather than website or folder
Wang, Simoni, & Wu 2006	WV High Schools	N = 159 Female Ages: 14-20 Purposive Sample	Quantitative Survey Descriptive – Correlational	Theory of Reasoned Action (TRA)	None	<ul style="list-style-type: none"> • ↓ HPV knowledge • Sexually active teens more knowledgeable about using condoms to prevent HPV • Teens in single parent homes more knowledgeable
COLLEGE STUDENTS						
Author	Setting	Population	Study Design	Theory	Intervention	Findings
Bynum et al. 2011	Historically black colleges	N = 575 Male and Female Ages: 18-26 years Cross-sectional	Quantitative Descriptive- Correlational	HBM	None	<ul style="list-style-type: none"> • 75% had heard of HPV (females more than males) • Females more knowledgeable than males • Males scored lower on perceived severity, benefits, cues to action and higher on perceived barriers than females • No gender difference in perceived susceptibility • 71% had heard of the HPV vaccine • Females preferred HPV education from health provider, whereas males preferred television or internet
Gerend & Shepherd 2011	Florida State University	N = 739 Female Ages: 18-26 years	Quantitative Descriptive - Correlational	None	None	<ul style="list-style-type: none"> • Only 3% had not heard of HPV, most knew it was related to CC • ↓ knowledge related to genital warts and transient nature of HPV • Mean knowledge scores 4.9 out of 10 • Correlates of ↑ knowledge (↑age, sexual activity, non-conservative, previous STD testing)
Gerend, Shepherd, & Shepherd 2011	Southeastern University	N = 1612 Female Age: 18-26 yo	Quantitative Quasi- Experimental	None	Vaccine Video	<ul style="list-style-type: none"> • Gain frame or Loss Frame video had no effect on intentions to get vaccinated • 27% had intentions to get vaccinated post-intervention, 30% had no intentions, 44% undecided • Perceived barriers to vaccine = safety (26%), cost (17%), fear of shots (11%), no need (9%), and no access (6%) • Safety and low need were mentioned more often among non-intenders, other barriers mentioned more often among intenders

Stock, Peterson, Houlihan, & Walsh 2012	College	N = 238 Male & Female Age: 18-35 yo Cross-sectional	Quantitative Experimental	None	Fact Sheet	<ul style="list-style-type: none"> Intervention ↑ knowledge, and perceived risk to HPV Intervention ↓ intention to oral sex Men expressed ↑ likelihood to get vaccination after intervention (more so than women)
Vogtmann et al. 2011	Mexico College	N = 1109 Male and Female Age: 17- 26 years Cross-sectional Mexican American	Quantitative Descriptive – Correlational	None	None	<ul style="list-style-type: none"> Those more likely to have heard of HPV = older, female, science students, higher socioeconomic background, having health insurance, and being sexually experienced Low HPV knowledge overall
Polik & Hardie 2010	Delaware Lesbian Community groups	N = 96 Female Age: > 18 years Convenience Sample	Quantitative Descriptive – Correlational	None	None	<ul style="list-style-type: none"> 30% lacked knowledge of HPV transmission among female – female sexual relations Openness with health care provider about lesbian status = ↓ knowledge of HPV transmission
Yanikkerem et al. 2010	Turkey University	N = 553 Male & Female Age: 18-32 yo Cross-Sectional	Quantitative Quasi-Experimental	None	Face-to-face	<ul style="list-style-type: none"> ↓ HPV knowledge pre-intervention ↑ knowledge post-intervention ($p < 0.05$) ↑ positive attitude toward vaccine after intervention
Allen et al. 2009	New England University	N = 1,401 Female Ages: > 18 years	Quantitative Descriptive - correlational	Transtheoretical Model, TRA, Social Cognitive theory, HBM	None	<ul style="list-style-type: none"> Most had heard of HPV and the vaccine Those in preparation and action had the highest HPV knowledge scores Perceived severity highest among those decided against vaccine Perceived benefits highest among those in preparation and action stages Those in action stage had lowest perceived barriers Social norms higher among preparation and action stage participants All but perceived susceptibility were associated with stage of readiness to get vaccinated
Caron, Kispert, & McGrath 2009	University	N = 361 Female Age: 18-34 years Cross-sectional	Quantitative Descriptive - Correlational	None	None	<ul style="list-style-type: none"> Most had heard of HPV and the HPV vaccine (85%) + attitude to vaccine
Elit, Trim, Mohan, Nastos, & Harnish 2009	University	N = 203 Male and Female Men = 57 Women = 146 Ages: mean age 19.7 years Undergraduate	Quantitative Descriptive	None	None	<ul style="list-style-type: none"> ↓ HPV knowledge (did not differ between men and women) Internet and family doctor most preferred source of sexual health information Women more likely than men to have heard of HPV vaccine Only 32.6% of women who knew about HPV vaccine expressed interest in getting vaccine
Marlow et al. 2009	United Kingdom College	N = 365 Female Age: 16-19 yo Cross-Sectional	Quantitative Quasi Experimental	HBM	Fact Sheet	<ul style="list-style-type: none"> ↓ HPV knowledge pre-intervention ↑ perceived susceptibility = ↑ acceptability of vaccine Barriers to vaccine = worry about side effects, afraid of needles, ↑ perceived benefit = ↑ acceptability of vaccine ↑ barriers = ↓ acceptability of vaccine Benefits and barriers = strongest predictors of acceptability Culture & religion did not have an effect on vaccine acceptability

						<ul style="list-style-type: none"> • White, higher socioeconomic had ↑ acceptability over ethnically diverse, lower socioeconomic participants
Doherty & Low 2008	College	N = 119 Male & Female Age: N/A Prospective	Quantitative Experimental	None	Fact Sheet (delivered via web)	<ul style="list-style-type: none"> • Women ↑ knowledge, positive attitudes toward vaccine, perceived susceptibility to infection on pre-test than men • ↑ positive attitudes to vaccine post-test • ↑ perceived risk to HPV post-test • ↑ knowledge of HPV post-test • Knowledge maintained at 1 month follow-up • Intervention group = clinical improvement, but not significant improvement on condom use at one month follow-up
Gerend & Magloire 2008	Florida University	N = 124 Male and Female Ages: 18-26 years	Quantitative Descriptive – Correlational	None	None	<ul style="list-style-type: none"> • 78% had heard of HPV • Women more knowledgeable than men (94% vs. 62%) • Most had high knowledge scores • Low perceived risk of HPV • 64% interested in learning more about HPV • 4 women had received HPV vaccine • Of 60 women not previously vaccinated 65% were interested in getting the vaccine
Lambert 2001	New York College	N = 60 Male & Female Age: > 18 yo Prospective	Quantitative Quasi-Experimental	None	Face-to-Face	<ul style="list-style-type: none"> • ↓HPV knowledge pre-test • PA students knowledge > psychology students • Knowledge = between gender • ↑HPV knowledge at 3 month follow-up • PA students knowledge still > psychology students • Psychology students had > overall improvement in knowledge
WOMEN						
Author	Setting	Population	Study Design	Theory	Intervention	Findings
Chang et al. 2013			Quantitative Quasi-Experimental Immediate post-test follow-up	None	Face-to-Face lecture based educational seminar	<ul style="list-style-type: none"> • Low pre-intervention HPV knowledge • Knowledge increased post-intervention • Increased intention toward vaccination post-test
Kester et al. 2013			Quantitative Quasi-Experimental Immediate post-test of intervention group	None	Face-to-Face 10 minute group education session for intervention group only	<ul style="list-style-type: none"> • 62% of the seventy four individuals whose health care provider mentioned HPV vaccine had received the vaccine, whereas only 3% initiated vaccination without health care provider recommendation. • Intervention group had higher HPV knowledge scores • 38% had already had the HPV vaccine with 19% completion of the series. • Of those not already having the vaccine, the intervention group was more likely to have intentions toward vaccination(86%) than the control group (57%) (OR=2.09;95%CI = 1.02-9.36; p<0.05)
Vanderpool et al. 2013			Quantitative Quasi-Experimental	TBP and IMB Framework	13 minute Video developed based on IMD Framework to promote completion of 3 dose series	<ul style="list-style-type: none"> • Increased intention for series completion predicted increased behavior for series completion
Krawczyk et al. 2012			Quantitative Experimental Immediate	HBM	3 groups: <ul style="list-style-type: none"> • Written HPV information • Video HPV 	<ul style="list-style-type: none"> • Pre-intervention scores modest and intention to vaccination low • Both written and video group had higher knowledge than control group at pre and post intervention testing • Both written and video group had increased intentions to vaccinate post-

			post-test follow-up		information Control	test than did controls
Patel et al. 2012	University Clinic	N = 256 Female Age: > 18 yo	Quantitative Experimental	TPB	Fact Sheet	<ul style="list-style-type: none"> • No difference between type of educational material • Baseline intentions to get vaccinated = 41% • Baseline no intentions to get vaccinated = 31.3% • Reasons for intentions to get vaccinated: worry over CC (65.7%), worry over genital warts (48.6%), physician recommendation (40%) • Reasons for no intentions to get vaccinated: safety concerns (48.8%), side effects (48.8%), cost (41.3%), long-term consequences (40.0%), not being at risk for HPV (28.8%) • HPV knowledge not correlated with vaccine intentions • Intervention was associated with vaccine behavior (5.5% had 1 dose of vaccine at 6 month follow-up)*** chart review of vaccine uptake • Intentions associated with behavior (those with intentions to vaccine more likely to get vaccinated) • Cost and sexual risk taking not associated with intentions but not behavior
Bayer et al. 2011	Peru Clinics	N = 185 Female Age: 18-67 years Purposive Non-probabilistic sample	Quantitative	HBM	None	<ul style="list-style-type: none"> • Only 1 in 5 gave CC information • Few 2.2% gave HPV information • Only 31% gave literature • Only 11.9% gave pap smear information • Amount of Ed. Given influenced by length of visit • Nurses more likely to educate than physicians
Bendik et al. 2011	Southeastern University	N = 1,975 Female Age: 18-24	Quantitative Correlational	None	None	<ul style="list-style-type: none"> • ↓ HPV knowledge (transmission, prevalence, seriousness) • Perceived importance of HPV, severity of HPV, severity of CC, perceived likelihood of getting CC, age at sexual debut, # of sexual partners, age, HPV knowledge were all associated with getting the vaccine • Among unvaccinated students, intentions to get vaccine were influenced by doctor recommendation to get it (35.4%), being able to pay for it (19.4%), parents encourage it (16.4%), becoming sexually active (14.0%), having more sexual partners (9.6%).
Juraskova, Bari et al. 2011	Australia University	N = 159 Female Age: < 26 yo	Quantitative Experimental	HBM	2 different Fact Sheets Leaflet 1: Cervical Cancer (CC) information Leaflet 2: CC and Genital Warts (GW) information	<ul style="list-style-type: none"> • ↓ HPV Knowledge pre-test • Intentions ↑ post-intervention • Intentions to get vaccine predictor of behavior to get vaccine post-intervention • Intentions to get vaccine predictor of information seeking behavior post-intervention • CC+GW group (44%) more likely to get vaccine than CC only group (32%) • Perceived barriers and Perceived benefits = predictors of vaccine intentions • Barriers = side effect concerns, access, pain, cost, multiple injections • Note: vaccine provided free to this population, but cost was cited as barrier if they would have to pay for it • Measured Actual Behaviors at 2 month follow up
Juraskova, O'Brien et al. 2011	Australia University	N = 159 Female Age < 26 yo	Quantitative Experimental	TPB and moral norm constructs	Fact Sheets (delivered via computer)	<ul style="list-style-type: none"> • Intentions, perceived behavior control, and moral norms not predictors of behavior • Model (TPB) predicted 54% of variance in intention to get vaccination • Intention only predicted 9.6% of variance in behavior • Gap between intentions and behavior
Mills et al.	Kentucky	N =	Quantitative	None	Brochure	<ul style="list-style-type: none"> • Focus was on removing barrier of cost for vaccine to determine likelihood

2011	Clinic and College	Female Age: 18-26 yo	Experimental			<ul style="list-style-type: none"> of vaccination Clinic participants more likely than college participants to get vaccinated*** measured vaccine behavior through voucher receipts for shots given Clinic population using condoms or oral contraceptive were more likely to get vaccinated College women using IUD were more likely to get vaccinated Those having previous pap test more likely to get vaccinated Those with no doctor contact in last 12 months less likely to get vaccination Those with hx of abnormal pap were less likely to get vaccination Those participating in mutual masturbation less likely to get vaccination
Royer & Falk 2011	4 Urban Clinics and one Midwestern University classroom	N = 302 Female Ages: 18-24 years Cross-sectional	Quantitative Survey data Descriptive – correlational	Common Sense Model	None	<ul style="list-style-type: none"> Most believed HPV would negatively affect their health Most felt HPV was a chronic illness Most thought rate of HPV transmission was low Felt HPV dx would cause them shame and embarrassment, and negatively impact relationships and willingness to disclose dx Women likely to believe HPV would result in cancer and or cause outward symptoms Women already dx with HPV knew more about it, knew it had fewer symptoms, and had fewer negative psychosocial beliefs than those not already dx
Teitelman et al. 2011	Low-Income Urban	N = 34 Female Ages: 13-26	Mixed-Method Descriptive-Correlational	TPB	None	<ul style="list-style-type: none"> 53% intended to get vaccine ↑Intentions affected by, younger age of sexual debut, unemployment, + tobacco use, + hx of STI Model constructs of attitudes, norms, and behavioral control = predictors of vaccine intention
Wong 2011	Malaysia Rural	N = 449 Female Convenience sample	Quantitative Descriptive - Correlational	None	None	<ul style="list-style-type: none"> ↓ HPV knowledge, awareness of vaccine, awareness cervical cancer screening and CC risk factors 2/3 had intentions to vaccine even though they had never heard of it ↑ knowledge of CC screening and CC risk factors = ↑ intentions to vaccine ↓ Intentions to vaccine = fear of safety, embarrassment over getting STI vaccine, perception of low risk for HPV Overall need for more education of rural Malaysia women
Cermak, Cottrell, & Murnan 2010	Cincinnati Social Service employees	N = 109 Female Ages: 18-65	Quantitative Descriptive	None	None	<ul style="list-style-type: none"> 71.6% reported physician did not educate them on HPV Only 13.8% reported HPV was discussed by physician Most do not remember doctor recommending HPV vaccine (76.1%) Women with higher education had more HPV knowledge than those with low education
Fry et al. 2010	Urban Clinic	N = 383 pre-test N = 130 post-test	Quantitative Quasi-Experimental	None	Face-to-Face education of physicians treating the women	<ul style="list-style-type: none"> ↑ knowledge of difference between pelvic exam and pap test post-intervention No difference in knowledge regarding recommended pap smear interval ↑ Knowledge of what pap smear screens for post-intervention Spanish speaking women ↑ pap knowledge over English speaking women
Kwan et al. 2010	Hong Kong, China Clinic	N = 294 Female	Quantitative Experimental	None	Fact Sheets <ul style="list-style-type: none"> Message 1: low risk(lr)+high risk (hr)HPV 	<ul style="list-style-type: none"> ↓ HPV knowledge pre-test ↑ intentions to pap smear pre-test Message 1 = > stigma Message 2 = Stigma > Message 3, < Message 1

