EFFECTS OF FEMININITY IDEOLOGIES AND SEXUAL SELF-CONCEPT ON HPV VACCINATION INTENTIONS: AN EXPLORATORY EXTENSION OF EXISTING HEALTH BEHAVIOR CHANGE MODELS

by

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ABSTRACT

KATHERINE ANN ROOF. Effects of femininity ideologies and sexual self-concept on HPV vaccination intention: An exploratory extension of existing health behavior change models. (Under the direction of DR. VIRGINIA GIL-RIVAS)

Human Papillomaviruses (HPVs) are a group of over 100 different types of related viruses currently infecting 79 million Americans, making it the most pervasive sexually transmitted infection in the United States (American Cancer Society [ACS], 2013; Centers for Disease Control [CDC], 2013a). Persistent exposure to high-risk HPV types (e.g.,Types 16 and 18) due to unprotected sex remains the single-most important risk factor for developing serious pre-cancerous and cancerous lesions of the reproductive and genital regions (CDC, 2007). Although incidence and mortality rates associated with cervical cancer continue to decrease every year since 1955, largely due to the availability of Pap tests and other screening programs, invasive cervical cancer still remains a serious national health issue with 12,360 new cases and 4,020 projected deaths for 2014 alone (ACS, 2014). Sexually active young adults have the highest rates of infection, with one study citing a 44.8% prevalence of HPVs in a sample of females between the ages of 20 and 24 years (Weller & Stanberry, 2007). Despite widespread access to vaccination programs, only 33.4% of female adolescents have received all three doses of either vaccination (CDC, 2013b). Among college populations, rates of vaccination are estimated to be a mere 12.7% (Laz, Rahman, & Berenson).

Examining antecedents of sexual risk behavior may better capture the nuances of social realities impacting HPV-related protective health intentions and behaviors and thus lend explanatory power to traditional models of health behavior change. Missing from

discourses of sexual risk behavior is a thorough appreciation of how women feel and experience their sexuality and to what extent these lived experiences influence decisions concerning their health, including preventive HPV-related sexual health practices (e.g., Savin-Williams & Diamond, 2004).

This project explored how factors reflecting differential systems of power, privilege, and gendered sexual scripts complement existing constructs of health behavior theory (i.e., Health Belief Model [HBM; Rosenstock, 1966], Theory of Planned Behavior and Reasoned Action [TPB; Ajzen, 1985; 1991; Fishbein & Ajzen, 1975]), to influence both sexual risk behaviors and HPV vaccination intentions of 261 sexually active college women (age 18-26). Specific aims were: to examine the contribution of constructs related to femininity ideology (body objectification and inauthenticity in relationships) (Tolman & Porche, 2000) and sexual self-schema (Johnson Vickerburg & Deaux, 2005; Snell, 1995) to vaccination intentions via their impact on sexual risk behaviors. Using structural equation modeling, full support was found for a model of sexual risk behavior that included femininity ideology and both positive and negative sexual self-schemas. The final model of HPV vaccination intention provided partial support for constructs associated with health behavior theory (vulnerability, safety/effectiveness, subjective norms). Additionally, the hypothesized relationships between sexual risk behavior with perceived vulnerability and physician communication with vaccine intention were also supported. The indirect effects of femininity ideology on both sexual risk behavior and vaccination intentions operated chiefly through negative sexual self-schema. Other findings included inadequate personal protection, insufficient preventative gynecological care, dearth of HPV-related health knowledge, and lack of vaccine intentionality among

participants. Appreciating the broader sociocultural antecedents of HPV vaccination decision-making may generate novel opportunities for individual-level interventions and vaccination campaign efforts.

DEDICATION

This dissertation is dedicated to my parents

Susan Francis Miller Roof and *Joseph Henry Roof*

and to my friends:

Carmela Michele Adams, Ashley Elizabeth Collins, Jill Hazen Crunkleton,

Nancy Michelle Gluck, Nicole Andrea Hudak, and *Whitney Elizabeth Okula.*

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LIST OF ABBREVIATIONS

AAFP	American Academy of Family Physicians
ACA	Affordable Care Act
ACS	American Cancer Society
AFIS	Adolescent Femininity Ideology Scale
ANOVA	Analysis of Variance
BO	Body Objectification
CDC	Center for Disease Control
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
DTaP	Diphtheria, Tetanus, and Pertussis
EFA	Exploratory Factor Analysis
FDA	US Food and Drug Administration
HBM	Health Belief Model
HPV(s)	Human Papillomavirus(es)
IP	Internet Protocol
IPV	Inactivated Polio Vaccine
IR	Inauthenticity in Relationships
KAPS	Knowledge and Perception Survey
LGBT	Lesbian, Gay, Bisexual, Transgender
ML	Maximum Likelihood Estimation
MMR	Measles, Mumps, and Rubella
MSSCQ	Multidimensional Sexual Self-Concept Questionnaire

RMSEA	Root Mean Square Error of Approximation
SEM	Structural Equation Modeling
SONA	SONA Systems (recruitment website)
SRB	Sexual Risk Behavior
SRMR	Standardized Root Mean Squared Residual
STI	Sexually Transmitted Infection
TLI	Tucker-Lewis Index
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
TTM	Transtheoretical Model
UNCC	University of North Carolina at Charlotte
US	United States

CHAPTER 1: INTRODUCTION

2.4 Human Papillomaviruses (HPVs)

In recent years, concern associated with HPVs and their link to cervical, vaginal, vulvar, penile, anal, and oropharyngeal cancers has intensified to the extent that HPVs are now perceived as a serious health threat by the medical and social science communities. HPVs are a group of over 100 different types of related viruses causing warts or papillomas (non-cancerous growths) in squamous epithelial cells found on the surface of the skin, linings of the genitals, anus, mouth, and throat (American Cancer Society [ACS], 2014). HPVs cause warts on various parts of the body, such as common warts on hands (Types 2, 4 and others), plantars warts on the soles of the feet (Type 1 and others), flat warts on the face, neck, wrists and knees (Types 3, 10, 28), butcher's warts on the hands and fingers (Type 7), filiform warts around the mouth, nose, or beard areas, periungual warts around the fingernails, and oral, genital and anogenital warts in these regions (Gaston & Garry, 2012). Forty HPV types are sexually transmitted and can infect the genital areas, resulting in genital HPV infection (CDC, 2013a). Exposure to low-risk HPV types (Types 6 or 11) is linked to benign or low-grade abnormalities of the cervix, anogenital warts, and a disease of the respiratory track known as recurrent respiratory papillomatosis (RRP) (Lacey, Lowndes, & Shah, 2006). Genital HPV infection is primarily transmitted via sexual contact, usually through intercourse, but also through skin-to-skin contact during nonpenetrative sexual contact (Winer et al., 2003). Persistent

exposure to high-risk HPV types (especially Types 16 and 18) due to unprotected sexual activity remains the single-most important risk factor for developing serious pre-cancerous and cancerous lesions of the cervical, vulvar, vaginal, and anal regions for women (CDC, 2007). The relationship between genital HPV and cervical cancer in women has increasingly garnished the attention of the medical and professional communities. In fact, the HPV-cervical cancer relationship has been the driving force behind HPV research since its discovery by German virologist Harald zur Hausen in 1984 (McIntyre, 2005). Since this time, investigators have also been learning more about HPV as an independent risk factor for the development of squamous cell carcinomas of the larynx, mouth, and oropharynx (Hansson et al., 2005; Syrjanen, 2007).

1.1.2 Epidemiology of HPVs

HPV is the most pervasive sexually transmitted infection (STI) in the United States [US], with 79.1 million Americans currently infected and 14.1 million new cases occurring every year (CDC, 2013a). To put things into perspective, all combined there are only 5.6 million annual new cases of chlamydia, trichomoniasis, gonorrhea, herpes simplex virus type 2 (HSV-2), syphilis, human immunodeficiency virus (HIV), and Hepatitis B in the US (CDC, 2013a). Over half of new HPV cases occur in young adults between the ages of 15 and 24 (CDC, 2009). Sexually active young adults have the highest rates of infection, with one study citing a 44.8% prevalence of HPVs in a sample of females between the ages of 20 and 24 years (Weller & Stanberry, 2007). The CDC estimates that most sexually active men and women, regardless of sexual orientation, will contract one or more types of HPV at some point in their lives, with women having up to an 80% chance of contracting HPV infection by age 50 (CDC, 2008; CDC, 2013a).

1.1.3 HPVs and Health Consequences

Presently, HPV infections have been causally implicated in about 75% of cervical cancer and in 90% of genital warts cases (National Cancer Institute [NCI], 2012a). The CDC analyzed National Program of Cancer Registries (NPCR) and Surveillance, Epidemiology, and End Results (SEER) data spanning 2004-2008 across 100% of the US population to determine the annual percentage and number of cancers attributable to HPV. According to these analyses, 51% of vulvar cancers, 64% of vaginal cancers, 93% of anal cancers, 36% of penile cancers, and 63% of 3ropharynx33l cancers were linked to HPV (CDC, 2012).

Genital HPVs are typically asymptomatic, causing no clinical manifestations and clearing organically within one to two years unless a person is re-infected (91% of cases clear within one to two years) (Ho, Bierman, Beardsley, Chang, & Burk, 1998; Moscicki et al., 2001; Sun et al., 1997; Woodman et al., 2003). Infections lasting multiple years increase a person's risk of cancer, as infected cells not cleared organically can continue to grow, develop mutations, and form high-grade lesions which ultimately become tumors (NCI, 2012a). Infection with multiple types of HPVs is quite common, as 20% of people with HPV test positive for more than one strain (CDC, 2013a).

Genital warts (typically types 6 and 11) may appear within a few weeks or months after sexual contact with an infected partner, although it is possible for some warts to manifest years after exposure (ACS, 2014). These warts, if left untreated, may regress spontaneously (20-30% of cases), may remain unchanged, or may increase in number or size (CDC, 2013b). Treatment options include topical solutions, ointments, and creams, 3ropharynx3, podophyllin resin, bi- and tricholoracetic acid, surgical excision,

intralesional interferon injections, and laser therapy (Workowski & Berman, 2010). Approximately 30% of cases recur at some point, regardless of whether the warts cleared spontaneously or subsequent to treatment (Workowski & Berman, 2010).

Low-grade pre-cancerous cervical lesions may only necessitate follow-up pelvic examinations and endocervical curettage (scraping cells of the endocervical canal) to monitor persistence and progression or estrogen creams to regulate hormones, while moderate to high-grade pre-cancerous cervical abnormalities may require treatment to destroy (ablative therapy) or remove (excisional therapy) the problematic areas (Moyer, 2012; NCI, 2012b). Current ablative therapies include the use of liquid nitrogen or carbon dioxide to freeze cervical tissue (cryotherapy) and the direction of high energy narrow light beams on cervical areas (laser ablation). Possible excision techniques include passing electrical currents through a wire to remove a cone-shaped portion of the cervix (loop electrosurgical excision procedure [LEEP] or loop excision of the transformation zone [LLETZ]) and using a scalpel or laser instead of a wire (cervical cone biopsy or conization). Invasive cervical and HPV-associated cancers typically require a custom course of treatment involving surgery, radiation, and chemotherapy, depending upon disease stage. Although incidence and mortality rates associated with cervical cancer continue to decrease every year, largely due to the availability of Pap tests and other screening programs since 1955, invasive cervical cancer still remains a serious national health issue, with 12,360 new cases and 4,020 projected deaths for 2014 alone (ACS, 2014). Since data have been available beginning in 1975, the cervical cancer mortality rate has consistently been higher for African American than all other racial/ethnic groups in the US despite the incidence rates being highest among Hispanic women (Howlader et

al., 2012). ACS estimates over 45,000 cases of non-invasive cervical cancer (carcinoma in situ) for 2014 in the US (ACS, 2014). On a global scale, there were an estimated 528,000 new cervical cancer cases and 266,000 cervical cancer deaths worldwide in 2012 with around 85% of the global burden occurring in less developed regions (Southern Africa, Middle/Eastern Africa, Melanesia) (Ferlay et al., 2010). The total number of cancer cases worldwide that are attributable to HPV is much higher, since the viruses also affect the anus, penis, vulva, vagina, and 5ropharynx (Forman, 2012).

1.1.4 Risk Factors and Known Correlates of HPV Transmission

The existing literature and current epidemiological reports consistently indicate that behavioral risk factors associated with the transmission of HPV include having an early sexual debut, having multiple sexual partners, having a sexual partner who has multiple sexual partners, engaging in sexual activity with a person having visible genital warts, and knowing a sexual partner less than a year (Baseman & Koutsky, 2005; Ho et al., 1998; Koutsky, 1997; Sellors et al., 2003; Svare et al., 2002; Winer et al., 2003). Beyond these behavioral antecedents, demographic factors associated with an increased risk of HPV acquisition include being under the age of 25, being single, identifying as African American/Black or Hispanic, and having a low socioeconomic status (Burk et al., 1996; Jain et al., 2009; Winer et al., 2003). In addition, there are a multitude of psychological (e.g., depression, anxiety), behavioral (e.g., substance use), and interpersonal factors (e.g., relationship status, communication skills, coping strategies) that influence young women's sexual risk behaviors (Kirby, 2001).

1.1.5 Prevention

The challenge with HPV prevention is that most individuals with healthy immune systems do not realize that they have been infected. This lack of awareness is largely due to its generally asymptomatic presentation. Moreover, infections clear or become undetectable within six months to two years after infection. It is difficult to make a case to individuals to protect themselves against an unseen and largely unnoticed disease, no matter its severity or universality.

The use of barrier-method protection such as condoms or dental dams decreases the chances of contracting HPV but does not offer full protection, given transmission also occurs through skin-to-skin contact (Steiner & Cates, 2006). In one study, consistent condom use for all instances of intercourse with partners for eight months was associated with a decreased risk of HPV infection (37.8% per 100 patient years at risk) compared to partners using condoms less than five percent of the time (89.3% per 100 patient years at risk) [patient years at risk was calculated by adding the length of time from participants' date of first male-female vaginal intercourse to the date of HPV infection or date of last clinic visit] (Winer et al., 2006).

Another important facet of prevention against HPV and HPV-related health conditions are annual internal pelvic examinations of patients 21 years and older and "external-only" visits for girls between the ages of 13 and 21 years—unless an internal exam is warranted by concern, patient history, or symptoms suggestive of female genital tract, pelvic, urologic, or rectal conditions (American College of Obstetricians and Gynecologists, 2012). Annual exams are a primary source of preventive care as they offer a platform for patient counseling, education, immunization, and the assessment of health

risk factors that can help tailor the scope of services provided. Annual STI testing is recommended for sexually active persons, regardless of age (ACOG, 2012).

In a vast effort to limit HPV infection and the number of cervical cancer-related cases and deaths associated with HPV, the US Food and Drug Administration (FDA) licensed a 3-dose, prophylactic, quadrivalent HPV (Types 6, 11, 16, 18) recombinant vaccine (Gardasil®) for use among girls and women (aged 9-26 years) in 2006 to Merck & Co., Inc. (FDA, 2006; Gostin & DeAngelis, 2007). The Merck vaccination protects against the two highest-risk types of HPV for cervical cancers as well as two lower-risk strains implicated in the development of genital warts. Subsequently Merck sponsored a series of studies that resulted in FDA approved indication of Gardasil® for the prevention of certain vulvar and vaginal cancers (FDA, 2008), for use in boys and young men ages 9-26 years (FDA, 2009), and for use in the prevention of anal cancer (FDA, 2010b). A clinical review of results from a 48-month safety, immunogenicity, and efficacy trial (N = 3800) did not recommend approval for the request to extend current indications of Gardasil® to women 27-45 years of age (FDA, 2010a; Muñoz et al., 2009). This decision was supported in a second large-scale, cohort, 7-year study echoing the low potential benefit of HPV vaccination or HPV screening to prevent or detect new infections in women aged 34 years or older, given rates of infection decline sharply for this age group and damage from exposure to carcinogenic HPV infections would have mostly already occurred (Rodríguez et al., 2010). On October 16, 2009, a second manufacturer, GlaxoSmithKline Biologicals, was granted FDA approval for its 3-dose prophylactic bivalent HPV vaccine, Cervarix®, against HPV Types 16 and 18, to be used among girls and young women aged 10 to 25 years (GlaxoSmithKline, 2009). Most recently, Merck

released an even more comprehensive version of their vaccination, Gardasil 9®, for use among females and males ages nine through 26 years (FDA, 2014). Gardasil 9® adds protection against five additional strains of HPV—31, 33, 45, 52, and 58—known to cause 20% of cervical cancers. The inclusion of additional types also more effectively guards against anal cancers, as well as anal, cervical, vulvar, and vaginal intraepithelial neoplasia (abnormal, often precancerous lesions and changes in surface cells). Gardasil®, Gardasil 9®, and Cervarix® all employ recombinant DNA technology which effectively tricks the immune system into generating antibodies against the targeted strains of HPV in response to virus-like particles mimicking HPV exposure (Day, Kines, Thompson, Jagu, Roden, Lowy, et al., 2010).

Since approval of the vaccination programs, "Healthy People 2020" includes three goals specific to HPV prevention: 1) to increase the vaccination coverage level of three doses of HPV vaccine for females by age 13 to 15 years to 80% (from a 16.6% baseline in 2008), 2) to reduce the death rate from cancer of the uterine cervix below a target level of 2.2 deaths/100,000 females (from a 2.4 per 100,000 baseline in 2007), and 3) to increase the proportion of women who receive a cervical cancer screening based on the most recent guidelines [every three years] with a target of 93% of women aged 21 to 65 years receiving screening (from an 84.5% baseline in 2008) (US Department of Health and Human Services, "Healthy People," 2020).

Despite widespread access to two HPV vaccination programs, only an estimated 33.4% of female adolescents (13 to 17 years of age) received all three doses of either vaccination in 2013 (CDC, 2013b). The rate of 3-dose vaccination completion for this age group increased from 5.9% in 2007 and peaked in 2012 at 34.8%. Among US young

adult women (18 to 26 years of age), only an estimated 12.7% have completed the vaccination series (Laz, Rahman, & Berenson, 2012). Low coverage levels are particularly alarming as rates of HPV infections are still extremely high. One longitudinal study (2.2 years, on average) using a subsample of 60 adolescent girls (aged 14-17 years) attending primary care clinics found a cumulative prevalence rate of 82% (Brown et al., 2005). More recently, researchers screened 97 sexually active urban females who have never had the HPV vaccine (aged 15-22 years) across three anatomical regions (Schlecht et al., 2012). Seventy-three percent tested positive for HPV at one or more anatomical site (oral, anal, cervical); 44% (*n = 41)* had HPV in two regions and 9% (*n* = 8) had HPV in all three regions (Schlecht et al., 2012). Sexually active young adults also have extremely high rates of infection, with one study citing a 44.8% prevalence of HPVs in a representative sample of females between the ages of 20 and 24 years (Dunne et al., 2007). A similar rate was found across a 36-month prospective study of 399 female college students examined every six months, with 14% becoming infected each year, for a cumulative incidence of 43% (Ho, Bierman, Beardsley, Chang, & Burk, 1998). A slightly lower HPV baseline prevalence rate of 32% was reported in a study sample of 467 freshmen college women enrolled from 2004-2009; however, seven percent were not sexually active and eight percent had previously received at least one dose of the HPV vaccine (Banister et al., 2013). Twenty-two percent and 16% of enrolled freshmen women had two and three types of HPV, respectively.

Vaccination rates are particularly low for young women of racial/ethnic minority backgrounds in the United States. In a representative national study (N = 2,168) of 15- to 24-year-olds, African American women were significantly less likely to have initiated the

HPV vaccination process compared to White counterparts (18.2% vs. 33.1%), after accounting for socio-demographic factors (i.e., age, parent education level, and household income) and access to health care (i.e., insurance and usual source of health care) (Gelman, Miller, Schwarz, Akers, Jeong, & Borrero, 2013). This difference could be explained in some part by African American women receiving fewer provider vaccination recommendations (Lau, Lin, & Flores, 2012; Ylitalo, Lee, & Mehta, 2013) or being exposed to negative social attitudes about the vaccine itself (Lechuga, Swain, & Weinhardt, 2011; Wilson, Brown, Boothe, & Harris, 2013). Hispanic women (US born and foreign born) were also less likely to have initiated the HPV vaccination process compared to White women, but the difference was fully attenuated when socio-demographic factors and health care access were included in explanatory models (Gelman et al., 2013). This finding suggests that improving access to care via more affordable insurance and clinical services might offset discrepancies in HPV vaccination uptake among young Hispanic women.

Empirically verified barriers have been put forward in partial explanation of low vaccination rates to date. In a review of the literature, Holman and colleagues (2014) synthesized reasons for adolescent non-compliance given by health care professionals, parents, underserved and disadvantaged populations, and males. Most telling were the results around specific barriers to completion of the 3-dose HPV vaccine series, in which lack of insurance coverage, lack of a regular medical home, lack of health care professional recommendation, little contact with the medical system, and being unaware or forgetting about the need for additional doses were the overarching themes. Similar trends were revealed in a literature review of college age women in which cost, concern

about side effects or efficacy, lack of information, lack of transportation, inactive sexual status, newness of the vaccine, lack of insurance coverage, and others (i.e., pregnancy, being monogamous or married, having a history of HPV infection) were chief reasons for vaccine non-compliance. Although health insurance plans are often a condition for enrollment at many institutions and the 2010 Affordable Care Act (ACA) dictates health coverage, perceived institutional and access barriers still remain.

Presently, known individual-level influences on young women's decisions regarding HPV vaccination include knowledge and awareness about the vaccine and the link between HPV and cervical cancer, perceptions of vaccine safety and effectiveness, sexual risk experiences, perceived risk of infection, perceived severity of infection, perceived social norms, and physician recommendations (Dempsey & Davis, 2006; Patel, Zandieh, & Chang, 2009). The manner and extent to which these influences intersect with axes of identity such as class, race, citizenship status, age, sexual orientation, physical ability, and level of education are diverse. Living with interlocking dimensions of social and cultural disadvantage or inequality may contribute to perceived barriers to engaging in behavior-change actions (e.g., distrust of medical profession, lack of LGBT-friendly provider).

In order to better appreciate the intricacies involved in college women's intentions to vaccinate (or not to vaccinate), looking to existing theoretical models proves useful.

1.2 Theories of Health Behavior Change

Several theories provide conceptual frameworks for approaching and understanding the determinants of health behavior and for guiding behavioral interventions across multiple levels in various contexts. These health behavior theories

are continually challenged, evaluated, and refined for their ability to effectively capture the complexities of preventive, illness, and sick-role behaviors (Rothman, 2009). In effect, there is a dynamic interrelationship between fundamental research, intervention research, surveillance research, and application and program delivery. After all, these endeavors each ultimately aim to understand the forces at play in shaping a person's thoughts, feelings, and health behaviors. While no single theory or conceptual framework dominates the field of health behavior change, those that are most cited and most widely used inevitably shape the field by defining the scope and scale of practice and influencing the training and socialization of its professionals and practitioners (Glanz, Rimer, & Lewis, 2002).

