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## Readiness for HPV Vaccination: A Comparison of Male and Female College Students

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READINESS FOR HPV VACCINATION:  
A COMPARISON OF MALE AND FEMALE  
COLLEGE STUDENTS

BY

ANNE C. FERNANDEZ

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE  
REQUIREMENTS FOR THE DEGREE OF  
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OF  
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## ABSTRACT

**Background:** Human Papillomavirus (HPV) is the most common sexually transmitted disease in the world. It is associated with significant morbidity and mortality in both sexes, accounting for approximately 5% of all cancers worldwide. Receiving the HPV vaccine can substantially reduce the risk of HPV infection and subsequent disease. At this time the majority of Americans reach adulthood without being vaccinated. Increasing HPV vaccination among young adults requires empirical assessment and understanding of HPV-related beliefs and behaviors among this population. To achieve this goal, three studies were conducted.

**Study 1:** This study examined demographic and psychosocial correlates of HPV vaccination among 834 young adults. HPV vaccination rates in this sample were 73.7% for women and 26.1% for men. Gender comparisons indicated women were more likely to have heard of HPV, received the HPV vaccine, and had higher HPV-related knowledge. Health-care providers and mothers were common sources of vaccine recommendation among men and women. Those who identified as white and/or Hispanic and participants with health insurance were most likely to have received the vaccine. Other predictors of vaccination included higher HPV-related knowledge and perceived responsibility for HPV prevention. These findings underscore several important demographic and psychosocial factors associated with HPV vaccination.

**Study 2:** This study developed and validated measures of the TTM constructs Stage of Change, Decisional Balance, and Self-Efficacy in young adult men ( $N = 329$ ). The stage distribution was: Precontemplation 54.1%, Contemplation 14.6%, Preparation

5.2%, and Action/Maintenance 26.1%. Principal Components Analysis (PCA) performed on a split half sample revealed a 2-factor solution for the Decisional Balance scale, representing both Pros ( $\alpha = 0.78$ ) and Cons ( $\alpha = 0.83$ ). For the Self-Efficacy scale, PCA revealed a single-factor solution ( $\alpha = 0.83$ ). Confirmatory Factor Analysis (CFA) confirmed that the two-factor uncorrelated model for Decisional Balance,  $\chi^2 (35) = 82.6$ ,  $p < .001$ , CFI = .92, GFI = .92, AASR = .06, and a single factor model for Self-Efficacy,  $\chi^2 (14) = 43.4$ ,  $p < .001$ , CFI = .93, GFI = .92, AASR = .04. Follow-up ANOVAs supported the theoretically predicted relationships between Stage of Change, Pros, and Self-Efficacy. Overall, these results support the validity of these TTM measures for HPV vaccination among young adult men and provide the foundation for an intervention to promote vaccine acquisition.

**Study 3:** This study examined gender invariance for measures of Decisional Balance and Self-Efficacy for HPV vaccination using data collected from 329 men and 505 women. The original measures were developed in Study 2 and in past research. Structural equation modeling was used to test for factorial invariance. Pattern Identity Invariance was a good fit for the Decisional Balance measure. The highest level of invariance, Strong Factorial, was a very good fit for Self-Efficacy. Evidence of Pattern Identity and Strong Factorial invariance for Decisional Balance and Self-Efficacy, respectively, indicates that measures of the latent constructs Decisional Balance and Self-Efficacy are the same across male and female subgroups. These measures will yield meaningful comparisons of men and women in future research and clinical applications.

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# CHAPTER 1

## INTRODUCTION

Lifetime risk of HPV infection exceeds 50% for men and women (Centers for Disease Control and Prevention, 2009). With regards to men, a literature review of 40 studies of HPV prevalence (types, 6, 11, 16, and 18) indicated prevalence rates that ranged from 1.3%-72.9% (Dunne, Nielson, Stone, Markowitz, & Giuliano, 2006). In general, studies that sampled multiple anatomical sites and specimens found higher incidences of HPV infection (Dunne et al., 2006; Nielson et al., 2007). In one such comprehensive study, overall HPV prevalence was 65.4% among 463 men ages 18 to 40 (Nielson et al., 2007) indicating that HPV prevalence may be even higher than research typically reports. Prevalence estimates of HPV infection among women also vary, and rates are comparable to those reported among men. In a longitudinal study of women who were negative for HPV at a baseline, 60% of the women contracted HPV at some point over a five year follow-up period (Baseman & Koutsky, 2005). In a large national sample of women (N = 4,150) ages 14 - 59, the rate of current HPV infection was 42.5% overall (Hariri et al., 2011).

In addition to anogenital HPV infection, oral HPV infection is a growing concern internationally among both men and women (Chaturvedi et al., 2011; Ramqvist & Dalianis, 2010). Approximately, 6.9% of men and women in the United States had an oral HPV infection in a recent national study (Gillison et al., 2012).

## **HPV-Related Health Problems**

HPV infection can lead to a myriad of health problems including anogenital cancers, oropharyngeal cancers, and anogenital warts. Although most cases of HPV clear on their own, HPV infection is implicated in approximately 99% of all cases of cervical cancer (Wang, 2007), 90-93% of anal cancers, 12-63% of oropharyngeal cancers, and 36-40% of penile cancers (Chaturvedi, 2010). Prior to HPV vaccination licensure for the years 1998 to 2003, 25,000 cases of HPV-associated cancers occurred annually in 38 states and the District of Columbia (Centers for Disease Control and Prevention, 2008a). While cervical cancers were the most common (10,800 annually), almost 7,400 potentially HPV-associated head and neck cancers occurred per year. The vast majority of these (5,700) were among men. Additionally, there were over 3,000 HPV-associated anal cancers per year (1,900 in women, and 1,100 in men), 2,300 incidences of vulvar cancer, 800 incidences of penile cancer, and 600 incidences of vaginal cancer (Hernandez et al., 2008; Joseph et al., 2008; Ryerson et al., 2008; Saraiya et al., 2008; Watson et al., 2008).

Women are disproportionately affected by HPV-related cancers and as a result prevention efforts have predominately targeted females only. Due to these targeted efforts rates of cervical cancer have decreased in the United States, while rates of other HPV-related cancers have increased (Chaturvedi, 2010). Oral cancer, the second most common HPV-associated cancer, is on the rise, especially among males (Ryerson et al., 2008). In a large population based study, the overall prevalence of oral HPV infection was significantly higher for men (10.1%) than women (3.6%) even after controlling for sexual behavior (Gillison et al., 2012). Anal cancer diagnosis has

increased several fold since 1973 (Maggard, Beaney, & Ko, 2003). Anal cancer occurs in both genders, but survival rates following diagnosis are lower for men at all stages of the disease (Joseph et al., 2008).

Alarmingly, among men who have sex with men rates of anal cancer are higher than rates of cervical cancer among women (Chin-Hong et al., 2005; Goedert et al., 1998; Jemal et al., 2003). Although anal HPV infection is not uncommon among heterosexual men (Nyitray et al., 2010) it has been called “nearly universal” among gay and bisexual men (Vajdic et al., 2009) who are 17 times more likely to develop anal cancer. Individuals with weak immune systems, such as those carrying the human immunodeficiency virus (HIV) are also at higher risk for developing HPV-related cancers and are also more likely to get severe cases of genital warts that are hard to treat (Centers for Disease Control and Prevention, 2010). These increasing rates of anal and oropharyngeal cancers, particularly among men, warrant additional prevention efforts.

Race, ethnicity, education, and socio-economic status are also related to HPV infection, morbidity, and mortality. African- American women are at greater risk for HPV infection (Hariri et al., 2011), incidence of cervical cancer (Schairer, Brinton, Devesa, Ziegler, & Fraumeni, 1991), and morbidity resulting from cervical cancer (Ries et al., 2006). Hispanic/Latina women are also more likely to be diagnosed with cervical cancer, and Hispanic men suffer from a disproportionate number of HPV-related cancers (Colón-López, Ortiz, & Palefsky, 2010; Hernandez et al., 2008). Rates of HPV infection and related cancers may be lower among Asian/Pacific Islanders (Akogbe et al., 2012; Hernandez et al., 2008). Lower education and higher poverty are

also associated with incidence of HPV-related cancer (Benard et al., 2008; Hernandez et al., 2008).

While the development of anogenital and oropharyngeal cancers are the most serious HPV-related risks, HPV diagnosis and genital warts have a substantial psychosocial impact on the individual and society (Daley et al., 2010; Jeynes, Chung, & Challenor, 2009). The Centers for Disease Control and Prevention (CDC) indicates that about 1% of males and females in the U.S. have genital warts at some time in their lives (Centers for Disease Control and Prevention, 2008b). However, the National Disease and Therapeutic Index estimates are much higher. During their 1999-2004 survey years 5.6% (95% CI: 4.9-6.4) of sexually active 18-59 year olds self-reported a history of a genital wart diagnosis (Dinh, Sternberg, Dunne, & Markowitz, 2008).

### **HPV Vaccination**

In June 2006, a quadrivalent HPV (Gardasil) vaccine was licensed for use in the United States among females ages 9 – 26 to prevent anogenital cancers, precancerous lesions, and genital warts (U.S. Food and Drug Administration, 2006). Gardasil is a quadrivalent vaccine that provides protection against the four strains of HPV, namely types 6, 11, 16, and 18. Types 6 and 11 are “low-risk” strains that can lead to genital warts, while types 16 and 18 are “high-risk” strains that can lead to various cancers and precancerous lesions (Centers for Disease Control and Prevention, 2009). A second bivalent vaccine (Cervarix) was approved for use among women in 2009 and protects against high-risk HPV types 16 and 18 (U.S. Food and Drug Administration, 2009b). In October, 2009 the US Food and Drug Administration approved the

quadrivalent vaccine to prevent genital warts among males ages 9 -26 years old (U.S. Food and Drug Administration, 2009a), and in 2010 it was approved to prevent anal cancers and precancerous lesions among males and females ages 9-26 (U.S. Food and Drug Administration, 2010).

Following approval from the FDA, the Advisory Committee on Immunization Practices (ACIP) conducted an investigation and recommended routine use of the quadrivalent HPV vaccine for females in 2007 and for males in 2011 (Centers for Disease Control and Prevention, 2007; Centers for Disease Control and Prevention, 2011b). The recommended schedule is a 3-dose series with the second and third doses administered two and six months after the first dose. The recommended age for vaccination of males and females is 11-12 years, but can be administered as young as 9 years. “Catch-up” vaccination is recommended for females aged 13-26 and males ages 13-21 years who have not been previously vaccinated. Men as old as 26 years may be vaccinated but they fall outside the age range for “routine” vaccination.

According to the CDC, the cost of the vaccine in 2010 is \$125 per dose (\$375 for series) making it the most expensive vaccine in the U.S. immunization schedule. It is the only vaccine that prevents a sexually-transmitted disease (Rodewald & Orenstein, 2009) and the only vaccine that prevents against any form of cancer.

**Vaccine Controversy.** The HPV vaccine has been controversial since its debut due to doubts about its efficacy and safety as well as religious and moral objections related to its association with sexual activity (Benítez-Bribiesca, 2009). Many of these safety and efficacy concerns are unsubstantiated but continue to persevere in the general population and popular press. In particular, the appropriateness and cost-

effectiveness of male-vaccination is an area of ongoing debate and controversy (Stupiansky, Alexander, & Zimet, 2012). Those who support the universal recommendation for the HPV vaccine in men point out that the female-only recommendation (a) does not protect men who have sex with men, (b) that gender-neutral vaccination is the quickest way to produce “herd-immunity,” (c) that both genders transmit HPV and thus a universal vaccine is more equitable from a public health perspective, (d) that men suffer from genital warts and HPV-related cancers, and (e) that a universal vaccination is generally more effective and less confusing to the public (Rosenthal & Zimet, 2010). The majority of practicing physicians supported the gender-neutral vaccine recommendation; 94% either somewhat or strongly agree that men should be vaccinated (Weiss, Zimet, Rosenthal, Brenneman, & Klein, 2010). Those who oppose the HPV vaccine for males argue that male vaccination is not cost-effective if female vaccination rates are high, and that the need to prevent HPV infection in high-risk subgroups (e.g. men who have sex with men) does not warrant vaccination of all men (Peres, 2010).