		Age: > 18 yo			<ul style="list-style-type: none"> • Message 2: hrHPV • Message 3: ds+hrHPV • (ds=de-stigmatizing language) 	<ul style="list-style-type: none"> • Message 3 = < stigma • ↑ HPV knowledge post-intervention for all groups • ↑ post-intervention intentions to pap smear (higher than pre-test)
Ilter et al. 2010	Clinic	N = 525 Female Ages: 19-53 years	Quantitative Descriptive Survey	None	None	<ul style="list-style-type: none"> • 82% had heard of pap tests, but only 56% had heard of HPV • 51% had at least one pap test • Only 52% knew HPV was connected to CC • 77% had heard of HPV vaccine • 56% reported willingness to get HPV vaccine • Most reported recommendation from health providers as a reason to get vaccinated
Luque et al. 2010	Central Florida & Southern Georgia Clinics serving latino migrant farm workers	N = 80 Female Age: 19-54 Cross-sectional	Mixed Methods Survey Design Descriptive	None	None	<ul style="list-style-type: none"> • Lack of awareness re: prevention of cervical cancer • Barrier to vaccine was lack of information, cost, fear of safety, access
Rosen et al. 2010	Canada Clinical Trial	N = 495 Female Age: 30-69 yo Cross-Sectional	Quantitative Experimental	None	<p>Pamphlets</p> <ul style="list-style-type: none"> • Pamphlet 1= long form with more HPV info • Pamphlet 2= short form with less HPV info • Control 1= long form on general cancer prevention • Control 2 = short form on general cancer prevention 	<ul style="list-style-type: none"> • Both forms = ↑ uncertainty and anxiety, but after controlling for inherent uncertainty/anxiety traits only long form was found to ↑ uncertainty and anxiety • Authors conclude uncertainty with HPV is inherent and increasing factual information does not negate it
Warren 2010	Northeastern Pennsylvania College	N = Female Age: 18-23 yo	Quantitative Quasi-Experimental	None	Face-to-Face with written	<ul style="list-style-type: none"> • ↑ knowledge post-intervention • ↓ HPV knowledge at pre-test
Zimet, Weiss, Rosenthal, Good, & Vichnin 2010	Large managed care database	N = 1,375 Female Ages: 19-26 years Purposive (those	Quantitative Descriptive	None	None	<ul style="list-style-type: none"> • 93.5% agreed cervical cancer was a devastating disease and genital warts are embarrassing 90.0% • 73% reported being comfortable talking about sexual health with doctor • of the 185 in this study, 176 reported hearing about the HPV vaccine, but only 32.4% thought it was important to them • 30.1% reported discussing it with their doctor and receiving doctor recommendation to get the vaccine

		not yet vaccinated against HPV)				<ul style="list-style-type: none"> While most felt they could obtain the vaccine few actually did, reasons for not getting vaccinated were marriage, monogamous 54.9%, others thought it was too new 35.4% or didn't have enough information 31.7%. 24.4% were concerned about safety and 14.6% were concerned about insurance covering it
Cates et al. 2009	North Carolina Clinic Rural Predominantly black	N = 138 Female Ages: 18-84 years	Quantitative Descriptive – Correlational	None	None	<ul style="list-style-type: none"> Only 24% of black women had heard of HPV compared to 57% of white Black women had ↓ knowledge, and were less likely to think HPV was a serious threat to health, and perceived themselves less likely to get CC Only 20% of participants had heard of vaccine and did not differ among race
Dursun, Altuntas, Kuscu, & Ayhan 2009	Turkey	N = 1,434 Female Age: 17-80 years	Quantitative Descriptive			<ul style="list-style-type: none"> < half knew of HPV ↓ HPV awareness + attitude toward accepting HPV vaccine
Papa et al. 2009	Clinic	N = 50 Female Age: > 30 yo	Quantitative Quasi-Experimental	None	Face-to-Face with written	<ul style="list-style-type: none"> ↑ knowledge post-intervention ↓ concern over positive HPV dx post-intervention (those with concern were related to cancer) Positive attitude to pap testing with reflex test for HPV
Pitts et al. 2009	Singapore	N = 2,145 Female Age: 18-49 years	Quantitative Descriptive – Correlational	None	None	<ul style="list-style-type: none"> ↓ awareness of HPV ↓ HPV knowledge + attitude toward vaccine among those who knew of HPV
Waller et al. 2009	England, Scotland, Wales	N = 1081 Female Age: 25-64 Nationally Representative	Quantitative Experimental	None	Fact Sheet (delivered via computer)	<ul style="list-style-type: none"> ↓ low number aware of HPV prior to study large number reported regular pap screening lack of knowledge of HPV cancer link Knowledge of HPV as STD = ↑ anticipated shame Prior to knowledge of HPV as STD 90% disagreed with anticipated shame No ↑ shame with education on prevalence of HPV or general HPV education, and women with college education reported less shame/worry than those with less formal education Regularly screened pap patients reported less shame/worry than rare/never screened women
Crosby et al. 2008	Clinic	N = 28 Female Age: 17-23 yo	Quantitative Quasi-Experimental	Precaution Adoption Process Model	Face-to-Face or Phone	<ul style="list-style-type: none"> HPV + dx = ↑ intentions to pap test in future HPV + dx = ↓ smoking intentions in future HPV + dx = ↑ intentions to get vaccine
Fazekas et al. 2008	North Carolina Clinics Rural	N = 146 Female Age: > 18 yo	Quantitative Correlational	Implied - Health Belief Model	None	<ul style="list-style-type: none"> Few knew of HPV, low HPV knowledge Younger = ↑ intentions toward vaccine African American = ↓ intentions toward vaccine Public clinics = ↑ intentions to vaccine over private OB/gyn clinics Most said HPV vaccine would be most acceptable if it were free ↑ perceived likelihood of infection/CC, and ↑ perceived severity of HPV/CC = ↑ intentions ↑ belief in effectiveness = ↑ acceptability of vaccine Cues to action and ↓ perceived barriers = ↑ acceptability of vaccine

						<ul style="list-style-type: none"> • Women felt daughter more at risk than themselves and therefore more willing to pay for vaccine for daughters than for themselves
Kahn et al. 2008	Cincinnati Clinic	N = 409 Female Age: 13-26 Sexually experienced	Quantitative Correlational	TPB, social cognitive theory, HBM	None	<ul style="list-style-type: none"> • Low vaccine uptake at start of study with only 5% being vaccinated against HPV with one dose and only 0.2% receiving all 3 doses • 66% reported intentions to get vaccinated in next year • 68% were dx with HPV with 60% having high-risk types • ↓ intentions to vaccine = lack of insurance, safety concerns, riskier sexual activity • ↑ intentions to vaccine = ↑ HPV knowledge, belief people in their life would approve of the vaccine, ↑ perceived severity of HPV, ↑ perceived benefits to vaccine,
Ferris et al. 2007	Georgia & Texas Clinic	N = 472 Female Age: > 25 yo	Quantitative Quasi- Experimental	None	Pamphlet	<ul style="list-style-type: none"> • Attitudes toward getting self- vaccinated ↓ after intervention • Attitudes toward getting daughter vaccinated ↑ after intervention • Biggest reason for not wanting vaccine for self was monogamy and low perceived need • Attitudes for those undecided on pre-test were more positive after intervention
Gerend et al. 2007	North Florida Community clinics	N= 58 Female Age: 18-50	Quantitative Semi-structured Interview Correlational	HBM	Face-to-Face	<ul style="list-style-type: none"> • Intentions to get vaccine generally high • ↑ intentions correlated with ↑ susceptibility, perceived safety, perceived effectiveness, and physician recommendation, and history of previous HIV testing
Mock et al. 2007	Santa Clara County Community	N = 491 (combined intervention group) N = 477 (media only group) Female Age: > 18 yo Prospective Vietnamese Americans	Quantitative Experimental	None	Face-to-Face with mass media exposure vs. only mass media exposure	<ul style="list-style-type: none"> • Good pap attendance prior to study • Combined education group sought pap more than mass media group during study • Both groups had ↑ intentions to get pap as result of intervention • Both groups had ↑ knowledge as result of interventions, but combined education group scored higher
Waller et al. 2007	Urban London University	N = 811 Female Age: college age	Quantitative Quasi- Experimental	None	Written (delivered via internet)	<ul style="list-style-type: none"> • ↑ stigma and shame in those who knew HPV was a STD • Knowledge of prevalence = ↓ stigma, shame, and anxiety • Written educational material did not translate into adequate knowledge of HPV • Need more research on best practices for communicating HPV information
Giles & Garland 2006	Australia Clinics	N = 90 Female Age: 18-30 years	Quantitative Descriptive	None	None	<ul style="list-style-type: none"> • Most had heard of HPV and knew it was an STD • Only 1/3 had heard of HPV vaccine • Lack of knowledge regarding transmission and relation to CC and pap testing
Moreira, Oliveira, Neves, Karic, & Filho 2006	Brazil Clinic	N = 204 Female Age: 16-23 years	Quantitative Descriptive	None	None	<ul style="list-style-type: none"> • ↓ HPV knowledge • + HPV vaccine attitudes

		Cross-sectional				
Kahn et al. 2005	Urban Clinic	N = 100 Female Age: 14-21 yo Purposive	Quantitative Quasi- Experimental	None	Face-to-Face with visual aids and written	<ul style="list-style-type: none"> • Educational intervention ↑ HPV knowledge • Education and screening = ↑ feelings of empowerment, associated with doing something positive for their health • ↑ HPV knowledge = ↑ self-confidence and locus of control to treatment and prevention of HPV • + HPV result = ↑ distress and ↑ anticipated stigma • Educational intervention = ↑ intentions to safe sex practice • Most planned to tell partner of result, those not disclosing tended to be HPV positive • Reported reason for not disclosing was fear of stigma and feeling shameful, feared partner anger and rejection, feared perception by partner that they had been unfaithful
Kahn et al. 2003	Cincinnati Community & clinical sites	N = 52 Female Age: 18-30 yo Mean 25 yo	Quantitative	TPB, Social Cognitive Theory, HBM	None	<ul style="list-style-type: none"> • Good knowledge of HPV among study population • + attitudes about receiving HPV vaccine, 75% felt vaccine was safe • 62% felt it was very effective • Most had self-perceived risk of contracting HPV • ↑ perceived severity of HPV/CC • 85% with ↑ intention to get vaccinated against HPV • Age, marital status, race/ethnicity, health insurance not associated with intentions toward vaccination • Knowledge and global belief in goodness of vaccination = ↑ intentions toward HPV vaccine • Personal beliefs not associated with intentions (susceptibility & severity)

↑ = increased, ↓ = decreased, + = positive

Chapter 3

This chapter will discuss the research methods and design used for this study. A discussion of human rights concerns is provided, along with an explanation of the sample selection criterion and data collection procedures. Parametric and non-parametric analysis techniques are discussed, and attention is given to the methods used for establishing rigor in this study.

Design

This study used a quasi-experimental, pre-test and post-test design, with delayed intervention treatment administered to the control group at study completion. Participants were recruited both face-to-face and on-line. Participants recruited face-to-face ($n = 42$, 22%) in this study were assigned based on clinic location to either the intervention or control group, while participants recruited on-line ($n = 152$, 78%) were randomized by the computer program to either the intervention or control group. A quasi-experimental design was chosen over an experimental design. The decision to assign face-to-face participants rather than randomize them, as was done with the online participants, was made due to the potential for participants and staff from the face-to-face enrollment sites to interact between clinics. Some of the clinics are affiliated with the same organization and there was concern of spillover with randomization at these sites. However, because clinics are located in different counties, the decision was made to assign participants to intervention and control groups based on county. Distance between the county clinic sites is quite far, thus decreasing the possibility of spillover from one county to another.

Four clinics were identified in two counties (Fayette & Greenbrier) of southern West Virginia. The clinics are designated Federally Qualified Health Centers (FQHC), with the mission of caring for rural underserved and uninsured populations. As FQHCs the clinics

administer similar federally funded programs for cervical cancer screening of women.

Therefore, the participants in both the control and intervention groups who were recruited face-to-face were from similar socioeconomic backgrounds, and utilized similar cervical cancer screening services at the facilities.

On-line recruitment was initiated after noting that many age eligible women in the clinics did not meet inclusion criteria for the study due to having received at least one HPV vaccine. Thus, the protocol was amended to expand recruitment to women in the workforce, general population, and university school setting. Flyers advertising the study to these women directed them to an on-line enrollment portal through survey monkey. Women who opted to participate in the study through this method were randomized to either the intervention or control group.

Human Rights Considerations

The study was approved by West Virginia University's Internal Review Board (IRB), and attention was given to the protection of human subjects in compliance with all IRB protocols. Written and verbal study information (Appendix A) were provided to prospective participants upon initial recruitment face-to-face, and written informed consent was provided to participants recruited online. Face-to-face participants were initially informed by clinic staff that a research study was being conducted, and clinic staff provided the participant with written information about the study, later referring interested persons to the researcher for verbal information and written informed consent. Online participants simply clicked a link provided in an information flyer and were directed to the informed consent for the study. Information sheets detailed the purpose of the study, the required amount of time for participation in the study, risks and benefits of participation in the study, the fact that participation was voluntary, and researcher contact information should participants have further questions about the study.

The study questionnaire posed no more than minimal risk to participants, and likely benefitted participants by increasing awareness of HPV and HPV prevention measures. Additionally, the study intervention DVD and handout posed no more than minimal risk, instead conferring benefit of increased HPV knowledge, increased positive health beliefs toward HPV and HPV prevention, and increased willingness to accept the HPV vaccine for themselves and their adolescent children post-intervention. Because the researcher believed the DVD and handout intervention would be more beneficial at increasing participants HPV knowledge and willingness to access prevention services, the researcher provided a delayed treatment protocol for control group participants, so equal benefit of the study intervention services was provided.

Because the geographic area for this research was rural and included areas where the researcher was a member of the community, there was the potential for the researcher to be known personally by some participants in the study. To avoid the potential for coercion, the researcher avoided direct face-to-face contact with prospective study participants during initial recruitment. The researcher relied on the clinic staff to distribute the study information sheet and to notify prospective participants of the availability of a study being conducted at the face-to-face recruitment sites. Only after reading the information sheet and indicating to the clinic staff their willingness to participate, were participants referred to meet the researcher for enrollment in the study. Coercion in the online setting was avoided by having online participants self-selected to the on-line survey after getting email and bulletin board notification of an available study.

Sample Selection

A prospective cohort sampling design was used in this study, and included women 18-26 years old presenting for health care at the designated clinics and self-selecting to participate online after receiving notification of the availability of the study. Women were eligible for the

study if they met the age criteria, were English speaking, were non-pregnant, and had not received the HPV vaccine prior to study recruitment. This age group was chosen because they are eligible for the HPV vaccine, and are above the age of consent for vaccination. While females under 18 years are also eligible for the HPV vaccine, they must have parental consent to receive the vaccination. Parental consent may not be obtainable in the family planning clinic setting because many females under 18 years may be presenting for pap testing without parental knowledge, and confidentiality concerns preclude acquiring parental consent for younger age groups in this setting.

The selection of 18-26 year olds is significant for this study because many of this age group in West Virginia are under or uninsured and most do not qualify for traditional free vaccine programs (like the West Virginia Vaccines for Children (VFC) program). Previous research has suggested that cost is a major barrier to HPV vaccine uptake (Mills et al., 2011). However, one study removed the barrier of cost and found that lack of knowledge and concern for vaccine safety were more significant barriers to vaccine uptake (Juraskova, Bari et al., 2011). This study will shed additional light on the actual barriers to vaccine uptake and the relationship of these barriers to knowledge surrounding HPV and HPV prevention among this population.

Women who participated in the study were given a \$5 gift card after completing the pre-test and received a \$10 gift card at the two month follow-up completion of the post-test questionnaire. The remuneration functioned as an incentive to participate in the study, but could also address the barrier of cost for transportation to obtain vaccination services. In addition, to address the barrier of cost for vaccination, the researcher worked with uninsured participants to access the Merck patient assistance program for free vaccine. Forms for this program were

provided to those in need and clinic staff assisted uninsured participants wishing to become vaccinated as a result of participating in the study.