Alongside some of the other leading theories and models in the health behavior literature (e.g., Social Cognitive Theory (SCT) (Bandura, 1977; 1986), the Transtheoretical Model (TTM) (Prochaska & DiClemente, 1983; Prochaska, DiClemente, & Norcross, 1992; Prochaska & Velicer, 1997), the Health Belief Model (HBM) (Rosenstock, 1966), and the theory of Reasoned Action and Planned Behavior (TPB) (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975)) have been utilized as the theoretical underpinnings in a long tradition of studies to improve the prediction of both behavioral health intentions and actual health behavior change. The HBM and TPB are appropriate models from which to launch an exploration of HPV vaccination intentions, because they are focused on explaining motivations for an individual-level low-frequency health behavior (i.e., 3 HPV shots), whereas other theories encompass multiple levels of influence (interpersonal, institutional, community, policy) or are better suited to explaining behaviors that involve long term changes (e.g., diet, exercise, diabetes

monitoring, dental hygiene). In truth, the most successful explanatory models combine variables from both theories, some of which have been specific to sexually transmitted infection [STI] vaccination intentions/behaviors (Boehner, Howe, Bernstein, & Rosenthal, 2003; Bonney et al., 2007; de Wit, Vet, Schutten, & Steenbergen, 2005; Kahn, Rosenthal, Hamann, & Bernstein, 2003). Still, very few studies utilizing the HBM, TPB, or various subsets of their components seem to account for potential modifying factors that could play a role in sexual health intentions and behaviors. One examination of modifying factors particular to HPV vaccination can be seen in Gerend and Shephard's (2007) study of perceived vulnerability and two higher-risk sexual behaviors, which found that both a greater number of lifetime sexual partners and infrequent condom use were related to HPV vaccination intentions. More thorough treatments of the HBM and TPB in the context of HPV vaccination intention are given next.

1.2.2 Health Belief Model

The Health Belief Model (HBM) (Rosenstock, 1966) may be one useful framework for understanding factors that contribute to young women's intentions to vaccinate against HPV in the same way it has aided our understanding of influenza vaccination intentions (Brewer, Chapman, Gerrard, Gibbons, & McCaul, 2007; Chapman & Coups, 1999). Since its inception, the model has been expanded (e.g., Janz & Becker, 1984) and widely used to predict and explain a variety of long- and short-term behavioral intentions and actual health behaviors in diverse populations (Corwyn & Benda, 1999; Rosenstock, Stretcher, & Becker, 1994). This model is comprised of the following constructs: *perceived susceptibility* (belief regarding the likelihood of getting a condition), *perceived severity* (belief about the seriousness of a condition and its health

effects), *perceived benefits* (belief in efficacy of behavior to reduce risk or seriousness of effects), *perceived barriers* (belief about tangible and psychological costs of behavior), *cues to action* (strategies to activate readiness to engage in behavior), and *self-efficacy* (confidence in ability to take action) (Janz, Champion, & Stretcher, 2002). Together, these health belief components reflect a person's perceptions and beliefs about engaging in a particular health behavior (Paine & Garceau, 1999) and generally hold that the desired behavior is a function of the subjective value that the person places on the outcome of the behavior and the expectation that performing the behavior will achieve that outcome. In other words, knowing whether or not an individual personally ascribes to a health threat and knowing whether or not they feel a certain health practice will lessen their risk to this threat will predict whether or not they carry out this health behavior (Stretcher & Rosenstock, 1997). The more that a person believes HPV to be a serious personal health threat, the more likely that person is to take action against that threat (Burak & Meyer, 1997). Janz and Becker (1994) point out that perception of severity may be lowered if that person is asymptomatic, has not been diagnosed with the condition, or when the threat of associated negative outcomes occurs in the long term. Perceived severity is particularly relevant in the context of HPV, which is usually asymptomatic, often clears on its own, frequently goes undiagnosed, and seems to play a central role in the development of cervical cancers, especially after repeated exposure to the virus (something that happens over time). Although not expressly discussed in the literature, the possibility exists that since HPV is so prevalent, especially among young women, and therefore not as socially taboo as other STIs, that it may not be taken seriously as is medically warranted. Perceived severity (also known as negative utility

and negative evaluation) has been extensively explored in the protective-health and behavior change literatures as a significant predictor of various preventative health behaviors (Harrison, Mullen, & Green, 1992; Weinstein, 1993).

The degree of personal vulnerability, or rather the perception that an individual is personally at risk for contracting one or more HPVs, is another critical component of young women's plans to get the vaccination, in so far as increased vulnerability for illness generally increases the strength of intentions to initiate a vaccination program (Brewer et al., 2007). College-age women are significantly more likely to endorse HPV vaccination intentions when holding an increased belief that they are likely to get infected in their lifetime (Patel, Zochowski, Peterman, Dempsey, Ernst, & Dalton, 2012). Perceived vulnerability in the context of HPV, like other STIs, bears consideration, as young women seem to underestimate their personal risk. Most people, especially those in "committed relationships," operate under the assumption that their sexual partner is both faithful and is therefore "clean." In a study of 124 college-age men and women, of whom 29% were in a committed relationship, over half (56%) felt they were not at risk for HPV infection (Gerend & Magloire, 2008); having a higher number of current sexual partners was a unique predictor of HPV risk perceptions in this study. Again among the 167 responding in a sample of 172 college-age women enrolled in personal health courses, only 15.6% felt susceptible to HPV infection (Lopez & McMahan, 2007). The overwhelming majority (96%) of the sample (n=105) considered themselves to be in monogamous relationships. Among 2007 Greek college women, self-reporting a stable relationship status (versus non-stable) was predictive of non-HPV vaccination (Donadiki et al., 2012, 2014). Likewise, female participants in a different study utilizing a college-

age population (N = 406, *n* = 94 with 3 dose HPV vaccine) overwhelmingly failed to perceive themselves at risk for HPV infection (60%) or did not know whether they were at risk or not (15%) (Licht, 2010). Beyond having a low perception of infection risk, these women did not perceive themselves to be at risk of transmitting HPV to a partner (67%), or again did not know whether they held a transmission risk or not (21%) (Licht, 2010). As 23% of this particular population had been fully inoculated against four strains of HPV, there is some question as to whether vaccination renders an overestimation of the vaccine's preventive power. In still another study, 51 out of 88 (58%) of sexually experienced college women perceived themselves at risk for HPV, and of the 36 actually tested for HPV (41% of study population), 13 were positive for HPV (36% of tested sub-sample; 15% of study population) (Rameriz, Ramos, Clayton, Kanowitz, & Moscicki, 1997). This same study revealed a comparable number of positive HPV tests in women who did not perceive themselves at risk, thus revealing their inability to accurately identify their risk of HPV infection. The most frequent reasons reported for feeling invulnerable to contracting HPV were practicing safer sex by using a condom, "taking good care of self," being in a monogamous relationship, and feeling healthy with no symptoms. The chasm between self-assessment of risk and actual risk is an inherent challenge for individual-level behavior change theories to explain HPV vaccination decision making and must be considered a limitation of this research.

Two commonly cited barriers (a HBM construct) in HPV acceptability studies with adolescents, parents, and clinicians are perceived vaccine effectiveness and safety (Brewer & Fazekas, 2007; Davis, Dickman, Ferris, & Dias, 2004; Zimet, 2005). Aggressive marketing campaigns along with recent media coverage primarily focus on

the utility of the vaccine to prevent cervical cancer in conjunction with regular gynecological examination; however, these messages do little to assuage effectiveness and safety fears or to counter religious and socio-political agendas that oppose vaccination (Alta Charo, 2007; Gollust, Attanasio, Dempsey, Benson, & Fowler, 2013; Gostin, 2011; Shelton, Snavely, De Jesus, Othus & Allen, 2013). Concerns of young women over short- and long-term vaccine effectiveness to prevent HPV infection and its safety will factor into decisions regarding whether or not to get the vaccination series, especially among those with already reticent approaches to matters of sexuality.

Prior to the availability of the HPV vaccine, research indicated that physician recommendation (a cue to action) to receive the vaccine was a key predictor of hypothetical intentions to vaccinate in samples of adolescent girls and young adult women (Zimet et al., 2000). Post-vaccine development, physician encouragement or recommendation has been shown to be correlated with vaccination intentions in samples of low-income minority women (Gerend, Lee, & Sheperd, 2007), in male and female college students (Jones & Cook, 2008), and Canadian female obstetrics and gynecology outpatients (Lenehan, Leonard, Nandra, Isaacs, & Fisher, 2008). Physician recommendation has been shown to be a key determinant of HPV vaccination uptake of adolescents in samples of parents, healthcare staff, and school staff (Dempsey, Abraham, Dalton, & Ruffin, 2009; Reiter, Brewer, Gottlieb, McRee, & Smith, 2009). Among young women (19-26 years), discussing HPV vaccination with their physician and being given the recommendation to be vaccinated was strongly associated with vaccination behavior (Rosenthal, Weiss, Zimet, Ma, Good, & Vichnin, 2011). Moreover, the strength of a provider's recommendation was a significant determinant of vaccination, with women

receiving a “strong” recommendation having a 4-fold greater likelihood of uptake in the same sample. Provider recommendations have also been a strong correlate of vaccine initiation for other immunization programs, including influenza and Hepatitis B (Bigham et al., 2006; Lyn-Cook, Halm, & Wisnivesky, 2007; Samoff, Dunn, VanDevanter, Blank, & Weisfuse, 2004; Shahrabani, Benzion, & Yom, 2009).

Contemporary conceptualizations of the HBM have increasingly begun to include an additional factor, *knowledge,* for its added explanatory power in examinations of preventative health behaviors, including preventative sexual health behaviors. Knowledge of disease transmission, pathology, and preventative measures has been found to play a role in decreasing higher-risk sexual behaviors among young adults in the US (Burazeri, Roshi, & Tavanxhi, 2004; Burstein, Lowry, Klein, & Santelli, 2003; Holcomb, Motiño Bailey, Crawford, & Ruffin, 2004; Kahn, Goodman, Huang, Slap, & Emans, 2003). Recent research indicates that adolescents, young adults, caregivers, and health care practitioners have divergent and limited understandings of HPV fraught with misconceptions about the link between symptoms associated with genital warts, the purpose of pap smears, and the association of HPV with both abnormal pap smears and cervical cancer (Dell, Chen, Ahmad, & Stewart, 2000; Holcomb et al., 2004; Gerend & Magloire, 2008; Mays et al., 2000; Yacobi, Tennant, Ferrante, Pal, & Roetzheim, 1999). Moreover, despite sexual health education components, although variable in quality, being commonplace in US school-systems, many young people only become informed about particular STIs after a diagnosis (Downs, Bruine de Bruin, Murray, & Fischhoff, 2006). Decreasing the number of young college-age women infected with HPV via vaccination programs depends on comprehensive education about the virus, its

transmission routes, disease course, and preventative individual- and interpersonal-level efforts to decrease one's likelihood of infection. As an aside, it is likely that the importance of knowledge in decision-making around HPV vaccination uptake may be diminished in populations of very young adolescents (an age-range beyond the scope of this project) where physicians' encouragement to get vaccinated and caregiver beliefs may have greater influence on actual uptake (Gamble, Klosky, Parra, & Randolph, 2010).

Misconceptions, misinformation, and limited knowledge surrounding HPV potentially interfere with attitudinal, self-efficacy, and normative beliefs about engaging in a particular preventative health behavior (e.g., Mays et al., 2000; Montgomery, Bloch, Bhattacharya, & Montgomery, 2010). Having accurate and comprehensive information about HPV and health-related sequelae may engender a sense of empowerment, opening the door for young women to become more active participants in their own healthcare, including the screening and prevention of HPV and related diseases (Mays et al., 2000). Agency and empowerment gleamed from knowledge may play out in how individuals utilize their health care opportunities to successfully obtain the vaccination series. Successfully engaging in discussions or negotiations of preventative sexual health behaviors is more difficult for young women embodying objectified constructs of femininity or silencing their authentic selves in the service of their partner's wishes, the desire to avoid conflict or suggesting a partner is "dirty," or deference to an authority figure's preferences for not getting HPV vaccination despite their own level of knowledge that very well may lead them to perceive themselves at risk (Crepaz et al, 2009; Pearson, 2006; Ramsey & Hoyt, 2014; Teitelman et al., 2009).

Despite the seemingly elemental connection between knowledge and behavior change, knowledge of preventative health care information alone is not sufficient to produce behavior change (e.g., Helweg-Larsen & Collins, 1997). Owing to this reality, the factors intrinsic to femininity ideology and female sexual self-concept hold the potential to shed new light on reasons young women engage in protective and preventative behaviors and offer a novel direction to take HBM- and TPB-guided interventions aimed at decreasing HPV infection rates.

A number of studies directly informed by the HBM have focused on young women's behavioral intentions to engage in preventative gynecological and HPV-related health behaviors (Ali, 2002; Buchanan, 2009; Lopez & McMaham, 2007). Brewer and Fazekas (2007) performed a thorough review of the HBM's use in HPV literature to predict vaccine acceptability. Perceived effectiveness of the vaccination, perceived susceptibility to HPV infection, barriers to recommendation, along with physician's recommendations proved to be key predictors of vaccination acceptability in the included studies. Other studies, not included in this review, also found similar results with perceived susceptibility and perceived benefits emerging as the key significant predictors of intentions to engage in preventative gynecological health behaviors, including vaccination among women (Bish, Sutton, & Golombok, 2000; Buchanan, 2009; Burak & Meyer, 1997; Liau & Zimet, 2000). A sample (N = 2007) of 18- to 26-year-old Greek-speaking female college students were surveyed about their reasons for non-compliance with HPV vaccination, given the fact that the vaccine has been free of charge to women between 12 and 26 years of age since 2008 (Donadiki et al., 2014). Participants with higher scores for general perceived barriers (e.g., lack of information about the vaccine),

specific vaccination barriers (e.g., cost), and no general benefits (e.g., lack of belief in utility of all vaccinations) were each associated with a decreased likelihood of vaccination uptake.

While the HBM and its associated constructs have successfully been employed to partially illuminate the decision-making processes involved in HPV related health behavior initiatives, another model of health behavior, the TPB, offers an opportunity for additional insights.

1.2.3 Theory of Planned Behavior

The theory of planned behavior is actually an extension of the theory of reasoned action (TRA), originally designed to predict and explain human behavior in specific contexts (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). The TRA puts forward that attitudes and social normative perceptions work together to determine a person's intention to perform a specific health behavior; this intention in turn directly affects the actual behavior. "Attitude toward behavior" involves beliefs about whether the behavioral performance is associated with certain attributes or outcomes, the value of these attributes or outcomes, and an evaluation of these outcomes as positive or negative. "Subjective norms" refer to beliefs about whether important others approve or disapprove of the behavior and motivations to comply with those recommendations. The TRA assumes behavior is directly determined by intention but does not account for the diverse degrees to which individuals have volitional control over a behavior given external issues or their environment (e.g., skills, resources, transportation). Later, Ajzen (1985) added the construct of "perceived behavioral control," which resulted in a combined model commonly referred to today as the TPB. Perceived behavioral control involves three

dimensions: the perceived self-efficacy to perform the behavior, the perceived difficulty or ease involved with performing this behavior, and the amount of perceived control over the behavior. Demographic variables, personality traits, and emotions are thought to impact behavior via their influence on TPB constructs if they influence underlying beliefs and attitudes toward the behavior and subjective norms (Ajzen, 1988; 1991).

Elements of the TPB have been studied in a host of research endeavors around intentions to engage in preventative sexual health practices and the actual behaviors. As an example, the TPB was used to evaluate intentions to use condoms with new sexual partners after an intervention about a hypothetical new antiretroviral therapy (Gagnon & Godin, 2000). The authors found all TPB variables were significantly associated with condom use intentions; perceived behavioral control PBC and subjective norms were significant predictors in regression analyses. Specific to HPV vaccination intentions, one Australian study aimed to investigate the effect of differential information framing on vaccination intentions using the TPB; while message framing had no effect on intention or uptake, components of TPB explained 54% of the variance in intentions and intentions predicted 9.6% of the variance in vaccination initiation behavior at 2-month follow-up (Juraskova et al., 2012). The authors note that data collection occurred in an early phase of the first extensive public health HPV vaccination initiative, which had begun only 8 weeks prior (April 2007) and most likely does not paint an accurate picture of the country's current university vaccination rate at time of publication.

1.2.4 Comparative Utility of HBM and TPB

To the author's knowledge, only two studies have overtly compared the HBM and TPB in the prediction of intentions related to vaccination or uptake since the FDA's

approval of Gardasil®. The first is Buchanan's (2009) dissertation work examining the efficacy of HBM and TPB in predicting intentions to receive the HPV vaccination in 143 young adult university women from the rural Midwest. In this study, health belief variables (i.e., perceived susceptibility, benefits, and self-efficacy) explained 43% of the variance in behavioral intention, adjusting for condom use during participant's last sexual activity with a new partner and whether or not the participant had ever had sexual intercourse. Significant predictor variables from the TPB were attitudes toward vaccination and subjective norms. An integrative model with these five variables was significant and explained 57% of the variance in intention to vaccinate (Buchanan, 2009).

A second study utilized the HBM and TPB in the prediction of HPV vaccine uptake in a sample of 735 young adult women randomly assigned to three differently framed HPV educational video messages (gain-framed, loss-framed, no-frame) and take-home pamphlets (Gerend & Shephard, 2012). At ten months, HBM variables of perceived susceptibility, safety concerns, vaccine cost, and physician recommendation were significant predictors of vaccine uptake. In an estimated model specified by TPB variables, vaccination intentions, subjective norms, and self-efficacy were all positively related to vaccine uptake. Both models offered a relatively good fit to the data, with the TPB model outperforming HBM in terms of vaccination behavior, potentially due to its inclusion of behavioral intentions. When combined, the constructs accounted for 43% of the variance in vaccine uptake. Subjective norms and self-efficacy emerged as independent predictors in this study, serving to underscore the social nature of health decision making as well as the critical link between a decision and confidence in one's

ability to adequately implement the steps needed to perform a health behavior, even a low-frequency behavior such as vaccination.

There are several limitations of both the HBM and TPB and their use that make drawing conclusions and identifying trends in the literature about HPV vaccination intentions or behaviors difficult. One, there are inconsistencies in the number of HBM and TPB components that are included in these studies and that were incorporated into statistical analyses. Two, the items and entire measures for HPV-related health beliefs, knowledge, and attitudes are generally inconsistent and have various levels of reliability and validity. Three, these models do not account for a whole host of modifying factors that could potentially play a role in sexual risk behaviors and how these relationships affect intentions to engage in health behaviors. Four, intention does not always reliably predict behavior and the variance in behavior that can be predicted by theoretical constructs can sometimes be low (Conner & Armitage, 1998; Godin & Kok, 1996; Sheeran, 2002).

As discussed, HBM and TPB constructs partially and inexactly explain women's intentions to protect themselves against a potential health threat (i.e., avoid HPV infection via vaccination). Stepping back to appreciate socio-cultural influences on health behavior may open up channels of understanding that augment existing models of decision-making. The indistinguishable and parallel construction and adaption of our physical bodies with our environments is evidenced in our lived experiences. Neural activity and resulting perceptions, thoughts, and behaviors, including self-hood, is shaped by the social environment specific to place and time at both structural and functional levels (Rule, Freeman, & Ambady, 2013). Reciprocally and simultaneously, our culture is

fashioned by thought and behavior. Efforts to evaluate how women's decisions around HPV vaccination are made might benefit from a consideration of how gendered sexual scripts and negotiations of power and privilege play out in social institutions.

1.3 Ideologies of Femininity

Rules of femininity are both culturally transmitted and read from the visual images of mass media as well as socialized via bodily discourses; together these cultural patterns and interpersonal exchanges dictate fashion, bodily dimension, facial expression, physical movement, thought, and behavior (Bordo, 1989; Kwan & Trautner, 2009). Largely unrealistic physical ideals privilege beauty, youth, whiteness, thinness, and fragility (McKinley, 1999). The female behavioral repertoire, sexual behavior included, emphasizes a careful balance of agency and freedom with passivity and self-control (McKinley, 1999). Historically female sexual behavior has been denied, suppressed, restricted, commodified, and exploited—especially expressions of female sexuality not linked with conception or motherhood (Steinem, 1995). Conventional ideas about women's sexuality are highly contradictory, with notions of faithfulness, agreeableness, dependency, weakness, nurturance, sensitivity, and generosity on one hand and notions of being alluring, voracious, all-devouring, and consuming on the other (Bartkey, 1990; Weeks, 2003). Women also face a double-bind in regards to whether or not sexual activity is socially acceptable (Hamilton & Armstrong, 2009). Participating in sexual activities can leave room for informal routes of social punishments and censure (e.g., derogatory labels, scorn from friends, changed family relationships) and opens up possibilities of STIs and unwanted pregnancy (Frye, 1983; Kreager & Staff, 2009). At the same time, young women refraining from sexual activities may face equally challenging

social sanctions, including harassment, pressures to engage, accusations of lesbianism, and a plethora of labels (e.g., frigid, tease, prude) (Frye, 1983). Connell (1987), Schippers (2007) and others refer to this narrow configuration of gendered practice as "emphasized femininity," which is oriented around accommodating the interests and desires of men and defined by compliance to subordination. Repeated exposure to the same messages of emphasized femininity normalizes their existence and naturalizes them in the essence of what it means to be a woman and what it means to be female (Kilbourne, 2005). Moreover, these discourses propagate schemas of relationships and romance that young girls should supposedly desire, ones that often exude the illusion of female power and self-sovereignty, yet in actuality work to subvert them (Kilbourne, 2005).

Truthfully, none of the conventional ideals of emphasized femininity or characteristics of women's sexuality are inherently maladaptive. Likewise, neither sexual activity nor sexual inactivity is intrinsically harmful. These collective discourses only become problematic when they diminish the ability of young girls and women to acknowledge their own sexual desires, be assertive about what they want, have agency in relation to their own feelings, avoid coercion and violence, be in tune with their bodies, and feel entitled to different kinds of sexual expression (Haffner, 1998; Tolman, 1999).

Second-wave feminism's critique of dominance concerned itself with male power over women, sexual exploitation of disempowered subjects, and issues of consent and informed choice. Discourses of dominance as specifically related to genitalia are central to feminist analyses of sadomasochism, pornography, sexual assault, transgender and intersexuality rights, and sexual and reproductive health care, among others. In *Outlaw Culture* (2006) and elsewhere, bell hooks has written and lectured on issues of power,

domination and subordination, and oppression and resistance, while holding White supremacy, capitalism, patriarchy, the entertainment and pornographic industries, internalized racism, and other domains under a critical spotlight. Hooks' critique encompasses and helps explain a wide range of cultural realities, including the portrayal of minority women and their anatomies as subservient and childlike or exotic and dangerous. The various implications of sexual domination for the lived experiences of Western girls and women and to some extent feminized "others" such as men who have sex with men and male-to-female transgender persons are vast. In a world where injustices and inequalities flank the structures of societal institutions, the body and genitalia, becomes the site for "appalling violence, pain and disease, and a landscape of uneven power relations," a battleground for deciding what is right and wrong, acceptable and unacceptable, normal and abnormal, human and inhuman (Weeks, 2003, p. 67). One contemporary example of power over female genitalia is the largely still-restricted access to emergency contraception (e.g., Plan B One-Step) in the majority of US states (Guttmacher Institute, 2015). As of July 1, 2015, nine states have adopted legislation that restricts access to emergency contraception and only 23 states have enforced mandates that protect or expand access (Guttmacher Institute, 2015). A second example is seen in the socialized paranoia surrounding female genital hygiene [an over $2 billion per year US industry that includes tampons/liners/pads, washes, sprays, douches, powders, wipes] to the detriment of women's health with exposure to endocrine-disrupting chemicals, carcinogens, and allergens resulting in an increased risk of bacterial and yeast infections, pelvic-inflammatory disease, cervical cancer, and STI transmission (Wendee, 2014).

Example three is the growing trend of elective genital-normalization cosmetic procedures—vaginoplasty, clitoral hood size reduction, labioplasty, hymenoplasty, and laser-based and cryogenic lightening—to accommodate the esthetics standardized by the entertainment and pornography industries' constructions of the sexed female subject (Green, 2005; McNamara, 2006; Triana & Robledo, 2015). Labiaplasty alone increased from 2013 to 2014 by 49% in the US compared to a two percent decrease in overall cosmetic surgeries—a growth rate exceeded only by buttock augmentation (86%) (The American Society for Aesthetic Plastic Surgery [ASAPS], 2014).