Due to these ongoing debates and uncertainty regarding the cost-effectiveness of male vaccination, the ACIP provided a “permissive” recommendation for male HPV vaccination in 2009 allowing for the administration of the HPV vaccine among males ages 9-26 but not making it part of their routine vaccination schedule (Peres, 2010). The full-recommendation was made two years later in 2011, a full four years after the female vaccination received the same recommendation (Centers for Disease Control and Prevention, 2011b). The ACIP made the full-recommendation on the basis of vaccine safety data, the estimated impact of HPV-related disease and cancer on men

and women, cost-effectiveness analysis, and other programmatic considerations. Cost-effectiveness studies suggest that the male vaccination is cost-effective when female vaccine coverage is low and the full range of HPV-related health-outcomes and associated-diseases are considered (Centers for Disease Control and Prevention, 2011b). Private insurance coverage of the vaccine(s) varies, however the “routine” recommendation means that most will cover the vaccine for males and females. Vaccination is covered by managed care organizations, the vaccine for children program, and those without private health insurance may be reimbursed through Merck-funded assistance programs (Haupt & Sylvester, 2010)

**Gender and HPV Vaccination.** Due to its very recent licensure and approval, limited data is available on HPV uptake among men but estimates from 2011, indicate that as few as 2.8% of adult men between the ages of 19-21 received  $\geq 1$  dose of the vaccine, relative to 43.1% of young adult women in the same age range (Centers for Disease Control and Prevention, 2013). This is an increase from 2010 when less than 1% of adult men, and 28.2% of adult women had received any doses of the vaccine. Among adolescent males, 8.3% received  $\geq 1$  dose of the vaccine in 2011, while over half (53.0%) of adolescent girls were vaccinated (Centers for Disease Control and Prevention, 2012). Collectively, these data reveal that in recent years approximately half of females and the vast majority of males in the US reach adulthood without receiving the HPV vaccine. Unfortunately, vaccination rates also remain low when men and women turn 18 and can make their own medical decisions.

Given the gender difference in vaccine uptake and earlier vaccine licensure, it is not surprising that women have higher awareness of HPV and the HPV vaccine. In



research recruiting nationally representative samples, 79% of women were aware of the availability of the HPV vaccine (Jain et al., 2009), relative to 73% of gay and bisexual men (Reiter, Brewer, McRee, Gilbert, & Smith, 2010), and 63% of heterosexual adult men (Reiter, Brewer, & Smith, 2010). Research that directly compares men and women's awareness of HPV and acceptability of the vaccine is still emerging but reveals discrepancies between men and women, with women having higher rates of knowledge and intentions to be vaccinated. Among students (N = 575) at three colleges, males were significantly less likely to have heard of HPV, scored lower in HPV knowledge, were less likely to perceive HPV health outcomes as severe, less likely to perceive benefits of the vaccine, reported fewer cues for vaccine acceptance, and perceived more barriers to vaccination compared to females (Bynum, Brandt, Friedman, Annang, & Tanner, 2011). In a study of young adults at two universities, 94% of women had heard of HPV as compared to 62% of men. Women also had higher overall knowledge scores, while men had higher perceived shame related to HPV vaccination diagnosis (Gerend & Magloire, 2008). These gender differences are not limited to American adults. Awareness and knowledge of HPV is higher among women in Holland (Lenselink et al., 2008), Australia (Pitts et al., 2010), and Portugal as well (Medeiros & Ramada, 2010). These findings underscore that education is an initial hurdle in terms of increasing male vaccination; Without awareness of HPV and the availability of the vaccine, interest in vaccination among men will remain low.

**Race/Ethnicity and HPV Vaccination.** Intention to vaccinate varies across racial and ethnic subgroups. Results of research generally indicate that individuals

who identify as white have higher rates of vaccine uptake and intention to receive the HPV vaccine, and some research has found higher rates of vaccination among Hispanic women as well. A study of women receiving Medicaid in Florida revealed Hispanic women had the highest rates of vaccine initiation followed by white non-Hispanic women. Black women had the lowest rates of vaccine initiation and were half as likely as their white counterparts to complete the 3-shot vaccine series (Cook et al., 2010). A study of adolescent girls in Pittsburgh reported similar racial disparities, indicating that even after controlling for public assistance; black females were approximately 35% less likely than white females to have any dose of the HPV vaccine (Keenan, Hipwell, & Stepp, 2012). Among 1,019 women ages 18-24 years old, non-Hispanic white women were most likely to report HPV vaccination and awareness, followed by non-Hispanic black women, and Hispanic women (Ford, 2011).

Among men there is initial evidence that Hispanic men are more likely to intend to receive the HPV vaccine, relative to non-Hispanic white men, and non-Hispanic black men (Daley et al., 2011). These findings underscore the importance of HPV vaccine promotion efforts among diverse populations.

**HPV Vaccination and College Students.** College students are an important population to target with regards to HPV prevention and HPV vaccination promotion. College students tend to be the appropriate age for adult HPV vaccination and are at high risk for contracting HPV (Partridge et al., 2007). Research indicates students are more willing to be vaccinated than the general public. A literature review of male attitudes regarding the HPV vaccine indicates that 74% - 78% of college men reported

they were willing to get the HPV vaccine, compared to 33% of men in a community sample (Liddon, Hood, Wynn, & Markowitz, 2010). College attending women are also more likely to indicate intentions to receive the HPV vaccine relative to their non college-attending peers (Manhart et al., 2011). Despite increased willingness to receive the HPV vaccine, qualitative research suggests that there are many misperceptions about HPV and underestimation of risk among college students (Allen, Fantasia, Fontenot, Flaherty, & Santana, 2009). In a recent study, men recognized that HPV was a sexually transmitted infection that was more common among individuals with numerous sexual partners. However, it was still perceived as a “women’s disease.” Awareness of HPV-related cancers in men was low and many misunderstandings about the actual effects of HPV were apparent. Men were also apprehensive about the idea of being vaccinated, vocalizing doubts about vaccine safety, cost, and accessibility. In general men emphasized that education is necessary before prevention efforts will be successful among adult men (Allen et al., 2009). College women also misperceive the prevalence and risks associated with HPV infection. Licht and colleagues (2010) found that college women underestimate the risk of acquiring and transmitting HPV, and women with higher knowledge of specific HPV health risks were more likely to have received the HPV vaccine (Licht et al., 2010).

### **HPV Vaccine Promotion**

Increasing knowledge about HPV and awareness of the availability of the HPV vaccine are important steps for prevention of HPV. Examining HPV-related

knowledge is consistent with the health belief model and is included in the 'Consciousness Raising' process within the Transtheoretical Model of Change (J. O. Prochaska, Velicer, DiClemente, & Fava, 1988; J. O. Prochaska & DiClemente, 1983; von Wagner, Steptoe, Wolf, & Wardle, 2009). Health-literacy is considered an important factor in decision-making and miscommunication of health information can have deleterious effects (von Wagner et al., 2009). Research indicates that men and women have critical knowledge deficits with regards to HPV viral transmission, prevention, screening, and treatment (Allen et al., 2009; Licht et al., 2010; Sandfort & Pleasant, 2009; Wong & Sam, 2010). Brief educational interventions have been effective at correcting such knowledge deficits, increasing understanding of HPV, and increasing positive attitudes towards HPV vaccination (Gottvall, Tydén, Höglund, & Larsson, 2010; Lambert, 2001; Reiter, Stubbs, Panozzo, Whitesell, & Brewer, 2011).

While health-literacy is an important factor in many areas of health-related decision making, knowledge-based interventions are not necessarily sufficient for increasing intention to vaccinate. For example, among parents, an HPV vaccine information sheet increased post-intervention knowledge but not intentions to vaccinate their child relative to a control group (Dempsey, Zimet, Davis, & Koutsky, 2006). An experimental study that provided men with education about the health benefits of HPV vaccination found that educating them about benefits to the partner (e.g. preventing cervical cancer) did not increase intentions to receive the vaccine (Gerend & Barley, 2009). While knowledge and awareness are essential for young adults to make informed decisions about HPV prevention, information alone does not appear to be a sufficient to increase vaccination rates. Similar conclusions have been

drawn in other areas of health behavior change (Baranowski, Cullen, Nicklas, Thompson, & Baranowski, 2003).

### **Psychosocial Predictors of Vaccination**

There are a number of behavioral and psychosocial predictors of HPV acceptability and uptake include being sexually active, having a higher number of lifetime sexual partners, having higher perceived efficacy of vaccine, having higher perceived health benefits of the vaccination, having a higher perceived susceptibility to HPV physician recommendation, and anticipated regret if one were to forgo vaccination and later contract HPV (Anhang Price, Tiro, Saraiya, Meissner, & Breen, 2011; Brewer & Fazekas, 2007; Daley et al., 2011; Dempsey, Butchart, Singer, Clark, & Davis, 2011; Keenan et al., 2012; Krawczyk et al., 2012; Liao, Stupiansky, Rosenthal, & Zimet, 2012; Lu et al., 2011; Reiter, Brewer, & Smith, 2010; Reiter, Brewer, McRee et al., 2010). HPV vaccine cost and access are also important predictors of vaccine intentions. Increasing cost of the HPV vaccine is inversely related to intention to vaccinate among men and women (Liao et al., 2012), as is being uninsured (Anhang Price et al., 2011; Patel et al., 2012). Less than half of adult men in one study reported they had somewhere they could get the vaccine (Daley et al., 2011) which underscores the importance of increasing men's awareness of vaccine providers and outlets. Future interventions should aim to apply to intervene on modifiable and empirically-based predictors of vaccination, not just aim to increase knowledge and awareness of HPV and the vaccine.

Interventions that use psychological theory or target behavioral factors in an effort to increase HPV vaccination are not well-represented in the literature. However, several novel intervention strategies have been successfully implemented. One study used text messaging to promote vaccine series completion. This intervention effectively increased completion of the second and third dose of the HPV vaccine using text reminders; however, participants self-selected in to the text-messaging program and may have been more intrinsically motivated to complete the series (Kharbanda et al., 2011). A four-arm randomized study examined the efficacy of culture-centric narrative interventions. Results indicated college women were almost twice as likely to report HPV vaccination at a 2-month follow-up after watching a video that combined peer- and expert-based narratives on HPV vaccination. Mediation analyses indicated that increases in self-efficacy (psychological and logistical) mediated increases in HPV vaccination (Hopfer, 2012). However, watching the peer-based narrative alone did not increase HPV vaccination, and watching the expert-based narrative alone actually decreased HPV vaccination rates relative to the control group. These results underscore the importance of message source and self-efficacy in promoting vaccination and also the complexity of the vaccine-related decision-making process.

### **The Transtheoretical Model of Change**

Clearly there is a need for an intervention among young adults, and men in particular, to increase HPV-related knowledge, acceptability, and motivation to receive the HPV vaccine series. However, before such intervention can occur, reliable

and valid measures must be developed to assess knowledge, attitudes, and motivation as they relate to HPV and the HPV-vaccination. Measures that are organized around a systematic behavior change framework would be particularly useful for future intervention development and tailoring. One such framework is the Transtheoretical Model of Behavior Change (TTM). The TTM is an integrative model of behavior change that uses the constructs of Stages of Change, Decisional Balance, Self-efficacy, and Processes of Change to understand and predict how people make behavioral health changes (C. C. DiClemente, Prochaska, & Gibertini, 1985; C. C. DiClemente et al., 1991; J. O. Prochaska & DiClemente, 1983; Velicer, DiClemente, Prochaska, & Brandenburg, 1985). Stage of Change is the central organizing construct of the TTM. It represents a temporal/developmental dimension as evidenced by 5 stages: Precontemplation (PC), Contemplation (C), and Preparation (PR), Action (A), and Maintenance (M). Traditionally, Precontemplators are those who are not intending to make a change (i.e. get vaccinated) in the next six months. Contemplators are intending to change in the next six months. People in the Preparation stage are planning to change in the next 30 days (and have made a previous attempt to improve). People in the Action and Maintenance stages have reached some behavioral criterion (such as successful vaccination), with those in Action having reached criterion within the last six months.

The Decisional Balance construct provides a measure of an individual's rating of the relative importance of the pros versus the cons of changing a specific behavior (Velicer et al., 1985). Research indicates that the pros are more salient in the earlier stages and the cons are more important to intervene upon in the later stages (Hall &

Rossi, 2008). A crossover in which pros begin to outweigh cons typically occurs in during the preparation stage, and is believed to be necessary for behavior change to occur. Self-efficacy theory originally proposed by Bandura (Bandura, 1977; Bandura, 1982) was adapted for use with the TTM. Situational self-efficacy embodies the level of confidence an individual has to engage in a new behavior or to maintain a behavior in a variety of challenging situations (Velicer, DiClemente, Rossi, & Prochaska, 1990). Self-efficacy, is expected to increase as one progresses through the stages (J. S. Rossi & Redding, 2001).

### **The Current Study**

This study aims to examine motivation and decision-making related to HPV vaccination among male and female college students using the TTM as an organizing framework. The proposed research represents the first application of the TTM to male HPV vaccination and the first to use this empirical behavior change model to explore gender differences in vaccine readiness. The current research is presented as three "studies."

Study 1 aims to present descriptive information about HPV awareness, knowledge, and perceptions of responsibility for HPV vaccination among young adult men and women, and subsequently examines these factors as predictors of HPV vaccination status. In pursuit of this goal, study 1 also aims to develop measures of HPV-related Knowledge and Perceived Responsibility for HPV vaccination . Concurrent measurement and examination of men and women enables relevant gender-based comparisons for all constructs.



Study 2 aims to develop and test male-specific measures of TTM constructs including Stage of Change, Decisional Balance, and Self-Efficacy using qualitative and quantitative measurement development among a sample of 329 young adult men.

Study 3 aims to examine gender invariance with regards to the measures of readiness for HPV vaccination developed in Study 2 and in past research (Lipschitz et al., 2013). Measurement structure of the Decisional Balance and Self-Efficacy Scales are compared using data from 834 men and women.