The monetary incentive of \$5 and \$10 is believed to be sufficient to make participation in the study worthwhile, but is not excessive given the current price per gallon of gas in the United States economy. In addition, efforts were made to ensure access to the HPV vaccine for all participants in the study regardless of health insurance coverage. The attempt to remove the barrier of cost of the vaccine in this study was necessary to assess the true effects of the study's educational intervention effectiveness on vaccination behaviors.

Data Collection

Data collection began upon approval of the study by West Virginia University's Internal Review Board (IRB), and continued until adequate numbers were achieved. Initial power analysis calculations based on a medium effect size, power of 0.80, and level of significance of 0.05, indicates a sample size of 154 would be sufficient for this study if no participants were lost to follow-up. The initial power calculation used was ten times the number of predictor variables (4 predictor variables) divided by the percentage of people expected to utilize vaccination in this study (26%), which is based on the previous percentages in a similar HPV vaccine study (Mills et al., 2011; Peduzzi, Concato, Kemper, Holford, & Feinstein, 1996). To account for possible attrition of 20% (attrition number was derived from similar studies' attrition rates) the decision was made to oversample, for a total sample size of 193. Recruitment was cut off at 194 participants completing the pre-test and 147 post-test. The decision was made to cut off at this point after preliminary data analysis suggested the collection to 154 post-test would not have any significant bearing on the outcome variable.

Methods to Assure Rigor

To maintain rigor in this study reliability of the study instrument was confirmed.

Reliability refers to the consistency with which an item measures the same construct on two or more occasions (Polit & Hungler, 1999). Reliability of the instrument measures were determined by assessing the internal consistency of the tools constructs.

The instrument chosen for this study is based on the HBM and was previously used to assess HPV knowledge, beliefs, and behaviors among college students (Bynum et al., 2011). With permission from the instrument author (Appendix E), modifications were made to remove racial pride constructs from the instrument and to add additional belief construct questions pertinent to this study. Previous instrument psychometric tests (Table 4) support the tool as an adequate instrument to measure research questions addressing the effectiveness of HPV prevention education (Reliability of perceived susceptibility, $r=0.42$; perceived severity, $a=0.80$; perceived benefit, N/A; perceived barriers, $a=0.58$; cues to action, $a=0.90$) (Bynum et al., 2011). However, the addition of questions to specific belief model constructs (perceived susceptibility, perceived benefits, and perceived barriers) increased the reliability of these measures in the current study (Table 5 & 6).

Table 4. Original Health Belief Model Scales (Bynum, 2011)

Scale	Cronbach Alpha	Question Set
Perceived Susceptibility	$r = 0.42$	<ul style="list-style-type: none"> It is extremely likely that I will get HPV in my lifetime. My current behaviors put me at risk for HPV.
Perceived Severity	$a = 0.80$	<ul style="list-style-type: none"> HPV is a serious infection. Cervical Cancer is a serious disease. Cancer of the Penis is a serious disease.
Perceived Benefits	$a = \text{N/A}$	<ul style="list-style-type: none"> Getting the HPV vaccine could save my life.
Perceived Barriers	$a = 0.58$	<ul style="list-style-type: none"> I couldn't afford to get the HPV vaccine. I would not get the HPV vaccine because I am afraid of needles. I don't think vaccines work.
Cues to Action	$a = 0.90$	<ul style="list-style-type: none"> Knowing that HPV affects people like me would encourage me to get the HPV vaccine. Knowing more about HPV would encourage me to get the HPV vaccine. If my doctor recommended that I get the HPV vaccine then I would. If my mother approved of the HPV vaccine then I would approve of it also. If my grandmother approved of the HPV vaccine then I would approve of it also. If my friends approved of the HPV vaccine then I would approve of it also.

Table 5. Reliability of health belief model constructs

<i>HBM Construct</i>	<i>Original Instrument</i>	<i>Modified Instrument</i>
Perceived Susceptibility	$r = 0.42$	$a = 0.75$
Perceived Severity	$a = 0.80$	$a = 0.67$
Perceived Benefits	n/a	$a = 0.77$
Perceived Barriers	$a = 0.58$	$a = 0.80$
Cues to Action	$a = 0.90$	$a = 0.87$

Table 6. Modified Health Belief Model Scales (Current Study n=194)

Scale	Cronbach Alpha	Question Set
Perceived Stigma	a = 0.78	<ul style="list-style-type: none"> ▪ Most people think that people with HPV should be ashamed of themselves. ▪ Most people think that people with HPV are to blame for their problem. ▪ Most people think that people with HPV are a danger to others. ▪ Only people who are sexually promiscuous get HPV.
Perceived Susceptibility	a = 0.75	<ul style="list-style-type: none"> ▪ It is extremely likely that I will get HPV in my lifetime. ▪ My current behaviors put me at risk for HPV. ▪ HPV is a very common infection. ▪ My risk of getting HPV is higher than most people's risk.
Perceived Severity	a = 0.67	<ul style="list-style-type: none"> ▪ HPV is a serious infection. ▪ Cervical Cancer is a serious disease. ▪ Cancer of the Penis is a serious disease. ▪ HPV can be life-threatening. ▪ HPV is very likely to cause cervical cancer.
Perceived Benefits	a = 0.77	<ul style="list-style-type: none"> ▪ Getting the HPV vaccine could save my life. ▪ Getting the HPV vaccine could protect me from getting certain types of HPV. ▪ Getting the HPV vaccine will reduce the chance of me getting cervical cancer in the future.
Perceived Barriers	a = 0.80	<ul style="list-style-type: none"> ▪ I couldn't afford to get the HPV vaccine. ▪ I would not get the HPV vaccine because I am afraid of needles. ▪ I don't think vaccines work. ▪ I have concerns about whether the HPV vaccine is safe. ▪ I have concerns about whether the HPV vaccine is effective. ▪ I have concerns about possible side effects of the HPV vaccine.
Cues to Action	a = 0.87	<ul style="list-style-type: none"> ▪ Knowing that HPV affects people like me would encourage me to get the HPV vaccine. ▪ Knowing more about HPV would encourage me to get the HPV vaccine. ▪ If my doctor recommended that I get the HPV vaccine then I would. ▪ If my mother approved of the HPV vaccine then I would approve of it also. ▪ If my grandmother approved of the HPV vaccine then I would approve of it also. ▪ If my friends approved of the HPV vaccine then I would approve of it also.

The modified instrument is comprised of five-items assessing vaccine acceptability (e.g. would you get a vaccine to prevent HPV infection? Response options: yes, no, don't know). Twelve items assessing HPV knowledge and six-items assessing pap knowledge are assessed using response options of yes, no, don't know, and are reverse scored so that correct responses are given a score of one and incorrect responses and don't know responses are given a score of zero. The instrument also includes four-items assessing HPV stigma beliefs, four-items assessing perceived susceptibility, four-items assessing perceived severity, six-items assessing perceived barriers, four-items assessing perceived benefits to HPV vaccination, and six-items assess cues to action toward HPV vaccination uptake. Items assessing health beliefs are scored on a four-point Likert scale (1= strongly disagree to 4= strongly agree). Other history and demographic information is assessed to include sexual history, race, age, relationship status, and education level (Appendix B).

The data collection process began following written informed consent of participants. After informed consent participants were given the pre-test questionnaire (Appendix B). Then intervention group participants were given the HPV educational intervention materials to view, which consist of a short DVD video and HPV fact sheet. The control group received only the HPV fact sheet (Appendix C). Both groups were encouraged to get the HPV vaccination. Two-months after registration in the study, all participants received a post-test questionnaire via mail/email (with stamp addressed return envelope), telephone, or return appointment to the study site (Appendix D). Six-months after enrollment in the study, chart review was conducted to assess whether participants completed the HPV vaccine series. At the six-month interval control group participants were also given the delayed treatment protocol of the DVD and HPV fact sheet via the mail.

Data Analysis

Data were analyzed using Statistical Package for the Social Sciences (SPSS) program for analysis, and data were stored on the researchers password protected computer in a locked office. Data analysis began with an inspection of the data to identify any outliers or missing data that could affect analysis results. Once identified, decisions were made on whether to exclude any outliers or missing data from the final analysis of results. No outliers were identified needing exclusion from results, but missing data on some questions was noted and analyzed using list-wise exclusion.

Data analysis consisted of descriptive statistics of demographic data, such as, age, race, sexual orientation, relationship status, education level, smoking status, and use of hormonal contraceptives. Assuming a normal distribution and random sampling, t-test were used to show differences between the intervention and control groups on HPV knowledge, pap knowledge, and HPV belief mean scores. Assuming expected category counts of five or greater, Chi-square test were used to detect group differences on the categorical variables of HPV awareness, HPV vaccine awareness, HPV prevention behavior, and health information preferences. Assuming homogeneity of variance, mixed within and between analysis of variance was used to assess the impact of knowledge and belief scores by group over time. Lastly, logistic regression, using four predictors (HPV knowledge scores, HPV belief scale scores, group, and insurance) were used to predict willingness to accept the HPV vaccine.

Summary

A review of the study methodological considerations has been provided with in-depth discussion of human protection considerations, sample selection, data collection and analysis,

and steps to assure methodological rigor. Supporting documents are provided to illustrate materials used in this study (Appendix A, B, C, D).

CHAPTER 4

This chapter presents results obtained following an educational intervention designed to change women's HPV knowledge, beliefs, and behaviors. Data analysis consisted of descriptive statistics of demographic data, such as, age, race, sexual orientation, relationship status, education level, smoking status, and use of hormonal contraceptives. Paired samples t-tests were used to compare pre/post-test measures on HPV knowledge, pap knowledge, and HPV belief mean scores. Mixed between-within subjects analysis of variance were conducted to show interactions between type of educational intervention and time on HPV knowledge, pap knowledge, and HPV belief scale scores. Chi-square tests detect group differences on categorical variables of HPV awareness, HPV vaccine awareness, HPV prevention behavior, and health information preferences. Lastly, logistic regression models, using four independent variables (HPV knowledge scores, HPV belief scale scores, group, and insurance) were developed to predict prevention behavior.

Results

Sample Description

The mean age of respondents was 22 years of age (SD 2.4, range 18-26). The majority of respondents classified themselves as white (90%) with the remaining classifying themselves as black (3%), Hispanic/Latino (2%), Asian (3%), American Indian (0.5%) or other mixed race (2%). Regarding marital status, 46% were single, 43% were married and/or living with a partner, and 10% were in a relationship but not living with a partner. Regarding education most reported having some college or an associate degree (47%), with 23% reporting either high school graduate or GED equivalent, and 19% reporting a bachelor's degree, and 6% reporting a graduate or professional degree (Table 7).

The study assessed several risk factors related to cervical cancer (Table 8). Several risk factors were noted among the population. Twenty-one percent of respondents smoked and 56% reported using hormonal contraceptives, both of which are risk factors associated with cervical cancer. Additionally, respondents reported early mean age of sexual debut (mean = 17 years, range 12-26 years, SD 2.4 years), and numerous lifetime sexual partners (mean = 5 partners, range 1-32 partners, SD 5 partners). Also, increasing their risk of HPV transmission, the majority reported not using condoms with their last sexual intercourse (57%).

About a third (34%) of the study participants had not yet had pap smear screening tests. Of the 34% who had not had pap testing, 46% were above the age of 21 years when regular pap testing is advised. The remaining 54% of women who had not had pap testing were 21 years and younger, and for these women pap smear screening guidelines require pap testing not start until women are at least 21 years of age. Among those who had pap smear testing (66%), almost a third (28%) of respondents reported having an abnormal pap test in the past, which may place them at high-risk for cervical cancer. Among those with abnormal pap testing (10%), reported knowing the abnormal results were a result of being diagnosed with HPV.

The sample was also assessed on insurance status. Surprisingly a large number of the respondents reported having either private insurance or Medicaid (84%). However, they still reported cost (41%) as the most frequent barrier to getting the HPV vaccine. It was noted that those who marked cost as a barrier also frequently marked risks of shots (38%) as a barrier to vaccination. Other barriers to vaccination reported at Time 1 were “not available” (14%), “no perceived need” (20%), and “other” (21%). The reported barriers decreased slightly at Time 2 with only 33% reporting cost, and risk of vaccines as a barrier at Time 2. The number reporting non-availability of the vaccine also decreased to 10% and those citing no perceived need dropped

to 12%, and other 14% for the respondents as a whole (Figure 1). Respondents reported “other” barriers for not accepting the vaccine as, “meant to do it and just haven’t done it, does not cover enough strains of HPV, not enough long-term research, at the end of the age bracket so feel it is not needed now, have already tested positive for HPV, risks of vaccines in general, just don’t want it, I’m gay so don’t need it, and just don’t want to go to the doctor”.

Table 7.

Characteristics and demographics of participants (n = 194)			
	N (%)	Minimum Maximum	Mean (SD)
Age	194 (100)	18-26	22 (2.4)
Race			
White	174(90)		
African American/Black	5(3)		
Hispanic/Latino	4(2)		
Asian	6(3)		
American Indian/Alaskan Native	1(.5)		
Other	4(2)		
Sexual Orientation			
Heterosexual	168(88)		
Gay/Lesbian	4(2)		
Bisexual	15(8)		
Unsure	4(2)		
Relationship Status			
Single	91(46)		
Married	41(21)		
Living with Partner	43(22)		
Divorced/Separated	2(1)		
Other	19(10)		
Education Level			
Less than High School	10(5)		
High School Graduate or GED	45(23)		
Associate Degree or Some College	91(47)		
Bachelors Degree	36(19)		
Graduate/Professional Degree	12(6)		
Insurance Status			
Private Insurance	112(57)		
Medicaid	53(27)		
Clinic Program (Family Planning, Sliding Fee)	8(4)		
Out of Pocket (Private Pay)	14(7)		
None	8(4)		

Table 8. Cervical cancer screening & risk factors

	N (%)	Minimum Maximum	Mean (SD)
Sexual Debut (age in years)	173	12-26	17 (2.4)
Lifetime Number of Sexual Partners	157	1-32	5 (4.6)
Smoking Status			
Yes	42 (21)		
No	155 (79)		
Sexually Active			
Yes	173 (91)		
No	18 (9)		
Condom Use with Last Intercourse			
Yes	75 (42)		
No	100 (57)		
Don't know/not sure	2 (1)		
Reason for Condom Use			
Prevent Pregnancy	129 (66)		
Prevent HIV	105 (53)		
Prevent STI	94 (48)		
Other	11 (6)		
Hormonal Contraceptive Use			
Yes	111 (56)		
No	86 (44)		
Ever Had Pap			
Yes	128 (66)		
No	65 (34)		
History Abnormal Pap			
Yes	38 (28)		
No	93 (69)		
Don't know/not sure	4 (3)		
Diagnosed with HPV			
Yes	19 (10)		
No	167 (88)		
Don't know/not sure	3 (2)		
Diagnosed with Sexually Transmitted Infection			
Yes	17 (9)		
No	177 (91)		

Figure 2.

HPV Awareness and Acceptance of the HPV Vaccine

Overall awareness of HPV and the HPV vaccine were assessed for both the control and intervention group at time 1 and time 2. Chi-Square test for independence (with Yates Continuity Correction) showed no significant difference between the control and intervention groups on awareness of HPV at time 1, $\chi^2(1, n = 193) = 0.000$, $p=0.985$, $\phi = 0.015$. While there was a statistically significant increase in awareness of HPV for both groups following the educational intervention [control group = $\chi^2(1, n=82) = 13.23$, $p < 0.001$; and intervention group = $\chi^2(1, n=65) = 6.25$, $p = 0.012$], there was no significant difference between the control and intervention groups on awareness of HPV at time 2 (with Yates Continuity Correction), $\chi^2(1, n = 147) = 1.40$, $p=0.238$, $\phi = -0.135$ (Table 9).

Table 9.