Two aspects of [emphasized] femininity ideology have been explored by psychologists Tolman and Porche (2000). These authors acknowledge that there are multiple ideologies of femininity in modern Western society but insist that the specific brand of femininity, "emphasized femininity," linked with "the patriarchal system of the dominant White, middle-class culture of the United States . . . is both oppressive and hegemonic" (2000, p. 336). According to their theory, femininity ideology is a broad and evolving construct attempting to capture the ways in which girls and young women experience pressures in a patriarchal world to behave in "feminine" ways in both their relationships with others (i.e., to "play nice," to avoid conflict, to supress anger) and in their relationships with their own bodies (i.e., regulating their physical bodies to conform with prevailing images of beauty and attractiveness, denying their authentic needs and desires) (Tolman, Impett, Tracy, & Michael, 2006). These two factors—inauthenticity in relationships and body objectification—have been implicated in adolescent girls' and young women's decision-making about their bodies and have been loosely associated with sexual health behaviors in the literature. Tolman and colleagues conducted research

beginning in 1999 implicating femininity ideology with the sexual health and well-being of girls and young adults (Impett, Schooler, & Tolman 2005; Impett & Tolman 2006; Tolman 1999; 2000; 2005; 2006; Tolman, Striepe, & Harmon 2003).

1.3.2 Inauthenticity in Relationships

Faced with gendered expectations about what social interactions are deemed appropriate and desirable, young women often silence particular feelings, thoughts, and actions, especially those contrary to emphasized femininity (e.g., pride, anger). This silencing may be done sacrificially (putting another's needs before one's own) or as an act of self-preservation in order to avoid conflict, maintain a relationship, not hurt others, or to appear desirable. Quite literally young women modify, suppress, or enhance aspects of their character or person in an effort to pacify others, to be "good girls," that is, to be "unerringly nice, polite, modest, and selfless" (Simmons, 2009). The incongruence between what a girl thinks and feels and what she says and does in relational contexts may then be defined as *inauthenticity in relationships* (Impett, Sorsoli, Schooler, Henson, & Tolman, 2008). The process of silencing has previously been described as "loss of voice" (Brown & Gilligan, 1993), "false-self behavior" (Harter, Waters, & Whitesell, 1997), or "silencing the self" (Jack & Dill, 1992). Being less than authentic in the service appearing "good" or "desirable" or "content" may work against girls in the context of sexual health (Tolman, 1999). Decisions about sexual activities, including the use of protection and contraception, and choosing or refusing a partner necessitates women and girls "being able to voice and enact their desires, interests, and needs" (Impett, Schooler, & Tolman, 2006, p. 132).

Inauthenticity is especially problematic when it comes to negotiations of sexual gratification and sexual health behaviors in a society that defines sexual activity and sexual response in terms of male anatomy and heterosexuality (Weeks, 2004). Forfeiting one's authentic self and feeling unable to articulate one's desires and needs to sexual partners increases the likelihood of sexual risk behaviors and negative sexual experiences (e.g., Amaro, 1995; Wingood & DiClemente, 1998). For instance, self-silencing of condom negotiation has been found in the literature to be associated with unwanted unprotected sex among adolescents (Teitelman, Tennille, Bohinski, Jemmott, & Jemmott, 2011) and with risk of HIV infection among older women (Jacobs & Thomlison, 2009). Self-silencing by adolescent girls was associated with lower sexual communication, reduced contraceptive use, and reduced relationship satisfaction (Widman, Welsh, McNulty, & Little, 2006).

1.3.3 Body Objectification

In a similar vein, two processes of *body objectification* may be implicated in negative sexual and reproductive health outcomes for young girls and women. Young women 1) dissociate from their own innate desires (e.g., for food, for sex) and 2) continuously survey and assess their bodies from another's perspective—mostly the male "gaze"—in response to being socialized in a culture that objectifies and commodifies women's physical appearance and sexuality (Bordo, 1993; de Beauvoir, 1961; Impett et al., 2006). For example, girls and women are socialized to take up less space than men, yield space to men, and to be physically smaller than male counterparts in variety of contexts (e.g., on public transportation). Carli, Loebner, and LaFleur (1995) discuss how women constrict their arms and legs and remain upright and stiff in contrast to men with

high power statuses who expand their limb positions and sit and stand in relaxed postures.

Constant body self-surveillance is a central tenet of having an objectified body consciousness (Spitzack, 1990). Objective self-surveillance is a process of self-regulation so as to meet terms dictated by cultural standards, remain free of negative judgments, and be perceived as desirable. It entails the habitual practice of scanning and monitoring one's spatial position and outward appearance from an external view and making adjustments if necessary. In effect, women's relationship with their body is estranged, distanced, and becomes that of object and external onlooker. When internalized, these carefully monitored standards seem as though they originate from within and give an illusion of personal choice, empowerment, and autonomy instead of recognition of externally imposed pressures (Bartky, 1988; Spitzack, 1990). Because the standards are nearly impossible for women to achieve failing to resolve the dissonance between an idealized physicality and one's perceived physical reality results in appearance anxiety, decreased awareness of internal bodily states, reduced "flow" (peak motivational states), body shame and global attributions of failure (e.g., "I am a bad person") (Fredrickson & Roberts, 1997; Noll & Fredrickson, 1998). The process of body objectification has been implicated with negative body image, disordered eating, cognitive and physical task performance, and depression, across both experimental and correlational studies (Moradi & Huang, 2008). Most relevant to the topic at hand is that the dissociation from or abandonment of one's corporeality (i.e., their physical being, material nature, internal bodily state) sets the stage for higher-risk sexual behaviors and unhealthy decision-making, as it is linked to notions of diminished "flow," perceived self-worth, self-esteem,

and power relations, that make engaging in self-preserving acts like preventative HPV-related behaviors more difficult (e.g., Impett & Tolman, 2006).

Previous studies have suggested a direct relationship between ideologies of femininity and sexual health outcomes (Curtin, Ward, Merriwether, & Caruthers 2011; Impett, Schooler, & Tolman, 2006; Impett, & Tolman, 2006; Tolman, 1999, 2000, 2005, 2006; Tolman, Striepe, & Harmon, 2003; Wingood & DiClemente, 1998; 2000). It is important to note that the specific mechanism by which this relationship occurs remains obscure. Possible agents linking femininity ideologies with sexual health outcomes include self-efficacy (agency and assertiveness), sexual knowledge, and sexual embodiment (feelings about the body during sexual encounters) (Curtin, Ward, Merriwether, & Caruthers, 2011). As an illustration, Impett, Schooler, and Tolman (2006) found that body objectification was related to less frequent use of condoms at first intercourse and inauthenticity in relationships was associated with less frequent use of hormonal contraception among 116 teenage girls (age 16 to 19 years). Additionally, sexual self-efficacy was found to mediate the associations between inauthenticity in relationships and hormonal contraception frequency and also between body objectification and condom use at first intercourse.

The hypothesized relationship between femininity ideology and women's perception and integrity of their sexual selfhood is explored henceforth.

1.4 Sexual Self-Concept

The various ideals of female sexuality in contemporary Western society have become anchored in the interior experiences of women's lives, which affect their ability to have authentic relationships with others and with their own physicality (Tolman,

1994). The extent to which a young women is in touch with her corporeality, relationships (in particular, romantic relationships), and sexual desires gets reflected in the ways in which she conceptualizes the sexual aspects of the self (Andersen & Cyranowski, 1994; Johnson Vickburg, & Deaux, 2005). This generalized cognitive appraisal, termed a *sexual self-schema*, is "derived from past experience, manifest in current experience, influential in the processing of sexually relevant social information, and gives guidance for sexual behavior" (Andersen & Cyranowski, 1994, p. 1092). While the antecedents for processing sexually relevant social information and sexual decision-making are multifaceted and vast, one's sexual self-schema and the extent to which a young woman is authentic in relationship to her own body and with others may shed light onto decisions surrounding preventative HPV-related behaviors.

1.4.2 Overview

Conceptual definitions and working models of the sexual self, sometimes referred to as sexual self-concept, sexual self-perception, sexual self-views, sexual self-schema, or sexual self-schemata, have become increasingly commonplace in research in the public health, social and behavioral sciences, and medical fields. Some of these models, such as Buzwell and Rosenthal's (1996) taxonomy of sexual selfhood styles, have both cognitive and affective evaluations. Others deal singularly with cognitive attributions and evaluations (Anderson & Cyranowski, 1994; Andersen, Cyranowski, & Espindel, 1999; Cyranowski & Andersen, 1998). These cognitive models suggest that a person's view of their sexual self is not merely a product of prior or current behavior but rather a dynamic, multifaceted conceptualization including both interpersonal and intrapersonal components, one that interprets and organizes actions and experiences and has

motivational implications for future behavior (Anderson & Cyranowski, 1994). Sexual self-schema has been proposed as having two independent dimensions—positive and negative—with coactivation that results in four self-views: positive schematic, negative schematic, aschematic, and co-schematic (Anderson & Cyranowski, 1994).

The theory's conceptualization was complemented by Johnson Vickberg and Deaux (2005), who proposed that self-concepts of any nature are far more complex than general personality traits or individual characteristics. Johnson Vickberg and Deaux (2005) suggest that woman's sexual self-concept includes feelings, roles, and behaviors related specifically to sexual situations. Perhaps most notably, these authors consider the collective impact of historical social discourses about appropriate and inappropriate expressions of female sexuality. These conceptual changes are reflected in their program of research.

1.4.3 Theoretical Applications of Sexual Self-Concept

The real usefulness of this body of work lies in the strength of its theoretical underpinnings. Having a positive sexual self-schema involves perceived efficacy to deal effectively with sexual aspects of one's self, the tendency to be assertive about sexual aspects of one's life, experiencing sexuality in a satisfying and enjoyable way, and believing sexual aspects of one's life are under one's personal control (Snell, 1995). Women with a positive sexual schema generally have a higher degree of sexual arousal, experience passionate and romantic emotions, have more positive evaluations of sexual events and various sexual practices, more openness to uncommitted sexual relationships, have little embarrassment or conservatism regarding sexuality, and rate themselves as "more sexual" than their negative sexual schema counterparts (Anderson & Cyranowski,

1994). Negative sexual self- schematic individuals feel more tension, discomfort, and anxiety about the sexual aspects of their life, may fear engaging in sexual relations with another individual, and tend to experience feelings of sadness, unhappiness, and depression regarding their sex life (Snell, 1995). Having a strongly negative sexual self-schema, or rather, a self-schema of sexuality that is driven by coercive experiences, with negative emotions, and concerns about impressions holds implications for preventative HPV-related health intentions and behaviors among young women.

From an early age, girls are socialized to recognize that an inherent vulnerability in being female is the risk and reality of sexual violence in the form of rape, incest, verbal abuse, and harassment; this underlying climate of psychological (and often physical) threats impacts women's day-to-day lives, as well as their sexual experiences (Daniluk, 1993). At the same time, young girls and women find it difficult to reconcile conventional and dominant discourses about goodness, virginity, and fidelity with their desires for sexual experiences and physical gratification; this dissonance heightens a mentality of shame, guilt, and self-blame (Daniluk, 1993), which likely has implications for sexual behaviors and health.

1.5 Connecting Femininity Ideologies and Sexual Self-Schemas

Young women who suppress their authentic sexual selves in service of pleasing their partner or conforming to certain sexual scripts may be more likely to endorse a negative sexual self-schema. Said differently, not feeling empowered or not knowing how to relay honest information to sexual partners about one's beliefs, desires, needs, or acceptable forms of sexual expression may result in unwanted, coercive, or exploitive sexual acts (Tolman, Spencer, Porche, & Rosen-Reynoso, 2003). Negative sexual

experiences of this nature place young women at increased risk for transmission of STIs, including high-risk forms of HPV, due to decreased opportunities for control of barrier-method protection, number of partners, and specific sexual acts (Wingood & DiClemente, 2000). Young women may endorse negative sexual self-schema if they evaluate, assess, and experience their physicality based on internalized impressions of dominant discourses about what it means to be feminine, beautiful, desirable, and worthy in modern Western society. Young women dissociating and abandoning their bodies in this manner may be likely to engage in higher risk sexual activities (often coercive, unwanted, or unfulfilling) and less able to engage in self-preserving acts such as negotiating barrier-method method protection (Pulerwitz, Amaro, De Jong, Gortmaker, & Rudd, 2002; Wingood & DiClemente, 2000). Because these young women hold negative views of sexuality in general, they may have increased perception of their risk for infection, despite some degree of dissociation from their corporeality and objectification of their physical being, which may have implications for preventive behaviors that do not require negotiation with others such as vaccination.

Johnson Vickberg and Deaux (2005) provide the caveat that the perception of what constitutes a healthy self-schema of sexuality varies from person to person and across groups. It stands to reason that a generally positive relationship with one's sexuality and sense of empowerment over sexual matters may be associated with decreased likelihood of engaging in sexual risk behaviors. Accordingly, perception of risk is likely decreased among women with high positive sexual self-schema. Independently of a lowered risk perception and unlikely participation in sexual risk

activities, having an active investment in one's sexual health and healthy sexuality may increase intentions to get the HPV vaccination.

In sum, one's sexual self-schema, degree of body objectification, and degree of inauthenticity in relationships hold direct implications for participation in higher-risk sexual behaviors and for indirectly influencing TPB and HBM constructs already widely understood to help explain preventative health intentions and behaviors (Impett et al., 2006; Impett & Tolman, 2006; Schooler, Ward, Merriwether, & Caruthers, 2005; Seal, Minichiello, & Omodei, 1997); however, it is unclear to what extent they are specifically connected to HPV vaccination intention and behavior. To reiterate, perceived susceptibility and perceived benefits from the HBM (Bish, Sutton, & Golombok, 2000; Buchanan, 2009; Burak & Meyer, 1997; Liau & Zimet, 2000) and perceived behavioral control/self-efficacy and subjective norms from the TPB (Buchanan, 2009; Gerend & Shephard, 2012) emerged as independent predictors in previous HPV vaccination intention and vaccine uptake studies. As gendered sexual scripts and power dynamics play out within relationships and surrounding sexual activities with partners, young women may engage in a spectrum of sexual risk behaviors, all the while having a varied ability to decline, to negotiate safer sex practices, to view themselves as vulnerable to infection, or to be embodied in their own subjectivity. Our understanding of how self-efficacy, subjective norms, perceived benefits, and perceived susceptibility, among others, predict HPV vaccination intention (or behavior) is elevated when held under a lens of feminist-guided theory, which filters everything through the context of power and privilege differentials across sex and gender.

In addition, elements of a young woman's sexual health history, degree of knowledge related to HPV, and anticipated regret associated with not getting the HPV vaccination may moderate these relationships. Rather, it is possible that the relationships and interrelationships between variables may look different under various conditions (e.g., high versus low levels HPV knowledge, use versus non-use of barrier-method method protection during last sexual activity versus non-use). Several of these moderating factors are discussed below.

1.6 Additional Factors to Consider

Several factors related to sexual health history not previously discussed have also been shown to be associated with vaccination status in the literature (for review, see Ratanasiripong, 2012). For example, the use of a condom or barrier-method method protection at last intercourse has been related to higher rates of vaccination (Conroy, Rosenthal, Zimet, et al., 2009). One of the most salient demographic factors in the investigation at hand is the matter of whether or not a young woman considers herself as "single" or "in a relationship."

Relationship status (being in a relationship or being single) seems to reduce the likelihood of intentions surrounding HPV vaccination. For example, a study of non-vaccinated young women (19-26 years) cited being married or in a monogamous relationship most frequently as the explanation for not yet receiving the HPV vaccine (Zimet, Weiss, Rosenthal, Good, & Vichnin, 2010). Moreover, data from a nationally representative sample found that not being married was associated with a greater likelihood of HPV vaccination among young women 18 to 26 years of age (Jain et al., 2009). Even physician's attitudes vary with regard to a patient's relationship status in a

hypothetical study that found lowest vaccination priority was given to patients who were married or in long-term monogamous relationships than for dating or not-dating patients (Zimet et al., 2011). Relationship status also seems to matter in terms of barrier-method method protection for HPV prevention, as women married or in a relationship were 40% more likely to report seldom/never using condoms with temporary partners over the past year than single women [participants self-defined the term "temporary" in this study] (Leval et al., 2011). This finding supports previous research finding higher rates of condom use among casual sexual partners than steady partners (Sheeran, Abraham, & Orbells, 1999) and is consistent with findings indicating married women or women in steady relationships are significantly less likely to use condoms with temporary extradyadic partners (Pulerwitz, Amaro, De Jong, Gortmaker, & Rudd, 2002). Lack of condom use for women in steady partnerships may be explained by their use of contraceptive devices (e.g., UTI's or hormonal birth control) and a reduced perception of risk associated with having had fewer partners.

A second and chiefly exploratory arm of this research endeavor involves Connolly and Reb's (2005) concept of anticipated (pre-decisional) regret. These researchers summarize anticipated regret as a negative or aversive emotion associated with thinking about a personal health care choice one is about to make; it involves mental simulations of the possible outcomes related with specific actions or inactions. Anticipated regret concerning influenza vaccination was recently explored among adults (Weinstein et al., 2007). In this study, adults were more likely to get vaccinated against influenza when they believed they would regret getting the flu because they were not vaccinated. The first study to examine anticipated regret in the context of HPV found that

caregivers of adolescent and teenage girls with higher anticipated inaction regret significantly endorsed higher HPV vaccination intentions for their daughters, even when perceived likelihood and severity of cervical cancer were controlled for statistically (Ziarnowski, Brewer, & Weber, 2009). Anticipated regret among caregivers has repeatedly been found to be associated with caregivers' HPV vaccination intentions for their daughters (Brewer et al., 2011; van Empelen et al., 2013). Similar results were found among adolescent males, caregivers of adolescent males, and gay and bisexual men, where all groups endorsed stronger vaccination intentions if they expressed higher levels of anticipated regret about not getting vaccinated and subsequently developing an HPV infection (Gilbert, Reiter, Brewer, McRee, & Smith, 2010; Reiter, McRee, Kadis, & Brewer, 2011).

All in all, the dangers inherent in repeated exposure to high-risk HPV strains, combined with the high prevalence of HPV, in addition to the drastically low vaccination completion rates among young college-age women, point to the need to reexamine our current understandings of health behavior intentions. Presently cognitive theoretical models such as the HBM and TPB offer up important explanatory factors in the decisional processes connected with vaccination. HBM and TPB factors consistently associated with HPV vaccination intention or uptake have previously been integrated into combined models that accounted for 57% of variance in intention (Buchanan, 2009) and 43% of uptake (Gerend & Shephard, 2012). In an effort to close the gap in our knowledge about how young women form their intentions to vaccinate against HPVs, heretofore largely based on information gleamed via the application of the HBP and TPB, this investigation proposes that the driving factors of these models be scrutinized and

interpreted through a feminist lens. With this perspective, femininity ideology and sexual self-schema overlay the pervasive influence of differential systems of power, privilege, and gendered sexual scripts upon existing health behavior constructs (e.g., perceived susceptibility, self-efficacy). Highlighted by this process, is a cohort of young women engaging in sexual risk behaviors who are dissociated from their physicality, uncomfortable expressing their authentic desires, and who endorse a negative sexual-self schema. As women participate (albeit often under coercive, exploitive, or unwanted circumstances) in these sexual risk behaviors, the pervasive, contradictory, and unrealistic, often unhealthy ideals associated with emphasized femininity, as well as their feelings, roles, and behaviors related to sexual situations (past and present) must affect their cognitions and beliefs (i.e., TPB and HMB factors), thus providing insight into sexual health behavior and HPV vaccination decision-making processes.

1.7 Research Aims and Hypotheses

This study's overarching aim was to articulate and test a hypothesized model of college women's HPV vaccination intentions (see Figure 1) using a structural equation modeling (SEM) approach. In the first part of the model (P1), femininity ideologies and sexual self-schema were positioned as distal factors serving to predict sexual risk behavior.

P1H1. Femininity ideologies (body objectification and inauthenticity in relationships) along with positive and negative sexual self-schemas were expected to contribute to sexual risk behavior among college women.

In the second part of the model (P2), sexual risk behavior was expected to directly contribute to perceived vulnerability of HPV infection.

P2H1. Higher levels of sexual risk behavior among college women were expected to be directly related to higher levels of perceived vulnerability to HPV infection.

Also in part two of the model, perceived vulnerability and a subset of other HBM (Janz & Becker, 1984; Rosenstock, 1966) and TPB (Azjan, 1991) constructs were expected to affect HPV vaccination intentions more proximally.

P2H2. Lower perceptions of barriers and greater perceptions of vulnerability to infection, perceived severity of health consequences, subjective HPV vaccination norms, vaccine safety and effectiveness (all HBM/TPB variables) were each expected to relate to greater vaccination intentions.

P2H3. Subjective norms for vaccination and perceived vaccine safety and effectiveness were also expected to moderate the relationship between perceived vulnerability and HPV intentions (perceived vulnerability x subjective norms x perceived vaccine safety and effectiveness). Specifically, young women who report increased perceptions of vulnerability, a stronger endorsement of subjective vaccination norms, and have increased perceptions of vaccination safety and effectiveness would be more likely to endorse intentions to vaccinate.

P2H4. Subjective norms for vaccination and perceived vaccine safety and effectiveness were expected to moderate the relationship between perceived barriers for vaccination and HPV intentions (perceived barriers x subjective norms x perceived vaccine safety and effectiveness). Specifically, young women who report fewer perceived barriers, a stronger endorsement of

subjective norms, and increased perceptions of vaccination safety and effectiveness would be more likely to endorse intentions to vaccinate.

P2H5. Subjective norms for vaccination and perceived vaccine safety and effectiveness were expected to moderate the relationship between perceived HPV severity and vaccination intentions (perceived severity x subjective norms x perceived vaccine safety and effectiveness). Specifically, young women who report greater perceived severity, a stronger endorsement of subjective norms, and increased perceptions of vaccination safety and effectiveness would be more likely to endorse intentions to vaccinate.

P2H6. Greater healthcare provider influence (i.e., having a provider talk about vaccination options or having a provider recommend the HPV vaccine series) would be directly associated with greater vaccination intention.

CHAPTER 2: METHOD

2.1 Participants

Participants were 286 female undergraduate students at a large southeastern university between the ages of 18 and 26 years old, who had never received one or more injections in an HPV vaccination series (i.e., Gardasil® or Cervarix®), and who had been sexually active (i.e., engaged in oral, anal, or vaginal sexual activity) in the three months preceding participation. Students not meeting these requirements or not reading English were excluded; no other minority groups or subgroups were excluded from the study. The exclusion of females 26 years old and above was derived from the current FDA vaccination approval having only been granted for use among girls and women between the ages of nine and 26 years (GlaxoSmithKline, 2009). Minors and males were excluded from this study due to the nature of the research questions and because some of the constructs under investigation (e.g., femininity ideology) were only relevant to females.

2.2 Procedure

Research design. Data were collected at one time point and were exclusively self-report.

Recruitment. Participants were recruited both via SONA Systems (the psychology department's research participation website) and from flyers placed in the Student Health Center and on public bulletin boards in common areas around campus (Appendix A). Three methods of recruitment were employed and are detailed next.

1. Participants completed a pre-screen questionnaire the first time they logged in to SONA systems. All eligible participants were sent an email to their university account inviting them to participate in the study and giving directions about how to participate using the external Qualtrics website. Subsequent email invitations were sent at any point after two weeks time from the date of the first invitation. Participants who met the inclusion criteria were asked to complete the study in a private location.

2. The study was described on the online research participation website (SONA systems) for students currently enrolled in psychology courses requiring research participation for class credit (see script below). Students voluntarily choose to participate by clicking on the study from the list available to them. All potential participants completed the prescreen items after following the link to the external Qualtrics website. If an individual was determined not to be eligible to participate, they were routed to a thank you message and their session was automatically closed. An email script for ineligible participants is included below. Furthermore, pre-screen data from ineligible participants were purged/deleted at the end of each semester.