## CHAPTER 2

### METHODOLOGY

#### STUDY 1

##### Recruitment

The target population for this study included men and women between the ages of 18 and 26 years old. Individuals under 18 years old were excluded because of the study's emphasis on health-related decision making in the absence of parental consent. Individuals over 26 years old were excluded because HPV vaccination among is recommended through the age of 26 only. No participant was excluded on the basis of race, ethnicity, gender, or sexual orientation.

Recruitment took place during the fall of 2011 and spring of 2012. Men and women were recruited from undergraduate psychology courses at the University of Rhode Island and through a national survey sampling company. Participants recruited through the university received class extra credit as an incentive for participation, and those recruited through the survey company received monetary compensation based on the survey company's payment structure (range: \$1.00 - \$2.00 for survey completion). All recruitment and human subject's procedures were approved by the university's institutional review board.

On-campus recruitment resulted in a predominantly female sample due to the disproportionate number of female students in the targeted psychology courses. In order to recruit a larger male sample additional men were recruited from a national

survey sampling company. The male samples from the two sources were compared to determine whether differences existed in terms of demographics or other key measures. Chi square analyses revealed the university sample had a higher proportion of white participants and a higher proportion of participants with health insurance. Male participants did not differ with regards to ethnicity, awareness of HPV, or Stage of Change for HPV vaccination.

### **Participants**

The final sample included 834 men and women. Demographic details can be found in Table 1. Recruitment from the university yielded 505 women and 210 men. An additional 119 men were recruited from a survey sampling company for a total combined sample of 505 women (60.6%) and 329 men (39.4%). In terms of race, the sample was 83% white, 6.8% black, 4.3% Asian, and 5.9% 'Other.' With regards to ethnicity, 9.1% of the sample identified as Hispanic. Participant's religious affiliations were 46.9% Catholic, 22.8% Protestant, 9.8% Atheist/Agnostic, 4% Jewish, 9% 'Other,' and an additional 7.6% chose 'Don't Know/Not sure. The median age was 20 years-old. In total 98.2% of the sample was in school, and the majority were college freshman (51.3%). The median grade point average was in the 3.1 to 3.5 range. Most participants had health insurance (92.1%). In terms of sexual orientation, 94% of the sample identified as heterosexual, 1.2% identified as homosexual, 3% as bisexual, and 0,7% as "other." An additional 1.1% did not identify their sexual orientation.

## **Measurement Development**

The current study evaluated both men and women, thus it was important to have measures that assessed HPV-related issues relevant to and validated among both genders. To address this need measures were developed using qualitative and quantitative methodology. Items were generated through 8 focus groups and 8 cognitive interviews conducted among men and women (men and women were in different groups). Focus groups aimed to develop measurement content and cognitive interviews evaluated item comprehension and interpretability. Finally the research team contacted other investigators conducting research on HPV vaccine uptake to review the content validity of the instruments. All items generated through male and female qualitative measurement development are presented in Tables 2 and 3.

## **Measures**

Participants provided demographic information such as gender, age, race, ethnicity, and religious affiliations.

*Stage of Change for HPV vaccination.* A short series of questions regarding past and present HPV-vaccine related behavior were developed to place participants in one of four mutually exclusive categories for stage of change (PC, C, Prep, A/M). Figure 1 describes the staging algorithm for HPV vaccination. The Action and Maintenance Stages are combined because maintenance for HPV vaccination is biologically determined and relapse back to an unvaccinated state cannot occur.

*Knowledge.* To determine the role of HPV-related knowledge this study assessed participant's knowledge of HPV transmission, risk factors, and health consequences among men and women (e.g., males can develop HPV-related cancers). Fifteen HPV-

related knowledge were rated by participants as “True,” “False,” or “Don’t Know” The “Don’t know” response option was given to discourage guessing. The response options were then coded to represent correct and incorrect responses (0 = incorrect/don’t know; 1 = correct). See Figure 2 for final items.

*Perceived Responsibility.* Seven items assessed participants gender-related beliefs regarding HPV prevention. Participants were asked the degree to which they agreed with a given statement (e.g. *Men and women should receive the HPV vaccine*). Responses are made on a 5-point scale, ranging from 1 = “completely disagree” to 5 = “completely agree.” See Figure 3 for final items.

*Sexual Orientation and Behavior.* Past sexual behavior was assessed by asking participant's their lifetime number of sex partners (open-ended). Condom use was assessed with one item: "How often do you use condoms when having vaginal or anal sex?" Response options ranged from 1 = "Never" to 5 = "Always." Sexual orientation was assessed using a single item asking whether participants identified as "Heterosexual," "Bisexual," or "Homosexual." An open-ended 'other' category was also provided.

### **Statistical Analyses**

Chi square tests of independence were used to compare categorical variables such as HPV-related awareness and HPV vaccination status across demographic groups. Analysis of Variance (ANOVA) was used to examine mean differences in continuous variables such as HPV-related knowledge and perceived responsibility across demographic groups. Categories of race had to be combined in to 'white,'

'black,' and 'other' to ensure adequate sub-group sizes for analyses. Data normality was examined using the Shapiro-Wilk test of normality. Non-normal data underwent logarithmic transformation. Significance of statistical tests and effect sizes are reported for all analyses. Effect size conventions of small, medium, and large are assigned according to standards put forth by (Cohen, 1988).

Exploratory and confirmatory data analytic techniques were used to develop the knowledge and perceived responsibility scales. A split-half sample was used for cross-validation of measures. The overall Cronbach's alpha was examined to determine scale reliability. The exploratory stage of measurement development applied principal components analysis (PCA) with varimax rotation on item correlation matrixes. The number of components retained were based on the minimum average partial procedure (MAP; Velicer, 1976) and parallel analysis (Horn, 1965). The PCA estimated the number of components and their correlation, factor loadings, and the internal consistency coefficient for each component. Factor loadings were examined and poorly loading items (those less than 0.40 or greater than 0.90) and complex items (those with a factor loading greater than 0.40 on more than one component) were removed (Redding, Maddock, & Rossi, 2006). Final item selection was determined on the basis of item clarity, lack of redundancy, and conceptual breadth of theory.

Confirmatory factor analysis was conducted on the second half of the sample using the components and items indicated in the PCA. Analyses were conducted using EQS structural modeling computer program (P. M. Bentler, 1993). Fit indices used to determine the best fitting model included (1) the likelihood ratio chi square statistic, (2) root mean-square error of approximation (RMSEA), (3) the comparative fit index

(CFI), and (4) the average absolute standardized residual statistic (AASR). Diagnostic indicators provided by the analysis were used to detect poorly functioning items.

## **STUDY 2**

This study is a measurement development trial and initial application of the TTM to HPV vaccination among young adult men. The present study describes the development of TTM-based measures of Stage of Change, Decisional Balance, and Self-Efficacy for HPV vaccination which are tailored to men ages 18 to 26 years old. Data to develop measures of the processes of change were not collected for this project. The current study builds upon (Lipschitz et al., 2013) work that developed tailored theory-driven TTM measures for use among young adult women.

### **Measurement Development**

The current study employed a sequential approach to measurement development (Jackson, 1970; Jackson, 1971; Redding et al., 2006). Measurement development followed the following steps as defined by (Redding et al., 2006): (a) defining the construct, (b) writing scale items, (c) expert review, pilot testing, and formative research, (d) field testing and exploratory analysis (e) data collection, (f) item analysis, and (g) cross validation and confirmatory analysis. Measurement development proceeded from a comprehensive literature review to qualitative item development, focus groups, cognitive interviews, survey administration, and quantitative analysis. It evaluated the utility of an algorithm approach to determining Stage of Change, and developed Decisional Balance and Self-Efficacy scales. The patterns of these

constructs across Stage of Change were compared to those established in previous research (Hall & Rossi, 2008).

### **Item Development**

Using these female-based measures as a guide (see Lipschitz et al., 2013), item development for men was conducted. The previously developed female-specific items were modified and new items were added to the item pool to assess issues more relevant to men. In addition, pre-existing TTM-based measures from a variety of health behaviors were reviewed (e.g. blood donation) to ensure adequate breadth of construct. The items were further refined through qualitative methods such as focus groups and cognitive interviews. All focus groups and cognitive interviews were facilitated by male graduate students and/or male undergraduates seniors. Please see Appendix A for the items for all measures.

*Focus Groups.* Four focus groups were conducted ( $N = 28$ ) by recruiting men between the ages of 18 and 26 from undergraduate psychology classes. Each focus group was co-facilitated by two male psychology graduate students or advanced undergraduates. The focus group lasted approximately 1.5 hours and participants received \$20 as compensation. The primary purpose of these groups was to assess the HPV-related beliefs and attitudes of males in the target population to inform measurement development.

*Cognitive Interviews.* Following focus groups and item development, four one-on-one cognitive interviews were conducted ( $N = 4$ ). Each cognitive interview lasted



approximately one hour and participants received \$20 as compensation. The primary purpose of interviews was to determine the clarity and readability of the item pool.

## **Measures**

*Stages of change for HPV vaccination.* A short series of questions regarding past and present HPV-vaccine related behavior were developed to place participants in one of four mutually exclusive categories for stage of change (PC, C, Prep, A/M). Figure 1 describes the staging algorithm for HPV vaccination. The Action and Maintenance Stages are combined because the maintenance for HPV vaccination is biologically determined and relapse back to an unvaccinated state cannot occur.

*Decisional Balance.* Twenty-two items were designed to represent the pros (11 items) and cons (11 items) of HPV vaccination. Participants were asked to rate how important each item is in their decision whether or not to get the HPV vaccine (e.g., I will be protecting myself from a sexually transmitted infection). Responses are made on a 5-point scale, ranging from 1 = “not at all important” to 5 = “extremely important.”

*Self-Efficacy.* Thirteen items were designed to assess an individual’s confidence in their ability to receive the HPV vaccine in a variety of situations that may present challenges or obstacles to engaging in the behavior (e.g., when it seems too expensive). Responses are made on a 5-point scale, ranging from 1 = “not at all confident” to 5 = “extremely confident.”

## **Recruitment**

The target population for this study included men between the ages of 18 to 26 years old. Individuals under 18 years old were excluded because of the study's emphasis on health-related decision making in the absence of parental consent. Individuals over 26 years old were excluded because HPV vaccination among men is recommended through the age of 26 only. No participant was excluded on the basis of race, ethnicity, gender, or sexual orientation. Efforts to recruit a diverse sample of students at the target university were undertaken. The study was advertised at the multicultural and LGBT (Lesbian, Gay, Bisexual, and Transgender) centers on campus.

Survey assessment recruitment took place during the fall of 2011 and spring of 2012. Participants were recruited from undergraduate courses at the University of Rhode Island and through a national survey sampling company. Participants recruited through the university received class extra credit as an incentive for participation, and those recruited through the survey company received monetary compensation based on the survey company's payment structure (range: \$1.00 - \$2.00 for survey completion). All recruitment and human subject's procedures were approved by the university's institutional review board.

*Sample Size Determination.* Approximately 300 participants were targeted for recruitment for the survey assessment. Sample size determinations were based on recommendations for exploratory and confirmatory factor analytic approaches put forth by (Clark & Watson, 1995; Guadagnoli & Velicer, 1988; S. M. Noar, 2003; Redding et al., 2006) In general, 200 to 300 participants are recommended for measurement development purposes when using cross-validation, with fewer subjects

needed when item loadings are high (.60 - .80) (Redding et al., 2006). Anticipated factor loadings for this study are medium in magnitude (.40 - .80) based on past TTM research examining HPV vaccination among women (Lipschitz et al., 2013).

*Consent and Human Subjects.* For focus groups and cognitive interviews, the consent form was thoroughly reviewed and all of the questions answered, before participation began. Facilitators reminded students that their decision to participate had no bearing on their academic standing or relationship with the university. Participants were free to leave the group/interview at any time. For students taking part in the assessment battery portion of this study, informed consent took place online. The principal investigator's name and contact information was provided to the student should questions arise. When participants accessed the study they saw a brief study introduction followed by the consent form. Students were required to agree to the consent form prior to accessing the survey.

## **Participants**

The final sample included 329 men. Demographic details can be found in Table 1. The sample was 76% white (n = 250), and 89.7% non-Hispanic (n= 295). The mean age was 21 years old (SD = 2.4). The sample was comprised almost entirely of undergraduate students (87.8%). The average GPA was in the 3.1 to 3.5 range. In terms of religion the largest portion of the sample identified as Catholic (36.5%) or Protestant (27.7%). Almost half of men lived in a dormitory or on-campus housing (47.7%). The majority of the sample had health insurance (87.2%) and most men had heard of HPV (80.5%). In total, 63.8% (n = 210) of men were recruited from the

university and 36.2% (n = 119) were recruited from the survey sampling company. The two samples were compared to determine whether differences existed in terms of demographics and readiness to receive the HPV vaccine. Chi square analyses revealed the university sample had a higher proportion of white participants and a higher proportion of participants with health insurance. Participants did not differ with regards to ethnicity, awareness of HPV, or Stage of Change.