Heard of HPV					
	Intervention		Control		Sig.
Time 1	Yes	No	Yes	No	p=0.985
	81%	19%	79%	21%	
Time 2	94%	6%	99%	1%	p=0.238
	p = 0.012		p < 0.001		

Nor was there a difference between groups on awareness of the HPV vaccine at time 1 (with Yates Continuity Correction), $\chi^2 (1, n = 188) = 0.115$, $p = .734$, $\phi = -0.039$, or at time 2 (with Yates Continuity Correction), $\chi^2 (1, n = 148) = 0.000$, $p = 1.00$, $\phi = -0.013$. However, there was a statistically significant increase in awareness of the HPV vaccine for both groups following the educational intervention [control group = $\chi^2 (1, n = 82) = 12.25$, $p < 0.001$; and the intervention group = $\chi^2 (1, n = 66) = 13.00$, $p < 0.001$] (Table 10).

Table 10.

Heard of the HPV Vaccine					
	Intervention		Control		Sig.
Time 1	Yes	No	Yes	No	p=0 .734
	81%	19%	84%	16%	
Time 2	99%	1%	99%	1%	p= 1.000
	p < 0.001		p < 0.001		

Respondents were asked about their willingness to accept the HPV vaccine for themselves and their adolescent children before and after receiving the HPV educational intervention. There was no difference between the groups on willingness to accept the vaccine for themselves at time 1 (with Pearson Chi-Square), $\chi^2 (2, n = 194) = 0.777$, $p = 0.678$, $\phi = 0.063$; nor at time 2 (with Pearson Chi-Square), $\chi^2 (2, n = 146) = 3.89$, $p = 0.143$, $\phi = 0.163$.

Similarly, there was no difference between the groups in willingness to accept the vaccine for their adolescent daughters at time 1 (with Pearson Chi-Square), $\chi^2(2, n=194) = 4.014, p=0.134, \phi=0.144$, nor at time 2 (with Pearson Chi Square), $\chi^2(2, n=147) = 2.25, p = 0.324, \phi=0.124$. Willingness to accept the vaccine for themselves and their adolescent children increased for both groups over time, and while not significant, the intervention group was slightly more likely to accept the vaccine for themselves and their adolescent daughters than the control group. Groups did not significantly differ on willingness to accept the vaccine for their adolescent sons at time 1 (with Pearson Chi Square), $\chi^2(2, n=194) = 2.131, p = 0.345, \phi = 0.105$. However, groups significantly differed on willingness to accept the vaccine for adolescent sons at time 2 (Pearson Chi Square), $\chi^2(2, n=147) = 6.22, p=0.045, \phi = 0.206$ (Figure 2). Participants in the intervention group were significantly more likely to accept the vaccine for their adolescent sons at time 2 than those in the control group.

Figure 3.

Health Information Preferences

Participants gave information regarding preferences for receiving health information, sources of health information used most often, and sources of health information trusted most. Results are presented in Table 11. Overall, participants reported the sources they most preferred for health information was their health care provider (83%) or the internet (66%), followed by pamphlets (50%), school health center (35%), television (31%), family (30%), friends (27%) and other (3%). The sources most used by respondents for seeking health information were health care provider (72%) or the internet (72%), followed by family (26%), pamphlets (21%), school health center (20%), television (12%), friends (17%) and other (1%). Despite using other sources for health information, participants reported the source of health information most trusted was their health care provider (80%).

Table 11. Health information sources

	Preference for Receiving Health Information	Source Used The Most	Source Trusted The Most
	N (%)	N (%)	N (%)
Health Care Provider	163(83)	141(72)	158(80)
Pamphlets	98(50)	41(21)	6(3)
Internet	120(66)	141(72)	16(9)
TV	60(31)	23(12)	3(2)
Family	59(30)	51(26)	11(6)
Friends	54(27)	33(17)	4(2)
School Health Center	68(35)	40(20)	4(2)
Other	6(3)	2(1)	3(2)

Knowledge and Belief Scale Scores

Pap knowledge was assessed with a six-item scale. Percentage of correct responses to the questions are presented (Table 12) for both time periods. Independent t-test comparing pap knowledge based on previous pap testing experience is presented in Table 13. Women who had

not previously had pap testing were significantly less knowledgeable than pap tested women at both time 1 and time 2.

Paired sample t-test comparing pre/post-test measures (Table 14) showed overall a statistically significant increase in pap knowledge over time ($p = <0.001$). Mixed between-within subjects analysis of variance (Table 15) was conducted to assess the impact of the two educational interventions (written material alone vs. video with written material) on participants pap knowledge scores, across the two time periods. There was no significant interaction between the type of educational intervention and time, Wilks Lambda = 0.99, $F(1, 140) = 0.718$, $p = 0.398$, partial eta squared = 0.005. The main effect for time was significant, Wilks Lambda = 0.853, $F(1, 140) = 24.16$, $p = <0.001$, partial eta squared = 0.147, with both groups showing a significant increase in pap knowledge scores across time. The main effect for group was not significant, $F(1, 140) = 0.159$, $p = 0.691$, partial eta squared = 0.001, suggesting no difference in the effectiveness of the two teaching approaches.

HPV knowledge was assessed with a twelve-item scale. Percentage of correct responses to the questions are presented (Table 16) for both time periods. Paired sample t-test comparing pre/post-test measures (Table 14) showed overall a statistically significant increase in HPV knowledge over time ($p = <0.001$). A mixed between-within subjects analysis of variance was conducted to assess the impact of the two educational interventions (written material alone vs. video with written material) on participants HPV knowledge scores, across two time periods (Table 15). There was no significant interaction between the type of educational intervention and time, Wilks Lambda = 0.99, $F(1, 136) = 0.185$, $p = 0.668$, partial eta squared = 0.001. The main effect for time was significant, Wilks Lambda = 0.838, $F(1, 136) = 26.27$, $p = <0.001$, partial eta squared = 0.162, with both groups showing a significant increase in HPV knowledge scores

across time. The main effect for group was not significant, $F(1, 136) = 0.344$, $p = 0.558$, partial eta squared = 0.003, suggesting no difference in the effectiveness of the two teaching approaches.

Table 12. Descriptive Statistics Pap smear knowledge questions		
	N (%) Correct	
	Time 1	Time 2
A pap smear is a test to find out if a woman is pregnant	162 (85)	129(88)
All women should be getting pap smears by the time they are 21 years old	150(79)	130(88)
A pap smear checks for changes in the cells of a woman's uterus, also called the womb	85(45)	68(46)
A pap smear checks for changes in the cells of a woman's cervix	161(84)	145(98)
Getting regular pap smears is the best thing a woman can do to prevent cervical cancer	141(74)	132(91)
If a woman has a pap smear result that is not normal that usually means that she has cancer	139(73)	114(77)

Table 13. T-test

Comparing pap knowledge based on previous exposure to pap testing

Pap Knowledge Score	Pap Testing	Mean	SD	t	df	Sig. (2-tailed)
Time 1	No	3.31	2.09	-5.451	73.65	<0.001
	Yes	4.91	1.16			
Time 2	No	4.50	1.17	-3.689	89.41	<0.001
	Yes	5.16	.814			

Table 14. Paired Sample T-Test

Knowledge and belief scale scores over time

	N	Minimum Maximum	Mean	SD	Sig.
Pap Knowledge	142	0 6	4.28 (Time 1) 4.85 (Time 2)	1.72 1.08	<0.001
HPV Knowledge	138	0 12	7.28 (Time 1) 8.52 (Time 2)	3.37 2.43	<0.001
Belief Scale Scores	116	0 81	47.95 (Time 1) 49.66 (Time 2)	8.03 7.72	0.007

Table 15. Mixed Within and Between Analysis of Variance
Impact of educational intervention

		Control			Intervention			Wilkes Lambda
		N	M	SD	N	M	SD	
Pap Knowledge	Pre-Test	78	4.29	1.81	64	4.28	1.61	0.99, F(1,140)=0.718, p=0.398, partial eta squared = 0.005
	Post Test	78	4.76	1.12	64	4.95	1.03	
HPV Knowledge	Pre-Test	78	7.44	3.46	60	7.08	3.27	0.99, F(1,136)=0.185, p=0.668, partial eta squared = 0.001
	Post Test	78	8.59	2.37	60	8.43	2.53	
Belief Scale Scores	Pre-Test	60	47.68	8.74	56	48.25	7.26	0.99, F(1,114)=.163, p=0.687, partial eta squared = 0.001
	Post Test	60	49.63	8.67	56	49.69	6.64	

Table 16.
HPV knowledge questions

	N (%) Correct	
	Time 1	Time 2
HPV can cause HIV/Aids	108(57)	81(55)
You can always tell when someone has HPV	151(80)	122(84)
HPV can cause abnormal pap smears/Pap test	149(79)	128(88)
Only women get HPV	116(61)	106(73)
HPV can cause herpes	79(42)	67(46)
HPV can cause genital warts	79(42)	90(63)
You can have HPV without knowing it	156(83)	137(94)
HPV is a sexually transmitted infection (STI) or STD	134(71)	116(80)
HPV can cause cervical cancer	150(79)	132(90)
The HPV vaccine protects against all HPV infections	74(39)	75(52)
Condoms are not 100% effective at preventing HPV	139(74)	121(82)
HPV is spread by skin to skin contact	61(32)	70(48)

HPV related health beliefs were assessed using belief subscale scores that were compiled for a total belief scale score. The subscales consisted of perceived stigma, perceived susceptibility, perceived severity, perceived barriers, perceived benefits, and cues to action. Paired samples t-test comparing pre/post-test measures showed overall a significant increase in

total Health Belief Scale Scores over time (Table 14). Additionally there was a significant increase in participant severity subscale scores over time ($p = 0.001$), and benefits subscale scores did not change significantly over time ($p = 0.072$). There was no significant change in any of the other subscale scores over time, but there was a trend in the sample toward lower HPV related stigma beliefs, higher severity, susceptibility, and benefits beliefs, lower barriers beliefs, and increased beliefs in cues to action at time 2 (Table 17).

**Table 17. Paired Sample T-Test
Belief sub-scale scores over time**

	N	Mean	SD	Sig.
Stigma Scale Scores	139	5.16 (Time 1) 4.94 (Time 2)	2.43 2.13	0.259
Susceptibility Scale Scores	135	4.71 (Time 1) 4.8 (Time 2)	2.30 2.22	0.595
Severity Scale Scores	138	9.01 (Time 1) 9.49 (Time 2)	1.69 1.59	0.001
Barriers Scale Scores	136	7.73 (Time 1) 7.45 (Time 2)	3.65 3.27	0.204
Benefits Scale Scores	142	6.09 (Time 1) 6.30 (Time 2)	1.51 1.29	0.072
Cues to Action Scale Scores	137	10.73 (Time 1) 11.17 (Time 2)	3.67 8.03	0.158

Mixed between-within subjects analysis of variance was conducted on each subscale and the total belief scale scores to assess the impact of the two educational interventions (written material alone vs. video with written material) on participants' scores, across two time periods. There was no difference between the groups detected. The subscale results and interpretations are presented in (Table 18) and the subscale responses are presented in Table 19.

In relation to the subscale of perceived stigma associated with HPV there was no significant interaction between the type of educational intervention and time, Wilks Lambda = 0.99, $F(1, 137) = 0.890$, $p = 0.347$, partial eta squared = 0.006. The main effect for time was also not significant, Wilks Lambda = 0.99, $F(1, 137) = 1.051$, $p = 0.307$, partial eta squared = 0.008, with neither group showing a significant decrease in HPV related stigma beliefs across time. The main effect for group was also not significant, $F(1, 137) = 0.005$, $p = 0.942$, partial eta squared = 0.000, suggesting no difference in the effectiveness of the two teaching approaches on HPV related stigma beliefs.

The subscale of perceived severity of HPV showed no significant interaction between the type of educational intervention and time, Wilks Lambda = 0.99, $F(1, 136) = 0.188$, $p = 0.665$, partial eta squared = 0.001. However, the main effect for time was significant, Wilks Lambda = 0.99, $F(1, 136) = 10.72$, $p = 0.001$, partial eta squared = 0.073, with both groups perceiving greater severity of HPV across time. The main effect for group was not significant, $F(1, 136) = 0.884$, $p = 0.349$, partial eta squared = 0.0060, suggesting no difference in the effectiveness of the two teaching approaches on changing participants perceived severity of HPV beliefs.

The subscale of perceived benefits to HPV vaccination showed no significant interaction between the type of educational intervention and time, Wilks Lambda = 0.99, $F(1, 140) = 0.204$, $p = 0.652$, partial eta squared = 0.001. The main effect for time was also not significant,

Wilks Lambda = 0.97, $F(1, 140) = 3.112$, $p = 0.08$, partial eta squared = 0.022, with neither group showing a significant increase in perceived benefits to HPV vaccination across time. The main effect for group was also not significant, $F(1, 140) = 0.274$, $p = 0.602$, partial eta squared = 0.002, suggesting no difference in the effectiveness of the two teaching approaches on perceived benefits of HPV vaccination.

Cues to action were also assessed and showed no significant interaction between the type of educational intervention and time, Wilks Lambda = 0.99, $F(1, 135) = 0.176$, $p = 0.676$, partial eta squared = 0.001. The main effect for time was also not significant, Wilks Lambda = 0.98, $F(1, 135) = 2.098$, $p = 0.150$, partial eta squared = 0.015, with neither group showing a significant increase in cues to action scores across time. The main effect for group was also not significant, $F(1, 135) = 1.358$, $p = 0.246$, partial eta squared = 0.010, suggesting no difference in the effectiveness of the two teaching approaches on cues to action scores. (Note: The cues to action sub-scale assessed in the study instrument were separate from the overall study “cue to action”, which was the educational intervention).