3. Printed flyers were placed in the Student Health Center and on public bulletin boards in common areas around campus. Written permission was obtained by Health Center officials before placing flyers in these locations (Appendix A). Participants were asked to access the study in a private location of their choosing where they would not be disturbed, to read and electronically agree to an informed consent, and to complete all questionnaires and measures online utilizing Qualtrics.

Three scripts were developed for purpose of recruitment via SONA Systems (Appendices A, B, & C). A fourth script (Appendix D) was developed for purpose of recruitment via the Student Health Center and public bulletin boards around campus.

Participants recruited via SONA automatically received one psychology subject-pool credit for participating. Participants recruited via flyers received one entry in a drawing for a Target gift card/certificate valued at $10.00, with odds of receipt equal to or better than one in ten. There were multiple drawings and participants selected were notified via campus email the last week of the semester they participated.

All data were kept confidential. Each participant and their data were assigned a numeric code (identification number). Only the principal investigator and her academic advisor were able to connect individual participant codes to identifying information prior to dataset de-identification. The identifying information removed from the data set included university and secondary email addresses, Internet Protocol (IP) address, latitude and longitude coordinates, and date and time of participation. Under all circumstances, identifying information was physically and electronically separated from participant responses. Any documents with participants' names or other identifying information were kept in a locked file cabinet in a locked office or in a secure drive on the UNC Charlotte network with password-protected access. Identifying information for ID numbers was purged no later than one year after study completion.

There were no expected physical risks associated with participation in this study. Due to the sensitive and private nature of the study (e.g., information about sexual activity, STIs) there was a chance that participants might experience adverse psychological, emotional, or social effects. Recalling specific events or reporting some of

this information might be uncomfortable or embarrassing to participants. Participants could stop at any time or simply end the study without any consequences.

A procedure for handling and reporting cases of adverse effects was in place; however, no adverse effects or negative events as a result of participation in the study were reported. The investigators' professional contact information was made available to participants to assist any individual who experienced distress or adverse effects, had general concerns about their participation, or would like more information about the confidentiality of their responses. Participants were instructed (via informed consent) that their participation was completely voluntary and that they may stop at any time without consequence. In addition, a button was presented on every screen of the electronic survey for participants to press if they wished to quit the study at any point. All participants were made aware of counseling services available to them free of charge at the university's counseling center during normal business hours. Participants were also instructed to call 911 if they were having thoughts of hurting themselves or others.

2.3 Power Analysis

There is little consensus on the sample size calculation approach or the minimum sample size required to conduct Structural Equation Modeling (SEM) or path analysis (a subset of SEM), although some rule any number excessive of 200 as sufficient to provide statistical power for data analysis (Garver & Mentzer, 1999). Another generally agreed-upon value ranges from ten to twenty participants for every free parameter estimated (Kline, 2005). Generally, larger sample sizes and degrees of freedom result in higher power for SEM analysis (Kline, 2005). The "t-rule" for model identification provides the condition that you cannot estimate more parameters than there are unique elements—

sample variances and covariances—in a covariance matrix (Bollen, 1989). The proposed model for CFA of sexual risk behaviors contains seven factor loadings, seven measurement errors, and one correlation among latent variables; therefore, the number of elements is 15(15+1)/2 = 120 (Kline, 2005). The hypothesized model implies the estimation of the following 24 parameters: variances and covariances (9), the regression coefficients (8), and the error variances (7). The hypothesized model has 21 fewer parameters than unique observations so it may be identified (Kline, 2005). The full proposed SEM model for HPV vaccination contains 26 factor loadings, seven measurement errors, and two covariances; hence, the number of elements is 32 (528 unique observations). This model implies the estimation of 24 factor loadings (two loadings were fixed at 1.00), seven measurement errors, and two covariance leaving two free parameters to be estimated. Taking the above guidelines into consideration suggested enrollment of at least 230 participants for adequate power for planned analyses.

2.4 Measures

Eligibility screening. Participants were asked to answer four questions to ascertain their sex, age, HPV vaccination status as having or not having previously received one or more injections in an HPV vaccination series (i.e., Gardasil® or Cervarix®), and sexual activity as whether they have or have not been sexually active (i.e., engaged in oral, anal, or vaginal sexual activity) in the three months preceding participation.

Demographic characteristics. Participants responded to five items regarding their ethnicity, academic class standing, marital status, dating status, and relationship status.

HPV vaccination intention. A single item assessed the perceived likelihood of obtaining the HPV vaccine in the six months following participation using a 5-point scale ranging from not at all likely [0] to completely likely [5].

Body objectification. Participants responded to the 8-item objectification of one's own body (BO) subscale of the revised version of the Adolescent Femininity Ideology Scale (AFIS; Tolman, Impett, Tracy, & Michael, 2006). Responses ranged from strongly disagree [0] to strongly agree [6], with higher scores reflecting increased degree of body objectification. Statements were modified to avoid indicating gender, relationship, and age specificity. For instance, "I would tell a friend I think she looks nice, even if I think she shouldn't go out of the house dressed like that" and "I think that a girl has to be thin to feel beautiful" were modified as "I would tell someone I think they look nice, even if I think they shouldn't go out of the house dressed like that" and "I think that a female has to be thin to feel beautiful," respectively. The subscale was mean scored and Cronbach's alpha among this study's sample was acceptable ($\alpha = .75$).

Inauthenticity in relationships. Participants responded to the 9-item inauthenticity in relationship (IR) subscale of the revised version of the Adolescent Femininity Ideology Scale (AFIS; Tolman et al., 2006) described above. Example items include, "Often I look happy on the outside in order to please others, even if I don't feel happy on the inside" and "I tell people what I honestly think even when it is an unpopular idea" (reversed). Responses range from strongly disagree [0] to strongly agree [6], with higher scores on reflecting increased inauthenticity in relationships. The subscale was mean scored and Cronbach's alpha among participants in this study was acceptable ($\alpha = .70$).

Positive sexual self-schema. Anderson and Cyranowski (1994) suggest that sexual self-schema is derived from positive and negative dimensions. Positive sexual self-schema was measured using four subscales of five items each from the Multidimensional Sexual Self-Concept Questionnaire (MSSCQ; Snell, 1995): *sexual self-efficacy,* defined as the belief that one has the ability to deal effectively with the sexual aspects of oneself (items 2, 9, 16, 23, 30; e.g., "I have the ability to take care of any sexual needs and desires that I may have"); *sexual assertiveness,* defined as the tendency to be assertive about the sexual aspects of one's life (items 3, 10, 17r, 24, 31; e.g., "I do not hesitate to ask for what I want in a sexual relationship"); *sexual esteem,* defined as a generalized tendency to experience one's sexuality in a satisfying and enjoyable way (items 4, 11, 18, 25, 32; e.g., "I have positive feelings about the way I approach my own sexual needs and desires"); and *internal sexual control,* defined as the belief that the sexual aspects of one's life are determined by one's own personal control (items 7, 14, 21, 28, 35; e.g., "My sexuality is something that I am largely responsible for"). Respondents indicate how characteristic of them each statement is on a 5-point Likert-type scale ranging from not at all characteristic of me [0] to very characteristic of me [4]. Total scale and subscales were mean scored. After removing item ten (corrected item-total correction = -.34), Chronbach's alpha for total positive sexual self-schema was excellent ($\alpha = .92$). Initial internal consistency for the subscales was adequate to good at .87, .70, .86, and .75, respectively. Further revisions occurred subsequent to CFA resulting in new Chronbach's alphas: $.93_{\text{Positive Total}}$, $.87_{\text{Sexual Efficacy}}$, $.77_{\text{Sexual Assertiveness}}$, and $.86_{\text{Sexual Esteem}}$.

Negative sexual self-schema. Negative sexual self-schema was measured using three subscales of five items each from the MSSCQ (Snell, 1995): *sexual anxiety,* defined

as the tendency to feel tension, discomfort, and anxiety about the sexual aspects of one's life (items 1, 8, 15, 22, 29; e.g., "I worry about the sexual aspects of my life"); *fear of sex,* defined as fear of engaging in sexual relations with another individual (items 5, 12, 19, 26r, 33r; e.g., "I am fearful of engaging in sexual activity"); and *sexual depression,* defined as the experience of feelings of sadness, unhappiness, and depression regarding one's sex life (items 6, 13, 20, 27r, 34; e.g., "I feel discouraged about my sex life"). Total scale and subscales were mean scored. After deleting item 27 (corrected item-total correlation = -.69), initial internal consistency for the total negative sexual self-schema scale was good ($\alpha = .91$). Chronbach's alphas for the initial subscales were also good at .85, .79, and .84, respectively. After later CFA revisions, Chronbach's alphas were $.92_{\text{Negative Total}}$, $.92_{\text{Sexual Stress/Depression}}$, and $.83_{\text{Fear of Sex}}$.

Sexual risk behavior. Participants completed the 23-item Sexual Risk Survey (SRS; Turchik & Garske, 2008) to assess the frequency of sexual risk behaviors in the past six months. The survey has five factors where participants specify the exact number of times they have participated in various activities: sexual risk-taking with uncommitted partners (eight items; e.g., "sex with someone you don't know well or just met"), risky sex acts (five items; e.g., "vaginal sex without a condom"), impulsive sexual behaviors (five items; e.g., "sexual encounter you engaged in willingly but later regretted"), intentions to engage in sexual risk behaviors (two items; e.g., "gone out to bar/party/social event with the intent of engaging in sex"), and risky anal sex acts (three items; e.g., "anal sex without a condom"). The risky sex act factor contains items describing vaginal sex without a condom or birth control, cunnilingus and fellatio without protection, and sex under the influence of substances. Similiarly, the factor for risky anal

sex acts details unprotected anal penetration, sex, and analingus. Two items pertaining to intentions to engage in sexual risk behaviors were omitted from the total score, as it is actual past behavior that is the variable of interest, leaving a 21-item measure. The original authors and others suggest creating four ordinal categories with raw responses or with transformations (to reduce response range variability), then mean scoring (Turchick, Garske, Probst, & Irvin, 2010). This scoring method was not chosen for two reasons: 1) it is sample-dependent, 2) frequency of sexual risk behavior does not translate well as an indicator of HPV infection (e.g., one sexual act and thirty sexual acts can both result in HPV infection). Instead, each of the remaining 21 items were dichotomized as on [1] off [0] variables, then summed. Possible scale scores ranged from 0-21. This measure showed adequate internal consistency ($\alpha = .76$) among participants for this study.

Perceived vulnerability to becoming infected with HPV. Three items (absolute risk, comparative risk, and affective heuristic of risk) used in previous research (Gerrard, Gibbons, Benthin, & Hessling, 1996; McPartland et al., 2005) were utilized. Participants responded on a 6-point scale ranging from not at all likely [0] to highly likely [5] for absolute and comparative risk and strongly disagree [0] to strongly agree [5] for affective heuristic of risk. A mean score was calculated, with higher scores indicating higher perceived risk. This measure showed good internal consistency in this sample ($\alpha = .82$).

Perceived HPV severity. Perceived severity of HPV-related health conditions (i.e., cervical cancer, anal cancer, vaginal/vulvar cancers, genital warts, warts in the throat) were assessed by five items. Response options ranged from not at all [0] to quite a lot [3]. A similar measure of three HPV-related diseases (i.e., genital warts, oral cancer, anal cancer) has been utilized successfully (McRee, Reiter, Chantala, & Brewer, 2010).

Mean scores were calculated, with higher scores reflecting stronger beliefs about the severity of HPV. Among this study's sample Chronbach's alpha was excellent (α = .95).

Perceived barriers for vaccination. Belief in one's ability to receive the vaccine was measured using a three-item scale, assessing overall confidence in ability to receive all three vaccine shots, time, and affordability (Kahn et al., 2008). There were five response categories for each item, ranging from not at all confident [0] to completely confident [4]. Responses were averaged to create a mean score, with higher scores reflecting stronger confidence in overcoming barriers to vaccination. Cronbach's alpha for the three-item scale in this study was good (α = .87).

Subjective norms. Perceived social norms surrounding HPV vaccination were assessed by six items in the likeness of a scale developed by Young et al. (2010) that measures perceived expectations of valued others (i.e., friends, family, main healthcare provider, spiritual/religious community, relationship partner, students at university). There were five response categories for four items, ranging from completely disagree [1] to completely agree [5]. Two items referencing the opinion of a religious/spiritual leader and healthcare provider had a sixth response category, "not applicable" [6]. Scores were averaged to create a mean score, with higher scores indicating stronger approval of valued others to receive the HPV vaccination. Chronbach's alpha was good for both the four-item scale (α = .86) and for the six-item scale (α = .83, n = 188). The four-item scale was used for all analyses.

Vaccine safety and effectiveness. Two of the four factors from the Carolina HPV Immunization Attitudes and Beliefs Scale (CHIAS) (McRee et al., 2009) were used to collectively assess perceived harms and effectiveness of HPV vaccination. Three items

assessed perceived HPV vaccine safety, to which participants responded using a 5-point Likert-type scale ranging from strongly disagree [0] to strongly agree [4]. Two items assessed vaccine effectiveness, with participants responding effective [0] to extremely effective [4]. The items were mean scored with higher scores indicating an increased perception of vaccination safety and effectiveness. Chronbach's alpha for this sample was adequate at .74 for the total scale and .77 and .86 for safety and effectiveness, respectively.

The remaining factors, described below, were not included in the hypothesized model of HPV vaccination intention but were assessed in exploratory manner for their effects, as they have been shown to be associated with health protection intentions and behaviors, including HPV vaccination (Allen et al., 2009; Caskey, Lindau, & Alexander, 2009; Connolly & Reb, 2005; Kahn, Rosenthal, Hamaan, & Bernstein, 2003; Weinstein, Kwitel, McCaul et al., 2007; Ziarnowski, Brewer, & Weber, 2009). The decision to exclude variables was based on logistical considerations that balanced the primary research objectives (grounded in theory) with model parsimony.

HPV knowledge. Participants responded to an 16-item checklist, with 13 items from the Knowledge and Perceptions Survey (KAPS) (McPartland et al., 2005) and three items created for use in this study (i.e., "If you do not come into contact with the same type of virus again, a healthy immune system can clear HPV on its own without treatment," "There is no test to identify if men have HPV," and "Risk of HPV infection can be reduced by using a condom or dental dam"). Correct responses were aggregated to form a "knowledge" score, with higher scores indicating greater HPV knowledge. Previous use of the KAPS has yielded good internal consistency, face validity, and

construct validity (Kang & Kim, 2011; Yacobi et al., 1999), although the original authors did not report validity and reliability estimates for the 13-item knowledge scale. Reliability for this sample was extremely low ($\alpha = .24$). Low reliability likely reflects true inconsistencies and gaps in participant knowledge of virus transmission, pathology, and preventative measures.

Sexual health history. Participants answered ten questions about number of male and female sexual partners in the last year, length of time since last gynecological exam, length of time since last Pap Smear, length of time since last STI testing, current use of hormonal methods of birth control (i.e., pills, implants, patches, shots, sponges, rings), whether or not they have been diagnosed with HPV, use of condom or dental dam during last oral, vaginal, and anal sexual activity.

Anticipated regret. Perceptions of vulnerability have also been complemented by the assessment of a related construct—anticipated regret (Connolly & Reb, 2005; Weinstein, Kwitel, McCaul et al., 2007; Ziarnowski, Brewer, & Weber, 2009). Five items corresponding to five health consequences of HPV infection (i.e., cervical cancer, anal cancer, vaginal/vulvar cancer, genital warts, respiratory papillomatosis) assessed anticipated regret. Participants rated how much they agree with the statement: "Imagine that you got an HPV infection that could lead to cervical cancer, but the HPV vaccine might have prevented it. How much would you regret that you did not get the HPV vaccine?" Participants will respond on a 4-point scale ranging from not at all [0] to a great deal [3]. A mean score was calculated with higher scores indicating higher perceived anticipated regret. Internal consistency among this study's sample was excellent ($\alpha = .98$).

2.5 Plan of Analysis

All data analyses were conducted using IBM® SPSS® (Statistical Package for Social Sciences) Statistics version 22.0.0.0 (IBM Corp, 2013) and Mplus version 7 (Muthén & Muthén, 1998-2012). Data were screened to assure that assumptions of normality and linearity were met. Evidence of skewness and kurtosis was evaluated following Weston and Gore's (2006) guidelines of absolute values greater than 3.0 (skew index) and 10.0 (kurtosis index) indicating potentially problematic distributions. Bivariate correlations examined whether key variables were associated in the expected directions. The first part of the model—hypothesis P1H1—was tested by three steps next described. First, a series of exploratory factor analyses (EFA) using Maximum-likelihood (ML) estimation was performed to examine the factor structure of sexual self-schema. As modeled, a two-dimension theorization (i.e., positive and negative) of sexual self-schema overlays Snell's (1994) multi-faceted conceptualization. Second, a confirmatory factor analysis (CFA) was used to test the overall measurement model of the two latent constructs (i.e., positive sexual self-schema, negative sexual self-schema). Third, structural equation modeling (SEM) using maximum-likelihood (ML) estimation was used to test the structural model of sexual risk behavior, including its direct effects (e.g., negative sexual self-schema) and its indirect effects (i.e., the role that negative sexual self-schema plays in the relationship between body objectification and sexual risk behaviors).

To approach the full model, linear regression analyses were used to determine which, if any, potentially confounding variables (e.g., anticipated regret, HPV-related knowledge, age, relationship status) should be considered for inclusion as statistical

controls in a full model for HPV vaccination. Statistical controls help determine whether the variables of interest influence HPV vaccination intentions or uptake above and beyond the contributions of known factors. Then a series of structural models for HPV vaccination intention were tested and compared using ML estimation. Mplus was used to evaluate how well the structure implied by the hypothesized models was represented by the variances and covariances among the observed variables. The specific path estimate linking sexual risk behavior to perceived vulnerability (hypothesis P2H1), various direct effects (e.g., physician communication on HPV vaccination intent [hypothesis P2H2]) and indirect effects (e.g., the role that sexual self-schema, sexual risk behaviors, and perceived vulnerability have in the relationship between inauthenticity in relationships and intent to vaccinate against HPV) were evaluated by this procedure. Planned models for testing included a main effects model (hypothesis P2H3) and three models each with a different 3-way interaction (hypotheses P2H3, P2H4, and P2H5). The original model reflecting all original hypotheses and pathways is shown by Figure 1.

In order to identify appropriate fit of the models to the sample data and in an effort to determine practical and substantive meaning of the hypothesized model, multiple fit indices were evaluated: the Root Mean Square Error of Approximation and its associated confidence interval (RMSEA; Marsh, Balla, & Hau, 1996), the comparative fit index (CFI; Bentler, 1990), the standardized root mean squared residual (SRMR; Hu & Bentler, 1999), and the Tucker-Lewis Index (TLI; Tucker & Lewis, 1973). Although still reported out of convention, the chi-square statistic (χ^2) was not considered, as it is overly sensitive to sample size and multivariate normality, leading almost all models with samples over 200 to be significant (an indicator of bad model fit). Guidelines for

determining and reporting model fit followed recommendations in the literature (Hooper, Couglan, & Mullen, 2008; Hu & Bentler, 1999; Kline, 2005).

CHAPTER 3: RESULTS

3.1 Preliminary Analyses

A total of 286 participated in this study. Nine responses were excluded from analyses because participants attempted to participate two (n = 7) or three (n = 1) times. For the seven participants completing the measures multiple times, the most complete set was retained. One participant gave data during two semesters, in which case the earliest response was retained. Multiple responses occurred only in the early stages of data collection, before automatic controls were introduced preventing users from repeat survey access. Other participants (n = 16) were dropped due to incomplete data for key variables of interest; it is unknown whether this missing data were due to voluntarily exiting the survey or if difficulties interfacing with the website (e.g., screen froze up, abruptly closed, timed out) were experienced. In order to investigate whether or not there were differences between the information contained in the duplicate cases, dropped cases, and retained cases, one-way ANOVA analyses were conducted and revealed no significant differences (F(2, 281) = 1.02, p = .36) in intention to vaccinate. Similarly, there were no significant differences in age (F(2, 282) = .22, p = .80), race/ethnicity (F(2, 282) = .53, p = .59), academic class (F(2, 282) = .84, p = .43), dating status (F(2, 282) = 1.03, p = .34), relationship status (F(2, 282) = .38, p = .36), or marital status (F(2, 282) = .44, p = .65). An examination of skewness and kurtosis revealed that mean perceived severity of HPV was non-normal across both indices of distribution. The distribution of

perceived severity was negatively skewed (most values right of the mean) and leptokurtic (high peak), meaning that the bulk of participants endorsed very high levels of mean perceived severity. Logarithmic transformation (e.g., $\log_{10}X$) and inverse functions (e.g., 1/X) and cubing methods all failed to correct for normality, as verified by z-testing (e.g., z-value = skew value/SEskewness) with a critical absolute z value over 3.29 ($50<n<300$) corresponding to .05 alpha level (West, Finch, & Curran, 1995). The largest-extreme-value distribution of mean perceived severity is arguably non-normal by nature, since most rational individuals would rate having negative health outcomes like cervical cancer as having quite a large impact on their lives. The decision was made to keep perceived severity in raw form, given that planned analyses included using the normality-based ML parameter estimates with bootstrapping, which are usually quite robust under conditions of non-normality in Mplus (B. O. Muthen, personal communication, May 16, 2008).

A total of 261 unique participant responses were retained for data analyses. Detailed participant sociodemographic and behavioral characteristics are contained in Table 1. Participants' mean age was approximately 20 years (*SD* = 2.05), with a majority in their first two years of college (63.22%). The majority of the participants were White (non-Hispanic) (60.92%), not married (93.87%), dating only one person (68.58%), and viewing themselves as being in a relationship (72.03%). The majority (90.04%) also reported having had exclusively male sexual partners in the past six months. Most participants reported having had oral, anal, or vaginal sex with just one male partner in the previous six months (59.39%).

Approximately one-third of participants reported never having a gynecological wellness exam. Of women having ever having a gynecological exam (*n* =175), 74.86%

had a gynecological exam within the past year. Approximately half of all participants had never received a Pap smear. The majority of women (76.30%) ever having received a Pap smear (n = 135) had it performed less than one year ago. Sexually transmitted disease testing was last done between one to two years prior to completion of the survey for most women (n = 115) ever tested (75.16%). Just over two-fifths (41.38%, n=108) of the sample population indicated never having been tested for a sexually transmitted disease. Current use of hormonal methods of birth control (e.g., pills, implants, patches, shots, sponges, rings) was reported by just over half of participants (52.49%, n=137). Barrier method protection was not used by the majority of participants reporting on their last instance of oral sex (96.75%, n =246), vaginal sex (59.34%, n = 241), and anal sex (92.59%, n = 54). Descriptive statistics, number of items per variable, and response ranges for key variables of interest are presented in Table 2.

University women engaged in an average of nearly nine separate sexual risk behaviors (M=8.50, SD= 3.67) at least once over the past six months: three activities with uncommitted partners (M=2.97, SD = 2.16), three risky vaginal or oral sexual activities (M=3.18, SD=1.30), two behaviors involving impulsivity (M=1.91, SD=1.31), and less than one risky anal sex act (M=0.44, SD=.79). Examples of commonly endorsed risk behaviors included using alcohol or drugs before or during sex (66.28%), giving fellatio without a condom (82.38%), and giving or receiving cunnilingus without a dental dam (64.75%). Detailed frequencies for at least one occurrence of various sexual risk behaviors are given in Table 3. Participants overall reported that items relating to positive and negative sexual self-schema were generally “somewhat characteristic” (the middle value) and “slightly characteristic” of themselves, respectively. The average participant

"neither agreed nor disagreed" (a middle value) that they were inauthentic in their relationships and "slightly disagreed" that they engaged in body objectification. It is important to note that a quarter of women (24.52%) reported some degree of body objectification and 28.00% reported some degree of inauthenticity in relationships.