### **Statistical Analyses**

Data was examined for violations of normality before exploratory and confirmatory measurement testing and analysis took place. Exploratory and confirmatory data analytic techniques were employed to study the psychometric properties of these measures. A split-half sample as used for cross-validation of measures. The overall Cronbach's alpha was examined to determine scale reliability. The exploratory stage of measurement development was applied principal components analysis (PCA) with varimax rotation on item correlation matrixes. The number of components retained were based on the minimum average partial procedure (MAP; Velicer, 1976) and parallel analysis (Horn, 1965). The PCA estimated the number of components and their correlation, factor loadings, and the internal consistency coefficient for each component. Factor loadings were examined and poorly loading items (those less than 0.40 or greater than 0.90) and complex items (those with a factor loading greater than 0.40 on more than one component) were removed (Redding et al., 2006). Final item selection was determined on the basis of item clarity, lack of redundancy, and conceptual breadth of theory.

Confirmatory factor analysis was conducted on the second half of the sample using the components and items indicated in the PCA. Analyses were conducted using EQS structural modeling computer program (P. M. Bentler, 1993). Fit indices used to determine the best fitting model included (1) the likelihood ratio chi square statistic, (2) root mean-square error of approximation (RMSEA), (3) the comparative fit index (CFI), and (4) the average absolute standardized residual statistic (AASR). Diagnostic indicators provided by the analysis were used to detect poorly functioning items.

External validity of the measures was determined by examining the functional relationship between Stage of Change and the measures of Decisional Balance and Self-Efficacy using multivariate analysis of variance. The results were then compared with construct relationships in other content areas.

### **STUDY 3**

Study 3 aims to examine gender invariance for measures of Decisional Balance and Self-Efficacy for HPV vaccination. The original measures were developed in Study 2 and in past research (Lipschitz et al., 2013). Measurement structure of the Decisional Balance and Self-Efficacy scales are compared using data collected from 834 men and women. See study 1 for methods related to participant recruitment and demographics.

#### **Sample Size**

Sample size consideration for this study took into account that the power to detect trivial differences in the properties of a measure across groups for larger samples ( $\geq 400$  per group) is high; however larger sample sizes may be needed when groups are

unequal, the number of indicators is low, and factor loadings differ substantially. For the current research, measures have 1 to 2 factors, and 4 to 6 indicators per factor; therefore a sample size of 300 or more per group is adequate to capture a meaningful difference with reference to measurement invariance (Guadagnoli & Velicer, 1988; MacCullum, Browne, & Cali, 2006).

## **Measures**

*Decisional Balance.* The measure of Decisional Balance for HPV vaccination was developed among men and women using the sequential method of scale development (Jackson, 1970; Jackson, 1971). Items were developed to represent the pros and cons of HPV vaccination. Participants were asked to rate how important each item is in their decision whether or not to get the HPV vaccine (e.g., I will be protecting myself from a sexually transmitted infection). Responses are made on a 5-point scale, ranging from 1 = “not at all important” to 5 = “extremely important.” The structure of the measure is a two-factor uncorrelated model with eight items: four items for pros of HPV vaccination and four items for cons of HPV vaccination. See Figure 4.

*Self-Efficacy.* The measure of Self-Efficacy for HPV vaccination was developed among men and women using the sequential method of scale development (Jackson, 1970; Jackson, 1971). Items were developed to assess an individual’s confidence in their ability to receive the HPV vaccine in a variety of situations that may present challenges or obstacles to engaging in the behavior (e.g., when it seems too expensive). Responses are made on a 5-point scale, ranging from 1 = “not at all

confident” to 5 = “extremely confident.” The structure of the measure single factor model with five items. See Figure 5.

### **Statistical Analyses**

Measures of Decisional Balance and Self-Efficacy for HPV vaccination were developed and tested among men and women using qualitative and quantitative research methods. See Study 2 for a full description of male measurement development and Lipschitz et al. (Lipschitz et al., 2013) for a description of female measurement development. These measurement development procedures resulted in a 8-item Decisional Balance measure for women, and a 10-item Decisional Balance measure for men. Measurement development resulted in a 5-item Self-Efficacy measure for women, and an 7-item for men. The male measures included additional items not included in the female measures. These additional items were excluded from invariance analysis to allow for matched comparisons.

To examine measurement invariance across gender for the constructs Decisional Balance and Self-Efficacy, perceived risk multiple group CFA was used (Vandenberg & Lance, 2000). Three levels of invariance were tested in sequential order, with each level requiring more constraints: 1) Configural Invariance (unconstrained nonzero factor loadings); 2) Pattern Identity Invariance (equal factor loadings); and 3) Strong Factorial Invariance (equal factor loadings and measurement errors). Strong Factorial Invariance is the most restrictive type of invariance (Horn, McArdle & Mason, 1983; Meredith, 1993). The two subgroups for the invariance procedures were women (n = 505) and men (n = 329). Gender invariance was determined by examining change in

model fit as the constraints and degrees of freedom were added using change in CFI. If the constrained model provides an acceptable fit, then the structural model can be treated as the “same” for both genders. If the parameters of interest are different, then the two samples must be treated differently (P. M. Bentler, 1993).



## CHAPTER 3

### RESULTS

#### STUDY 1

##### Awareness of HPV

Overall, the majority of young adults had heard of HPV (90.2%). Chi Square analyses indicated women were more likely to have heard of HPV than men (96.4% vs. 80.5%),  $\chi^2(1) = 56.73$ ,  $p < .001$ , Cramer's  $V = .26$ , a medium effect. Chi square tests of race (black, white, other) indicated white participants were more likely to have heard of HPV relative to other subgroups,  $\chi^2(2) = 16.72$ ,  $p < .001$ , Cramer's  $V = .14$ , a small effect. Non-Hispanic participants were more likely to have heard of HPV relative to Hispanic participants,  $\chi^2(1) = 6.96$ ,  $p < .01$ , Cramer's  $V = .09$ , a small effect.

##### Knowledge Scale

All 15 knowledge items and responses are displayed in Table 4. Most participants were aware of general facts about HPV (e.g. that a person could be infected with HPV and not know it); however, participants were less likely to know specific information about HPV transmission and vaccination (e.g. that person with HPV can still benefit from HPV vaccination).

*Knowledge Scale Exploratory Analyses.* The 15 knowledge items were included in an initial PCA. Varimax rotation on the 15 x 15 matrix of item intercorrelations was

conducted to determine the factor structure of the scale. A total of two PCAs were conducted, which ultimately reduced the pool of 15 items to 10. Poorly loading items were removed ( $< .40$ ). See Table 5 for final PCA factor loadings. MAP and parallel analysis indicated a one-component solution. Internal consistency was good ( $\alpha = .79$ ). The single factor accounted for 34.8% of the total variance.

*Knowledge Scale Confirmatory Analyses.* Two models were tested for knowledge to determine which model provided the best fit for the data: (1) null model (suggesting no latent factors and used as a comparative model), and (2) a one factor model. Fit indices for each model are summarized in Table 6. The one factor model showed the best fit, and results of the structural modeling produced good factor loadings and good to excellent model fit,  $\chi^2(35) = 94.9$ , CFI = .92, GFI = .96, AASR = .03, RMSEA = .06. The coefficient alphas of the scale in the confirmatory sample was .79. The final items and their loadings in the confirmatory sample are shown in Figure 2.

*Knowledge Scores across Groups,* With regards to the 10-item knowledge scale, women had higher knowledge scores ( $M = 6.9$ ,  $SD = 2.4$ ) than men ( $M = 5.7$ ,  $SD = 2.9$ ),  $F(1, 833) = 40.35$ ,  $p < .001$ . The effect for gender was small to medium,  $R^2 = .046$ . Knowledge differed significantly by race,  $F(2, 833) = 3.24$ ,  $p < .05$ . This effect for race was very small,  $R^2 = .008$ . Participants who identified as white had higher knowledge scores ( $M = 6.5$ ,  $SD = 2.6$ ) than those who identified as black ( $M = 5.9$ ,  $SD = 2.8$ ) or identified with 'other' racial backgrounds ( $M = 5.9$ ,  $SD = 2.8$ ). Hispanic participants had lower knowledge scores ( $M = 5.6$ ,  $SD = 3.1$ ) than those did not identify as Hispanic ( $m = 6.5$ ;  $SD = 2.6$ ),  $F(833) = 5.2$ ,  $p < .05$ . This effect for ethnicity was very small,  $R^2 = .008$ .

## **Perceived Responsibility**

The seven Perceived Responsibility items and the mean responses are displayed in Table 7. In general men and women agreed all people should be vaccinated, that insurance companies should pay for the vaccine for both genders and that men and women should inform their partners if they think/know they have HPV.

*Perceived Responsibility Exploratory Analyses.* The 7 Perceived Responsibility items were included in an initial PCA. Varimax rotation on the 7 x 7 matrix of item intercorrelations was conducted to determine the factor structure of the scale. A total of three PCAs were conducted, which ultimately reduced the pool of 7 items to 5. MAP and parallel analysis indicated a one-component solution. See Table 8 for all final PCA factor loadings. Internal consistency was good ( $\alpha = .85$ ). The single factor accounted for 63.1% of the total variance.

*Perceived Responsibility Confirmatory Analyses.* Two models were tested for knowledge to determine which model provided the best fit for the data: (1) null model (suggesting no latent factors and used as a comparative model), and (2) a one factor model. Fit indices for each model are summarized in Table 6. The one factor model showed the best fit, and results of the structural modeling produced good factor loadings and good to excellent model fit,  $\chi^2(5) = 127.2$ , CFI = .89, GFI = .89, AASR = .04, RMSEA = .24. The coefficient alphas of the scale in the confirmatory sample was .86. The final items and their loadings in the confirmatory sample are shown in Figure 3.

*Perceived Responsibility across Groups.* With regards to the 5-item Perceived Responsibility scale, The maximum potential score was 25 and the mean score was 22.07 (SD = 3.86). This indicates there was a potential ceiling effect. Women had higher Perceived Responsibility scores (M = 23.00, SD = 4.17) than men (M = 20.63, SD = 23.32),  $F(1, 833) = 39.78, p < .001$ . The effect for gender was small to medium,  $R^2 = .046$ . Perceived Responsibility did not differ significantly by race, ethnicity, or insurance status.

### **HPV Vaccination**

In the current sample, 73.7% of women and 26.1% of men had received the full HPV vaccine series. See Table 1 for percentages of men and women in each Stage of Change. Chi-square analyses of gender by Stage of Change was significant  $\chi^2(3) = 188.14, p < .001$ . Women were more likely to be in A/M (i.e. to have received the full vaccine series) relative to men. Men were more likely to be in PC and C. This was a large effect, Cramer's  $V = .47$ . Chi-square analyses of ethnicity by Stage of Change was significant. Those who identified as Hispanic were more likely to be in A/M and less likely to be in P or PC. The effect size was small, Cramer's  $V = .10$ . Chi-square analyses for race (black, white, other) by Stage of Change was significant  $\chi^2(6) = 13.13, p < .05$ . Participants categorized as white and 'other' were more likely to be in A/M relative to black participants. The effect size was small, Cramer's  $V = .09$ . Table 9 presents for effect size for all predictors of Stage of Change.

Insurance status was also related to Stage of Change. Participants who had insurance were more likely to be in A/M and less likely to be in PC,  $\chi^2(3) = 9.65, p$

=.02, This was a small effect (Cramer's  $V = .11$ ). Age was related to Stage of Change  $F(3, 833) = 17.28, p < .001, R\text{-squared} = .06$ . This was a medium effect. Follow-up Tukey tests revealed that participants in A/M ( $M = 20.18, SD = 1.63$ ) were younger than those in Precontemplation ( $M = 21.01, SD = 2.15$ ) and Contemplation ( $M = 21.56, SD = 2.48$ ).

Knowledge was related to Stage of Change,  $F(3, 833) = 3.33, p = .019, R\text{-squared} = .01$ . This is a small effect. Tukey tests revealed that participants in PC ( $M = 6.06, SD = 2.87$ ) had lower knowledge scores than those in A/M ( $M = 6.66, SD = 2.55$ ).

Perceived Responsibility was also related to Stage of Change,  $F(3, 833) = 20.34, p < .001, R\text{-squared} = .07$ . This is a medium effect. Tukey tests revealed that participants in PC ( $M = 20.67, SD = 3.98$ ) had lower mean scores on Perceived Responsibility than those in PR ( $M = 22.71, SD = 3.31$ ) and A/M ( $M = 22.87, SD = 3.58$ ).

Smoking, which is highly correlated with a number of health risk behaviors, was associated with Stage of Change  $F(3, 833) = 4.01, p < .01, R\text{-squared} = .01$ . This is a small effect. Tukey tests revealed participants in A/M ( $M = 1.59, SE = .06$ ) smoked less than those in C ( $M = 2.12, SD = .08$ ). Sexual behavior was not related to HPV vaccination. The variables 'Number of sex partners,' 'Frequency of condom use,' and 'Sexual orientation' were examined across Stage of Change and results were not significant.

### **Who recommended the HPV vaccine?**

Among vaccinated participants, over half (65.5%) indicated a health-care provider recommended they receive the HPV vaccine. Mothers were another common source of vaccine recommendation (29.7%), followed by 'other' (2.2%), 'self' (1.7%), and fathers (0.9%).