**Table 18: Mixed Within and Between Analysis of Variance
Impact of educational intervention by belief subscales**

		Control			Intervention			Wilkes Lambda
		N	M	SD	N	M	SD	
Stigma Scale Scores	Pre-Test	77	5.25	2.62	62	5.04	2.20	0.99, F (1, 137)=0.890, p=0.347, partial eta squared = 0.006
	Post Test	77	4.87	2.20	62	5.03	2.05	
Susceptibility Scale Scores	Pre-Test	73	4.69	2.47	62	4.74	2.09	0.99, F (1,133)= 0.968, p=0.327, partial eta squared =0.007
	Post Test	73	4.95	2.44	62	4.64	1.94	
Severity Scale Scores	Pre-Test	74	9.14	1.65	64	8.85	1.73	0.99, F (1,136)= 0.188, p=0.665, partial eta squared = 0.001
	Post Test	74	9.56	1.61	64	9.40	1.59	
Barriers Scale Scores	Pre-Test	72	7.59	3.89	64	7.89	3.38	0.99, F (1,134)= 1.00, p=0.847, partial eta squared = 0.000
	Post Test	72	7.27	3.80	64	7.65	2.57	
Benefits Scale Scores	Pre-Test	77	6.11	1.63	65	6.06	1.37	0.99, F (1,140)= 0.204, p= 0.652, partial eta squared = 0.001
	Post Test	77	6.37	1.30	65	6.21	1.29	
Cues to Action Scale Scores	Pre-Test	75	10.50	3.96	62	11.01	3.30	0.99, F (1,135)= 0.176, p= 0.676, partial eta squared = 0.001
	Post Test	75	10.82	3.57	62	11.59	3.78	

Table 19.
Belief subscale responses

Stigma Beliefs	N (%)				Mean Score	t value	Sig. (2 tailed)
<i>Most people think that people with HPV should be ashamed of themselves</i>							
	Strongly Disagree	Disagree	Agree	Strongly Agree			
Pre-Test	31(17)	94(50)	53(28)	9(5)	1.7817		
Post-Test	30(21)	75(52)	36(25)	4(3)	1.0986	6.476	< 0.001
<i>Most people think that people with HPV are to blame for their problem</i>							
	Strongly Disagree	Disagree	Agree	Strongly Agree			
Pre-Test	26(14)	75(40)	76(40)	11(6)	1.5793		
Post-Test	23(16)	64(44)	53(36)	7(5)	1.7034	-1.587	0.115
<i>Most people think that people with HPV are a danger to others</i>							
	Strongly Disagree	Disagree	Agree	Strongly Agree			
Pre-Test	20(11)	57(31)	94(51)	14(8)	1.4085		
Post-Test	17(12)	56(38)	64(44)	10(7)	1.5423	-1.785	0.076
<i>Only people who are sexually promiscuous get HPV</i>							
	Strongly Disagree	Disagree	Agree	Strongly Agree			
Pre-Test	57(30)	88(47)	38(20)	5(3)	2.0552		
Post-Test	39(27)	75(50)	21(14)	13(9)	1.9517	1.768	0.079

Table 19 (cont).
Belief subscale responses

Susceptibility Beliefs	N (%)				Mean Score	t value	Sig. (2 tailed)
<i>It is extremely likely that I will get HPV in my lifetime</i>							
	Strongly Disagree	Disagree	Agree	Strongly Agree			
Pre-Test	38(20)	96(52)	43(23)	9(5)	1.0845		
Post-Test	35(24)	57(39)	43(30)	10(7)	1.1972	-1.562	0.121
<i>My current behaviors put me at risk for HPV</i>							
	Strongly Disagree	Disagree	Agree	Strongly Agree			
Pre-Test	76(41)	66(36)	39(21)	5(3)	.8881		
Post-Test	62(42)	58(40)	25(17)	2(1)	.7762	1.593	0.113
<i>HPV is a very common infection</i>							
	Strongly Disagree	Disagree	Agree	Strongly Agree			
Pre-Test	1(.5)	57(31)	107(58)	21(11)	1.8392		
Post-Test	0(0)	29(20)	97(67)	19(13)	1.9371	-1.961	0.052
<i>My risk of getting HPV is higher than most people's risk</i>							
	Strongly Disagree	Disagree	Agree	Strongly Agree			
Pre-Test	64(34)	91(49)	28(15)	3(2)	.8571		
Post-Test	41(29)	85(60)	14(10)	2(1)	.8429	.229	0.819

Table 19 (cont).
Belief subscale responses

Severity Beliefs		N (%)				Mean Score	t value	Sig. (2 tailed)
<i>HPV is a serious infection</i>								
		Strongly Disagree	Disagree	Agree	Strongly Agree			
	Pre-Test	2(1)	21(11)	116(63)	46(25)	2.2028		
	Post-Test	1(.7)	8(6)	80(55)	57(39)	2.3357	-2.322	0.022
<i>Cervical cancer is a serious disease</i>								
		Strongly Disagree	Disagree	Agree	Strongly Agree			
	Pre-Test	0(0)	5(3)	63(34)	118(63)	2.6207		
	Post-Test	0(0)	0(0)	47(32)	100(68)	2.6828	-1.263	0.209
<i>HPV can be life-threatening</i>								
		Strongly Disagree	Disagree	Agree	Strongly Agree			
	Pre-Test	2(1)	23(12)	110(60)	50(27)	2.1250		
	Post-Test	0(0)	11(8)	79(54)	57(39)	2.3125	-3.264	0.001
<i>HPV is very likely to cause cervical cancer</i>								
		Strongly Disagree	Disagree	Agree	Strongly Agree			
	Pre-Test	0(0)	24(13)	124(67)	36(20)	2.0857		
	Post-Test	0(0)	16(11)	92(64)	36(25)	2.1500	-1.194	0.235

Table 19 (cont).
Belief subscale responses

Barrier Beliefs	N (%)				Mean Score	t value	Sig. (2 tailed)
<i>I cannot afford to get the HPV vaccine</i>							
	Strongly Disagree	Disagree	Agree	Strongly Agree			
Pre-Test	47(26)	65(35)	56(30)	16(9)	1.8511		
Post-Test	41(28)	66(45)	33(23)	6(4)	1.9574	-1.617	0.108
<i>I would not get the HPV vaccine because I am afraid of needles</i>							
	Strongly Disagree	Disagree	Agree	Strongly Agree			
Pre-Test	81(44)	56(30)	32(17)	17(9)	2.1736		
Post-Test	66(45)	53(36)	20(14)	8(5)	2.2222	-.725	0.470
<i>I do not think vaccines work.</i>							
	Strongly Disagree	Disagree	Agree	Strongly Agree			
Pre-Test	70(38)	75(41)	27(15)	13(7)	2.1831		
Post-Test	55(38)	79(55)	8(6)	3(2)	2.2887	-1.699	0.092
<i>I have concerns about whether the HPV vaccine is safe.</i>							
	Strongly Disagree	Disagree	Agree	Strongly Agree			
Pre-Test	22(12)	56(30)	73(40)	33(18)	1.3776		
Post-Test	18(12)	49(33)	60(41)	20(14)	1.4406	-1.069	0.287
<i>I have concerns about whether the HPV vaccine is effective.</i>							
	Strongly Disagree	Disagree	Agree	Strongly Agree			
Pre-Test	19(10)	68(37)	81(44)	18(10)	1.4931		
Post-Test	14(10)	51(35)	64(44)	18(12)	1.4028	1.529	0.129
<i>I have concerns about possible side effects of the HPV vaccine.</i>							
	Strongly Disagree	Disagree	Agree	Strongly Agree			
Pre-Test	14(8)	57(31)	85(46)	31(17)	1.2917		
Post-Test	16(11)	37(25)	70(48)	23(16)	1.3056	-.226	0.822

Table 19 (cont).
Belief subscale responses

Benefits Beliefs	N (%)				Mean Score	t value	Sig. (2 tailed)
<i>Getting the HPV vaccine could save my life.</i>							
	Strongly Disagree	Disagree	Agree	Strongly Agree			
Pre-Test	8(4)	32(17)	120(65)	26(14)	1.8897		
Post-Test	1(.7)	21(14)	100(68)	25(17)	2.0069	-2.205	0.029
<i>Getting the HPV vaccine could protect me from getting certain types of HPV.</i>							
	Strongly Disagree	Disagree	Agree	Strongly Agree			
Pre-Test	0(0)	13(7)	130(70)	44(24)	2.1818		
Post-Test	1(.5)	4(2)	112(77)	28(19)	2.1469	.728	0.468
<i>Getting the HPV vaccine will reduce the chance of me getting cervical cancer in the future.</i>							
	Strongly Disagree	Disagree	Agree	Strongly Agree			
Pre-Test	1(.5)	28(15)	125(68)	31(17)	2.0350		
Post-Test	1(.7)	10(7)	100(68)	36(25)	2.1538	-2.135	0.035

Table 19 (cont).
Belief subscale responses

Cues to Action	N (%)				Mean Score	t value	Sig. (2 tailed)
<i>Knowing that HPV affects people like me would encourage me to get the HPV vaccine.</i>							
	Strongly Disagree	Disagree	Agree	Strongly Agree			
Pre-Test	4(2)	36(20)	116(63)	29(16)	1.9241		
Post-Test	2(1)	26(18)	93(63)	26(18)	1.9655	-.687	0.493
<i>Knowing more about HPV would encourage me to get the HPV vaccine.</i>							
	Strongly Disagree	Disagree	Agree	Strongly Agree			
Pre-Test	6(3)	25(14)	112(61)	42(23)	2.0140		
Post-Test	7(5)	21(14)	90(61)	29(20)	1.9720	.581	0.562
<i>If my doctor recommended that I get the HPV vaccine then I would get it.</i>							
	Strongly Disagree	Disagree	Agree	Strongly Agree			
Pre-Test	4(2)	50(27)	91(49)	41(22)	1.9021		
Post-Test	6(4)	35(24)	69(48)	35(24)	1.9091	-.111	0.912
<i>If my mother approved of the HPV vaccine then I would approve of it also.</i>							
	Strongly Disagree	Disagree	Agree	Strongly Agree			
Pre-Test	13(7)	55(30)	88(47)	30(16)	1.7273		
Post-Test	10(7)	40(27)	68(47)	28(19)	1.7692	-.638	0.524
<i>If my grandmother approved of the HPV vaccine then I would approve of it also.</i>							
	Strongly Disagree	Disagree	Agree	Strongly Agree			
Pre-Test	16(9)	68(36)	77(41)	26(14)	1.6224		
Post-Test	7(5)	45(31)	71(49)	22(15)	1.7343	-1.577	0.117
<i>If my friends approved of the HPV vaccine then I would approve of it also.</i>							
	Strongly Disagree	Disagree	Agree	Strongly Agree			
Pre-Test	19(10)	73(39)	70(37)	25(13)	1.5764		
Post-Test	10(7)	49(34)	62(43)	25(17)	1.6875	-1.593	0.113

Vaccine Uptake

Logistic regression was originally proposed to assess the impact of a number of factors on the likelihood that respondents would become vaccinated against HPV during the study. The model contained four independent variables (HPV knowledge scores, HPV belief scale scores, group, and insurance). Due to low numbers of respondents actually getting vaccinated ($N = 8$) during the study period, logistic regression analysis could not be conducted for this outcome variable. Vaccine status was verified for all but twelve (6%) participants using a three step approach (chart audit 42%, state immunization database 39%, and self-report 13%). During chi square analysis there were equal numbers of participants in both the control ($N = 4$) and intervention ($N = 4$) group who received the HPV vaccine during the study period. For this reason the outcome variable of interest in the logistic regression model was changed to look at intentions to accept the HPV vaccine. Intentions to accept the HPV vaccine were determined based on yes/no response to the question, “If cost were not an issue would you accept the HPV vaccine for yourself?”.

Using intention to accept the HPV vaccine as the outcome variable, logistic regression was performed with the same independent variables of HPV knowledge scores, HPV belief scale scores, group, and insurance. The full model containing all predictors was highly significant, $\chi^2(4, N = 124) = 28.57, p < 0.001$, indicating the model could distinguish between respondents who did and did not indicate intentions toward HPV vaccine. The model as a whole explained between 21% (Cox and Snell R square) and 28% (Nagelkerke R. Squared) of the variance in intentions to accept the vaccine, and correctly classified 70% of cases with a sensitivity of 84% and specificity of 50%. As shown in Table 20, only one of the independent variables made a unique statistically significant contribution to the model (Total Belief Scale Score) recording an

odds ratio of 1.142. This indicated that respondents who had increased total belief scale scores were 1.142 time more likely to have intentions to accept the vaccine than those with lower belief scale scores.

Table 20.

Logistic regression predicting likelihood of intentions to accept the HPV vaccine

	B	S.E.	Wald	df	p	Odds Ratio	95.0% C.I. for Odds Ratio	
							Lower	Upper
HPV Knowledge Scores	-.094	.090	1.081	1	0.298	.91	.763	1.087
Total Belief Scale Scores	.133	.033	16.216	1	<0.001	1.142	1.070	1.218
Group	.725	.420	2.986	1	0.084	2.065	.907	4.699
Insurance Status	1.222	.644	3.606	1	0.058	3.395	.961	11.991

Chapter 5

The purpose of this study was to evaluate the effectiveness of a video based HPV prevention education intervention compared to written HPV educational material at improving women's knowledge, beliefs, and behaviors regarding HPV and HPV prevention. The video-based first account stories of persons diagnosed with HPV and clear messages about prevention and treatment measures was hypothesized to be a more powerful educational tool for increasing patients' knowledge, beliefs, and behaviors regarding HPV and HPV prevention than written material alone. Based on previous literature, written material alone might not be sufficient to change health beliefs (Rosen et al., 2010; Waller et al., 2007). In addition, previous literature supported the use of storytelling for health education of patients as a way to increase patients' engagement with the material being presented (Comas-Diaz, 2012). By augmenting the written information with the addition of video-based stories, the learner would be engaged both visually and auditorily with the information presented in a way that would increase learning about HPV and HPV prevention.

HPV has been a focus of health care research for many years with a great deal of new scientific knowledge generated since the release of the HPV vaccine in 2006. However, despite the growing evidence to support a general lack of knowledge related to HPV among the world's population, there are still relatively few studies evaluating educational interventions to increase HPV knowledge. This review showed that only seventeen HPV educational intervention studies have been conducted in the past 13 years among vaccine eligible adult women. HPV educational intervention studies are needed to develop an evidence-based model that addresses specific population needs for HPV information. Additionally, using a strong theoretical framework can provide guidance for measurement outcomes that might be compared across studies in the future.

Having uniform, theoretically grounded intervention tools and outcome measures will contribute to nursing knowledge by generating research that is suitable for comparative effectiveness studies in the future. Currently, research has not provided evidence to support that a particular educational intervention is most effective at increasing participants' knowledge, beliefs, and behaviors toward HPV prevention. The purpose of this chapter is to discuss the findings of this study in relation to the current literature on the topic of HPV knowledge, beliefs and behaviors. Implications for nursing practice will be discussed along with suggestions for future research.

Impact on Knowledge

This study hypothesized that video-based first account stories of persons diagnosed with HPV and clear messages about prevention and treatment measures would be a more powerful educational tool for increasing participants' pap and HPV knowledge than written information alone. While it was observed that both pap and HPV knowledge significantly increased for both groups across time, there was no statistically significant difference between the groups based on type of educational information received. This is similar to Krawczyk et al. (2012) who also compared written and video delivered HPV information. Krawczyk et al. found that both groups scored similarly on HPV knowledge at pre-test and post-test. Krawczyk et al. speculated the reason for this was that the information delivered was identical except for the mode of information delivery. The researchers suggested that future studies might add music and images to trigger an emotional response in participants and target the video message to influence target audiences based on gender, culture, sexual experience, and age. The current study incorporated some of these elements, specifically music, images, and cultural brokerage through first account stories of a cervical cancer survivor. While findings from the current study were not statistically

significant, the video based educational group did have slightly higher knowledge scores than the written educational group.

Upon enrollment in the study, women's pap and HPV knowledge levels were low, even among participants who regularly had contact with health care personnel for pap screening. This is consistent with the literature suggesting low pap and HPV knowledge exists among women who have regular contact with health care providers for pap screenings (Cermak et al., 2010; Fry et al., 2010; Kahn et al., 2005; Waller et al., 2009; Warren, 2010). Findings from this study support that low pap and HPV knowledge is still a relevant problem today among women who regularly see health care providers for annual exams. The fact that knowledge deficits persist despite increasing access to health care providers through the affordable care act is concerning and speaks to many unmet educational needs that could be influenced by changes in health care practices.

Reasons for low knowledge despite regular health provider contact is unclear, but may be due to lack of time in the office for face-to-face education of women (Bayer et al., 2011), or could reflect a lack of HPV knowledge and self-efficacy among healthcare providers. Further research into reasons for women's unmet educational needs regarding HPV is warranted. Similarly, further research into healthcare providers' lack of provision of HPV education is also warranted.

Participants in this study were least knowledgeable regarding the fact transmission of HPV is via skin to skin contact rather than blood or body fluids. The participants also did not understand that there were many types of HPV and that the vaccine only protects against some types of HPV. Knowledge deficits were also related to signs and symptoms of HPV, with many participants believing HPV was the virus that caused herpes, HIV/AIDS, and many participants

did not understand the relationship between HPV and abnormal pap smears and cervical cancer. This is similar to the literature citing the most frequent knowledge deficits among women are associated with modes of transmission, prevalence, relationship of HPV to cancer, and lack of knowledge regarding prevention methods (Fry et al., 2010; Kahn et al., 2005; Waller et al., 2009; Warren, 2010). These discrepancies in accurate HPV knowledge are concerning and suggest a greater need for accurate health information on HPV. Future educational campaigns should stress factual HPV information related to the transmission and prevention of HPV.