Sixty-two percent of all participants had no intention of getting vaccinated in the near future. Among the remaining 100 women, 58 said they were only "slightly likely" to get vaccinated. Moderate vaccination likelihood was endorsed by 24 women; ten and eight women responded that they were "very" and "completely" likely to get the HPV vaccine. On average, women "neither agreed nor disagreed" that the vaccine was safe and felt that the vaccination was "moderately" effective, both middle values. More precisely, participants viewed the vaccination series as moderately effective (45.21%, n=118), very effective (30.65%, n=80), and completely effective (6.90%, n=18) in preventing cervical cancer. Similar proportions were reported for effectiveness in the prevention of genital warts: moderately effective (43.68%, n=114), very effective (31.80%, n=83), and completely effective (6.13%, n=16). Although there were clear majorities in rating proportions for short-term problems (41.38% slightly disagreed, n=108) and lasting health problems (40.23% neither agreed nor disagreed, n=105), young women were divided when it came to the overall safety of the vaccine. In fact, 41.76% (n=109) of respondents agreed to some extent with the statement: "I think the HPV vaccine is unsafe". Almost one-third of women "neither agreed nor disagreed" to the overall statement of safety. Only just over a quarter of participants indicated any extent of disagreement (26.05%, n=68) to this same item, which represents some degree of perceived vaccine safety. HPV and its related health consequences were generally

considered severe, with a majority of participants indicating these diseases and conditions would affect their lives "quite a lot". Mean health consequences of HPV were rated "moderately" or "quite a lot" by 96.17% (n=251) of the sample. Vaginal or vulvar cancer was perceived most severe (M = 3.84, SD = 0.47) and genital warts were reported to be the least severe (M = 3.71, SD = 0.59) but there was extremely little variability in ratings of severity across the health conditions. On average, participants felt that important others in their lives would only "somewhat agree" with HPV vaccination and felt completely confident that they could successfully obtain the vaccine series within the next six months. The majority of participants felt that friends (69.40%), family (58.60%), hypothetical (or actual) significant others (64.70%), other students at the same institution (52.40%), and healthcare providers (70.80%, N=227) would all agree to some extent that getting the HPV vaccination was a good idea. Participants were ambivalent about how those in their spiritual/religious communities would feel about HPV vaccination, with the majority indicating that these communities would "neither agree nor disagree" with vaccination (31.00%, N=198). Only 32.9% of those responding felt that their spiritual/religious communities would agree to any extent with HPV vaccination.

Perceived vulnerability was quite low in this sample, as participants on average endorsed that likelihood of future infection was "unlikely." In terms of absolute risk, the majority (36.40%) felt that they were highly unlikely to ever contract HPV in the future. When comparing their risk level to others of the same age, the majority (39.80%) reported that they were "highly unlikely" to get infected in the future. A third affective heuristic assessed perceived risk of infection in the absence of vaccination. An outstanding 80.80% of participants disagreed to some extent with the statement: "With no

vaccination, I would feel that I'm going to get HPV in the future". Healthcare provider communication or recommendations regarding HPV vaccination in the last six months was lacking, with participants generally indicating the absence of these interchanges. As no option (i.e., not applicable) was given for those who had not seen a physician in the past six months, interpretation of negative responses should be made with caution. Fifty-one percent of women shared that they had an HPV vaccination (e.g., Gardasil®, Cervarix®) discussed by a provider, and 44.40% recalled having a vaccination specifically recommended. Despite overall weak vaccination intentions and nearly complete lack of perceived vulnerability present in the sample, the average participant anticipated some regret upon future HPV or HPV-related health condition in the absence of vaccination. Overall understanding about HPV, routes and timelines of transmission, detection methods, and negative health sequelae was quite poor, with participants scoring an average of 63% (10/16 items) on an index of knowledge. At an item-level, the majority of participants answered all but four of the knowledge items correctly. Four-fifths of women mistakenly thought that genital warts were caused by the Herpes virus and nearly two-thirds thought that a negative HPV test indicated that they did not have HPV when in fact the tests have differing sensitivities to varying numbers of HPV types and false-negatives may occur. Three-fourths of the participants were not aware that there is no clinical test to detect HPV infection for men and almost four-fifths did not know that without re-exposure, a healthy immune system can frequently clear HPV infection from the body. Item-level descriptive statistics for the knowledge scale, including percentages, are provided in Table 4.

3.2 Exploratory Factor Analyses

The first EFA (ML) for the complete sexual self-schema item correlation matrix presented a six-factor structure which could explain 57.36% of the variance. A Scree plot suggested the retention of two factors with eigenvalues of 10.60 and 5.50. The varimax and oblique rotated solutions were similar. In a second run, two factors (i.e., positive, negative) were retained, which could explain 45.52% of the variance. Eigenvalues for the two factors were 10.60 (Positive) and 5.45 (Negative).

3.3 Confirmatory Factor Analyses

Factor loadings were examined for low internal consistency (i.e., $r < .60$); consequently, items 1, 5, 7, 14, 17, 26, 28, and 33 were dropped from the measure of sexual self-schema. The newly modified two-dimension self-schema scale was subjected to a CFA (ML) following the guidelines set forth by Kline (2005). Positive and negative sexual self-schema dimensions were assessed by four and three parcels, respectively, where each parcel represented the items constituting that dimension (Little, Cunningham, Shahar, & Widaman, 2002). As such, parcels coincided with subscales from the MSSCQ (Snell, 1995), previous factor analyses of the MSSCQ (Ramezani, 2013; Ziaei, Khoei, Salehi, & Farajzadegan, 2013), and the theoretical discussions of Anderson and Cyranowski (1994). Parceling has the benefit of reducing the number of parameters in the structural model, increasing reliability and likelihood of normal distribution, and improving model fit (Kelloway, 2015). The CFA model for sexual self-concept provided inadequate fit to the data ($\chi^2 = 121.45$, df = 13, $p < .001$; RMSEA = .18, 90% CI [.15-.21]; SRMR = .09; CFI = .89; TLI = .83), which required revisions.

CFA revisions. Examining the literature leading up to the creation of the MSSCQ, sexual anxiety and the factor sexual depression were highly correlated ($r = .75$, $p < .001$) (Snell, Fisher, & Walters, 2001). Given that these two factors may be tapping into the same information, they were combined and renamed "sexual stress-depression." Negative items 6, 8, 13, 15, 20, 22, 29, and 34 were now specified to load on the sexual stress-depression factor and items 12 and 19 were specified to load on the fear factor. Positive items 2, 9, 16, 23, and 30 were specified to load on the sexual self-efficacy factor, items 3, 24, and 31 were specified to load on the sexual assertiveness factor, items 4, 11, 18, 25, and 32 were specified to load on the sexual esteem factor. The sole remaining internal sexual control item (35), "My sexuality is something that I myself am in charge of," was reassigned to load on the sexual efficacy factor. The revised CFA model for sexual self-concept with five parcels (Figure 2) provided an adequate fit, according to indices of absolute ($\chi^2 = 16.90$, df = 4, $p < .01$; RMSEA = .11, 90% CI [.06, .17]; SRMR = .03) and incremental fit (CFI = .98; TLI = .95). The normed chi-square attempts to adjust for sample size; here, the ratio of χ^2/df = 4.22 indicates good fit (Schumacker & Lomax, 2004). Standardized factor loadings ranged from .79 to .97 ($M = .84$). The proportion of variance accounted for by each item in its respective factor ranged from .62 to .94 ($M = .70$). Descriptive statistics and standardized path coefficients are reported in Table 5. The revised correlation matrix for sexual self-schema dimensions and updated internal reliability scores ($\Delta\alpha_{\text{Positive Total}} = .01$; $\Delta\alpha_{\text{Negative Total}} = .01$) are presented in Table 6.

3.4 Correlational Analyses

Bivariate correlational analyses were employed to identify if significant relationships between variables of interest were in expected directions. A first set of

correlations was performed at the outset, while the second was performed after the CFA for sexual self-schema was conducted (Table 7). Subsequent to CFA, results of the correlational analyses were consistent with the expected relationships, with the following exceptions: perceived severity was not significantly positively associated with HPV vaccination intention, as was predicted (r = .06, p = .37), and positive sexual self-schema had no relationship with sexual risk behavior when a significant negative association was anticipated (r = .05, p = .46). Here forward, all discussion reflects the final set of correlational analyses (Table 7).

Intent to vaccinate. As expected (P2H2), those women with greater intentions to receive the HPV vaccination in the next six months perceived themselves as more vulnerable to infection, sensed fewer barriers to obtaining the vaccination series, felt that important others approved of vaccination, and believed HPV vaccination to be safer and more efficacious. Beyond expected associations with the HBP and TPB factors above, women with higher levels of vaccination intention tended to have a history of physician communications about HPV and higher levels of anticipated regret if not vaccinated. Age was the only sociodemographic characteristic or sexual health history variable directly associated with HPV vaccination intention, in that younger women expressed greater intentions to acquire the vaccination series in the next six months. Women with a stronger endorsement of body objectification were significantly more likely to report the intent to vaccinate. Two unforeseen relationships were that women endorsing aspects of positive and negative sexual self-schema were less likely and more likely to vaccinate, respectively.

Femininity ideology and sexual self-schema. Participants who reported higher levels of body objectification and inauthenticity in relationships were more likely to endorse having a negative sexual self-schema and were less likely to endorse aspects of positive sexual self-schemas. Moreover, those women with a significantly higher body objectification as well as those strongly endorsing a negative sexual self-schema participated in a higher frequency of sexual risk behaviors over the past six months. Women who endorsed higher levels of positive sexual self-schema viewed HPV and its health-related consequences as more severe, perceived fewer barriers to vaccination, and had higher levels of knowledge surrounding HPV. Despite endorsing these tendencies (all significantly associated with vaccination intention), women with positive sexual self-schema still reported lower vaccination intentions than women with negative sexual self-schema. In contrast, those participants who endorsed higher levels of negative sexual self-schema perceived HPV and its health-related sequelae as less severe and perceived more barriers to vaccination. The polarity in vaccination intention is also seen from the reverse; rather, women with stronger endorsements of negative sexual self-schema report stronger vaccination intentions, notwithstanding perceptions of severity and barriers.

HBM and TPB variables. College women who felt important others would support HPV vaccination felt more vulnerable to HPV acquisition, expressed fewer barriers to vaccination, thought that the vaccination was safer and more effective, rated the health consequences of HPV as more severe, and anticipated stronger feelings of regret if not vaccinated and infected down the road. Vaccine safety and efficacy was also significantly correlated with greater perceived vulnerability, more severe consequences of HPV infection, and higher anticipatory regret surrounding lack of vaccination. Higher

perceptions of barriers to vaccination were related to feeling less susceptible to infection and viewing the resulting effects of HPV infection on one's life as less severe. Finally, greater knowledge about HPV was correlated with a greater indication of future regret if not vaccinated and then developing an HPV-related health condition.

3.5 Analysis of Control Variables

Anticipated regret, HPV-related knowledge, age, relationship status, and seven sexual-history items were probed as potential control variables in a multiple regression analysis. When HPV vaccination intention was simultaneously regressed on control variables only, the overall model was not significant ($F(11, 249) = 1.68$, $p = .08$) (Table 8). Anticipated regret was the only significant predictor of HPV vaccination intention ($\beta = .18$, 95% CI [.05, .30], $p < .01$), accounting for 3.24 out of the 6.90% explained variance (after statistically controlling for differences due to the remaining predictor variables). Age was a marginal predictor for HPV vaccination, with younger college women having increased vaccination intentions ($\beta = -.06$, 95% CI [-.14, .01], $p = .09$).

3.6 Structural Equation Modeling

Sexual Risk Behavior. The structural model that was tested used the following variables in the explanation of sexual risk behavior: inauthenticity in relationships (AFIS IR), body objectification (AFIS BO), positive sexual self-schema (MSSCQ Positive), negative sexual self-schema (MSSCQ Negative), and sexual risk behaviors (SRS total) (see Figure 3). The latent constructs (i.e., MSSCQ Positive, MSSCQ Negative) were represented by the measurement model, supported by CFA findings. This model met specification requirements and provided excellent absolute ($\chi_2 = 37.43$, df = 15, $p = .01$; RMSEA = .08, 90% CI [.05, .11]; SRMR = .04) and incremental (CFI = .97; TLI = .94)

fit to the data. The identified model for sexual risk behavior is depicted in Figure 4, with standardized path coefficients (some error measurements were excluded from the figure for clarity). The proportions of variance explained by the predictors are provided in Table 9 in the form of squared multiple correlations. The standardized direct effects for sexual risk behavior were summed, indicating that 55% of the variance in sexual risk behaviors is accounted for by the model (St. = .55) (Kline, 2005). The direct and indirect pathway effects decomposition is presented in Table 10. All modeled direct effects on sexual risk behavior were significant. A review of the effects decomposition reveals that the significant indirect relationship between inauthenticity in relationships and participation in sexual risk behaviors seems to operate via negative sexual self-schema. Similarly, a marginally significant indirect relationship between body objectification and sexual risk behaviors is mediated by negative sexual self-schema.

HPV vaccination intention. It was hypothesized that perceived norms and safety and effectiveness would each significantly moderate the relationships between each of the HBM and TPB variables (i.e., perceived vulnerability, perceived severity, perceived barriers) and HPV vaccination intentions (see P2H3). Since perceived severity had absolutely no relationship with HPV vaccination intention, it was dropped from the model as a predictor or as potential variable in an interaction term. Next, interaction terms were created to represent five two-way interactions (i.e., barriers X norms [BxN], barriers X safety and effectiveness [BxS], norms X safety and effectiveness [NxS], vulnerability X norms [VxN], vulnerability X safety and effectiveness [VxS]), and two three-way interactions (i.e., barriers X norms X safety and effectiveness [BNS], vulnerability X norms X safety and effectiveness [VNS]). In order to test the remaining

hypotheses, a series of models increasing in complexity were compared. Model 1 was a main-effects model that included the controls (i.e., anticipated regret, age) and predictor variables only. Model 2 was a moderation model, with four two-way interactions (i.e., VxN, VxS, BxN, BxS) in addition to the existing predictors and controls. Model 3 was another moderation model with a single three-way interaction (i.e., BNS), three two-way interactions (i.e., VxN, VxS, NxS), and all predictors and controls. Model 4 was a moderation model with an alternate three-way interaction (i.e., VNS), three two-way interactions (i.e., BxN, BxS, NxS), and all predictors and controls. The Akaike Information Criterion (AIC) was used to examine models for fit and parsimony; lower AIC values suggest better fit and parsimony (Schumacker & Lomax, 2004).

The main-effects model (Model 1) results indicated that stronger perceived norms, an increased sense of vulnerability, higher perceptions of vaccine safety and effectiveness, more physician communication, and being younger were all associated with endorsing stronger intentions to vaccinate over the subsequent six months. Neither perceived barriers nor one of the control variables, anticipated regret, was associated with intentions to obtain the HPV vaccination in the next six months. Model 1 provided an adequate but not excellent fit to the data (χ_2 =151.32, df = 84, $p < .001$; RMSEA = .06, 90% CI [.04, .07]; SRMR = .07; CFI = .92; TLI = .92).

For Model 2, the interaction between perceived vulnerability and vaccine safety and effectiveness was marginally significant ($p = .06$), such that for women across all levels of vaccination safety and effectiveness, vaccination intention increased as perceived vulnerability increased (Figure 5). More precisely, there was an ordinal synergistic interaction effect in which women with the highest perceived safety and

effectiveness were most likely to endorse vaccination intentions as perceived vulnerability increased. The correlation between vaccination intention and vulnerability for women with low, moderate, and high levels of perceived vaccination safety and effectiveness is .18, .21, and .24, respectively. Model 2 resulted in only a borderline adequate fit to the data (χ_2 =240.22, df = 120, $p < .001$; RMSEA = .06, 90% CI [.05, .07]; SRMR = .07; CFI = .87; TLI = .87).

Hypothesis P2H5 was not tested, given that perceived severity was not related to HPV vaccination. Neither of the remaining hypothesized three-way interactions (Hypotheses P2H3, P2H4) were significant in Models 3, 4, (fit indices are presented in Table 11).

3.7 Structural Model Revisions

Revisions to Model 1 were considered using standardized residuals and the modification indices. Non-significant parameter estimates of predictors were deleted (i.e., critical ratio (c.r.) < ±1.96) (Shumacker & Lomax, 2004) and excluded from the final model. Perceived barriers ($p = .13$) and anticipated regret ($p = .17$) were dropped based on this criteria. None of the modification indices made theoretical sense and suggestions were not followed (e.g., adding a pathway whereby perceived vulnerability is regressed on anticipated regret, a control variable).

The revised main-effects Model 1 provided a similarly adequate fit to the data (χ_2 =126.75, df = 66, $p < .001$; RMSEA = .06, 90% CI [.04, .08]; SRMR = .06; CFI = .93; TLI = .92), as did the original Model 1, but with a reduced chi-square value and degrees of freedom. A comparison of the AIC model fit indices suggested that the most parsimonious best fitting model is the revised Model 1 (Table 12). The improved Model

1 is depicted in Figure 6 with standardized path coefficients (some error measurements were excluded from the figure for clarity). The sum of the standardized direct ($_{norms}$St. = .273, $p < .001$; $_{vulnerability}$St. = .146, $p < .01$; $_{safety/effectiveness}$St. = .223, $p < .001$; $_{communication}$St. = .147, $p < .01$; ageSt. = -.13, $p < .05$) and total indirect effects ($_{IR \rightarrow vaccination\ intention}$ St. = .004, $p = .08$; $_{BO \rightarrow vaccination\ intent}$St. = .003, $p = .13$) indicates that 66.30% of the variance in intention to vaccination against HPV in the next six months is accounted for by the model, controlling for the effect of age. Within this model, negative sexual self-schema appears to drive the indirect relationship between femininity ideologies and HPV vaccination, as both specific indirect pathways through negative sexual self-schema were marginally significant ($_{IR \rightarrow NEG \rightarrow SRB \rightarrow VUL \rightarrow VAC.INTENT}$St. = .005, $p = .06$; $_{BO \rightarrow NEG \rightarrow SRB \rightarrow VUL \rightarrow VAC.INTENT}$St. = .004, $p = .08$). Neither specific indirect pathway of femininity ideologies through positive sexual self-schema to vaccination intention was significant. Inspection of the lesser specific indirect pathways revealed that the indirect pathways from negative sexual self-schema (via sexual risk behavior and perceived vulnerability) (St. = .02, $p < .05$) and from sexual risk behaviors (via perceived vulnerability) (St. = .01, $p < .05$) to vaccine intent were also significant. The specific indirect pathway from positive sexual self-schema (via sexual risk behavior and perceived vulnerability) to vaccination intention was marginally significant (St. = .01, $p = .09$). The sum of the indirect pathways from femininity ideologies to sexual risk behaviors were also significant, as was expected based on previous mediation model testing ($_{IR \rightarrow NEG/POS \rightarrow SRB}$St. = .08, $p < .01$; $_{BO \rightarrow NEG/POS \rightarrow SRB}$. = .06, $p = .05$. Pathways via negative sexual self-schema drove the significance of these indirect sums.

3.8 Post-hoc Exploratory Analyses

Despite the fact that the revised Model 1 provided the best fit, it did not suggest absolute good fit to the data. In order to ascertain whether or not an even more parsimonious model would better fit the data, a greatly reduced main-effects model was tested with only femininity ideologies, sexual self-schemas, sexual risk behaviors, perceived vulnerability and physician recommendation as predictor variables explaining HPV vaccination intention. Age was retained as a control variable for continuity with previous models. The exploratory model performed well in terms of fit indices (χ_2 =71.13, df = 38, $p < .01$; RMSEA = .06, 90% CI [.04, .08]; SRMR = .05; CFI = .96; TLI = .95). The sum of standardized direct effects ($_{VUL}$St. = .23, $p < .001$; $_{PROVIDER}$St. = .15, $p < .01$; $_{AGE}$St. = -.102, $p = .09$) and total indirect effects ($_{IR\rightarrow VAC.INTENT}$St. = .006, $p < .04$; $_{BO\rightarrow VAC.INTENT}$St = .005, $p = .09$) reflects that only 28.70% of the variance in intention to receive the HPV vaccination in the upcoming six months was accounted for by the model, considering the impact of age. The overall explanatory value of the exploratory model was considerably less than the revised Model 1, which accounted for 66.30% of variance in intentions. With this in mind, the revised Model 1 appears to be the most parsimonious and best performing model.

CHAPTER 4: DISCUSSION

This study examined a hypothesized model of HPV vaccination intention that complemented existing validated constructs from health behavior theory (i.e., HBM, TPB) with femininity ideologies and sexual self-schema. To my knowledge this is the first study that introduces a feminist lens in this manner to the area of HPV vaccination decision-making. Specifically, this project investigated how factors reflecting differential systems of power, privilege, and gendered sexual scripts operate together to indirectly influence HPV vaccination intention. By appreciating the broader sociocultural context and antecedents of HPV vaccination decision-making, we can hope to discern novel opportunities for individual-level intervention and vaccination campaign efforts.

4.1 Descriptive Themes

Prior to discussing the importance and meaning of the results in light of the research questions explored, some interesting descriptive information about the sexual experiences and sexual health history of the participants is underscored. An alarming one-third of participants had never had a gynecological wellness exam, and half had never received a Pap smear, in spite of recommendations that a first visit to an obstetrician-gynecologist for screening and preventive services and guidance occur between the ages of 13 and 15 and that annual pelvic exams are recommended for patients aged 21 years and older (ACOG, 2012). Adding to a picture of inadequate preventative personal measures, 41% of women reported they had never been tested for

any STIs, and nearly all women reported that they had not used barrier-method protection during their last instance of oral (97%) and anal sex (93%). Only 60% of women recalled using barrier-method protection during last instance of vaginal sex. Besides failing to practice preventative sexual health behaviors, college women strongly refuted that they were at any risk for future HPV infection. Mean perceived vulnerability scores indicate that, overall, 87.40% of women felt unlikely that they would contract HPV in the future. Together, this information portrays a college environment with the propensity for the unchecked transmission of HPVs (and other STIs), setting the stage for immediate (e.g., genital warts, cervical lesions) and long-term (e.g., cervical cancer) negative health consequences.

The viability of the scenario described above is made even more alarming upon considering that the majority of women surveyed (n = 161) had no intention of getting vaccinated in the next six months. What then lies behind this apparent lack of intentionality among college women, especially given the majority viewed it as at least moderately effective and moderately safe? Nearly half (48.45%, n = 78) of women reporting zero intention to vaccinate had received a gynecological examination within the past year. The possibility exists that these women had no intention to receive the vaccination because they had recently been seen by at least one provider and were not due for a check-up during the upcoming six months. As previously discussed, HPV vaccine initiation and 3-dose completion has been linked to a host of barriers (e.g., insufficient or absence of insurance coverage, lack of a regular medical home, lack of transportation) (Holman et al., 2014). Among those with no intention to vaccinate in our sample, 68.32% (n = 110) reported that they were either somewhat confident or

completely confident that they could get all three doses of the vaccination in the next six months if they wished. While not within the purview of this investigation, unpacking the specifics behind our sample's lack of intention is worth pursuing in order to more fully understand HPV vaccine decision-making, particularly teasing apart perceived barriers from outright opposition. Largely in response to policies over mandating childhood vaccines, the numbers of "anti-vaccers" seeking personal exemptions (and religious exemptions in states where religion is loosely defined as any personal system of beliefs or philosophy of life) for youth have increased (Eisenstein, 2014). Both academic and medical literatures, in addition to social media campaigns, have surfaced wherein the benefits and risks inherent in various immunization programs are disputed (Diekema, 2014; Eberth, Kline, Moskowitz, Montealegre, & Scheurer, 2014). Reasons for personal exemptions range from distrust of the government, organized medicine, and the pharmaceutical industry to concerns about the harms caused by injecting unnatural substances into young people.