## **STUDY 2**

### **Exploratory Phase**

*Decisional Balance.* Twenty-two Decisional Balance items were included in the initial exploratory factor analysis. PCA with varimax rotation on the 22 x 22 matrix of item intercorrelations was conducted to determine the factor structure of the decisional balance measure. A total of five PCAs were conducted, which ultimately reduced the pool of 22 items to 10, with 5 items representing the pros and 5 items representing the cons of HPV vaccination. MAP indicated a three-component solution while parallel analysis suggested a two-component solution. After poorly loading items were removed and the second PCA was conducted both MAP and parallel analysis indicated a two factor solution. A two factor solution was retained. Examination of the item content revealed that one factor (five items) clearly reflected Pros of HPV vaccination and one factor (5 items) clearly represented Cons of HPV vaccination. All item loadings were above .60 (see Table 10), and the internal consistency was good for the pros scale ( $\alpha = .84$ ) and the cons scales ( $\alpha = .80$ ). The two factors accounted for 60.1% of the total variance ( 33.9 % for pros and 26.3% for cons).

*Self-Efficacy.* All 13 self-efficacy items were included in the initial exploratory factor analysis. PCA with varimax rotation on the 13 x 13 matrix of item

intercorrelations was conducted to determine the factor structure of the Self-efficacy measure. Four PCAs were conducted and the initial pool of 13 items was reduced to 7 items. MAP and parallel analysis indicated a one-component solution (see Table 11). The resulting HPV vaccination Self-Efficacy scale had good internal consistency ( $\alpha = .87$ ) and accounted for 56.1% of the total variance.

### **Confirmatory Model**

*Decisional Balance.* Three models were tested for Decisional Balance to determine which model provided the best fit for the data: (1) null model (suggesting no latent factors and used as a comparative model), (2) two-factor uncorrelated model, and (3) two-factor correlated model. Fit indices for each model are summarized in Table 12.

The two-factor correlated and uncorrelated model showed good model fit; however, the two factors had a very low correlation ( $r = -.006$ ) therefore the uncorrelated model was chosen. Results of the structural modeling produced good factor loadings and good to excellent model fit,  $\chi^2(35) = 82.6$ , CFI = .92, GFI = .92, AASR = .06, RMSEA = .09. The coefficient alphas of each scale in the confirmatory sample for Pros and Cons, were .78 and .83, respectively. The final items and their loadings in the confirmatory sample are shown in Figure 4.

*Self-Efficacy.* Two models were tested for Self-Efficacy to determine which model provided the best fit for the data: (1) null model (suggesting no latent factors and used as a comparative model), and (2) a one factor model. Fit indices for each model are summarized in Table 12.

The one factor model showed the best fit, and results of the structural modeling produced good factor loadings and good to excellent model fit,  $\chi^2(14) = 43.4$ , CFI = .93, GFI = .92, AASR = .04, RMSEA = .11. The coefficient alphas of the scale in the confirmatory sample was .83. The final items and their loadings in the confirmatory sample are shown in Figure 5.

### **External Validation Stage**

*Decisional Balance by Stage.* Analysis of Variance (ANOVA) revealed that individuals in different Stages of Change differed significantly on the pros,  $F(3, 328) = 10.13$ ,  $p < .001$ ,  $\eta^2 = .09$ , but not on the cons of HPV vaccination,  $F(3, 328) = 0.56$ ,  $p = .64$ ,  $\eta^2 = .01$ . Post-hoc analyses revealed that the pros were significantly lower in Precontemplation than in Preparation or Action/Maintenance. The Cons scale did not differ significantly across the stages, though the mean scores on this scale showed a general downward trend from Precontemplation to Preparation. Overall, the pros were .78 of a standard deviation higher Preparation relative to Precontemplation, and the Cons were .03 of a standard deviation lower. A graphical representation of T-scores on the Decisional Balance scales across the stages for HPV vaccination is shown in Figure 6. Means and Standard Deviations for Pros and Cons across the Stages of Stage are presented in Table 13.

Due to the lack of significant variability in the cons scale, an exploratory follow-up analysis was conducted on all of the original cons items. Analysis of Variance (ANOVA), with a bonferroni adjustment, revealed that only one item differed significantly across Stages of Change,  $F(3, 328) = 12.04$ ,  $p < .001$ ,  $\eta^2 = .10$ . This



item (*The vaccine would cost too much money*) was lower in Precontemplation and Contemplation relative to Preparation and Action/Maintenance. No other items were significant.

*Self-Efficacy by Stage.* Analysis of variance (ANOVA) conducted to examine the Self-Efficacy scale across the Stages of Change revealed significant differences,  $F(3, 328) = 7.09, p < .001, \eta^2 = .06$ . A graphical representation of self-efficacy T-scores across stage is shown in Figure 7. Means and Standard Deviations for Self-Efficacy across the Stages of Stage are presented in Table 13. Post-hoc analyses revealed that Self-Efficacy was lower in Precontemplation than in Preparation or Action/Maintenance.

### **STUDY 3**

To test for factorial invariance, structural equation modeling (SEM) was employed using EQS 6.1 software (P. M. Bentler, 1993). The following indices were used to analyze the fit of the invariance models: Comparative Fit Index (CFI), Normed Fit Index (NFI), Nonnormed Fit Index (NNFI), and Root Mean Squared Error of Approximation (RMSEA). The  $\chi^2$  values and  $\chi^2$  differences are reported, but alternative fit indices are relied upon for assessing model fit. The  $\chi^2$  test is too sensitive to trivial fluctuations and differences in general and in the context of invariance testing specifically (P. M. Bentler & Bonett, 1980; Hu & Bentler, 1999; Kline, 2005; Little, 2013). The CFI, NFI, and NNFI indicate how well a model fits the data with values from 0 to 1, with larger values indicating a better fit. Values greater than .90 indicate good fit and values greater than .95 indicate very good fit (P. M.

Bentler, 1992; Kline, 2005). For RMSEA, smaller values indicate better fit, with values less than 0.1 indicating good fit and values less than 0.05 indicating very good fit (Browne & Cudeck, 1993; Kline, 2005). The indicators of fit considered in the present study (CFI, NFI, NNFI, RMSEA) were the same indices utilized by (Ward, Velicer, Rossi, Fava, & Prochaska, 2004) and (Babbin et al., 2011) in papers evaluating the psychometric properties of Decisional Balance inventories for health behavior change. Additionally, the difference in CFI between the model and the previous (lower) level of invariance ( $\Delta$ CFI) was calculated. A value of  $-0.01$  or less indicates good model fit (Cheung & Rensvold, 2002). No constraints were dropped in any of the models to achieve a better fit.

### **Decisional Balance**

Results for Decisional Balance invariance can be seen in Table 14. Pattern Identity Invariance was a good fit for the data (CFI = .949, NFI = .929, NNFI = .940, RMSEA = .076). Change in CFI was .016 as constraints were added to the model, which indicates a reduction in model fit. The highest level of invariance, strong factorial, did not fit the data.

### **Self-Efficacy**

Results for Self-Efficacy invariance can be seen in Table 14. Pattern Identity Invariance was a very good fit for the data (CFI = .982, NFI = .972, NNFI = .976, RMSEA = .065). Change in CFI revealed a .005 decrease as constraints were added, further supporting invariance at this level. The highest level of invariance, strong

factorial was a good fit for the data (CFI = .966, NFI = .953, NNFI = .953, RMSEA = .077). Change in CFI revealed a .016 decrease in fit as parameters were added to the model.

### **Scale Reliabilities**

Since Pattern Identity and Strong Factorial Invariance held for each of the sample comparisons, the factor structure is reported for the combined male and female sample (see Figure 8 and Figure 9). In the total sample, coefficient alpha was 0.87 for Pros, 0.76 for Cons, and 0.86 for Self-Efficacy.

## CHAPTER 4

### DISCUSSION

#### **Study 1**

The current study reports rates of HPV vaccination in a sample of young adults and explores demographic and psychosocial correlates of vaccination such as gender, race, ethnicity, HPV-related awareness, knowledge, and perceived responsibility. It is one of few studies to compare male and female attitudes and opinions about HPV vaccination and adds to an emerging body of literature reporting rates of HPV vaccine uptake among young adult men.

#### **HPV vaccination**

Results from Study 1 indicate that 73.7% of women and 26.1% of men completed the full HPV vaccine series. These rates of vaccination are very similar to those reported for adolescents in Rhode Island, where the majority of the data were collected. In Rhode Island; 76.1% of adolescent females and 24.6% of adolescent males have received  $\geq 1$  dose of the vaccine in 2011 (Centers for Disease Control and Prevention, 2012). Data for adults were not available for comparison. These vaccination rates, however, are high relative to national averages. Nationally, 43.1% of adult women and 2.8% of adult men received  $\geq 1$  dose of the vaccine in 2011 (Centers for Disease Control and Prevention, 2013). Taken together, these data indicate that vaccination in Rhode Island are high relative to national averages, and that in some geographic regions and subpopulations approximately 1/4 of men and 3/4

of women have received at least one dose of the HPV vaccine. These findings are encouraging considering that some researchers concluded that male HPV vaccination was nearly "non-existent" one year after licensure (Reiter, McRee, Kadis, & Brewer, 2011). Now, three years after licensure male vaccination appears to be gaining momentum.

Results of Study 1 indicate substantial variation in HPV vaccination rates across demographic subgroups. As indicated, women were three times more likely to be vaccinated than men. These differences were statistically significant and the effect size was large. Within the entire study sample (men and women combined) black participants were less likely to have received the HPV vaccine relative to other racial subgroups; 45% of black participants were vaccinated compared to 56% of white participants, a difference of 11 percentage points. This degree of difference is large from a public health perspective (J. S. Rossi, 2013). Across research studies, black race is consistently linked with a decreased likelihood of HPV vaccine initiation and completion, underscoring the need for targeted interventions to increase vaccination among black men and women (Cook et al., 2010; Ford, 2011; Keenan et al., 2012).

With regards to ethnicity, Hispanic participants were more likely to be vaccinated than other ethnicities; 62% of Hispanic participants had completed the HPV vaccine compared to 54% of non-Hispanic participants. Rates of HPV vaccination among Hispanic populations are variable across studies. Several studies report Hispanic populations are more likely to report vaccination or intentions to receive the HPV vaccine relative to other ethnic groups (Cook et al., 2010; Daley et al., 2011), while other studies report Hispanics are less likely to receive the vaccine (Ford, 2011).

Sociodemographic and cultural explanations for these differences are unclear and may be related to differences in study sampling as well as the vast heterogeneity within the Hispanic population. Additional research is needed to clarify these research discrepancies. Overall, these findings underscore the importance of understanding potential vaccine disparities across racial and ethnic groups, particularly because black and Hispanic men and women have higher rates of HPV-related cancers and mortality relative to non-Hispanic whites (Hariri et al., 2011; Hernandez et al., 2008; Ortiz et al., 2010).

The current study also found younger participants were more likely to be vaccinated than older participants. Adolescent vaccination rates have consistently increased since vaccine licensure and outpaced adult vaccination rates (Centers for Disease Control and Prevention, 2011a; Centers for Disease Control and Prevention, 2012); thus younger cohorts are more likely to be vaccinated. These findings indicate there is an ongoing need for interventions and health promotion efforts that encourage "catch-up" vaccination among adults. While early adolescence is the ideal time for HPV vaccination, young adult vaccination can still have a substantial public health impact. In one epidemiological trial, 60% of unvaccinated sexually active young adults (18 years old or older) contracted HPV at some point over a 5-year period, indicating that vaccination during young adulthood can prevent a substantial portion of HPV infection and transmission (Baseman & Koutsky, 2005).

### **Who recommends the HPV vaccine?**

The majority of vaccinated participants (65.5%) cited doctors and health care providers as the source of vaccine recommendation. Those with health insurance were also more likely to be vaccinated. These findings are consistent with past research indicating physician recommendation is one of the most important factors that predicts HPV vaccination (Gilkey, Moss, McRee, & Brewer, 2012; Reiter, Brewer, & Smith, 2010; Reiter, Brewer, McRee et al., 2010). In fact, parents of adolescents are almost five times more likely to initiate vaccination when a physician recommends it (Ylitalo, Lee, & Mehta, 2012). Lack of physician recommendation may even perpetuate vaccine disparities. Researchers have found physicians are less likely to recommend the HPV vaccine to boys and ethnic/racial minorities, and this lower likelihood of recommendation is associated with lower vaccination rates in these groups (Gilkey et al., 2012; Ylitalo et al., 2012). Considered together, these findings indicate more effective methods should be implemented to promote vaccination recommendation by health care providers across all demographic groups.

Mothers were the second most common source of vaccine recommendation. Among vaccinated participants 29.7% indicated their mother recommended the vaccine. Only a very small percentage of participants indicated other sources of recommendation such as 'self' or fathers. These findings underscore the importance of mothers in promoting/facilitating HPV vaccination, while it appears fathers are rarely involved in the vaccination decision making process. These findings can inform future parent-based interventions; however among young adult populations parents

may have less influence over health care decisions and thus physician or media-based HPV vaccine promotion efforts may be more effective in this group.