Additionally, 34% (n = 65) of age eligible women in this study population reported never having pap testing. The subsequent pap and HPV knowledge scores among this group of study participants is significantly lower than the women who did attend for pap testing exams. This reflects similar findings in the HPV literature regarding the connection between regular pap testing, HPV knowledge, and prevention behaviors (Mills et al., 2011). The lack of participation in pap screening exams is concerning for this study group as they were noted to have several risk factors for HPV and cervical cancer (Table 6). Their lack of participation in secondary prevention of HPV related cancer may be related to their overall lack of pap and HPV knowledge and is consistent with previous studies showing lack of knowledge is a real barrier to prevention seeking behaviors (Bynum et al., 2011; Juraskova, O'Brien, et al., 2011). Additionally, many women do not understand the purpose of pap testing is to prevent cervical cancer (Hawkins et al., 2011; Panagopoulou et al., 2011; Vasconcelos et al., 2011). In fact, women most often report other reasons (contraception, pelvic pain or symptoms) for attending clinics for pap smear testing, not related to HPV or cervical cancer screening (Bayer et al., 2011; Bertram & Magnussen, 2008; Daley et al. 2010; Friedman & Sheppard, 2007; Perrin et al., 2006; Vasconcelos et al., 2011). Of major importance for future health initiatives is to educate young

women regarding the age they should start pap testing, the purpose of the pap test, and the importance of pap testing regardless of vaccine status.

Impact on Health Beliefs

Health Belief Model Constructs

In addition to evaluating women's knowledge of HPV this study sought to evaluate changes in women's health beliefs regarding HPV and HPV prevention. The video based HPV prevention education intervention was hypothesized to be more effective than written HPV educational material at improving health belief model constructs (perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and cues to action) regarding HPV prevention among women. The supposition was that as perceived susceptibility and severity increased, participants would perceive greater benefit and fewer barriers to vaccination, leading to increased uptake of primary prevention vaccination behaviors among the participants in the study.

Findings showed no significant difference in the effectiveness of the two teaching approaches on changing participants' health beliefs. However, there was a significant increase in the Total Belief Model Scale Scores for both groups over time. Additionally, there was a significant increase in perceived severity subscale scores for both groups over time, and while not significant there was a trend of positive changes in each subscale for both groups over time. In this study, both educational programs were equally effective at changing health beliefs related to HPV. This is similar to findings by Juraskova, Bari, et al. (2011) who showed significant changes in perceived severity and perceived benefits following an educational intervention. In their study, they also noted the subscales of perceived severity and perceived benefits were most predictive of vaccine behavior. The researchers found that the cues to action subscales were

more likely than other belief subscales to be a significant predictor of positive attitudes toward HPV vaccine acceptance. This is consistent with more recent studies of the Health Belief Model, which suggest the construct of “cues to action” is more predictive of health behaviors than other constructs in the model (Carpenter, 2010).

Previous HPV studies have utilized the Health Belief Model as a theoretical framework to guide study interventions. However, most studies have used only part of the model (ie. perceived susceptibility and severity) rather than the model as a whole, which may make the study outcomes less predictive (Carpenter, 2010; Harrison et al., 1992). Carpenter (2010) suggested using the four traditional model constructs (susceptibility, severity, benefits, barriers) as a whole, and including moderator variables (like “cues to action”). At the time of this study, there were only two HPV studies utilizing the model as a whole with “cues to action” (Bynum et al., 2011; Juraskova, Bari, et al., 2011). The current study found that utilizing the model as a whole was most predictive of vaccine intentions. Future HPV educational intervention studies should include the model in its entirety for maximum predictive value on outcome variables.

HPV Stigma Beliefs

Lack of HPV knowledge is associated in the literature with increased stigma beliefs associated with HPV (Bertram & Magnussen, 2008; Daley et al., 2008; Daley et al., 2010; Lagro-Janssen & Schijf, 2002). Stigma associated with HPV has implications for disease prevention in the future. Studies have identified stigma associated with HPV as a barrier to prevention seeking behaviors, partner notification, and social support (Friedman & Shepeard, 2007; Perrin et al., 2006). Addressing the psychosocial stigma attached to HPV is important to facilitate successful prevention programs.

This study hypothesized a video based educational program using a cervical cancer survivors story would result in greater decreases in HPV related stigma beliefs in women than written material alone. Findings from the study did not support the hypothesis that the video based educational program would be more effective than written information alone in changing women's HPV stigma beliefs. However, all of the women had higher rates of HPV stigma beliefs going into the study, which decreased for both groups over time. Therefore, HPV related stigma beliefs are impacted by factual HPV information, and lower HPV related stigma can impact HPV prevention seeking behaviors by women (Friedman & Shepeard, 2007; Perrin et al., 2006).

Prevention

Primary Prevention

HPV vaccination rates are low among women 19-26 years old, with only 20.7% of women having received at least one dose of HPV (MMWR, February 3, 2012). Several educational programs among women have sought to change this statistic. While the majority of studies showed that educational interventions can increase prevention intentions (Crosby et al., 2008; Fry et al., 2010; Juraskova, Bari et al., 2011; Kahn et al., 2005; Krawczyk et al, 2012; Kwah et al., 2010; Mock et al., 2007; Papa et al., 2009), one study showed no change in prevention intentions after receiving the educational intervention (Patel et al., 2012), and another study showed less participant self-intention to get vaccinated, but higher intentions to get the vaccine for their children following an educational intervention (Ferris et al., 2007).

This study sought to evaluate the effectiveness of two types of educational program on vaccine behaviors. However, actual vaccine behaviors could not be evaluated due to too few participants actually becoming vaccinated during the study period. Subsequently, the

effectiveness of the two educational programs was evaluated based on ability to predict changes in attitudes toward vaccination for the participants themselves and their adolescent children.

Findings showed both groups were more willing to accept the vaccine for themselves and their adolescent children post-intervention, but there was no statistically significant difference between the two groups on willingness to accept the vaccine for themselves' or their adolescent daughters. There was a statistically significant difference in the participants' willingness to accept the vaccine for their adolescent sons over time, with the video based education group being more willing than the control group to accept the vaccine for their adolescent sons at time

2. To determine the cause of this difference the two educational programs were evaluated for differences in message content. Evaluation showed the video based factual information regarding who is eligible to receive the HPV vaccine may have been more gender neutral than the written CDC fact sheet given to the control group. The video message simply provided the ages for which the vaccine has FDA approval, which includes "all males and females 9-26 years of age can receive the HPV vaccine". The CDC hand out is more specific about different age groups and risk groups who should be vaccinated. The CDC message reads "the vaccine is recommended for boys and girls ages 11 or 12 years, catch-up ages for boys are from 21-26 and the CDC recommends the vaccine for gay and bisexual men through age 26, and men and women through age 26 with an impaired immune system (including people living with HIV/AIDS)" (CDC, February 23, 2015). Possibly by including specific criteria for gay/bisexual men in the CDC handout participants were led to believe their son would not need the vaccine if he were not in this high-risk category. Additionally, it is possible that different age ranges for recommended and catch-up schedules based on gender led some women in the study to perceive less need for the vaccine for their adolescent boys when in effect it is equally important to

vaccinate both genders against HPV in order to eradicate the infection from the population.

Based on findings from this study, content review of parent handouts related to HPV and HPV vaccine information would be important. Simplified recommendations to include the same age range for both genders irrespective of other risk factors with long-term eradication of HPV infection among the general population as a goal might be more effective in swaying parent decisions to vaccinate adolescent children.

Secondary Prevention

There was a fairly large proportion of 18-26 years old women in this study who had not yet had a pap smear screening test (34%). This rate is higher than the national average of 22% for women (aged 18-65 years) who have not undergone pap testing (NCI, 2005). It is difficult to make a direct comparison of this number however, because the sample for this study is much smaller and the age ranges are not equal.

However, among those who had never had pap smear screening, 46% were above the age of 21 years when regular pap screening is advised. It is not clear why these women were not getting regular pap smear screening, but lack of knowledge regarding the benefits of regular pap testing may be a factor. It was observed that women naïve to pap testing had significantly lower pap knowledge scores at time 1 ($M = 3.31$, $SD\ 2.09$) than women who had pap testing prior to the study ($M = 4.91$, $SD\ 1.16$) $t(73.65) = -5.45$, $p = .000$ (two-tailed). Even though non-pap testing women had their knowledge increased over time ($M = 4.5$, $SD\ 1.17$), it was still significantly lower than the pap testing group of women ($M = 5.16$, $SD\ .81$) at time 2, $t(89.41) = -3.68$, $p = .000$ (two-tailed). Based on this data it is impossible to say whether age eligible screening participant lack of participation in pap screening is attributable to lack of knowledge regarding the need for screening or rather conversely their lack of knowledge is a result of no

exposure to pap screening. What can be inferred is a large portion of age eligible women in this study are not getting the recommended screened for HPV and cervical cancer, and according to responses on age of sexual debut and lifetime number of sexual partners they are at high-risk for HPV transmission. The findings in this study highlight a need for additional education among young women regarding the value of regular pap screening exams.

Significance of the Study

Contribution to Nursing Knowledge and Practice

Understanding women's HPV knowledge, beliefs and behaviors has implications for nursing practice because the current national vaccine uptake rate among adult women is low at 20%. Studies among women have shown a connection between HPV knowledge and beliefs and vaccine uptake. However, there are discrepancies in the literature regarding the most effective information and educational delivery format to meet this need. This study sought to compare the effectiveness of two type of information delivery on changing women's HPV knowledge, beliefs, and behaviors. Several implications can be drawn from the study to inform practice.

First, nurses are often the first point of contact patients have for health care information, and according to respondents in this study health care providers are the most trusted source of health information. However, this study demonstrated that women are not receiving adequate pap and HPV education despite having regular contact with health care providers for pap testing. It is unclear why they aren't receiving education, but their lack of knowledge does have a direct impact on their willingness to accept the HPV vaccine for themselves and their adolescent children. Both groups in this study were more willing to accept the vaccine for themselves and their adolescent children post-intervention. Thus, increasing women's knowledge of HPV and the HPV vaccine could in time have a positive influence on HPV vaccine rates. Additionally, by

providing gender neutral HPV educational information nurses may see greater willingness to accept HPV vaccination for adolescent boys.

Nursing can also play an important role in women's knowledge regarding pap screening exams. Many participants in this study who were age eligible were not yet having recommended pap screening tests. Nursing can influence this by reminding young women at every opportunity about recommended preventive health testing that should occur. Also observed in this study is that even among women who were getting regular pap testing their pap and HPV knowledge was low. Thus, it is important that nurses not assume that women attending regularly for pap testing already know all about the test, HPV, or other sexual health issues. Nurses need to treat every health care visit as an opportunity to broaden a patient's knowledge of health topics.

Beyond understanding the importance of health prevention behaviors, nurses also play a role in removing barriers to health care. In this study, the most common barriers to vaccination cited by participants were cost and fear of vaccines. Nurses can play a critical role in removing these two barriers by helping patients locate local clinics where the vaccine is available for low/no cost. Additionally, myths are pervasive in the public and through social media regarding the HPV vaccine that can falsely elevate peoples' fear of the vaccine. As such, dissemination of factual HPV information in places commonly viewed by the general public would be important for nurses to combat fears perpetuated by inaccurate information. Nurses should consider dissemination of HPV vaccination facts and dispelling myths in popular and accessible media including magazines and online social media forums. In this study, participants attending family planning clinics were more often getting the HPV information than women from the general population without access to regular health care. Thus, nurses need to step outside of their traditional work environments to reach women with minimal exposure to the health care system.

In this study, women had many unmet pap and HPV knowledge needs, which provide evidence of a major gap in nursing practice. Additional research among nursing/health care personnel is needed to determine their knowledge of HPV and their self-efficacy to educate patients regarding prevention.

Potential Impact on Health and Quality of Life

HPV is associated with significant morbidity and mortality. HPV morbidity is related to the chronic potential recurrence of genital warts, the psychological experience of stigma related to HPV diagnosis, and fear of cancer associated with HPV related cervical dysplasia. While HPV mortality has decreased among developed countries utilizing secondary prevention (pap testing), lives saved could be greater with increased awareness and acceptance of HPV primary prevention (vaccination). Currently, there is an underutilization of available HPV primary prevention services. This study supports both HPV primary and secondary prevention services are not being fully utilized by age eligible women, and many in the study were high-risk for HPV and its associated morbidity.

Participants in this study had several risk factors for HPV (young age of sexual debut, multiple partners, lack of condom use, etc.) and approximately 10% of participants in this study reported a previous diagnosis of HPV. This has significant implications for health and quality of life for study participants as those diagnosed with HPV will have to undergo expensive and often physically and psychologically painful diagnostic and treatment procedures to prevent later development of cervical cancer. Any effort we can make as a health care community to prevent morbidity associated with HPV infection is worthwhile.

Despite many participants having insurance coverage in this study, the most cited barriers to utilization of prevention services in this study was cost, availability, and fear of vaccines.

This finding suggest there may be social and health policy implications needing addressed in order to remove barriers to prevention services for adult women. Health policy legislation that could expand HPV vaccine availability to private physician offices, pharmacies, and other potential sources of access to adult women would be important to consider.

Vaccine Availability and Uptake

Despite being age eligible for the HPV vaccine, none of the study participants had yet been vaccinated upon enrollment in this study. A small number became vaccinated during the study ($n = 8$). Respondents reported several potential reasons for lack of vaccination.

Lack of availability of the vaccine for adult women is concerning. Fourteen percent of respondents at time 1 versus 10% at time 2 reported non-availability of the vaccine as a barrier to getting vaccinated. In this study, participants' intentions toward accepting the vaccine increased after learning more about HPV and the HPV vaccine, however, their behaviors toward vaccination during the study protocol indicated that while they were more inclined to accept the vaccine, few actually got vaccinated. Perhaps lack of vaccine availability is one reason for this finding. This has implication for future policy that might mandate greater availability of the vaccine for adult populations. First, policies might suggest expanded federal VFC funding for adult doses of the vaccine for those who are under or uninsured. Additionally, policies could be implemented at the state and national level to require access for all insured patients to adult vaccines health departments around the nation. Finally, health policy could be implemented to require the HPV vaccine for seventh grade entry along with other adolescent vaccines. This type of policy would eventually solve the problem of children reaching adulthood without receiving the HPV vaccine.

While the vaccine is available in every state and county in the nation, the vaccine may only be available at county health departments or clinics who subscribe to the Vaccines for Children funds. Additionally, these programs stock primarily for adolescent populations and may not have a large supply of private pay stock for adults due to the expense of maintaining a private vaccine supply. Many private physician offices opt not to stock vaccines due to the expense of maintaining the supply in low volume clinic settings.

Additionally, even though 84% of the population reported having insurance coverage, nearly 41% of respondents at time one and 34% at time 2 noted cost was a barrier to getting vaccinated. This finding reflects that while many more young people are being insured through the Affordable Care Act, there may be gaps in insurance coverage for vaccinations. Many women in this age group may fall through the cracks for age eligibility for government sponsored Vaccine Programs, which could impact women's ability to become vaccinated. While this study promoted pharmaceutical company charity programs for uninsured women, not all clinics were willing to subscribe to these program as they require extra paperwork and up front expense prior to reimbursement. For these reasons most clinics contacted during the study chose to refer patients to local health departments for vaccine services.

Another reason for lack of vaccine uptake may have been respondents' lack of perceived need for the vaccine. Based on comments by participants their lack of perceived need stemmed from many factors. Some felt that because they were currently monogamous with a male partner or lesbian, the vaccine was not needed. Additionally, many felt that because they were at the end of the age bracket for suggested vaccination, they were too late to begin HPV vaccination. A few participants reported already being diagnosed with HPV as a reason not to get the vaccine.