4.2 A Model of Sexual Risk Behavior

Testing for Hypothesis P1H1 successfully identified a model of sexual risk behavior that was partially explained by femininity ideologies (i.e., body objectification, inauthenticity in relationships) and sexual self-schema (i.e., positive, negative). Results indicate that the internalization of socialized gender expectations in relation to one's own physicality and to others, in conjunction with dynamic cognitive appraisals of one's sexual self, function collectively to inform the understanding of sexual risk behavior in young women. The direct effects of positive and negative sexual self-schema on sexual risk behaviors were significant, although the direction of the relationship between

positive sexual self-schema was opposite of what was hypothesized. One place to search for clues as to why positive sexual schema behaved against expectation might be gleamed from research such as Seal, Minichiello, and Omodei's (1997), study which found positive views of sexual relationships were associated with decreased sexual risk-taking with casual partners but increased sexual risk-taking for regular partners. Their result implied that relationship context (e.g., whether in a committed relationship or not in a committed relationship) might drive associations between sexual self-schema and sexual risk behaviors. Even though relationship status was deemed unnecessary for use as a control factor during full model testing, some clues for how this variable might be at play were discovered. In our sample, being in a committed relationship was inversely related to number of sexual risk acts (which is distinguished from frequency) women engaged in. Being in a relationship was related to positive sexual self-schema and not being in a relationship was related to negative sexual self-schema.

A review of the effects decomposition for the model of sexual risk behavior also revealed that the significant specific indirect effect of inauthenticity in relationships on participation in sexual risk behaviors seems to operate via negative sexual self-schema. Similarly, the significant specific indirect effect of body objectification on sexual risk behaviors is partially mediated by negative sexual self-schema. Neither specific indirect pathway from femininity ideologies to sexual risk behavior via positive sexual self-schema was significant. So then, the extent to which young women endorse socially prescribed dictates of appropriate behavior and affect—structured by conventional gender roles, stereotypical beliefs, immorality and impurity discourses—consequently influences

perceptions of their own sexuality, thus shaping the very nature of their lived experiences.

For the most part, women appeared to moderately endorse traditional ideologies of femininity. One-third of participants had body objectification scores above the midpoint. Nearly half of women expressed inauthenticity in their interpersonal relationships, as was reflected by mean scores above the midpoint. Mean and standard deviations for BO and IR were in line with those of previously reported studies (Hypes, 2010; Tolman et al., 2006). Given that these ideologies are ensconced in a long history of gendered social norms and sexual scripts, they persist as part of western culture and may serve some women well who navigate the politics and expectations within the institutions of their communities or family structures. At the same time, findings from this study imply that gendered expectations alter views of sexual self-hood in ways that influence sexual risk behavior and indirectly affect decisions related to a protective sexual health behavior—HPV vaccination.

The identified model for SRB implies that negative experiences of sexuality and negative associations with sexual activities have more influence in linking femininity ideologies to actual sexual risk behaviors than do positive experiences and associations. This finding underscores the impact of negative sexual self-schema on young women's participation in sexual risk behaviors, specifically one shaped by negative emotions or fear. Suppressing authenticity, feeling disempowered, conforming to sexual scripts, internalizing emphasized discourses of femininity, worth, beauty, and desire, and dissociating from ones physicality all provide opportunities for a negative sexual self-schema to take root. Women strongly endorsing femininity ideologies and negative

sexual self-schema were the most likely to engage in sexual risk behaviors. Beyond the potential consequences of unintended pregnancy and threats to one's well-being (e.g., assault, coercion), sexual risk behaviors place college women at increased risk of STIs, including high-risk types of HPV.

4.3 Bridging Lived Gendered Experience and Health Behavior Change in a Model of HPV Vaccination Intention

The expectation at this juncture, based on what is known from the HBM and TPB, was that increasing one's exposure to risk by engaging in sexual risk behaviors would spark some recognition of vulnerability to HPV infection. Indeed, among this study's sample, higher sexual risk behavior was significantly correlated with perceptions of vulnerability. The connection between sexual risk behavior and a subjective evaluation of personal risk for contracting HPV is pivotal in linking distal socio-cultural gendered expectations and experiences with more proximal HBM and TPB variables that shape decisions about HPV vaccination. As is the case, individuals are often poor estimators of their own risk. As an illustration, one study found that only 44.10% of urban female adolescents accurately estimated their risk for HIV/AIDS (Kershaw, Ethier, Niccolai, Lewis, & Ickovics, 2003). Accurate vulnerability judgments have many theorized determinants, including level of risk knowledge (Gerrard, Gibbons, & Bushman, 1996), the preservation of psychological well-being (Brown, Outlaw, & Simpson, 2000; Slovik, Finucane, Peters, & MacGregor, 2004), and specific relationship context between partners (Crosby et al., 2000; Reisen & Poppen, 1999). Aiken, Gerend, Jackson, and Randy, (2001) review the full gamut of determinants while giving thorough consideration

to the unique attributes of a specific health threat, cognitive heuristics, as well as personality and individual-level characteristics.

Hypothesis P2H1 stated that sexual risk behaviors were expected to be directly related to higher levels of perceived vulnerability to HPV infection, thus bridging P1 and P2 of the full model together. In testing P2H1, a final model of HPV vaccination intention (the revised main effects model) was identified, explaining 66.30% of the variance in HPV vaccination intentions among the college women surveyed for this study, controlling for the effect of age. Within this model, sexual risk behavior was a significant predictor of perceived vulnerability. The final identified model included body objectification, inauthenticity in relationships, positive and negative sexual self-schema, sexual risk behaviors, perceived vulnerability, healthcare provider communication, vaccine safety and effectiveness, and subjective norms, adjusting for the impact of age. This investigation affirmed that femininity ideologies and sexual self-schema, two novel contributions to matters of HPV preventative health, do in fact play an indirect role in the decision-making process surrounding HPV vaccination intentions. The indirect effects of femininity ideologies on HPV vaccination intention appeared to function chiefly through negative sexual-self schema (as opposed to operating through positive sexual self-schema or jointly with positive sexual self-schema).

At the outset, positive sexual self-schema was expected to decrease participation in sexual risk behavior. The positive path coefficient between these two variables may help explain why this construct operated poorly within the models considered. In the absence of a bivariate relationship between positive sexual self-schema and sexual risk behaviors, the significant relationship between negative sexual self-schema and sexual

risk behaviors is large enough to affect model indirect pathways. Moreover, positive sexual-self schema was negatively correlated with vaccination intentions while negative sexual self-schema was positively correlated with vaccination intentions. These bivariate relationships were counter to what was expected. It was thought that having increased sexual self-efficacy, esteem, assertiveness, and internal control of sexual matters would engender a sense of empowerment and the gumption necessary to consider (and hopefully act upon) preventative sexual health behaviors such as vaccination against HPVs. One possible explanation for this unsupported relationship is that the sense of agency, empowerment, and control that comprise a positive conceptualization of young women's sexual selves actually gives a false sense of security, thereby increasing participation in sexual risk behavior while buffering vulnerability and vaccination intentions. Women who feel they are in control of their sexual-self may simply underestimate their potential for future infection. This finding is in line with previous research showing that older adolescents and young adult women with positive sexual self-concepts have higher frequencies of sexual behaviors, a broader range of lifetime romantic and sexual behaviors, and more lifetime sexual partners (Andersen & Cyranowski, 1994; Breakwell & Millward, 1997; Buzwell & Rosenthal, 1996; Impett & Tolman, 2006; O'Sullivan, Meyer-Bahlbur, & McKeague, 2006).

Although the identified final model provided adequate fit to the data, highlighting instances of marginal significance may also meaningfully contribute to conversations about how these constructs relate to one another and how they function en masse to help explain vaccination intention. For instance, the overall indirect pathways of femininity ideologies (via negative sexual self-schema, sexual risk behavior, and vulnerability) to

vaccine intent were marginally significant. This finding suggests that body objectification and inauthenticity in relationship each play a role, albeit small, in the decision-making process surrounding HPV vaccination intentions. As another example, the lesser specific indirect pathway—that of positive sexual self-schema to HPV vaccination intent via sexual risk behavior and vulnerability—was also marginally significant. Despite a debatably limited performance of positive sexual self-schema, this finding supports the decision for its retention in the final model and warrants inclusion in future research endeavors of this nature.

Hypotheses P2H3, P2H4, and P2H5 each specified 3-way interactions where subjective norms and perceived vaccine safety and effectiveness moderated the relationship between perceived vulnerability and HPV vaccine intentions (b), perceived barriers for vaccination and HPV vaccine intentions (c), and subjective norms for vaccination and HPV vaccine intentions (d). None of the higher-order 3-way interactions were significant across any of the hypothesized models, but evidence was found to suggest at least one (Model 2) two-way interaction may be at play in HPV vaccination intentions among college women: safety and effectiveness X perceived vulnerability. Given these findings, vaccination intention may be maximized as a function of high safety and effectiveness perceptions and a high sense of personal vulnerability to future infection. This finding makes theoretical sense and may translate well for practical interventions to increase vaccination intentions at an individual level. For example, interventions might include exposing women to accurate statistics surrounding HPV vaccine adverse events in comparison to those reported for other established and mandated vaccination programs (e.g., IPV, DTaP, MMR). Interventions might also

include the dissemination of accurate HPV prevalence rates and risk factors/behaviors that exist for women, regardless of relationship context. It is cautioned that specific intervention procedures and content are beyond the scope of this study and insufficiently supported by these data alone.

Hypothesis P2H6 put forward that greater healthcare provider influence would be directly associated with greater HPV vaccination intention. The influence of healthcare professionals was supported at the bivariate correlational level and with significant direct effect pathways in both the best-fitting identified model (5.2), and in the identified exploratory model (4.3). Having a health care provider talk to women about HPV vaccines on the market and recommending that they receive the vaccination plays a significant role in women's intentions to do so over the next six months. The successful vaccination of young women against HPVs depends on the input of care providers, with some sources citing a 4- to 5-fold increase in likelihood for actual vaccination behavior when provided (Lau, Lin, & Flores, 2012; Ylitalo, Lee, & Mehta, 2013). A recent joint letter from leaders of the American Academy of Family Physicians (AAFP), the CDC, and other academic, clinical and research organizations emphasizes that all provider communication about vaccination must be both strong and firm, furthering the messages of vaccine safety, effectiveness, and importance (AAFP, 2015). NIS-Teen data from 2012 show 84% of adolescent girls not vaccinated for HPV received another vaccination during a healthcare visit; had a provider recommended the vaccination in combination with the other vaccine, national vaccination rates could be much higher (i.e., 91.3% of girls < 13 years with at least one dose) (Stokley et al., 2014).

4.4 The Big Picture

While the best-fitting identified model (5.2) indeed partially explained vaccination intention, the overall contributions of contemporary gender theory were less pronounced than anticipated. One clear strength of this investigation; however, is that the results imply existing HPV prevention messages and HPV vaccination promotion efforts are not working for this population of sexually active college women. A systematic review of educational HPV vaccination intervention efforts among college populations (in addition to those directed at parents or adolescents) yielded unconvincing evidence for specific implementation recommendations (Fu, Bonhomme, Cooper, Joseph, & Zimet, 2014). How best to frame message about vaccination (e.g., what is gained from vaccination versus what may be lost in the absence of vaccination), how to deliver the message (e.g., narrative, informative, graphic), and what works best as the content's focal point (e.g., cervical cancer, HPV, genital warts) are largely still being hammered out.

Efforts for curbing HPV infection and increasing vaccination coverage among college women are made particularly difficult given the unique set of developmental, environmental, and interpersonal circumstances characteristic of traditional college populations. In terms of development, college students are still undergoing structural and functional growth of their prefrontal cortex and surges of increased dopamine activity, together affecting overall capacity for self-regulatory control, decision making, planning, and understanding consequences (Blimling, 2013). In the college setting—which for most is the first significant length of time away from the constraints, regulations, and rituals of one's family, culture, and hometown—the process of identity development is carried out. Identity formation across several vectors (e.g., competence, managing emotions,

interdependence, purpose) during higher education is theorized to be the final psychosocial and neurobiological challenge of adolescence (Chickering & Reisser, 1993). Exercising the freedoms to experiment, explore, and discover one's self and place in the world is inherent to the process of identify formation. This same drive for experimentation, under a bounded capacity to appreciate future consequences and to regulate control, often spills over into risky and high-stimulus behaviors (e.g., using drugs, binge drinking, speeding, fighting). In the college setting, risky behaviors, including sexual risk-taking, are rewarded and reinforced by a similarly-minded peer group and its proxy, social media (Steinberg, 2008).

The sexual-health challenges distinctive of the college population were unmistakably present in this study, as evidenced by the descriptive results. Participants reported virtually no risk of HPV infection and felt unlikely that they would ever contract HPV. In the absence of perceived risk, participants practiced vastly insufficient preventative personal measures and engaged in numerous sexual risk behaviors. These sexual risk behaviors occurred despite having a strong understanding of short- and long-term health-related consequences of HPV infection, having high self-efficacy to obtain the vaccine series, and generally feeling supported by important others to vaccinate. As almost three-quarters of participants were in a relationship and the majority had only had one sexual partner during the past six months, assumptions about exclusivity and fidelity may have conferred a false sense of protection against HPV.

Relationship status, and the nature of- and meanings attached to the dyadic interpersonal relationship and sexual practices therewithin, has previously been shown to impact likelihood of HPV vaccine intentions (Jain et al., 2009; Zimet et al., 2010), uptake

(Lindley, Elkind, Landi, & Brandt, 2013), and well as condom use for STI prevention (Leval et al., 2011; Roberts & Kennedy, 2006; Seal, Minichiello, & Omodei, 1997). For instance, the cohabitation of romantic partners appears to diminish risk perception, perhaps due to assumptions of monogamy or the expectation that exposure has already occurred (Lindley et al., 2013; Roberts & Kennedy, 2006). Targeting incoming freshmen, before they have opportunities to establish themselves in relationships and view themselves as impervious to HPV infection, may be yet another critical time point for successful vaccination interventions to occur. As previously discussed, health care professionals that explain and recommend the HPV vaccination during visits, is also a critical point of intervention in the college setting. Perhaps then the most important lesson here is that there is not one magic moment of intervention, no generic message of prevention and no campaign effective enough to break through the unique developmental, social, and interpersonal contexts of college-age sexual activity. Instead, taking advantage of multiple key time points, using both educational and professionally delivered recommendations, may best affect rates of immunization, thereby reducing the numbers of HPV-related health conditions, including cervical cancer.

4.5 Limitations and Implications for the Future

This investigation has several limitations that should be mentioned. This study utilized a cross-sectional design which does not allow for interpretations of causality. It should be noted that this study also utilized a sample of convenience, using a psychology subject pool and flyers on a single campus, which does not ensure this sample is representative of young university women across the United States, or for that matter, young women in the southeast. It is also cautioned that the identified models herewithin

are not intended or expected to extend to young adolescents or teenagers where caregiver influence or physician opinion are chiefly at play in vaccination decision-making. The models are intended for young women with legal autonomy over their own medical care. Further, this study aimed to test a hypothetical model for intentions of getting the HPV vaccination when it is the actual behavior of vaccination that is the desired protective health outcome for the population at hand. A longitudinal study to assess how the model for vaccination intentions holds up as a model for actual vaccination behavior would be an important extension of this study. This model should also be re-fitted for diverse college-age female populations in order to discern whether or not the marginal significance of these indirect pathways are anomalies or whether they can be replicated. Exploring questions about how the model performs for various sub-groups of the female college population would promise an interesting shift for this line of study: Is there a difference for young women with high and low religiosity? With and without a history of sexual trauma? With primarily female versus primarily male sexual partners?

Nuances in model fit and explanatory power between the tested, revised, and exploratory models warrant further investigation. Testing the performance of alternative measures of sexual risk behaviors and of HBM/TBP variables is encouraged and can only augment dialogues of vaccination intention and uptake. Similarly, the application of femininity ideologies and sexual self-schema to the question of vaccination intent (or behavior) is a novel frontier with much room for exploration.

With great hope (and irony, given the central focus of this study) HPV vaccination intentionality and acquisition will one day become obsolete subjects of medical and social science inquiry. In this idyllic future, HPV vaccination will be as

widespread and commonplace as IPV (polio), DTaP (diphtheria, tetanus, pertussis) or MMR (measles, mumps, and rubella) vaccinations. At this juncture, even the 80% vaccination coverage goal championed by “Healthy People 2020” seems lofty (US Department of Health and Human Services, “Healthy People,” 2020), as the latest reports (2012 data) estimate the proportion of females and males 13-17 years fully vaccinated is only 33.40% and 6.80%, for females and males respectively (CDC, 2013b).