### **Sexual Orientation and Sexual Behavior**

Sexual orientation, number of lifetime sexual partners, and frequency of condom use did not predict HPV vaccination status. However, the current sample was 95% heterosexual, thus the sample of gay and bisexual men and women may have been too small to detect potential differences in attitudes and behavior related to HPV vaccination across groups.

### **HPV-Related Awareness and Knowledge**

Results indicated that HPV awareness was high, approximately 96% of women and 80% of men had heard of HPV. Comparing these rates to past research suggests that HPV awareness may be increasing with time. As recently as 2007 a review of seven studies reported only 42% (range 0%–72%) of respondents were aware of HPV (Brewer & Fazekas, 2007).

To determine participants knowledge of HPV, the current study developed and tested an HPV-related knowledge scale using exploratory and confirmatory analyses. Measurement development resulted in brief, reliable, and valid unidimensional measure. The scale was internally consistent, Cronbach's alpha was .79. All factor loadings were within an acceptable range (.41 to .62). This scale assesses individual's knowledge of HPV-related disease, prevention, and transmission. It includes issues relevant to both male and female sexual health.



Using the total knowledge scale score as a dependent variable, analyses indicated women had higher overall knowledge scores than men, and the effect size for this finding was in the medium range. Participants who identified as white were more likely to have heard of HPV and had higher knowledge scores relative to other racial subgroups. Non-Hispanic participants were more likely to have heard of HPV and had higher knowledge scores than those who identified as Hispanic. The majority of participants were aware of basic facts about HPV such as 'HPV vaccination could help prevent HPV infection' (85.9%) and 'a person could be infected with HPV and not know it' (82.6%). This study also revealed that participants had key knowledge gaps with regards to specific information about HPV infection and transmission. For example, most men and women incorrectly believed that HPV could *only* be spread through sexual intercourse and that condoms fully prevent against HPV transmission. These findings are consistent with past research that reports critical knowledge deficits with regards to HPV viral transmission, prevention, screening, and treatment among young adults (Allen et al., 2009; Licht et al., 2010; Sandfort & Pleasant, 2009; Wong & Sam, 2010). Knowledge scores were also related to readiness to receive the HPV vaccine. Those in earlier Stages of Change had lower knowledge scores than those in Action/Maintenance, however this effect was small.

Given the growing rates of HPV-related cancers in men and the impact of HPV on the population as a whole, increasing knowledge is one way to increase vaccine initiation; however, interventions that target knowledge have not successfully increased vaccination rates (Dempsey et al., 2006; Gerend & Barley, 2009). From a TTM-perspective increasing knowledge (i.e. Consciousness Raising) can start the

change process, but once knowledge is obtained individuals must use other cognitive and behavioral processes to move through the Stages of Change and take action on a given behavior (J. O. Prochaska et al., 1988; J. O. Prochaska & DiClemente, 1983). Thus, future interventions should ensure that young adults are educated about HPV but also include other empirically-supported behavior-change variables.

### **Perceived Responsibility**

The current research developed a measure to assess Perceived Responsibility for HPV prevention among young adult men and women. The measure of Perceived Responsibility adds to the literature by providing a tool to assess the relative importance individuals place on gender-specific HPV prevention efforts at the individual and societal level. Measurement development using exploratory and confirmatory analyses resulted in a brief, reliable, unidimensional scale. The scale was internally consistent. Cronbach's alpha was .86. All factor loadings were within an acceptable range (.62 to .85).

The Perceived Responsibility measure answers important questions about young adult's views regarding HPV prevention. Results of the current study indicate the majority of young adults 'agree' or 'strongly agree' that men and women should be vaccinated for HPV, that insurance should pay for vaccination for men and women, and that men and women should tell their partner's if they know/suspect they have HPV. The average participant rating of items on the Perceived Responsibility measure was 22 out of a maximum of 25 (with higher numbers indicating greater perceptions of responsibility). These data indicate there is a high level of interest and public

support for HPV vaccination and insurance coverage among young adults. The majority of young adults agree that vaccination is important from a public health perspective for both genders and believe that individuals and society have a responsibility to prevent HPV transmission.

Using the mean score for Perceived Responsibility as a dependent variable, analyses indicate that women had higher Perceived Responsibility scores than men. The effect for gender was small to medium. Differences across Stage of Change were also observed. Participants in Precontemplation had lower mean scores on Perceived Responsibility than those in Preparation and Action/Maintenance, indicating that unvaccinated individuals had lower Perceptions of Responsibility for HPV prevention than those who were vaccinated or preparing to receive the vaccine in the next 30 days. The effect size was in the medium range. The pattern of Perceived Responsibility across Stage of Change followed a similar pattern to that of Self-Efficacy. It was higher in Preparation and Action relative to Precontemplation and Contemplation. This indicates that there may be some similarities between these two constructs. This should be explored in future research.

Perceived Responsibility did not differ significantly by race, ethnicity, or insurance status. These findings indicate that perceptions of social and individual responsibility for HPV prevention are associated with an individual's vaccination status and gender. While this does not indicate direction of causality, it is intriguing from a clinical stand point. Future research should investigate whether perceptions of responsibility can be used to promote HPV vaccination in future interventions. In other areas of health, such as HIV prevention, messages about personal responsibility

are common elements of health promotion campaigns (Wolitski, Bailey, O'Leary, Gomez, & Parsons, 2003). These messages could be useful in HPV interventions because they appeal to people's desire to uphold individual and community standards that promote personal health or the well-being of others.

### **Strengths and Limitations**

This study had many strengths and limitations. Limitations include sample homogeneity. The majority of subjects were white young adults recruited from a single university in the northeastern United States; thus findings may not generalize to other groups. An additional limitation of the current research was recruitment inconsistency across the male and female sample. All women and two thirds of men were recruited from a single university. The remaining one third of men were recruited from a national survey company due to low recruitment rates at the target university. These differences in recruitment could have introduced differences between the male and female sample. However, comparisons of men across recruitment sources indicated consistency with regards to key dependent variables (e.g. vaccination rates).

Strengths of this study include recruitment of a large sample which enabled comparisons of demographic subgroups on key dependent variables. The measures of Knowledge and Perceived Responsibility add important HPV-related measures to the literature. To our knowledge few, if any, systematically developed scales have been developed to assess these constructs among men and women. This research represents an important step in understanding HPV-related knowledge, beliefs, and vaccination

among young adults, highlighting differences across gender, race, ethnicity, and age. It adds to a growing body of literature that attempts to understand motivation and decision-making related to vaccination among young adults and can inform future research and intervention development.

## **STUDY 2**

The current research represents the first study to develop Transtheoretical Model-based measures of HPV vaccination among young adult men. The study resulted in internally and externally valid measures of Decisional Balance (Pros and Cons) and Self-Efficacy for HPV vaccination. Construct validity was evident for two of the three TTM scales (Pros and Self-Efficacy). These two scales demonstrated known-groups validity across stages of HPV vaccination.

### **Decisional Balance**

Results supported a two-factor uncorrelated model for Decisional Balance. One factor was comprised of five 'Pros' items and the other factor was comprised of five 'Cons' items. Cronbach's alpha was good for both scales; .83 for Pros and .78 for Cons. External validity was tested by examining the variability in Pros and Cons across the Stages of Change to determine whether the scales followed patterns observed in past research. Research has shown that an increase in Pros from Precontemplation to Preparation, a decrease in Cons, and a corresponding "cross-over" in which Pros begin to outweigh Cons in the Preparation Stage of Change (Hall & Rossi, 2008; J. O. Prochaska et al., 1994). External validity of the Pros scale was supported. Pros was significantly higher Preparation than Precontemplation. The predicted cross-over did

occur, in which the Pros of behavior change begin to outweigh the Cons in the Preparation Stage. These findings are consistent with TTM theory and past results of measurement development for HPV vaccination among women (Lipschitz et al., 2013).

The magnitude of change in Pros and Cons across the Stages of Change was examined and compared with established standards demonstrated in past TTM research. In a meta-analysis of over 48 health behaviors, the average increase in Pros from Precontemplation to Preparation was 1.0 standard deviation. The average decrease in Cons from Precontemplation and Maintenance was .5 standard deviation units (Hall & Rossi, 2008). In this study the increase in Pros was .78 standard deviation units, and the decrease in Cons scaled was .03 standard deviation units. Thus, magnitude and direction of change in Pros adhered fairly closely to the past standard; however, Cons did not show the predicted decrease across Stage of Change. These findings suggest that the broader Cons construct does not play a powerful role in the decision to receive the HPV vaccination series for men. However, one specific 'Con,' cost of vaccination may play an important role. In a follow-up post hoc analysis of the original Cons items, cost of vaccine was the only item that was significantly related to Stage of Change. This item, "the vaccination would cost me too much money," was more likely to be perceived as a disadvantage of vaccination among men in Precontemplation and Contemplation relative to men in Preparation and Action. These findings, though preliminary, suggest that cost is a major barrier to vaccination among men. Past research also suggests that out-of-pocket vaccine cost is so high, that interventions focused on motivation or health beliefs will only be effective if vaccine

cost is reduced (Liau et al., 2012). Thus, reducing the cost of the HPV vaccine should be a public health priority.

### **Self-Efficacy**

Exploratory and confirmatory analyses resulted in a brief reliable measure of Self-Efficacy for HPV vaccination. Analyses supported a single factor model as the best fit for the data. The final scale was comprised of seven items with fit indices falling within an acceptable range (.49 to .75). The scale was internally consistent, Cronbach's alpha was .83. External validity was demonstrated by examining the variability in Self-Efficacy across the Stages of Change. Self-Efficacy is expected to increase from Precontemplation to Preparation (J. S. Rossi & Redding, 2001). This expected increase was observed. Self-Efficacy increased .8 of a standard deviation from Precontemplation to Preparation.

### **Limitations and Future Directions**

Limitations of the current study include recruitment of a predominantly white college-attending sample. These constructs may not generalize to other populations. In addition, the cross-sectional nature of this study did not enable tests of predictive validity. The research supported the internal validity of all constructs, however the Cons scale did not vary across Stages of Change in predicted ways indicating a lack of construct validity for this scale. Additional research should examine whether Cons is a reliable predictor of vaccination among men, or whether cost of vaccination is a more effective intervention target.

The current research represents a first-step in developing a TTM-based intervention to promote HPV-vaccination initiation and completion among young adult men. TTM-based computer-tailored interventions are based on psychometrically-sound measurement instruments that link empirically-supported constructs with readiness for health behavior change (S. M. Noar, Benac, & Harris, 2007). The results reported here highlight several constructs that can potentially be targeted to increase vaccination rates among the population of interest. Based on study results, interventions should aim to (1) increase perceived advantages of vaccination among individuals in early Stages of Change, (2) help men understand vaccine cost and resolve payment issues, and (3) increase Self-Efficacy by addressing perceived barriers to vaccination. Future longitudinal research should determine whether these constructs can be used to predict and increase vaccination through tailored interventions.

### **STUDY 3**

Study 3 is the first study to compare TTM-based measures of HPV vaccination across male and female subgroups. The current study examined factorial invariance for two TTM-based measures of Decisional Balance and Self-Efficacy developed among young adults. Both measures demonstrated factorial invariance across gender for Pattern Identity Invariance. Pattern identity Invariance requires that factor structure and factor loadings are constrained in the model. All fit indices, NFI, NNFI, CFI, and RMSEA consistently showed good fit across subgroups. The  $\Delta$ CFI indicator was below the cutoff (- .01) for Self-Efficacy indicating very good fit as constraints were



added to the model. Change in CFI was slightly above the cut-off for Decisional Balance (-.016); however, fit criteria should be considered in concert to determine overall fit (Little, 2013). For Decisional Balance four out of five criteria indicated good fit for Pattern Identity Invariance. The highest level of invariance, Strong Factorial Invariance was demonstrated for the Self-Efficacy measure only. Strong Factorial Invariance requires that factor structure, factor loadings, and error terms are constrained in the model. Reliability of the scales was good. Cronbach's coefficient alpha was 0.87 for Pros, 0.76 for Cons, and 0.86 for Self-Efficacy.

The demonstration of Pattern Identity Invariance for Decisional Balance and Self-Efficacy indicates that the factor structure and loadings for both the Decisional Balance and Self-Efficacy measures are invariant across gender. Accordingly, these measures can be used in their current form to simultaneously assess men and women and make meaningful mean comparisons. The demonstration of Strong Factorial Invariance for Self-Efficacy indicates the invariance of this measure is even more robust and confidence in invariance across gender is high.

Confirming the invariance of a factor model is beneficial to conducting valid research and is important for implementing clinical interventions based on the TTM. Evidence of Strong Factorial Invariance indicates that measures of the latent constructs Decisional Balance and Self-Efficacy are the same across groups. This does not mean that group means are the same, but that group means extrapolated from the measures can be compared in meaningful ways. By demonstrating factorial invariance, researchers can be confident that homogeneity among subgroups will not distort the results of future tests.

The current research promotes the use of HPV Decisional Balance and Self-Efficacy measures among men and women concurrently. The consistency of the measurement model across these groups provides strong empirical support for the construct validity of the scales. Invariant, psychometrically sound measures such as the HPV Vaccination Decisional Balance and Self-Efficacy measures are needed when developing effective tailored prevention interventions to increase HPV vaccination among men and women.