Many of these statements reflect a lack of understanding regarding HPV and HPV vaccination. Recommendations for vaccination are not made based on monogamy or lesbian sexual orientation, thus any woman up to the age of 26 years should consider getting the HPV vaccine. Additionally, even if a woman is already 26 years old and will turn 27 before finishing the HPV vaccine series, she can still start the vaccine series. The age cut off of 26 years is made based on what we know about HPV pathophysiology and epidemiology. Based on pathophysiology and epidemiology of HPV it is felt the vaccine is most cost effective when given at younger ages. There are no added safety concerns if a woman should finish her vaccine series after she turns 27 years old. Finally, participants' feeling they could not be vaccinated because they were already diagnosed with HPV is a misperception common among many people. In actuality previous diagnosis of any HPV strain does not confer immunity towards additional HPV strains (Wheeler, 2007). Nor does clearing the virus confer immunity against reinfection with the same HPV type in the future. Thus, all women regardless of previous diagnosis with HPV are encouraged to become vaccinated against available HPV strains in the vaccine. Overall, these statements reflect the lingering lack of knowledge many people have regarding HPV types, transmission, and the vaccine in general.

Finally, many respondents had an inherent fear of risks of vaccines as a reason for avoiding HPV vaccine uptake. This is troubling given there is a large body of scientific evidence suggesting the benefits of vaccines far outweigh the risks of vaccination. In particular, the HPV vaccine has an excellent safety profile with the most common side effects being pain and irritation at the injection site (Wheeler, 2007; FDA, 2015).

Respondents' concern for HPV vaccine safety suggests an ongoing need for continued education on the topic of HPV vaccine safety. Future educational programs must include factual

information regarding HPV vaccine safety as a way to decrease perceived barriers to vaccine uptake among women. Furthermore, nurses should be trained in delivering HPV information to young women and in promoting HPV vaccination.

Suggestions for Future Research

The current study represented a prospective quasi-experimental, pre-test/post-test design with delayed intervention treatment administered to the control group at study completion. The study was done because there was a lack in the current HPV literature reflecting effective HPV educational material and approaches for young women. Prior to this study there had only been two video delivered studies among women. One of which measured knowledge and the other assessed behavior outcomes following the intervention. This study was designed to evaluate the effectiveness of a video based educational program on women's knowledge and behaviors in comparison to the standard of care of written material alone.

This study found there was no difference in the effectiveness of the two types of educational material on HPV knowledge, however, both groups' HPV knowledge and attitudes scores improved following the different types of interventions. Also, the video-based education was significantly more effective at increasing women's willingness to accept the HPV vaccine for their adolescent sons. Therefore, future studies might build upon this by studying the video based educational program among a larger sample of mothers of adolescent sons to see if the same result is obtained and whether the video-based education might influence actual vaccine uptake among adolescent boys.

This study also found that while women are attending for pap screening they still have low pap and HPV knowledge scores suggesting they are not having all their educational needs met at these health care visits. Reasons for lack of educational information among women who

have contact with health care providers is unclear, but future research may uncover factors influencing the provision of HPV education to women in the clinic setting. Additionally, future research should explore nurses/health care providers' knowledge of HPV and their self-efficacy to educate patients on the topic. Possibly nurses and health care providers in general have unmet HPV and HPV vaccine knowledge needs.

Limitations

The majority of this sample was Caucasian with little ethnic or racial diversity and most respondents were living in rural Appalachia. Therefore, inferences cannot be made about women from other ethnicities, races, or geographic locations. Another limitation of this study related to recruitment procedures. Issues arose during face-to-face recruitment in clinic causing the researcher to amend the IRB protocol to expand recruitment to the workforce, internet, and university student email. Self-selection to an on-line survey poses challenges for verification of participant inclusion/exclusion criteria. However, of the 194 participants recruited in the study, only 12 were completely unverifiable for meeting inclusion criteria. The additional 182 were verifiable for female gender, age, and vaccine status. Also because participants self-selected for this study they may have some biases toward the topic, which would make their responses less representative of the population as a whole.

Another limitation was the inclusion/exclusion criteria for this study were too strict. Several women in the clinic were age eligible for the study and wanted to participate, but had already had at least one HPV shot which excluded them from the study. After moving the recruitment to the university student email more non-vaccinated women were found for the study. Additional studies among university students evaluating why they are not as likely to have gotten the vaccine would be important. Perhaps there is a need for greater awareness and

access to health care services like vaccination among this age group of women in the community and on campus.

Many HPV studies have assessed the impact of HPV knowledge on increasing HPV vaccine intentions. Few studies have assessed actual vaccine uptake behaviors. This study included assessment of actual vaccine uptake. However, few participants (control $n = 4$, intervention $n = 4$) received the HPV vaccine during the study. The low numbers of actual vaccine uptake in this study prevented analysis of the impact HPV education might have on vaccine uptake. Therefore, a limitation of this study was that conclusions could only be drawn regarding the impact of HPV education on intentions toward HPV vaccination rather than actual vaccine behaviors, which would have been preferred. It is not completely clear why so few participants became vaccinated during this study, but perhaps identified barriers of cost, access, and fear of shots were factors. Future studies should be designed to address these barriers in order to assess the impact education might have on actual vaccine behaviors.

Finally, a limitation of this study was that the control group in this study might have actually received more education than is typical of standard of care. While the researcher felt written information alone was probably more typical of standard of care, it may be that no education of any type is more typical of the standard of care. This finding is based on the evidence in this study showing that women who regularly attended clinics for pap test still have low levels of baseline knowledge.

Conclusions

In conclusion, there is a need for additional HPV research focusing on theoretically grounded educational interventions among differing populations at risk for HPV. In particular there is a need for additional research to determine why women who have regular contact with

health care providers are still having unmet HPV knowledge needs. A study among health care personnel related to this topic might provide valuable insight into this problem. Additionally, more research needs to be conducted regarding the importance of gender bias in HPV vaccine recommendations. This study indicates there was a statistically significant increase in women's willingness to vaccinate adolescent sons following the video based educational program.

Replication of this study among parents of adolescent children would be important as a way of informing our knowledge regarding adaptations needed on future CDC HPV literature.

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Appendix A: Information cover letter for participants

Dear Participant,

This letter is a request for you to take part in a research project to assess your knowledge, beliefs, and behaviors associated with HPV and HPV vaccination. This project is being conducted by Crystal Sheaves, a doctoral student at West Virginia University School of Nursing. Crystal Sheaves will administer this research project under the supervision of her Dissertation Chair, Dr. Ilana Chertok. Your participation in this project is greatly appreciated and will take approximately 20 minutes (to fill out a short survey and receive HPV educational material).

Your involvement in this project will be confidential, and no identifying information will be collected on the survey. All data will be reported in aggregate. **You must be 18 -26 years old, have never received a HPV shot, and non-pregnant to participate.** Your participation is completely voluntary, and you may discontinue at any time. Your visit today at the doctor's office will not be affected in any way if you choose not to participate in this study. West Virginia University's Institutional Review Board acknowledgement of this project is on file.

I hope that you will participate in this research project, as it could be beneficial in understanding the strength of the HPV knowledge, beliefs, and behaviors of women in West Virginia. Thank you very much for your time. Should you have any questions about this letter or the research project, please feel free to contact Crystal Sheaves at (304) 573-6963 or by e-mail at csheaves@hsc.wvu.edu. In addition, if you have questions or concerns regarding this study you may contact the West Virginia University Office of Research Compliance at 304-293-7073 ext. 3.

For more information on HPV, please visit the CDC website at: <http://www.cdc.gov/hpv/> You are also encouraged to discuss any questions or concerns you may have about HPV with your medical provider. In addition, a list of counseling services in your area is attached, if you should feel the need to discuss any concerns that arose after taking the survey.

Thank you for your time and help with this project.

Sincerely,

Crystal Sheaves

Appendix B: Pre-test HPV knowledge, beliefs, and behaviors questionnaire

Survey: _____

HPV Knowledge, Beliefs, and Behaviors Questionnaire

Please, read each question and put a check (✓) beside your answer. If you do not want to answer a question, you can leave it blank. Only mark one response for each question, unless you are asked to “check all that apply.”

Questions about You

1. **How old are you?** _____
2. **What is your race?**
 - ☐ White
 - ☐ African American or Black
 - ☐ Hispanic or Latino
 - ☐ Asian
 - ☐ American Indian or Alaska Native
 - ☐ Native Hawaiian or Other Pacific Islander
 - ☐ Other race (*Please specify*) _____
3. **What best describes your sexual orientation?**
 - ☐ Heterosexual
 - ☐ Gay/Lesbian
 - ☐ Bisexual
 - ☐ Unsure
4. **What is your current relationship status?**
 - ☐ Single
 - ☐ Married
 - ☐ Living with Partner (i.e., boyfriend/girlfriend)
 - ☐ Divorced/Separated
 - ☐ Other (*Please Specify*) _____
5. **What is your highest level of education?**
 - ☐ Some high school
 - ☐ High school graduate or GED equivalent
 - ☐ Associates Degree or Some college
 - ☐ Bachelor's degree or Associate's degree
 - ☐ Graduate/professional degree (i.e., Masters, PhD, MD)
6. **How do you pay for your health care appointments? (CHECK ONLY ONE)**
 - ☐ Private insurance
 - ☐ Medicaid
 - ☐ Clinic program (BCCSP, Family Planning, Sliding Scale, etc.)
 - ☐ Out-of-Pocket (Private Pay)
 - ☐ None

7. **Do you smoke?**

- ☐ Yes
☐ No

Questions about Your Sexual History

8. **Have you ever had sexual intercourse? (Sexual intercourse includes vaginal, oral, or anal sex.)**

- ☐ Yes
☐ No

9. **How old were you when you had sexual intercourse for the first time? _____**

10. **During your lifetime, with how many people have you had sexual intercourse with? _____**

11. **The last time you had sexual intercourse, did you or your partner use a condom?**

- ☐ Yes
☐ No
☐ Don't Know/Not Sure

12. **In general, do you use condoms to (*CHECK ALL THAT APPLY*):**

- ☐ Prevent pregnancy
☐ Prevent sexually transmitted infections (STIs) (also called STDs)
☐ Prevent HIV infection (the virus that causes AIDS)
☐ other reason (*Please specify*) _____

13. **Do you use hormonal contraceptives? (birth control pills, depo shot, or IUD)**

- ☐ Yes
☐ No

14. **How many times have you been pregnant?**

- ☐ 0
☐ 1
☐ 2
☐ 3
☐ 4
☐ 5 or more

15. **How many live births have you had?**

- ☐ 0
☐ 1
☐ 2
☐ 3
☐ 4
☐ 5 or more

16. **Have you ever had a Pap smear also known as a Pap test?**
☐ Yes
☐ No
☐ Don't Know/Not Sure
17. **How long has it been since you had your last Pap smear?**
☐ Less than 12 months ago
☐ 2 years ago
☐ 3 years ago
☐ 4 years ago
☐ 5 years ago
☐ 5 or more years ago
☐ Don't Know/Not Sure
18. **Have you ever been told by a health care provider that your Pap smear result is "abnormal"?**
☐ Yes
☐ No
☐ Don't Know/Not Sure
19. **Have you ever been told by a health care provider that you had a sexually transmitted infection or disease also called an STD or STI?**
☐ Yes
☐ No
☐ Don't Know/Not Sure
20. **Have you ever been told by a health care provider that you have HPV?**
☐ Yes
☐ No
☐ Don't Know/Not Sure
21. **If Yes, did your health care provider tell you that you had a high-risk type of HPV?**
☐ Yes
☐ No
☐ Don't Know/Not Sure
22. **If Yes, did your health care provider tell you that you had a low-risk type of HPV?**
☐ Yes
☐ No
☐ Don't Know/Not Sure

Questions about Your Sexual Health

23. Please tell us how much you agree or disagree with the statements (from “strongly disagree” to “strongly agree”).

	Strongly Disagree	Disagree	Agree	Strongly Agree
a. It is difficult for me to find effective solutions for the sexual health problems that come my way.	☐	☐	☐	☐
b. I'm generally able to accomplish my goals with regard to my sexual health needs.	☐	☐	☐	☐
c. I succeed in things I do to improve my sexual health.	☐	☐	☐	☐
d. I am directly responsible for my sexual health.	☐	☐	☐	☐

Pap Smear Knowledge

24. Please, respond to the following statements about HPV as TRUE, FALSE, or DON'T KNOW.
(If you don't know, check “DON'T KNOW.”)

	True	False	Don't Know
a. A Pap smear is a test to find out if a woman is pregnant.	☐	☐	☐
b. All women should be getting Pap smears by the time they are 21 years old.	☐	☐	☐
c. A Pap smear checks for changes in the cells of a woman's uterus, also called the womb.	☐	☐	☐
d. A Pap smear checks for changes in the cells of a woman's cervix.	☐	☐	☐
e. Getting regular Pap smears is the best thing a woman can do to prevent cervical cancer.	☐	☐	☐
f. If a woman has a Pap smear result that is not normal that usually means that she has cancer.	☐	☐	☐

HPV Knowledge and Awareness

25. Have you ever heard of HPV? (HPV stands for human papillomavirus.)
☐ Yes
☐ No
26. Have you ever heard of the HPV vaccine? (also called the HPV shot or GARDASIL.)
☐ Yes
☐ No

27. Please, respond to the following statements about HPV as TRUE, FALSE, or DON'T KNOW.
(If you don't know, check "DON'T KNOW.")

	True	False	Don't Know
a. HPV can cause HIV/AIDS.	☐	☐	☐
b. You can always tell when someone has HPV.	☐	☐	☐
c. HPV can cause abnormal Pap smears/ Pap tests.	☐	☐	☐
d. Only women get HPV.	☐	☐	☐
e. HPV can cause herpes.	☐	☐	☐
g. HPV can cause genital warts.	☐	☐	☐
h. You can have HPV without knowing it	☐	☐	☐
i. HPV is a sexually transmitted infection (STI) or STD.	☐	☐	☐
j. HPV can cause cervical cancer.	☐	☐	☐
k. The HPV vaccine protects against all HPV infections?	☐	☐	☐
l. Condoms are not 100% effective at preventing HPV?	☐	☐	☐
m. HPV is spread by skin to skin contact?	☐	☐	☐

HPV Vaccine Acceptability

28. If cost was not an issue, would you get the vaccine to prevent HPV infection?
☐ Yes
☐ No
☐ Don't Know/Not Sure
29. What are the barriers or reasons for not getting the HPV vaccine? (*CHECK ALL THAT APPLY*)
☐ Cost
☐ Not available
☐ Risks with shots
☐ No need
☐ Other: _____
30. Do you know where to go to get the HPV vaccine?
☐ Yes
☐ No
31. If you have an 11-12 year-old daughter (or became the parent of one in the future), would you have her vaccinated against HPV?
☐ Yes
☐ No
☐ Don't Know/Not Sure

32. If you have an 11-12 year-old son (or became the parent of one in the future), would you have him vaccinated against HPV?

☐ Yes
☐ No
☐ Don't Know/Not Sure

Attitudes, Beliefs, and Perceptions about HPV and HPV Vaccine

33. This section asks about your beliefs and perceptions about HPV and the HPV vaccine. Please tell us whether you agree or disagree with the following statements (from “strongly disagree” to “strongly agree”).