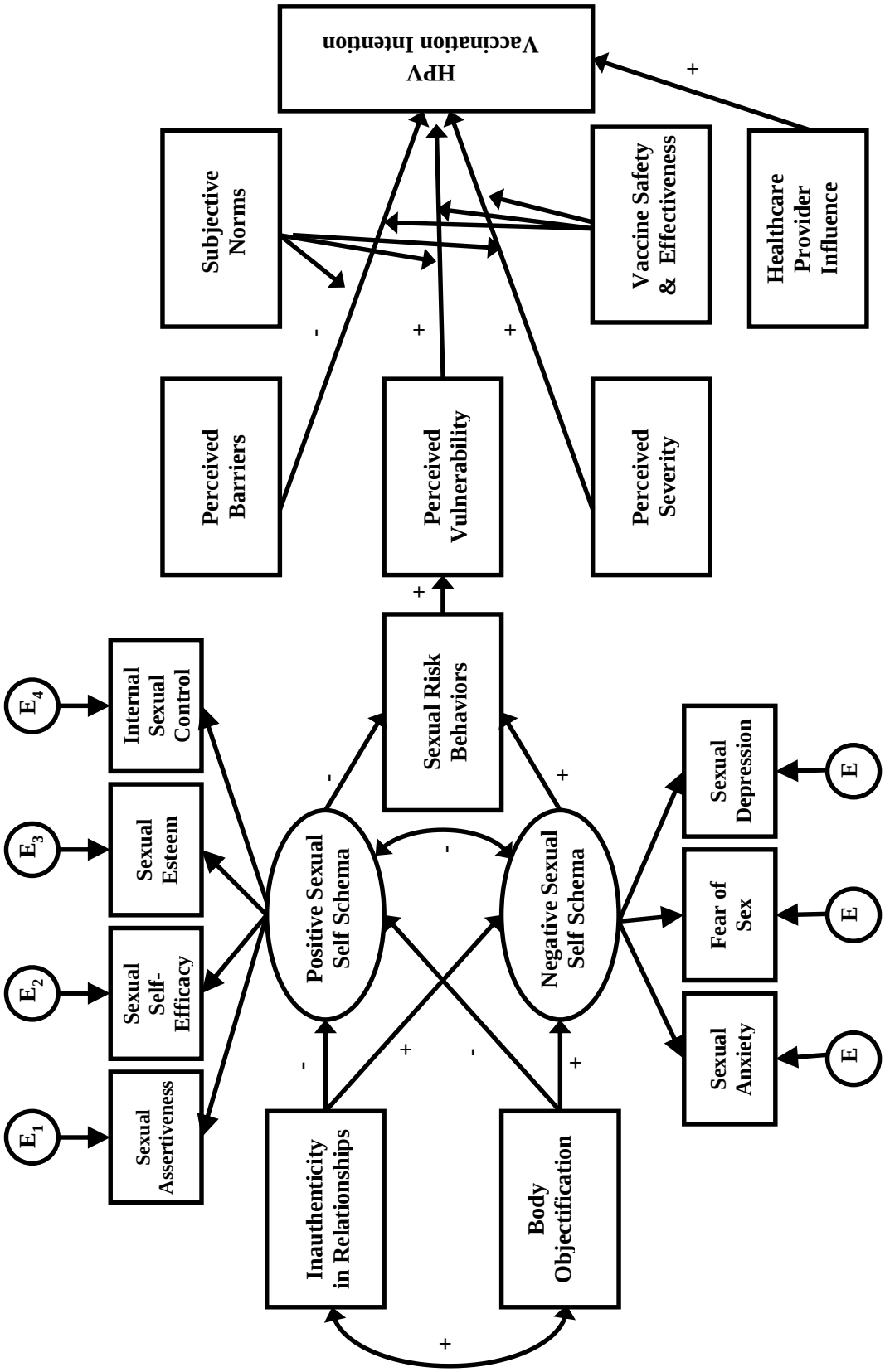


Figure 1: Hypothesized model of HPV vaccination intention

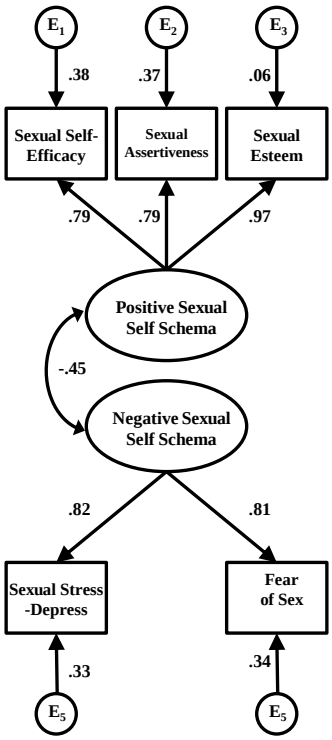


Figure 2: Identified CFA model for sexual self-schema with five parcels

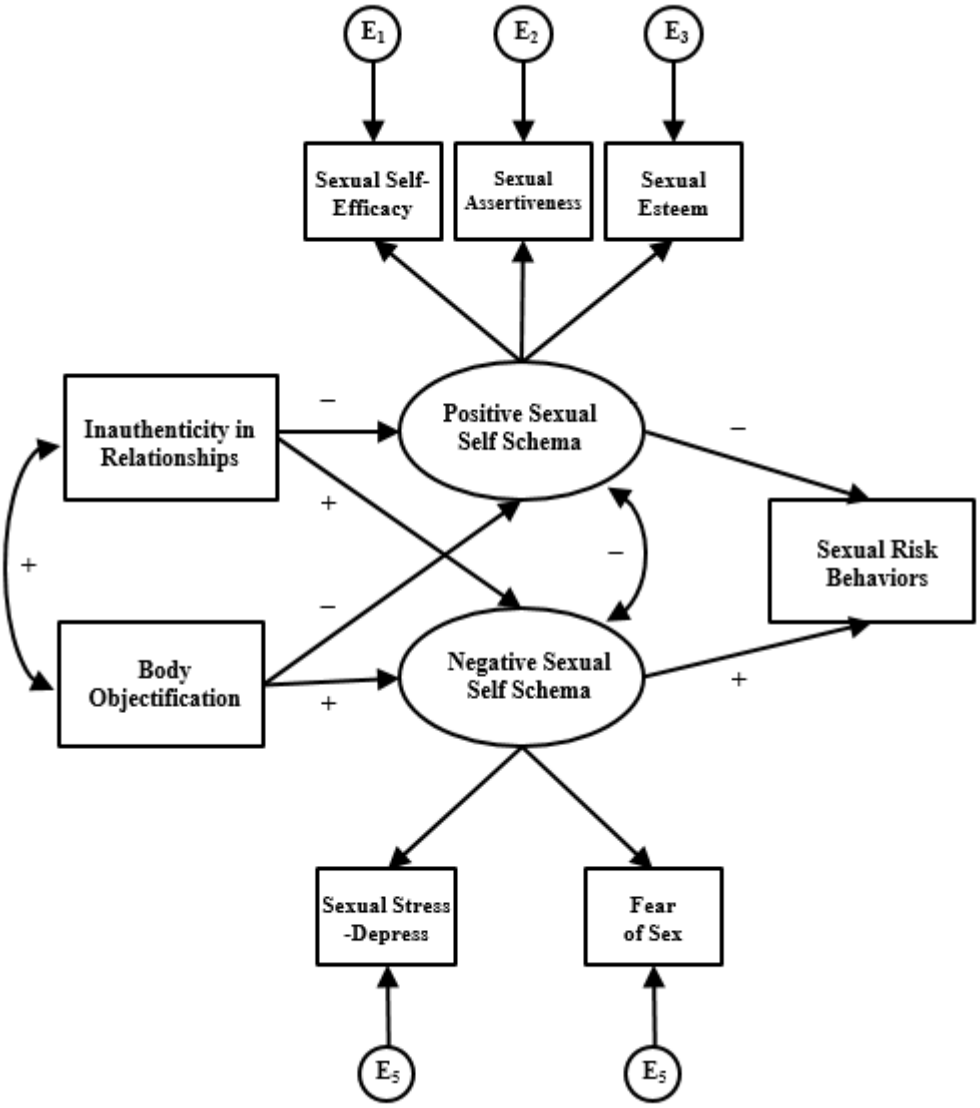


Figure 3: Hypothesized structural model for sexual risk behaviors

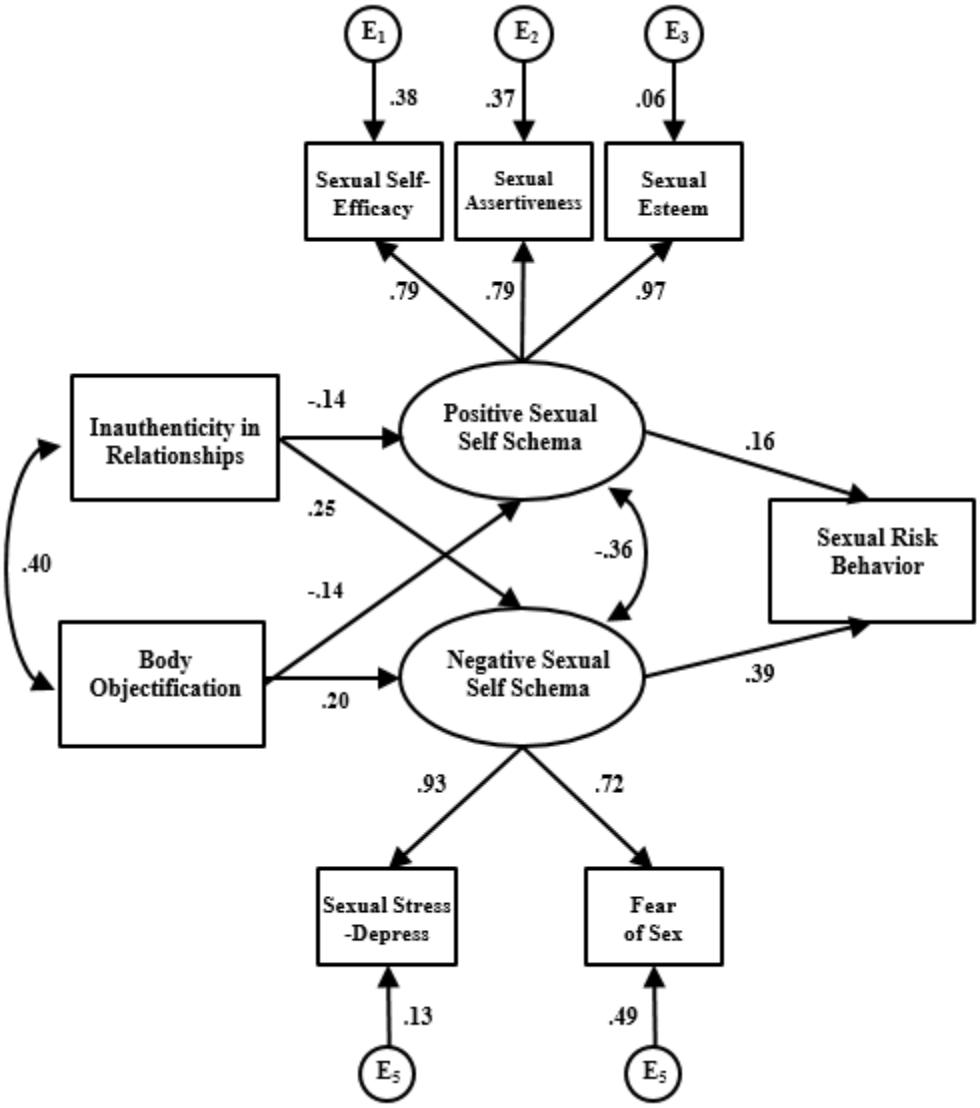


Figure 4: Identified model for sexual risk behaviors

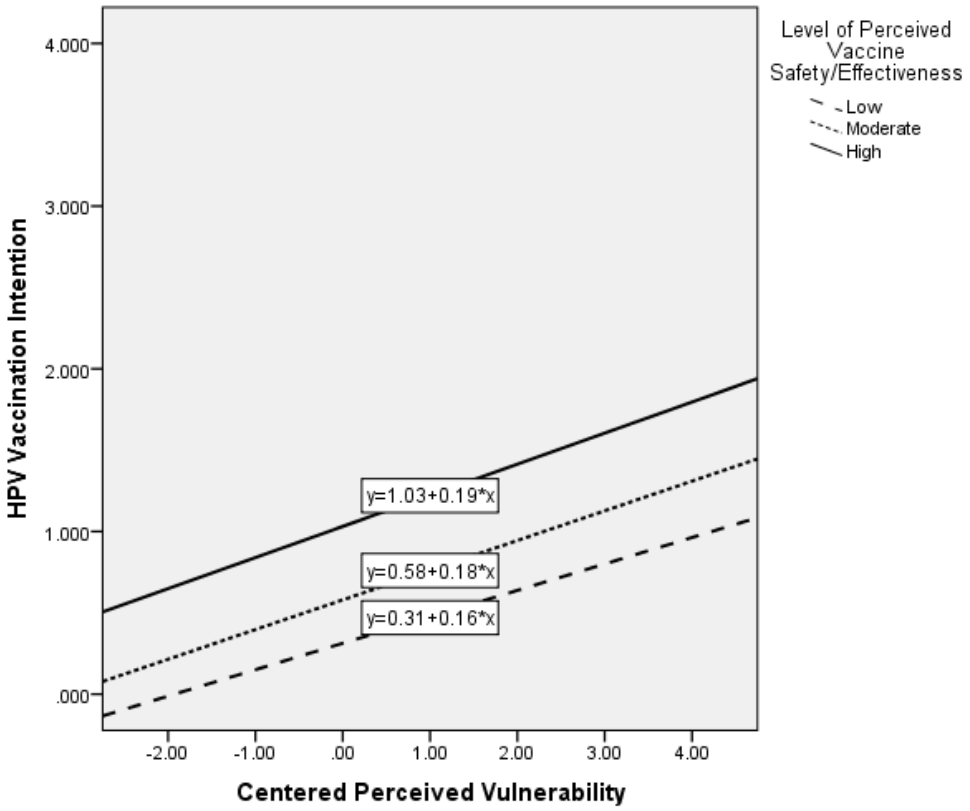
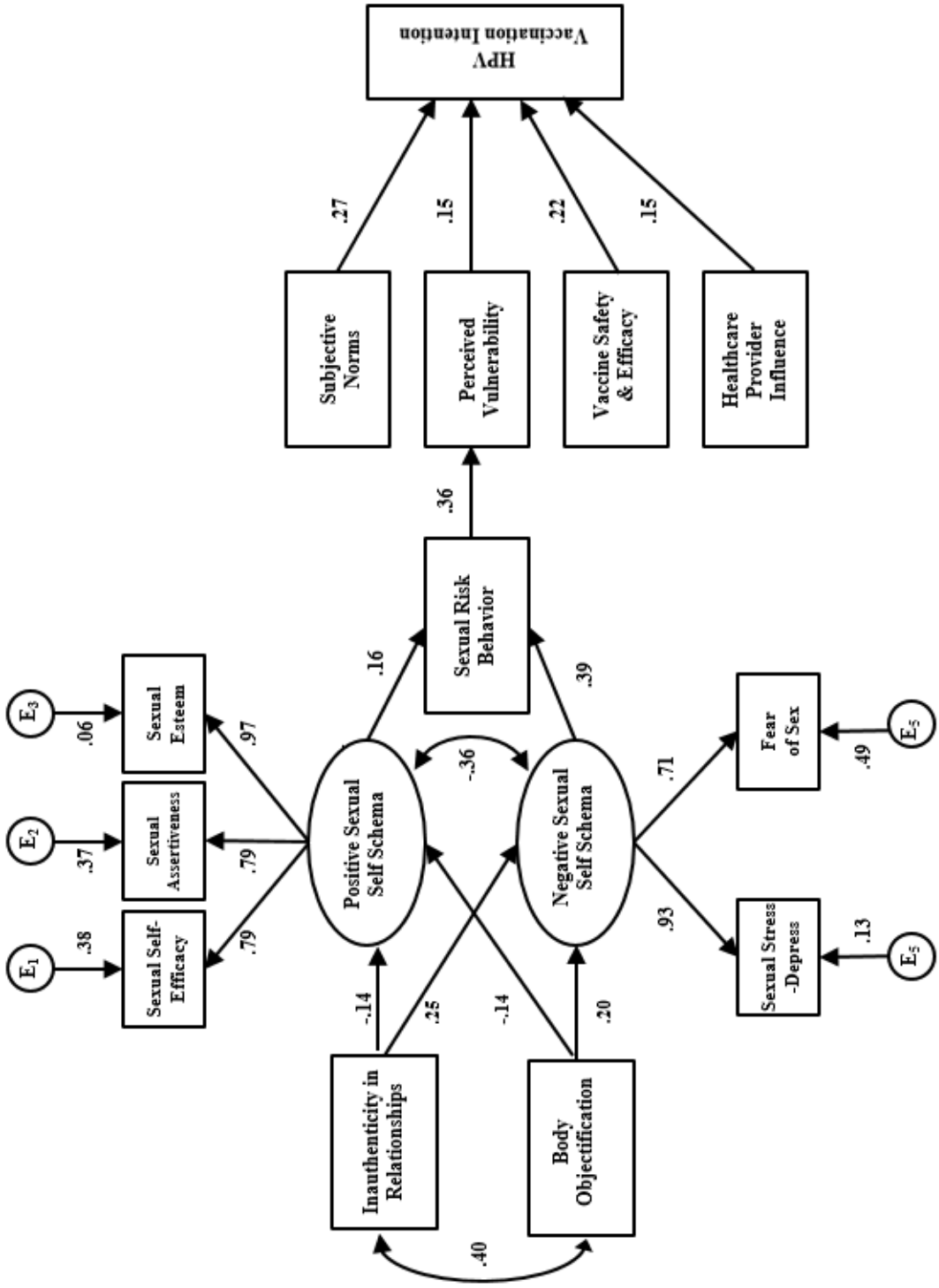


Figure 5: Moderation of perceived safety and effectiveness on the relationship between perceived vulnerability and HPV vaccination intention—Model 2



Note: Age was included as a control variable (Estimate: -.13, $p < .05$).

Figure 6: Final identified model for HPV vaccination intention—Revised Model 1

Table 1: Sociodemographic and behavioral characteristics (N = 261)

	N	*%*
Age		
18	64	24.52
19	64	24.52
20	50	19.16
21	33	12.64
22	19	7.30
23	8	3.07
24	8	3.07
25	7	2.68
26	8	3.07
Academic Year		
Freshmen	79	30.27
Sophomore	86	32.95
Junior	51	19.54
Senior	41	15.71
Post-Baccalaureate	3	1.15
Graduate	1	0.38
Ethnicity		
White (non-Hispanic)	159	60.92
Black / African-American (non-Hispanic)	59	22.61
Hispanic / Latina	19	7.28
Native American; Alaskan Native	1	0.38
Asian; Pacific Islander	7	2.68
Biracial; Multiracial	13	4.98
Other	2	0.77
Unknown	1	0.38
Marital Status		
Single	245	93.87
Married; Civil Union; Domestic Partnership	16	6.13
Dating Status		
Not dating	72	27.59
Dating one person	179	68.58
Dating more than one person	10	3.83
In a Relationship		
No	73	27.97
Yes	188	72.03
Hormonal Birth Control		
No	124	47.51
Yes	137	52.49

Time since last GYN Exam		
< 1 year	131	50.19
1 -2 years	32	12.26
> 2 years	12	4.60
Never	86	32.95
Time since last Pap Smear		
< 1 year	103	39.46
1 -2 years	24	9.20
> 2 years	8	3.07
Never	126	48.28
Previous HPV Diagnosis		
No	253	96.93
Yes	8	3.07
Time since last STI Test		
< 1 year	115	44.06
1 -2 years	26	9.96
> 2 years	12	4.60
Never	108	41.38
Last Oral Sex – Barrier Protection Use		
No	238	91.19
Yes	8	3.07
Not Applicable	15	5.75
Last Vaginal Sex – Barrier Protection Use		
No	143	54.79
Yes	98	37.55
Not Applicable	20	7.66
Last Anal Sex – Barrier Protection Use		
No	50	19.16
Yes	4	1.53
Not Applicable	207	79.31

Table 2: Descriptive statistics for variables of interest

	M	SD	# of Items	Item Range
Vaccination Intention	0.64	1.01	1	0 - 4
Inauthenticity in Relationships	2.59	0.94	9	0 - 6
Body Objectification	2.25	0.97	8	0 - 6
Sexual Self-Schema – Positive	2.34	0.89	14	0 - 4
Sexual Self-Efficacy	2.53	0.95	5	0 - 4
Sexual Assertiveness	2.22	1.04	3	0 - 4
Sexual Esteem	2.40	0.96	6	0 - 4
Sexual Self-Schema - Negative	0.81	0.88	10	0 - 4
Sexual Stress-Depression	0.84	0.89	8	0 - 4
Fear of Sex	0.77	1.04	2	0 - 4
Sexual Risk Behavior (sum)	8.50	3.67	21	0 - 1
Risk-taking with Uncommitted Partners	2.97	2.16	8	0 - 1
Risky Sex Acts	3.18	1.30	5	0 - 1
Impulsive Sexual Behaviors	1.91	1.31	5	0 - 1
Risky Anal Sex Acts	0.44	0.79	3	0 - 1
Vaccine Safety and Effectiveness	2.42	0.73	5	0 - 4
Perceived Severity	2.79	0.50	5	0 - 3
Subjective Norms	2.86	0.94	4	0 - 4
Perceived Vulnerability	1.24	1.04	3	0 - 5
Perceived Barriers	1.10	1.14	3	0 - 4
Physician Recommendations	0.48	0.47	2	0 - 1
Anticipated Regret	2.14	1.02	5	0 - 3
HPV Related Knowledge (sum)	10.44	1.81	16	0 - 1

N = 261.

Table 3: Descriptive statistics for SRB

Item	N	% Yes
1. Engaged in sexual behavior with ***BUT NOT HAD*** oral, anal, or vaginal sex	199	76.25
2. Left a social event with someone you just met	27	10.34
3. "Hooked up" ***BUT NOT HAD*** oral, anal, or vaginal sex with someone you didn't know or didn't know well	54	20.69
4. Had an unexpected and unanticipated sexual experience	129	49.43
5. Had a sexual encounter you engaged in willingly but later regretted	90	34.48
6. How many partners have you had sex with?	256	98.08
7. Had vaginal intercourse without a condom	183	70.11
8. Had vaginal intercourse without protection against pregnancy	91	34.87
9. Given fellatio (oral sex on a man) without a condom	215	82.38
10. Given or received cunnilingus (oral sex on a woman) without a dental dam	169	64.75
11. Had anal sex without a condom	37	14.18
12. You or your partner engaged in anal penetration by fingers, a hand, or other object without a latex glove or condom followed by	50	19.16
13. Given or received analingus (oral stimulation of the anal region, ''rimming'') without a dental dam	27	10.34
14. Had sex with someone you know but are not involved in any sort of relationship with (i.e., ''friends with benefits'')	90	34.48
15. Had sex with someone you don't know well or just met	47	18.01
16. You or your partner used alcohol or drugs before or during sex	173	66.28
17. Had sex with a new partner before discussing sexual history, IV drug use, disease status and other current sexual partners	75	28.74
18. Had sex with someone who has had many sexual partners (that you know of)	98	37.55
19. Had sex with someone who had been sexually active before you were with them but had not been tested for STIs/HIV	99	37.93
20. Had sex with a partner that you didn't trust	54	20.69
21. Had sex with someone who was also engaging in sex with others during the same time period (that you know of)	56	21.46

N = Number of participants endorsing at least one occurrence of the specified behavior.

Table 4: Descriptive statistics for KAPS

Item	N Answered Right	%	N Answered Wrong	%
HPV can cause herpes.*	**148**	**56.70**	113	43.30
Genital warts are caused by HPV.	**164**	**62.84**	97	37.16
HPV can cause cervical cancer.	**246**	**94.25**	15	5.75
If a woman's PAP smear is normal, she does not have HPV.*	**158**	**60.54**	103	39.46
Changes in a PAP smear may indicate that a woman has HPV.	**225**	**86.21**	36	13.79
Genital warts are caused by the herpes virus.*	51	19.54	**210**	**80.46**
PAP smears will almost always detect HPV.*	**147**	**56.32**	114	43.68
HPV can be passed from the mother to her baby during birth.	**184**	**70.50**	77	29.50
A negative test for HPV means that you do not have HPV.*	101	38.70	**160**	**61.30**
There is a vaccine to prevent HPV infection.	**230**	**88.12**	31	11.88
Most people with genital HPV have no visible signs or symptoms.	**224**	**85.82**	37	14.18
Having one type of HPV means that you cannot acquire new types.*	**238**	**91.19**	23	8.81
You can transmit HPV to my partner(s) even if you have no HPV symptoms.	**239**	**91.57**	22	8.43
Risk of HPV infection can be reduced by using a condom or dental dam.	**247**	**94.64**	14	5.36
If you do not come into contact with the same type of HPV virus again, a healthy immune system can clear it on its own without treatment.	60	22.99	**201**	**77.01**
There is no test to identify if men have HPV.	63	24.14	**198**	**75.86**

* = reverse coded.

Note: Bold indicates majority participant response.

Table 5: Descriptive statistics and standardized path coefficients for sexual self schema measurement model

Measure	Estimate	M	SD
Positive (total)		2.42	.89
Sexual Self-Efficacy	.79***	2.53	.95
Sexual Assertiveness	.79***	2.22	1.04
Sexual Esteem	.97***	2.40	.96
Negative (total)		.83	.87
Sexual Stress-Depression	.82***	.84	.89
Fear of Sex	.81`***	.77	1.04

*** $p < .001$.

Table 6: Intercorrelations and reliability after CFA revisions

Measure	α	1	2	3	4	5	6
1. MSSCQ Positive	**.93**	--					
2. Self-Efficacy	.87	.92***	--				
3. Assertiveness	.77	.85***	.65***	--			
4. Esteem	.86	.93***	.76***	.77***	--		
5. MSSCQ Negative	**.92**	-.33***	-.24***	-.26***	-.40***	--	
6. Stress/Depress	.92	-.30***	-.21***	-.23**	-.38***	.98***	--
7. Fear	.83	-.34***	-.29***	-.27***	-.36***	.79***	.67***

**$p < .01$; *** $p < .001$.

Table 7: Intercorrelations among variables of interest after CFA

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Intent to vaccinate	--												
2. Body objectification	.13*	--											
3. Inauthenticity in relationship	-.05	.40***	--										
4. Positive Sexual Self-Schema	-.13*	-.18**	-.16**	--									
5. Negative Sexual Self-Schema	.12*	.27***	.32***	-.33***	--								
6. Sexual Risk Behaviors	.05	.17**	.07	.05	.30***	--							
7. Perceived vulnerability	.23***	.12	.03	.03	.07	.36***	--						
8. Barriers	-.23***	.02	.11	-.17*	.13	-.04	-.15*	--					
9. Norms	.38***	-.02	.00	.01	-.04	.03	.19**	-.35***	--				
10. Safety and Effectiveness	.38***	-.01	-.02	-.03	.02	.06	.15*	-.19**	.46***	--			
11. Severity	.06	-.00	-.05	.12*	-.16*	-.15*	.03	-.23***	.31***	.20**	--		
12. Physician Communication	.18**	-.02	-.04	-.03	-.04	-.00	.04	-.09	-.03	.07	-.03	--	
13. Regret	.20**	.09	.12	-.03	.02	.07	.22***	-.11	.46***	.38***	.28***	-.00	--

Table 7: Intercorrelations among variables of interest after CFA

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13
14. Knowledge	-.05	-.13*	-.06	.18**	-.11	.03	.04	.00	-.08	.01	.10	.06	-.17**
15. Age	-.13*	-.23**	-.21**	.12*	-.14*	.02	.00	-.07	.10	.00	.07	-.19**	-.21**
16. Relationship Status	.09	-.43	-.07	.18**	-.36***	-.39***	-.10	-.01	.11	.08	.14*	-.00	.02
17. Sex with Males	-.02	.10	.03	.05	.02	.19**	-.02	-.02	.03	.04	-.08	-.03	.04
18. Time Since Last GYN Exam	-.01	.00	.18**	-.10	.15*	-.02	-.03	-.02	-.07	-.05	-.08	-.08	.12*
19. Time Since Last Pap	.04	.10	.19**	-.10	.12*	-.01	.04	.03	.01	-.03	-.05	-.03	.16*
20. Time Since Last STI Test	-.02	.10	.22***	-.14*	.15*	-.12*	-.04	-.02	-.03	-.04	-.03	-.04	.08
21. Hormonal Birth Control	.01	.01	-.03.	.06	-.18**	-.03	.01	-.01	-.11	.00	.07	.18**	-.02
23. Prior HPV Diagnosis	-.00	-.03	-.12	.04	-.04	.13*	.12*	-.15*	.13*	.03	.04	-.11	-.05

* p < .05; ** p < .01; *** p < .001.

Table 7: Intercorrelations among variables of interest after CFA (continued)

Measure	14	15	16	17	18	19	20	21	22
14. Knowledge	--								
15. Age	.15*	--							
16. Relationship Status	.03	.08	--						
17. Sex with Males	.00	-.06	-.02	--					
18. Time Since Last GYN Exam	-.09	-.33***	-.08	-.08	--				
19. Time Since Last Pap	-.09	-.44***	-.03	.04	.72***	--			
20. Time Since Last STI Test	-.05	-.28***	-.08	.03	.61***	.55***	--		
21. Hormonal Birth Control	.05	-.06	.06	.08	-.34***	-.12*	-.24***	--	
22. Previous HPV Diagnosis	.02	.39***	.06	.01	-.11	-.15*	-.10	-.05	--

* p < .05; ** p < .01; *** p < .001.