### **Limitations and Future Directions**

Limitations of this study involve sampling characteristics and recruitment techniques as discussed previously (see Study 1). Differences in recruitment between male and female sample had the potential to introduce sample differences that could influence measurement invariance. However, in the current study, these differences in sampling did not appear to impact analytic results. Invariance was demonstrated despite sampling differences.

Sample size was not adequate to examine measurement invariance across all relevant subgroups. Future research should determine whether these measures assess the same underlying constructs across racial, ethnic, and student vs. non-student populations.

## CHAPTER 5

### CONCLUSION

Collectively, these three studies add to an emerging body of literature examining male and female attitudes, knowledge, and intentions to receive the HPV vaccine. This study reports the highest rates of HPV vaccination among young adult men in the literature. This is encouraging given the recent licensure of the vaccine and concerns about public interest in the male vaccine. These studies collectively indicate that men are interested in vaccination, willing to receive the vaccine, have basic knowledge about HPV, and perceive HPV prevention as their responsibility. The current research also adds to the literature by presenting data collected from men and women following approval of the HPV vaccine for men. Gender comparisons, like those reported here, are uncommon in the literature, but are important for understanding the attitudes and behaviors of men and women post-HPV licensure.

The current research also adds several new TTM-based measures of male HPV vaccination to the literature including HPV-related Stage of Change, Decisional Balance, and Self-Efficacy. These measures can be used to understand behavior change, and are designed to predict and promote vaccination in future research. The Strong Factorial Invariance demonstrated in Study 3 further validates the use of these measures among both men and women and increases their research utility. Future research can use these measures to make meaningful comparisons of Pros, Cons, and Self-Efficacy across gender.

## **Implications for Diverse Populations**

Results of this study highlight key disparities in HPV vaccination and education. Black participants and men had lower likelihood for vaccination and lower overall knowledge scores than women and participants of other racial groups. The Hispanic sample had higher vaccination rates, but lower awareness and knowledge of HPV vaccination. Vaccination promotion and HPV prevention efforts among these groups are needed, particularly considering black and Hispanic populations have the highest rates of several HPV-related morbidity and mortality. This disproportionate impact on underserved population is unacceptable given that HPV-related mortality is largely preventable through HPV vaccination, pap smear screening, and early treatment. Reducing this health disparity will likely require intervention at the individual and population level through public health campaigns and targeted intervention programs. These interventions should specifically target demographic subgroups using culturally-tailored approaches because they be more effective in preventing sexually transmitted infections than a one-size fits all approach (R. J. DiClemente et al., 2004).

In the area of HPV-related vaccination and prevention, men are also an underserved population. The inclusion of men in this study is important for the advancement of men's sexual health issues. Traditional emphasis on women's health and family planning has resulted in men's sexual health needs being de-emphasized. Very little research has targeted the reproductive and sexual health of men, particularly heterosexual men (Sternberg & Hubley, 2004). Promoting men and women's awareness, knowledge and access to the HPV vaccine is consistent with non-

discriminatory projects and acceptable and sustainable sexual health education and programs (Collumbien & Hawkes, 2000). Additional efforts to include men in HPV prevention and education are warranted considering women are still three times more likely to be vaccinated than men several years after approval of the male vaccine.

### **Next Steps**

The next step in this research, in addition to those already listed, is to develop and test a TTM-based computer-tailored intervention to increase HPV vaccination among men. This intervention will be informed by the empirically-supported measures developed herein. Constructs not included in traditional TTM-based interventions, such as Knowledge and Perceived Responsibility, should also be included given positive associations between these measures and Stage of Change. Intervention development and testing could incorporate these measures in essential ways. The measures can be used for pre- and post-test assessment, the items can inform intervention content, and measurement-based statistical cut-offs can be calculated for intervention tailoring. Given the strong link between health-care provider recommendation and HPV vaccination behavior, a clinic-based intervention may be an ideal point of access. Web-based or tablet delivery could bring the intervention to clinic waiting rooms. This study represents the first stage in such a program of research and provides theoretically- and empirically-based assessments to serve as its foundation.

*Table 1. Demographics of Male and Female Sample*

		<u>MALE</u>		<u>FEMALE</u>	
		<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
<b>Stage of Change</b>					
	Precontemplation	178	54.1	92	18.2
	Contemplation	48	14.6	20	4.0
	Preparation	17	5.2	21	4.2
	Action/Maintenance	86	26.1	372	73.7
<b>Ethnicity</b>					
	White	250	76.0	442	87.5
	Black	34	10.3	23	4.6
	Asian	28	8.5	8	1.6
	American Indian/Alaskan Native	1	0.3	0	0.0
	Hawaiian/Pacific Islander	0	0.0	3	0.6
	Other	16	4.9	29	5.7
<b>Hispanic</b>					
	Not Hispanic	295	89.7	463	91.7
	Hispanic/Latino	34	10.3	42	8.3
<b>Religion</b>					
	Catholic	120	36.5	271	53.7
	Protestant	91	27.7	99	19.6
	Jewish	11	3.3	22	4.4
	Muslim	1	.3	3	0.6
	Buddhist	4	1.2	2	0.4
	Hindu	1	.3	0	0.0
	Atheist/Agnostic	58	17.6	24	4.8
	Don't Know/Not Sure	26	7.9	37	7.3
	Other	17	5.2	47	9.3
<b>Year in School</b>					
	Freshman	127	38.6	301	59.6
	Sophomore	64	19.5	74	14.7
	Junior	45	13.7	72	14.3
	Senior	41	12.5	43	8.5
	5th Year Undergraduate	12	3.6	10	2.0
	Other	10	3.0	5	1.0
	Not Currently In School	30	9.1	0	0.0

*Table 2. Original and Final Items for Male and Female Decisional Balance Measure*

Original Items	Final Male	Final Female	
PROS	Protecting myself from HPV would make me feel good.	X	X
	I would be protected from getting certain cancers and genital warts.	X	X
	I would be protecting myself from getting an STD.	X	X
	I would be less likely to spread HPV.	X	X
	I would be perceived as more responsible if I were to get vaccinated.	X	
	Getting the vaccine could help keep HPV from spreading.		
	Getting the vaccine would reduce the risk of future partners developing genital warts or cancer.		
	Having the vaccine would allow future partners to feel more comfortable having sex with me.		
	My doctor would approve of me getting the vaccination series.		
	People close to me would be happy with me if I received the vaccination series.		
I would be a role model for my peers if I got vaccinated.			
<b>Getting vaccinated would reduce my current/future partner(s) fear of contracting HPV.</b>			
CONS	My parents would know I was having sex if I got vaccinated.	X	X
	Receiving the series of three shots would take too much time.	X	X
	It would be too embarrassing to talk to my parents or doctor about getting vaccinated.	X	X
	My partner would not approve of me receiving the vaccine.	X	X
	I would not fit in with my friends because they have not received the vaccine.	X	
	Getting the vaccine would make me uncomfortable because I hate shots.		
	The vaccination would cost me too much money.		
	The vaccination could cause side-effects and unknown long-term risks.		
I would cause shame to my family/religion.			
<b>People would think I was having risky sex if I got vaccinated.</b>			

*Note.* Bold Items were included in original male survey development only

Table 3. Original and Final Items for Male and Female Self-Efficacy Measure

Original Items	Final Male	Final Female
When I think about the possible side effects of the vaccine.	X	X
When I anticipate that the shot will be painful.	X	X
When my family is against me getting vaccinated.	X	X
When I anticipate feeling faint or dizzy when getting the shot.	X	X
When it is inconvenient.	X	X
When it is too expensive.	X	X
When my significant other does not want me to get the vaccine.	X	
When I don't know how others will respond to my getting the vaccine.		
When I have to go somewhere unfamiliar to get the shot.		
When my friends are unsupportive of me getting the HPV vaccine.		
When it seems too difficult to fit into my schedule.		
When I am stressed.		
<b>When I know my partner(s) has already been vaccinated</b>		

Note. Bold Items were included in original male survey development only



Table 4. Knowledge Items and Accuracy of Responses

		<u>Men</u>	<u>Women</u>	<u>Total</u>	
	Answer	% correct	% correct	% correct	
1	<b>A person may be infected with HPV and now know it</b>	True	76.9	86.3	82.6
2	<b>HPV does not cause cervical cancer</b>	False	44.4	72.7	61.5
3	<b>Vaccination can help prevent HPV infection in men and women</b>	True	79.3	90.1	85.9
4	<b>HPV can lead to cancers of the anus, vagina, throat, and mouth</b>	True	47.7	60.4	55.4
5	<b>Only women are at risk for health problems related to HPV</b>	False	66.3	82.2	75.9
6	HPV can only be spread through sexual intercourse	False	23.7	28.7	26.7
7	<b>HPV is transmitted or spread via genital contact</b>	True	60.5	67.7	64.9
8	<b>Men are <u>not</u> routinely tested for HPV</b>	True	49.2	48.7	48.9
9	<b>Genital warts are unrelated to HPV</b>	False	42.2	45.9	44.5
10	For most people an HPV infection goes away on its own	True	9.1	6.7	7.7
11	<b>A person cannot transmit HPV is he/she does not have symptoms</b>	False	60.2	77.6	70.7
12	<b>Most people with HPV have no visible signs or symptoms</b>	True	45.3	58.6	53.4
13	Condoms fully prevent against HPV transmission	False	43.8	52.5	49.0
14	People who already have HPV cannot benefit from the HPV vaccine	False	25.2	28.3	27.1
15	If you started the HPV vaccination series and missed a shot, you have to re-start the series from the beginning	False	16.4	18.0	17.4

Note. Bolded items are included in the final scale.

*Table 5. Results of Principal Component Analysis for Knowledge Scale*

Knowledge Scale ( $\alpha = 0.79$ )	Factor Loading
A person may be infected with HPV and now know it.	0.60
HPV does not cause cervical cancer.	0.61
Vaccination can help prevent HPV infection in men and women.	0.55
HPV can lead to cancers of the anus, vagina, throat, and mouth.	0.65
Only women are at risk for health problems related to HPV.	0.59
HPV is transmitted or spread via genital contact.	0.58
Men are <u>not</u> routinely tested for HPV.	0.48
Genital warts are unrelated to HPV.	0.62
A person cannot transmit HPV if he/she does not have symptoms.	0.61
Most people with HPV have no visible signs or symptoms.	0.60

*Table 6. Fit Indices for Knowledge and Perceived Responsibility Models*

	$\chi^2$ (df)	GFI	CFI	AASR	RMSEA
<b>Knowledge</b>					
Model 1: Null Model	830.76 (45)*	---	---	---	---
Model 2: one factor model	94.9 (35)*	0.96	0.92	0.03	0.06
<b>Perceived Responsibility</b>					
Model 1: Null Model	1077.6 (10)*	---	---	---	---
Model 2: one factor model	127.2 (5)*	0.89	0.89	0.04	0.23

*Note.* N = 171,  $\chi^2$  = chi square, df = degrees of freedom, GFI = goodness of fit, index, CFI = comparative fit index, AASR = average absolute standardized residual statistic, \*p < .001

Table 7. Means of Perceived Responsibility Items among Men and Women

		<u>Women</u>		<u>Men</u>	
		<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
1	Anyone engaging in sexual activity (male or female) should get the HPV vaccine	3.97	1.08	3.61	1.06
2	If women get the HPV vaccine men don't need to	1.58	1.03	2.34	1.11
3	<b>Men AND women should receive the HPV vaccine</b>	<b>4.18</b>	<b>1.02</b>	<b>3.79</b>	<b>1.03</b>
4	<b>Insurance companies should pay for the HPV vaccine for MEN</b>	<b>4.38</b>	<b>1.01</b>	<b>4.11</b>	<b>1.14</b>
5	<b>Insurance companies should pay for the HPV vaccine for WOMEN</b>	<b>4.51</b>	<b>0.90</b>	<b>4.27</b>	<b>1.04</b>
6	<b>A woman should tell her partner(s) if she knows/suspects she has HPV</b>	<b>4.54</b>	<b>0.90</b>	<b>4.28</b>	<b>1.07</b>
7	<b>A man should tell his partner(s) if he knows/suspects he has HPV</b>	<b>4.46</b>	<b>1.00</b>	<b>4.19</b>	<b>1.12</b>

Note. Bolded items were included in the final Perceived Responsibility Scale

*Table 8. Result of Principal Components Analysis for Perceived Responsibility Scale*

Perceived Responsibility Scale ( $\alpha = 0.85$ )	Factor Loading
Men AND women should receive the HPV vaccine	0.723
Insurance companies should pay for the HPV vaccine for MEN	0.807
Insurance companies should pay for the HPV vaccine for WOMEN	0.778
A woman should tell her partner(s) if she knows/suspects she has HPV	0.828
A man should tell his partner(s) if he knows/suspects he has HPV	0.831

*Table 9. Magnitude of Effect Sizes for Predictors of HPV Vaccination*

Predictors of HPV vaccination	Effect Size Statistic	Effect Size Magnitude
Female Gender	Cramer's V = .47	Large
Higher Perceived Responsibility	R-squared = .07	Medium
Younger age	R-squared = .06	Medium
Having Insurance	Cramer's V = .11	Small
Hispanic Ethnicity	Cramer's V = .10	Small
White Race	Cramer's V = .09	Small
Smoking	R-squared = .01	Small
Higher Knowledge	R-squared = .01	Small
<b><u>Factors unrelated to HPV vaccination</u></b>		
Sexual Orientation	---	---
Number of lifetime sexual partners	---	---
Frequency of Condom Use	---	---

*Table 10. Results of Principal Components Analysis for Decisional Balance Scale*

	Factor Loadings
Pros Scale ( $\alpha = .84$ )	
Protecting myself from HPV would make me feel good.	.85
I would be protected from getting certain cancers and genital warts.	.81
<b>I would be perceived as more responsible if I were to get vaccinated.</b>	.64
I would be protecting myself from getting an STD.	.80
I would be less likely to spread HPV.	.81
Cons ( $\alpha = .80$ )	
<b>I would not fit in with my friends because they have not received the vaccine.</b>	.75
Receiving the series of three shots would take too much time.	.61
It would be too embarrassing to talk to my parents or doctor about getting vaccinated.	.79
My partner would not approve of me receiving the vaccine.	.75
My parents would know I was having sex if I got vaccinated.	.80

*Note.* Bolded items are in the male, but not the female, Decisional Balance Measure.