	Strongly Disagree	Disagree	Agree	Strongly Agree
a. Most people think that people with HPV should be ashamed of themselves	☐	☐	☐	☐
b. Most people think that people with HPV are to blame for their problem	☐	☐	☐	☐
c. Most people think that people with HPV are a danger to others	☐	☐	☐	☐
d. Only people who are sexually promiscuous get HPV	☐	☐	☐	☐

	Strongly Disagree	Disagree	Agree	Strongly Agree
e. It is extremely likely that I will get HPV in my lifetime.	☐	☐	☐	☐
f. My current behaviors put me at risk for HPV.	☐	☐	☐	☐
g. HPV is a very common infection	☐	☐	☐	☐
h. My risk of getting HPV is higher than most people's risk	☐	☐	☐	☐

	Strongly Disagree	Disagree	Agree	Strongly Agree
i. HPV is a serious infection.	☐	☐	☐	☐
j. Cervical cancer is a serious disease.	☐	☐	☐	☐
k. HPV can be life-threatening	☐	☐	☐	☐
l. HPV is very likely to cause cervical cancer	☐	☐	☐	☐

	Strongly Disagree	Disagree	Agree	Strongly Agree
m. I cannot afford to get the HPV vaccine.	☐	☐	☐	☐
n. I would not get the HPV vaccine because I am afraid of needles.	☐	☐	☐	☐
o. I do not think vaccines work.	☐	☐	☐	☐
p. I have concerns about whether the HPV vaccine is safe.	☐	☐	☐	☐
q. I have concerns about whether the HPV vaccine is effective.	☐	☐	☐	☐
r. I have concerns about possible side effects of the HPV vaccine.	☐	☐	☐	☐

	Strongly Disagree	Disagree	Agree	Strongly Agree
s. Getting the HPV vaccine could save my life.	☐	☐	☐	☐
t. Getting the HPV vaccine could protect me from getting certain types of HPV.	☐	☐	☐	☐
u. Getting the HPV vaccine will reduce the chance of me getting cervical cancer in the future.	☐	☐	☐	☐

	Strongly Disagree	Disagree	Agree	Strongly Agree
v. Knowing that HPV affects people like me would encourage me to get the HPV vaccine.	☐	☐	☐	☐
w. Knowing more about HPV would encourage me to get the HPV vaccine.	☐	☐	☐	☐
x. If my doctor recommended that I get the HPV vaccine then I would get it.	☐	☐	☐	☐
y. If my mother approved of the HPV vaccine then I would approve of it also.	☐	☐	☐	☐
z. If my grandmother approved of the HPV vaccine then I would approve of it also.	☐	☐	☐	☐
aa. If my friends approved of the HPV vaccine then I would approve of it also.	☐	☐	☐	☐

Questions about Your Health Information Sources

34. Have you ever attended an HPV-related event?

- ☐ No
☐ Yes

35. Have you ever seen the “Tell Someone”, “One Less”, or other television commercials about the HPV vaccine also called the HPV shot or GARDASIL?

- ☐ Yes
☐ No

36. If you wanted information on HPV, how would you like to receive this information? **(CHECK ALL THAT APPLY)**

- ☐ Health care provider
☐ Pamphlets
☐ Internet websites
☐ TV
☐ Family
☐ Friends
☐ School Health Center
☐ Other (Please specify) _____

37. Which source of health information do you use the most? **(CHECK ALL THAT APPLY)**

- ☐ Health care provider
☐ Pamphlets
☐ Internet websites
☐ TV
☐ Family
☐ Friends
☐ School Health Center
☐ Other (Please specify) _____

38. Which ONE source of health information do you trust the most? (CHECK ALL THAT APPLY)

- ☐ Health care provider
 - ☐ Pamphlets
 - ☐ Internet websites
 - ☐ TV
 - ☐ Family
 - ☐ Friends
 - ☐ School Health Center
 - ☐ Other (*Please specify*)
-

Thank you for filling out the survey!

Appendix C: Genital HPV infection – CDC fact sheet

What is HPV?

HPV is the most common sexually transmitted infection (STI). HPV is a different virus than HIV and HSV (herpes). HPV is so common that nearly all sexually active men and women get it at some point in their lives. There are many different types of HPV. Some types can cause health problems including genital warts and cancers. But there are vaccines that can stop these health problems from happening.

How is HPV spread?

You can get HPV by having oral, vaginal, or anal sex with someone who has the virus. It is most commonly spread during vaginal or anal sex. HPV can be passed even when an infected person has no signs or symptoms.

Anyone who is sexually active can get HPV, even if you have had sex with only one person. You also can develop symptoms years after you have sex with someone who is infected making it hard to know when you first became infected.

Does HPV cause health problems?

In most cases, HPV goes away on its own and does not cause any health problems. But when HPV does not go away, it can cause health problems like genital warts and cancer.

Genital warts usually appear as a small bump or group of bumps in the genital area. They can be small or large, raised or flat, or shaped like a cauliflower. A healthcare provider can usually diagnose warts by looking at the genital area.

Does HPV cause cancer?

HPV can cause cervical and other cancers including cancer of the vulva, vagina, penis, or anus. It can also cause cancer in the back of the throat, including the base of the tongue and tonsils (called oropharyngeal cancer).

Cancer often takes years, even decades, to develop after a person gets HPV. The types of HPV that can cause genital warts are not the same as the types of HPV that can cause cancers.

There is no way to know which people who have HPV will develop cancer or other health problems. People with weak immune systems may be less able to fight off HPV and more likely to develop health problems from it, this includes people with HIV/AIDS.

How can I avoid HPV and the health problems it can cause?

You can do several things to lower your chances of getting HPV.

Get vaccinated. HPV vaccines are safe and effective. They can protect males and females against diseases (including cancers) caused by HPV when given in the recommended age groups (see “Who should get vaccinated?” below).

HPV vaccines are given in three shots over six months; it is important to get all three doses.

Get screened for cervical cancer. Routine screening for women aged 21 to 65 years old can prevent cervical cancer.

If you are sexually active

- Use latex condoms the right way every time you have sex. This can lower your chances of getting HPV. But HPV can infect areas that are not covered by a condom - so condoms may not give full protection against getting HPV
- Be in a mutually monogamous relationship – or have sex only with someone who only has sex with you.

Who should get vaccinated?

All boys and girls ages 11 or 12 years should get vaccinated.

Catch-up vaccines are recommended for males through age 21 and for females through age 26, if they did not get vaccinated when they were younger.

The vaccine is also recommended for gay and bisexual men (or any man who has sex with a man) through age 26. It is also recommended for men and women with compromised immune systems (including people living with HIV/AIDS) through age 26, if they did not get fully vaccinated when they were younger.

How do I know if I have HPV?

There is no test to find out a person's "HPV status." Also, there is no approved HPV test to find HPV in the mouth or throat.

There are HPV tests that can be used to screen for cervical cancer. These tests are recommended for screening only in women aged 30 years and older. They are not recommended to screen men, adolescents, or women under the age of 30 years.

Most people with HPV do not know they are infected and never develop symptoms or health problems from it. Some people find out they have HPV when they get genital warts. Women may find out they have HPV when they get an abnormal Pap test result (during cervical cancer screening). Others may only find out once they've developed more serious problems from HPV, such as cancers.

How common is HPV and the health problems caused by HPV?

HPV (the virus): About 79 million Americans are currently infected with HPV. About 14 million people become newly infected each year. HPV is so common that most sexually-active men and women will get at least one type of HPV at some point in their lives.

Health problems related to HPV include genital warts and cervical cancer.

Genital warts: About 360,000 people in the United States get genital warts each year.

Cervical cancer: More than 11,000 women in the United States get cervical cancer each year.

There are other conditions and cancers caused by HPV that occur in persons living in the United States.

I'm pregnant. Will having HPV affect my pregnancy?

If you are pregnant and have HPV, you can get genital warts or develop abnormal cell changes on your cervix. Abnormal cell changes can be found with routine cervical cancer screening. You should get routine cervical cancer screening even when you are pregnant.

Can I be treated for HPV or health problems caused by HPV?

There is no treatment for the virus itself. However, there are treatments for the health problems that HPV can cause:

1. Genital warts can be treated by you or your physician. If left untreated, genital warts may go away, stay the same, or grow in size or number.
2. Cervical precancer can be treated. Women who get routine Pap tests and follow up as needed can identify problems before cancer develops. Prevention is always better than treatment. For more information visit www.cancer.org.
3. Other HPV-related cancers are also more treatable when diagnosed and treated early. For more information visit www.cancer.org.

Where can I get more information?

STD information

<http://www.cdc.gov/std/>

HPV Information

<http://www.cdc.gov/hpv/>

HPV Vaccination

<http://www.cdc.gov/vaccines/vpd-vac/hpv/>

Cancer Information

<http://www.cdc.gov/cancer/>

Cervical Cancer Screening

http://www.cdc.gov/cancer/cervical/basic_info/screening.htm

CDC's National Breast and Cervical Cancer Early Detection Program

<http://www.cdc.gov/cancer/nbccedp/>

CDC-INFO Contact Center
1-800-CDC-INFO

(1-800-232-4636)

Contact www.cdc.gov/info

CDC National Prevention Information Network (NPIN)
<https://npin.cdc.gov/disease/stds>

P.O. Box 6003

Rockville, MD 20849-6003
E-mail: npin-info@cdc.gov

National HPV and Cervical Cancer Prevention Resource Center
American Sexual Health Association (ASHA)

<http://www.ashasexualhealth.org/stdsstis/hpv/>

P.O. Box 13827
Research Triangle Park,
NC 27709-3827

1-800-783-9877

Appendix D: Post-test HPV knowledge, beliefs, behaviors questionnaire

Survey: _____

HPV Knowledge, Beliefs, and Behaviors Questionnaire

Please, read each question and put a check (✓) beside your answer. If you do not want to answer a question, you can leave it blank. Only mark one response for each question, unless you are asked to “check all that apply.”

Pap Smear Knowledge

24. Please, respond to the following statements about HPV as TRUE, FALSE, or DON'T KNOW.
(If you don't know, check “DON'T KNOW.”)

	True	False	Don't Know
g. A Pap smear is a test to find out if a woman is pregnant.	☐	☐	☐
h. All women should be getting Pap smears by the time they are 21 years old.	☐	☐	☐
i. A Pap smear checks for changes in the cells of a woman's uterus, also called the womb.	☐	☐	☐
j. A Pap smear checks for changes in the cells of a woman's cervix.	☐	☐	☐
k. Getting regular Pap smears is the best thing a woman can do to prevent cervical cancer.	☐	☐	☐
l. If a woman has a Pap smear result that is not normal that usually means that she has cancer.	☐	☐	☐

HPV Knowledge and Awareness

25. Have you ever heard of HPV? (HPV stands for human papillomavirus.)
☐ Yes
☐ No
26. Have you ever heard of the HPV vaccine? (also called the HPV shot or GARDASIL.)
☐ Yes
☐ No
27. Please, respond to the following statements about HPV as TRUE, FALSE, or DON'T KNOW.
(If you don't know, check “DON'T KNOW.”)

	True	False	Don't Know
a. HPV can cause HIV/AIDS.	☐	☐	☐
c. You can always tell when someone has HPV.	☐	☐	☐
c. HPV can cause abnormal Pap smears/ Pap tests.	☐	☐	☐
d. Only women get HPV.	☐	☐	☐
e. HPV can cause herpes.	☐	☐	☐
g. HPV can cause genital warts.	☐	☐	☐
h. You can have HPV without knowing it	☐	☐	☐
i. HPV is a sexually transmitted infection (STI) or STD.	☐	☐	☐
j. HPV can cause cervical cancer.	☐	☐	☐
k. The HPV vaccine protects against all HPV infections?	☐	☐	☐
l. Condoms are not 100% effective at preventing HPV?	☐	☐	☐
m. HPV is spread by skin to skin contact?	☐	☐	☐

HPV Vaccine Acceptability

28. If cost was not an issue, would you get the vaccine to prevent HPV infection?

- ☐ Yes
☐ No
☐ Don't Know/Not Sure

29. What are the barriers or reasons for not getting the HPV vaccine? (CHECK ALL THAT APPLY)

- ☐ Cost
☐ Not available
☐ Risks with shots
☐ No need
☐ Other: _____

30. Do you know where to go to get the HPV vaccine?

- ☐ Yes
☐ No

31. If you have an 11-12 year-old daughter (or became the parent of one in the future), would you have her vaccinated against HPV?

- ☐ Yes
☐ No
☐ Don't Know/Not Sure

32. If you have an 11-12 year-old son (or became the parent of one in the future), would you have him vaccinated against HPV?

- ☐ Yes
☐ No
☐ Don't Know/Not Sure

Attitudes, Beliefs, and Perceptions about HPV and HPV Vaccine

33. This section asks about your beliefs and perceptions about HPV and the HPV vaccine. Please tell us whether you agree or disagree with the following statements (from “strongly disagree” to “strongly agree”).

	Strongly Disagree	Disagree	Agree	Strongly Agree
bb. Most people think that people with HPV should be ashamed of themselves	☐	☐	☐	☐
cc. Most people think that people with HPV are to blame for their problem	☐	☐	☐	☐
dd. Most people think that people with HPV are a danger to others	☐	☐	☐	☐
ee. Only people who are sexually promiscuous get HPV	☐	☐	☐	☐

	Strongly Disagree	Disagree	Agree	Strongly Agree
ff. It is extremely likely that I will get HPV in my lifetime.	☐	☐	☐	☐
gg. My current behaviors put me at risk for HPV.	☐	☐	☐	☐
hh. HPV is a very common infection	☐	☐	☐	☐
ii. My risk of getting HPV is higher than most people's risk	☐	☐	☐	☐

	Strongly Disagree	Disagree	Agree	Strongly Agree
jj. HPV is a serious infection.	☐	☐	☐	☐
kk. Cervical cancer is a serious disease.	☐	☐	☐	☐
ll. HPV can be life-threatening	☐	☐	☐	☐
mm. HPV is very likely to cause cervical cancer	☐	☐	☐	☐

	Strongly Disagree	Disagree	Agree	Strongly Agree
--	-------------------	----------	-------	----------------

nn. I cannot afford to get the HPV vaccine.	☐	☐	☐	☐
oo. I would not get the HPV vaccine because I am afraid of needles.	☐	☐	☐	☐
pp. I do not think vaccines work.	☐	☐	☐	☐
qq. I have concerns about whether the HPV vaccine is safe.	☐	☐	☐	☐
rr. I have concerns about whether the HPV vaccine is effective.	☐	☐	☐	☐
ss. I have concerns about possible side effects of the HPV vaccine.	☐	☐	☐	☐

	Strongly Disagree	Disagree	Agree	Strongly Agree
tt. Getting the HPV vaccine could save my life.	☐	☐	☐	☐
uu. Getting the HPV vaccine could protect me from getting certain types of HPV.	☐	☐	☐	☐
vv. Getting the HPV vaccine will reduce the chance of me getting cervical cancer in the future.	☐	☐	☐	☐

	Strongly Disagree	Disagree	Agree	Strongly Agree
ww. Knowing that HPV affects people like me would encourage me to get the HPV vaccine.	☐	☐	☐	☐
xx. Knowing more about HPV would encourage me to get the HPV vaccine.	☐	☐	☐	☐
yy. If my doctor recommended that I get the HPV vaccine then I would get it.	☐	☐	☐	☐
zz. If my mother approved of the HPV vaccine then I would approve of it also.	☐	☐	☐	☐
aaa. If my grandmother approved of the HPV vaccine then I would approve of it also.	☐	☐	☐	☐
bbb. If my friends approved of the HPV vaccine then I would approve of it also.	☐	☐	☐	☐

Thank you for filling out the survey!

Appendix E:

(Permission Dr. Bynum)

From: Shalanda Bynum
 [Shalanda.Bynum@usuhs.mil]
 Sent: Tuesday, January 31,
 2012 8:35 AM
 To: Sheaves, Crystal
 Subject: Re: FW: Dr.
 Shalanda Bynum

Hi Crystal,

Please find attached the 52-item survey as well as three publications with published reliability statistics for each construct and my student sample. Please let me know if I can be of further help.

Best! sb

 Shalanda A. Bynum, PhD, MPH
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 Department of Preventive
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