Table 8: Results of the multiple regression analysis with controls only

Model	*b*	*S.E.*	*β*	R^2	F
HPV Vaccination Intention				.07	1.68
(Intercept)	.43	.16			
Regret	.18**	.06	.18		
Knowledge	-.01	.04	-0.01		
Age	-.06^	.04	-.00		
Relationship Status	.19	.14	.08		
Sex with males (#)	.00	.04	-.00		
Sex with females (#)	-.01	.04	-.05		
Time since last GYN exam	.27	.21	.13		
Time since last Pap Smear	-.17	.20	-.08		
Time since last STI test	.05	.16	.02		
Hormonal Birth Control	-.07	.14	-.04		
Previous HPV Diagnosis	.26	.39	.05		

**$p < .01$; ^$p = .09$.

Table 9: Squared multiple correlations explaining SRB

Parameter	Estimate
AFIS - BO	--.
AFIS - IR	--
MSSCQ - Positive	.06
Efficacy	.62
Assertiveness	.62
Esteem	.95
MSSCQ - Negative	.15
Stress-Depression	.74
Fear	.60

Table 10: Effects decomposition explaining SRB

	Endogenous Variables							
	AFIS BO		Positive		Negative		SRS	
Causal Variables	Ust.	St.	Ust.	St.	Ust.	St.	Ust.	St.
AFIS IR								
Direct Effect	.37***	.40	-.11*	-.14	.20**	.26	--	--
Tot. Ind. Effect			-.09	-.02	.44**	.10	.35**	.08**
AFIS BO								
Direct Effect	--	--	-.11*	-.14	.15**	.20	--	--
Tot. Ind. Effect	--	--	-.09	-.02	.33*	.08	.24	.06
MSSCQ Positive								
Direct Effect	--	--	--	--	-.18***	-.37	.80*	.15
MSSCQ Negative								
Direct Effect							2.16***	.40

Table 11: Fit indices for the five tested full models

Model		χ^2	*df*	*CFI*	TLI	RMSEA	RMSEA 90% CI	SRMR	AIC
	1	151.32	84	.92	.92	.06	.04 - .07	.07	7174.65
	2	240.22	120	.87	.87	.06	.05 - .07	.07	7173.34
	3	281.53	120	.84	.83	.07	.06 - .08	.07	--
	4	196.52	120	.91	91	.05	.04 - .06	.06	--
Revised Model		**126.75**	**66**	**.93**	**.92**	**.06**	**.04 - .08**	**.06**	**7174.84**
Exploratory Model		96.22	48	.94	.93	.06	.04 - .08	.06	7224.27

Notes: Model 1 = main effects only. Model 2 = four two way interactions. Model 3 = BNS, vulXnrm, vulXsne, sneXnrm. Model 4 = VNS, barXnrm barXsne sneXnrm. Models 1-4 contain all modeled predictor variables and two control variables, age and anticipated regret. Revised Model 1 = main effects only, predictor and control variables (barriers and anticipated regret omitted. Exploratory Model = only perceived vulnerability, physician recommendation, and age as a control.
Bold typeface indicates best fitting model.

Table 12: Squared multiple correlations explaining vaccination intentions—Revised Model 1

Parameter	Estimate
Inauthenticity in Relationship	--
Body Objectification	--
Perceived Norms	--
Physician Communication	--
Age	--
Vaccination Intention	.24
Perceived Vulnerability	.13
Sexual Risk Behavior	.13
MSSCQ - Positive	.06
Efficacy	.62
Assertiveness	.63
Esteem	.94
MSSCQ - Negative	.14
Stress-Depression	.87
Fear	.51

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APPENDIX A: RECRUITMENT FLYER SCRIPT

FEMALE RESEARCH VOLUNTEERS NEEDED

Volunteers needed for an online survey about sexual health

WHO:	Adult females, age 18-26, who have been sexually active, and who have NOT received the HPV vaccination (Gardasil or Cervarix).
WHAT (NOW):	Online survey about sexual health and protective behaviors; < 45 minutes.
WHAT (LATER):	In 6 months, you will be asked to take a shorter follow-up survey online; < 15 minutes.
BENEFITS:	One entry in a drawing for a $10.00 Target gift card/certificate. At Time 2 you will receive a second entry in a drawing for a $10.00 Target gift card/certificate. Odds of receipt are equal to or better than 1 in 10 at each drawing.
WHERE:	Please access the internet in a private location where you will not be disturbed. Follow this link [Women's Sexual Health & HPV Study] to the study and questionnaires.
RISKS:	There are no expected adverse effects of participation.
CONFIDENTIALITY:	All data collected will be kept confidential.
IRB APPROVAL:	This research study protocol has been approved by UNCC's Institutional Review Board [Protocol #].

APPENDIX B: DESCRIPTION OF STUDY ON SONA SCRIPT

The following script will be used to describe the research study on the SONA Systems online survey system participant sign-up page:

Title: Women's Sexual Health and HPV Study

Brief Description: This is a two-part online research study to investigate how young women think about their sexual health and protective health intentions and behaviors related to HPV (human papillomavirus).

Long Description: This is a two-part online research study to investigate how young women think about their sexual health and protective health intentions and behaviors related to HPV (human papillomavirus).

The first part of the study will take less than 45 minutes to complete and you will earn one (1) unit of research credit toward the completion of your psychology course research requirements.

The second part of the study will occur in 6-months time, will take less than 15 minutes to complete, and you will be contacted via email to participate. At this point you will be entered in a drawing for a Target $10.00 gift card/certificate as compensation for your time (odds of receipt will be no less than 1 in 10). Gift card recipients will be notified via email the last week of the semester of participation. You can also earn a half a unit (0.5) of research credit toward the completion of your psychology course research requirement IF you are still enrolled in a course utilizing SONA.

To participate in this study, first complete the PRESCREEN associated with this study: "Women's Sexual Health and HPV Study—PRESCREEN." After completing the PRESCREEN, and ONLY IF YOU ARE ELIGIBLE, you will receive an e-mail to your UNCC account with a link to an external website to take the actual survey and receive credit.

Eligibility: You are female. You are between the ages of 18 and 26. You have been sexually active within the past 3 months. You have NEVER received one or more of the HPV vaccinations (Gardasil or Cervarix). You currently attend UNCC.

APPENDIX C: RECRUITMENT EMAIL SCRIPT

The following script will be used in emails sent to eligible participants meeting prescreen requirements as determined by their responses to the SONA pre-screen questionnaire that appears upon first logging in to the SONA research website or the completion of the prescreen survey advertised on the sign up page:

Good day,
As a participant in the psychology research system (SONA Systems) you recently completed a pre-screen questionnaire and based on your responses, you ARE ELIGIBLE to participate in a study titled “Women’s Sexual Health and HPV Study.

This is a two-part online research study to investigate how young women think about their sexual health and protective health intentions and behaviors related to HPV (human papillomavirus).

The first part of the study will take less than 45 minutes to complete and you will earn one (1) unit of research credit toward the completion of your psychology course research requirements.

The second part of the study will occur in 6 months time, will take less than 15 minutes to complete, and you will be contacted via email to participate. At this point you will be entered in a drawing for a $10.00 gift card/certificate as compensation for your time (odds of receipt will be no less than 1 in 10). Gift card recipients will be notified via email the last week of the semester they participated. You can also earn a half a unit (0.5) of research credit toward the completion of your psychology course research requirement IF you are still enrolled in a course utilizing SONA.

Step 1: For more details please log on to the Sona System website: http://uncc.Sona-systems.com/ using your 49er express ID and the password that was recently emailed to you by the system. If you cannot find this email, have accidentally deleted it, or simply forget your password you can retrieve it using the "Lost Password" button on the left side of the website screen and it will be resent to your UNCC email.

Step 2: Click on "Women’s Sexual Health and HPV Study” and please follow the link to be redirected to the external study website.

Thank you for your participation. Both your responses and time are appreciated. Also, know that your responses to all questions will remain strictly confidential.

APPENDIX D: INELIGIBILITY EMAIL SCRIPT

The following script will be used in emails sent to ineligible participants not meeting prescreen requirements as determined by their responses to the SONA pre-screen questionnaire advertised on the study sign up page:

Good day,

As a participant in the psychology research system (SONA Systems) you recently completed a pre-screen questionnaire and based on your responses, you ARE NOT ELIGIBLE to participate in the study titled, “Women’s Sexual Health and HPV Study.”

Thank you for your interest in this research endeavor.
Both your responses and time are appreciated. Also, know that your responses to all pre-screen questions will remain strictly confidential.

APPENDIX E: MEASURES

R = reverse coded

I. PRESCREEN

	Male	*Female*
What is your sex?	0	1

How old are you?	[##]

	No	*Yes*
Have you previously received one or more shots in the HPV vaccination series (i.e., Gardasil or Cervarix)?	0	1

	No	*Yes*
Have you been sexually active (i.e., had oral, anal, or vaginal sex) in the past three months?	0	1

II. MEASURES

How do you identify yourself?	
White (non-Hispanic)	0
Black/African American (non-Hispanic)	1
Hispanic/Latino	2
Native American/Alaskan Native	3
Asian/Pacific Islander	4
Biracial/Multiracial	5
Please specify:	[String Variable]
Other	6
Please specify:	[String Variable]
Unknown	7

What is your current academic class standing (based on number of credit hours COMPLETED?	
Freshman	0
Sophomore	1
Junior	2
Senior	3
Post-Baccalaureate	4
Graduate	5

	Single	*Married; Civil Union; Domestic Partnership*
What is your marital status?	0	1

	Not Dating	*Dating One Person*	*Dating More Than One Person*
What is your dating status?	0	1	2

	No	*Yes*
Do you view yourself as being "in a relationship"?	0	1

	Not at all likely	*Slightly Likely*	*Moderately likely*	*Very Likely*	*Completely Likely*
In the next six months, how likely is it that you will receive the HPV vaccination.	0	1	2	3	4

To what extent do you agree with these statements about your body?							
	Strongly Disagree	*Moderately Disagree*	*Slightly Disagree*	*Neither Agree nor Disagree*	*Slightly Agree*	*Moderately Agree*	*Strongly Agree*
The way I can tell that I am at a good weight is when I fit into a small size.	0	1	2	3	4	5	6
I often wish my body was different.	0	1	2	3	4	5	6
I think that a female has to be thin to feel beautiful.	0	1	2	3	4	5	6

I think a female has to have a light complexion and delicate features to be thought of as beautiful.	0	1	2	3	4	5	6
I am more concerned about how my body looks than how my body feels.	0	1	2	3	4	5	6
I often feel uncomfortable in my body.	0	1	2	3	4	5	6
There are times when I have really good feelings in my body. (R)	0	1	2	3	4	5	6
The way I decide I am at a good weight is when I feel healthy. (R)	0	1	2	3	4	5	6

To what extent do you agree with these statements about people in your life?								
		Strongly Disagree	*Moderately Disagree*	*Slightly Disagree*	*Neither Agree nor Disagree*	*Slightly Agree*	*Moderately Agree*	*Strongly Agree*
1	I would tell someone I think they look nice, even if I think they shouldn't go out of the house dressed like that.	0	1	2	3	4	5	6
2	I worry that I make others feel bad if I am successful.	0	1	2	3	4	5	6
3	I would not change the way I do things in order to please someone else. (R)	0	1	2	3	4	5	6
4	I tell people what I honestly think even when it is an unpopular idea. (R)	0	1	2	3	4	5	6
5	Often I look happy on the outside in order to please others, even if I don't feel happy on the inside.	0	1	2	3	4	5	6

6	I wish I could say what I feel more often than I do.	0	1	2	3	4	5	6
7	I feel like it's my fault when I have disagreements with others.	0	1	2	3	4	5	6
8	When someone ignores my feelings, I think that my feelings weren't very important anyway.	0	1	2	3	4	5	6
9	I usually tell my friends when they hurt my feelings. (R)	0	1	2	3	4	5	6

The items in this questionnaire refer to people's sexuality. Please read each item carefully and decide to what extent it is characteristic of you.

		Not at All Characteristic of Me	*Slightly Characteristic of Me*	*Somewhat Characteristic of Me*	*Moderately Characteristic of Me*	*Very Characteristic of Me*
1	I feel anxious when I think about the sexual aspects of my life.	0	1	2	3	4
2	I have the ability to take care of any sexual needs and desires that I may have.	0	1	2	3	4
3	I'm very assertive about the sexual aspects of my life.	0	1	2	3	4
4	I derive a sense of self-pride from the way I handle my own sexual needs and desires.	0	1	2	3	4
5	I am afraid of becoming sexually involved with another person.	0	1	2	3	4
6	I am depressed about the sexual aspects of my life.	0	1	2	3	4
7	My sexuality is something that I am largely responsible for.	0	1	2	3	4

8	I worry about the sexual aspects of my life.	0	1	2	3	4
9	I am competent enough to make sure that my sexual needs are fulfilled.	0	1	2	3	4
10	I'm not very direct about voicing my sexual needs and preferences. (R)	0	1	2	3	4
11	I am proud of the way I deal with and handle my own sexual desires and needs.	0	1	2	3	4
12	I have a fear of sexual relationships.	0	1	2	3	4
13	I am disappointed about the quality of my sex life.	0	1	2	3	4
14	The sexual aspects of my life are determined in large part by my own behavior.	0	1	2	3	4
15	Thinking about the sexual aspects of my life often leaves me with an uneasy feeling.	0	1	2	3	4
16	I have the skills and ability to ensure rewarding sexual behaviors for myself.	0	1	2	3	4
17	I am somewhat passive about expressing my own sexual desires. (R)	0	1	2	3	4

18	I am pleased with how I handle my own sexual tendencies and behaviors.	0	1	2	3	4
19	I am fearful of engaging in sexual activity.	0	1	2	3	4
20	I feel discouraged about my sex life.	0	1	2	3	4
21	I am in control of and am responsible for the sexual aspects of my life.	0	1	2	3	4
22	I worry about the sexual aspects of my life.	0	1	2	3	4
23	I am able to cope with and to handle my own sexual needs and wants.	0	1	2	3	4
24	I do not hesitate to ask for what I want in a sexual relationship.	0	1	2	3	4
25	I have positive feelings about the way I approach my own sexual needs and desires.	0	1	2	3	4
26	I don't have much fear about engaging in sex. (R)	0	1	2	3	4
27	I feel unhappy about my sexual experiences.	0	1	2	3	4
28	The main thing which affects the sexual aspects of my life is what I myself do.	0	1	2	3	4
29	I feel nervous when I think about the sexual aspects of my life.	0	1	2	3	4

30	I have the capability to take care of my own sexual needs and desires.	0	1	2	3	4
31	When it comes to sex, I usually ask for what I want.	0	1	2	3	4
32	I feel good about the way I express my own sexual needs and desires.	0	1	2	3	4
33	I'm not afraid of becoming sexually active. (R)	0	1	2	3	4
34	I feel sad when I think about my sexual experiences.	0	1	2	3	4
35	My sexuality is something that I myself am in charge of.	0	1	2	3	4

These items have to do with how often you have done various behaviors IN THE PAST 6 MONTHS.

Your responses are confidential, Please be honest and take your time.

If you do not know for sure how many times a behavior took place, try to estimate the number close as you can. Thinking about the average number of times the behavior happened per week or per month might make it easier to estimate an accurate number, especially if the behavior happened fairly regularly.

If you've had multiple sexual partners, try to think about how long you were with each partner, the number of sexual encounters you had with each, and try to get an accurate estimate of the total number of each behavior.

If the question does not apply to you or you have never engaged in the behavior in the question, put a "0" on the blank.

***SEX** = includes receiving or giving oral sex, as well as giving or receiving penetrative anal or vaginal sex*

***SEXUAL BEHAVIOR** = includes (but is not limited to) passionate kissing/making out, fondling, heavy petting, oral-to-anal stimulation, hand-to-genital stimulation, non-penetrative or dry-sex, mutual masturbation, etc.*

1. IN THE PAST 6 MONTHS, how many partners have you engaged in sexual behavior with ***BUT <u>NOT</u> HAD*** oral, anal, or vaginal sex?	[#]
2. IN THE PAST 6 MONTHS, how many times have you left a social event with someone you just met?	[#]
3. IN THE PAST 6 MONTHS, how many times have you "hooked up" ***BUT <u>NOT</u> HAD*** oral, anal, or vaginal sex with someone you didn't know or didn't know well?	[#]
4. IN THE PAST 6 MONTHS, how many times have you gone out to bars/parties/social events with the intent of "hooking up" and engaging in sexual behavior ***BUT <u>NOT</u> HAVING*** sex with someone?	[#]

5. IN THE PAST 6 MONTHS, how many times have you gone out to bars/parties/social events with the intent of "hooking up" and having sex with someone?	[#]
6. IN THE PAST 6 MONTHS, how many times have you had an unexpected and unanticipated sexual experience?	[#]
7. IN THE PAST 6 MONTHS, how many times have you had a sexual encounter you engaged in willingly but later regretted?	[#]
8. IN THE PAST 6 MONTHS, how many partners have you had sex with?	[#]
9. IN THE PAST 6 MONTHS, how many times have you had vaginal intercourse without a condom?	[#]
10. IN THE PAST 6 MONTHS, how many times have you had vaginal intercourse without protection against pregnancy?	[#]
11. IN THE PAST 6 MONTHS, how many times have you given fellatio (oral sex on a man) without a condom?	[#]
12. IN THE PAST 6 MONTHS, how many times have you given or received cunnilingus (oral sex on a woman) without a dental dam?	[#]
13. IN THE PAST 6 MONTHS, how many times have you had anal sex without a condom?	[#]
14. IN THE PAST 6 MONTHS, how many times have you or your partner engaged in anal penetration by fingers, a hand, or other object without a latex glove or condom followed by unprotected anal sex?	[#]
15. IN THE PAST 6 MONTHS, how many times have you given or received analingus (oral stimulation of the anal region, "rimming") without a dental dam?	[#]
16. IN THE PAST 6 MONTHS, how many people have you had sex with that you know but are not involved in any sort of relationship with (i.e., "friends with benefits")?	[#]
17. IN THE PAST 6 MONTHS, how many times have you had sex with someone you don't know well or just met?	[#]
18. IN THE PAST 6 MONTHS, how many times have you or your partner used alcohol or drugs before or during sex?	[#]
19. IN THE PAST 6 MONTHS, how many times have you had sex with a new partner before discussing sexual history, IV drug use, disease status and other current sexual partners?	[#]
20. IN THE PAST 6 MONTHS, how many times (that you know of) have you had sex with someone who has had many sexual partners?	[#]
21. IN THE PAST 6 MONTHS, how many partners (that you know of) have you had sex with who had been sexually active before you were with them but had not been tested for STIs/HIV?	[#]
22. IN THE PAST 6 MONTHS, how many partners have you had sex with that you didn't trust?	[#]
23. IN THE PAST 6 MONTHS, how many times (that you know of) have you had sex with someone who was also engaging in sex with others during the same time period?	[#]

III. CONTROL VARIABLES

Please indicate whether you think the following statements about HPV are True or False.		*F*	*T*
1	HPV can cause herpes.	0	1
2	Genital warts are caused by HPV.	0	1
3	HPV can cause cervical cancer.	0	1
4	If a woman's Pap smear is normal, she does not have HPV.	0	1
5	Changes in a Pap smear may indicate that a woman has HPV.	0	1

6	Genital warts are caused by the herpes virus.	0	1
7	Pap smears will almost always detect HPV.	0	1
8	HPV can be passed from the mother to her baby during birth.	0	1
9	A negative test for HPV means that you do not have HPV.	0	1
10	There is a vaccine to prevent HPV infection.	0	1
11	Most people with genital HPV have no visible signs or symptoms.	0	1
12	Having one type of HPV means that you cannot acquire new types.	0	1
13	I can transmit HPV to my partner(s) even if I have no HPV symptoms.	0	1
14	Risk of HPV infection can be reduced by using a condom or dental dam.	0	1
15	If you do not come into contact with the same type of HPV virus again, a healthy immune system can clear it on its own without treatment.	0	1
16	There is no test to identify if men have HPV.	0	1

The following items have to do with your sexual health. Please be honest and think carefully about your answers. REMEMBER THAT THIS IS CONFIDENTIAL and your answers will not be shared in any way that connects your responses to your identity.				
How many different males have you had oral, anal, or vaginal sex with IN THE PAST SIX MONTHS?		[##]		
How many different females have you had oral, anal, or vaginal sex with IN THE PAST SIX MONTHS?		[##]		
How long has it been since your last gynecological exam?		< 1 yr		
How long has it been since your last Pap Smear?	< 1 yr	1-2 yrs	> 2yrs	N/A
How long has it been since you were last tested for a sexually transmitted infection?	< 1 yr	1-2 yrs	> 2 yrs	N/A
Do you currently use a hormonal method of birth control (e.g., pills, implant, patch, shot, ring)?	No	1-2 yrs	> 2 yrs	N/A
Have you ever been diagnosed with HPV?	No	Yes	- - -	
The last time you had ORAL SEX did you use a condom or dental dam?	No	Yes	- - -	
The last time you had VAGINAL SEX did you use a condom?	No	Yes	N/A	
The last time you had ANAL SEX did you use a condom?	No	Yes	N/A	

Please indicate how much you agree with the following statements about NOT getting vaccinated.					
		Completely Disagree			Completely Agree
1	IF I don't get the HPV vaccination and end up getting cervical cancer, I'd be mad at myself.	0	1	2	3
2	IF I don't get the HPV vaccination and end up getting anal cancer, I'd be mad at myself.	0	1	2	3
3	IF I don't get the HPV vaccination and end up getting vaginal/vulvar cancer, I'd be mad at myself.	0	1	2	3
4	IF I don't get the HPV vaccination and end up getting genital warts, I'd be mad at myself.	0	1	2	3
5	IF I don't get the HPV vaccination and end up getting respiratory papillomatosis (warts in the throat), I'd be mad at myself.	0	1	2	3

	No	*Yes*
IN THE PAST 6 MONTHS, has a health care provider talked with you about either of the HPV vaccinations (Gardasil or Cervarix)?	0	1
IN THE PAST 6 MONTHS, has a health care provider ever recommended that you receive either of the HPV vaccination (Gardasil or Cervarix)?	0	1

IV. MEASURES (CONTINUED)

Please indicate your beliefs about your chances of getting HPV.

		Highly Unlikely					*Highly Likely*
1	How likely do you think it is that you will get infected with HPV in the future?	0	1	2	3	4	5
2	Compared to others your age, how likely is it that you will get infected with HPV in the future?	0	1	2	3	4	5
		Strongly Disagree					*Strongly Agree*
3	With no vaccination, I would feel that I'm going to get HPV in the future.	0	1	2	3	4	5

Please indicate your beliefs about how getting HPV might affect your life.

		Not at all			*Quite a lot*
1	All in all, how much do you think having cervical cancer would affect your life?	0	1	2	3
2	All in all, much do you think having anal cancer would affect your life?	0	1	2	3
3	All in all, how much do you think having vaginal or vulvar cancer would affect your life?	0	1	2	3
4	All in all, how much do you think having genital warts would affect your life?	0	1	2	3
5	All in all, how much do you think having recurrent respiratory papillomatosis (warts in your throat) would affect your life?	0	1	2	3

Please indicate your beliefs about your ability to get vaccinated.					
	Not at all confident	*Somewhat unconfident*	*Neither Confident or Unconfident*	*Somewhat Confident*	*Completely confident*
If you wished to, how confident are you that you could get vaccinated completely against HPV in the next 6 months; that is, get all three vaccine shots?	0	1	2	3	4
If you wished to, how confident are you that you could find the time in the next 6 months to go to your health care provider for three visits to get vaccinated against HPV?	0	1	2	3	4
If you wished to, how confident are you that you could afford to get vaccinated against HPV in the next 6 months?	*0*	1	2	3	4

Please indicate how much you agree or disagree with the following statements about the people or groups of people in your life.						
	Completely Disagree	*Somewhat Disagree*	*Neither Agree or Disagree*	*Somewhat Agree*	*Completely Agree*	*Not Applicable*
My friends would think that getting the HPV vaccine is a good idea.	0	1	2	3	4	-
My family would think that getting the HPV vaccine is a good idea.	0	1	2	3	4	-
My main healthcare provider would think that getting the HPV vaccine is a good idea.	0	1	2	3	4	-9
My spiritual/religious community would think that getting the HPV vaccine is a good idea.	0	1	2	3	4	-9
If I was in a relationship with someone, they would think that getting the HPV vaccine is a good idea.	0	1	2	3	4	-
Students at my university think that getting the HPV vaccine is a good idea.	0	1	2	3	4	-

Please indicate your beliefs about HPV vaccine safety.					
	Strongly Disagree	*Somewhat Disagree*	*Neither Agree nor Disagree*	*Somewhat Agree*	*Completely Agree*
The HPV vaccine might cause short term problems, like fever or discomfort.	0	1	2	3	4
The HPV vaccine might cause lasting health problems.	0	1	2	3	4
I think the HPV vaccine is unsafe.	0	1	2	3	4
Please indicate your beliefs about how well the HPV vaccine works.					
	Not at all Effective	*Slightly Effective*	*Moderately Effective*	*Very Effective*	*Completely Effective*
How effective do you think the HPV vaccine is in preventing cervical cancer?	0	1	2	3	4
How effective do you think the HPV vaccine is in preventing genital warts?	0	1	2	3	4