*Table 11. Results of Principal Components Analysis for Self-Efficacy Scale*

Self-Efficacy ( $\alpha = 0.87$ )	Factor Loadings
<b>When my significant other does not want me to get the vaccine.</b>	.74
When I think about the possible side effects of the vaccine.	.72
When I anticipate that the shot will be painful.	.74
<b>When my family is against me getting vaccinated.</b>	.74
When I anticipate feeling faint or dizzy when getting the shot.	.81
When it is inconvenient.	.82
When it is too expensive.	.66

Note. Bold items are included in the male, but not the female, Self-Efficacy Measure



Table 12. Fit indices for Decisional Balance and Self-Efficacy Confirmatory models

	$\chi^2$ (df)	GFI	CFI	AASR	RMSEA
Decisional balance					
Model 1: Null Model	644.9 (45)*	---	---	---	---
Model 2: uncorrelated two factor model	82.6 (35)*	0.92	0.92	0.057	0.09
Model 3: correlated two factor model	82.6 (34)*	0.92	0.92	0.057	0.09
Self-Efficacy					
Model 1: Null Model	405.3 (21)*	---	---	---	---
Model 2: one factor model	43.4 (14)*	0.93	0.92	0.04	0.11

Note. N = 171,  $\chi^2$  = chi square, df = degrees of freedom, GFI = goodness of fit, index, CFI = comparative fit index, AASR = average absolute standardized residual statistic, \*p < .001

*Table 13. Means and Standard Deviations of Raw Scores for Decisional Balance and Self-Efficacy across the Stages of Change*

	PC		C		Prep		A/M	
	Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>
Pros Sum Score	17.84	4.33	19.33	4.12	21.24	3.35	19.91	4.22
Cons Sum Score	9.54	4.30	10.15	4.23	10.41	6.22	9.66	5.06
Self-Efficacy Sum Score	18.60	6.16	20.75	6.40	23.06	7.07	21.24	5.49

PC = Precontemplation, C = Contemplation, Prep = Preparation, A/M = Action/Maintenance.

Table 14. Goodness of Fit Statistics for Invariance Models

Model	$\chi^2(df)$	$\Delta \chi^2$	CFI	$\Delta CFI$	NFI	NNFI	RMSEA
<b>Decisional Balance</b>							
Configural Invariance	118.61 (40)	--	0.965	--	0.949	0.951	0.069
Pattern Identity Invariance	163.49 (48)	44.88 (8)***	0.949	0.016	0.929	0.940	0.076
Strong Factorial Invariance	328.28 (56)	164.79 (8)***	0.889	0.060	0.869	0.873	0.108
<b>Self-Efficacy</b>							
Configural Invariance	28.10 (10)	--	0.987	--	0.980	0.974	0.068
Pattern Identity Invariance	40.77 (15)	12.67 (5) *	0.982	0.005	0.972	0.976	0.065
Strong Factorial Invariance	65.52 (20)	24.75 (5)***	0.966	0.016	0.953	0.953	0.077

\*  $p < .05$ , \*\*\*  $p < .001$

Figure 1. Stages of Change for HPV Vaccination

75

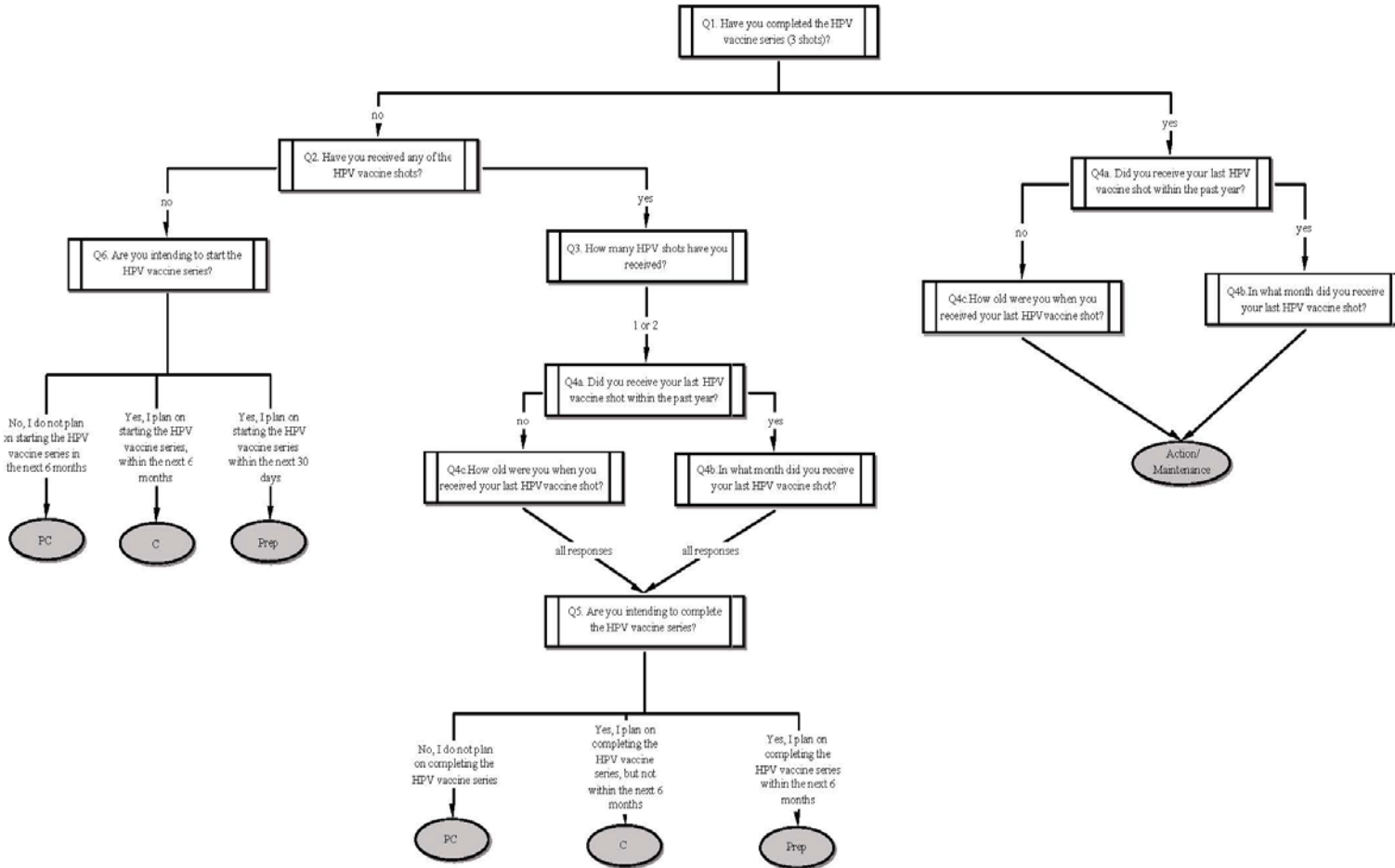


Figure 2. Knowledge Scale Structural Model

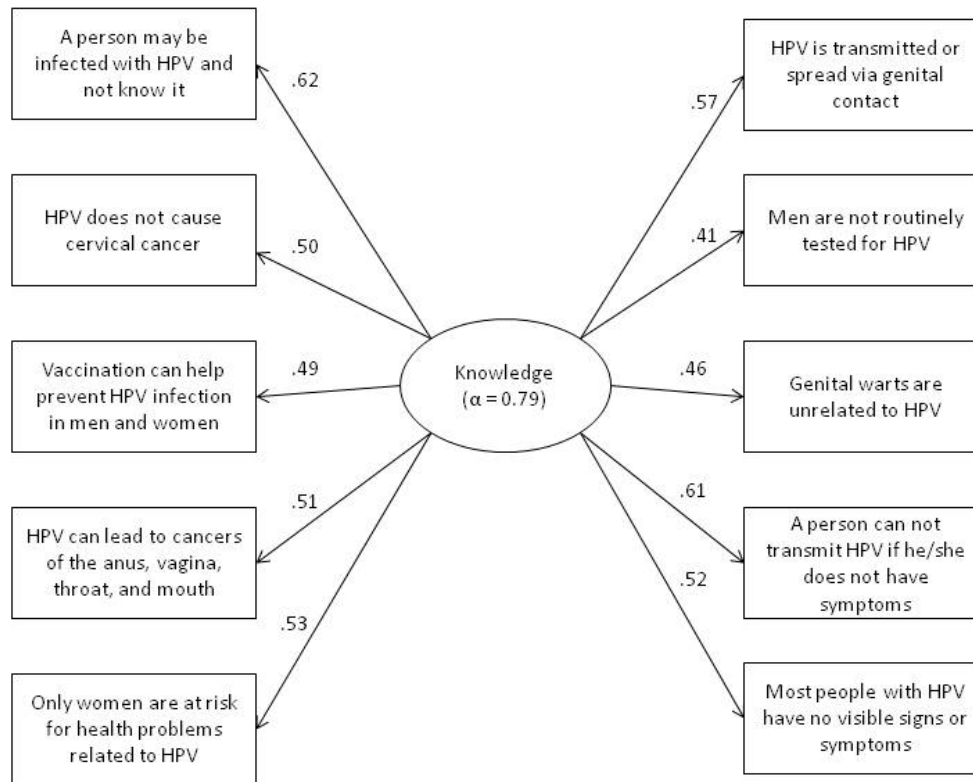


Figure 3. Perceived Responsibility Structural Model

77

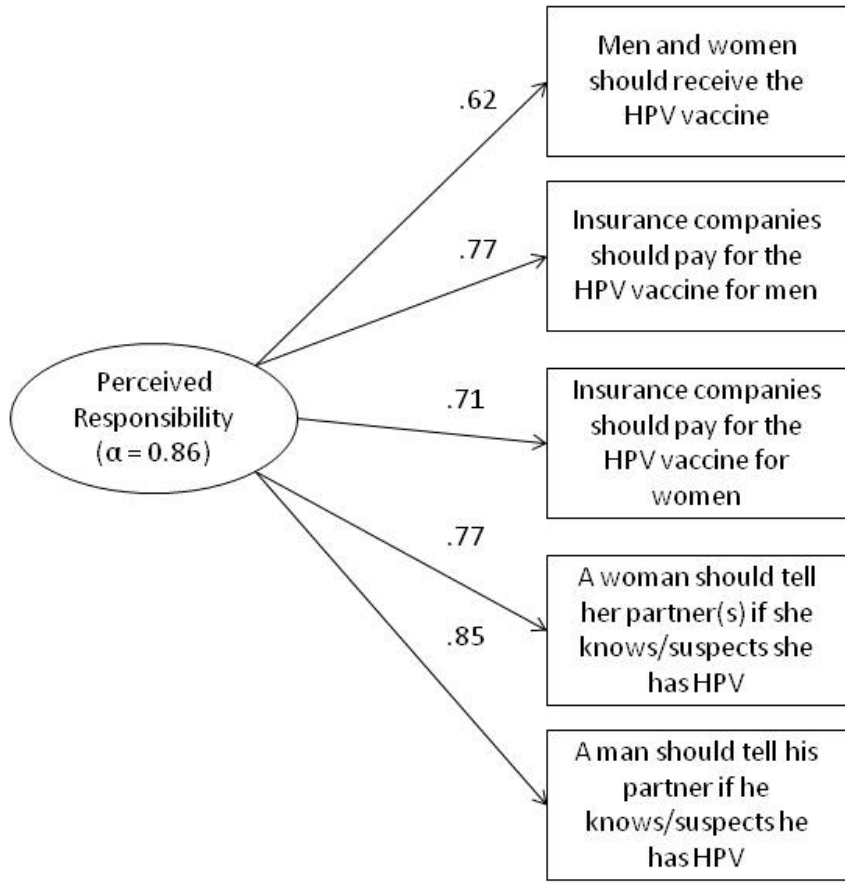


Figure 4. Male Decisional Balance Confirmatory Model

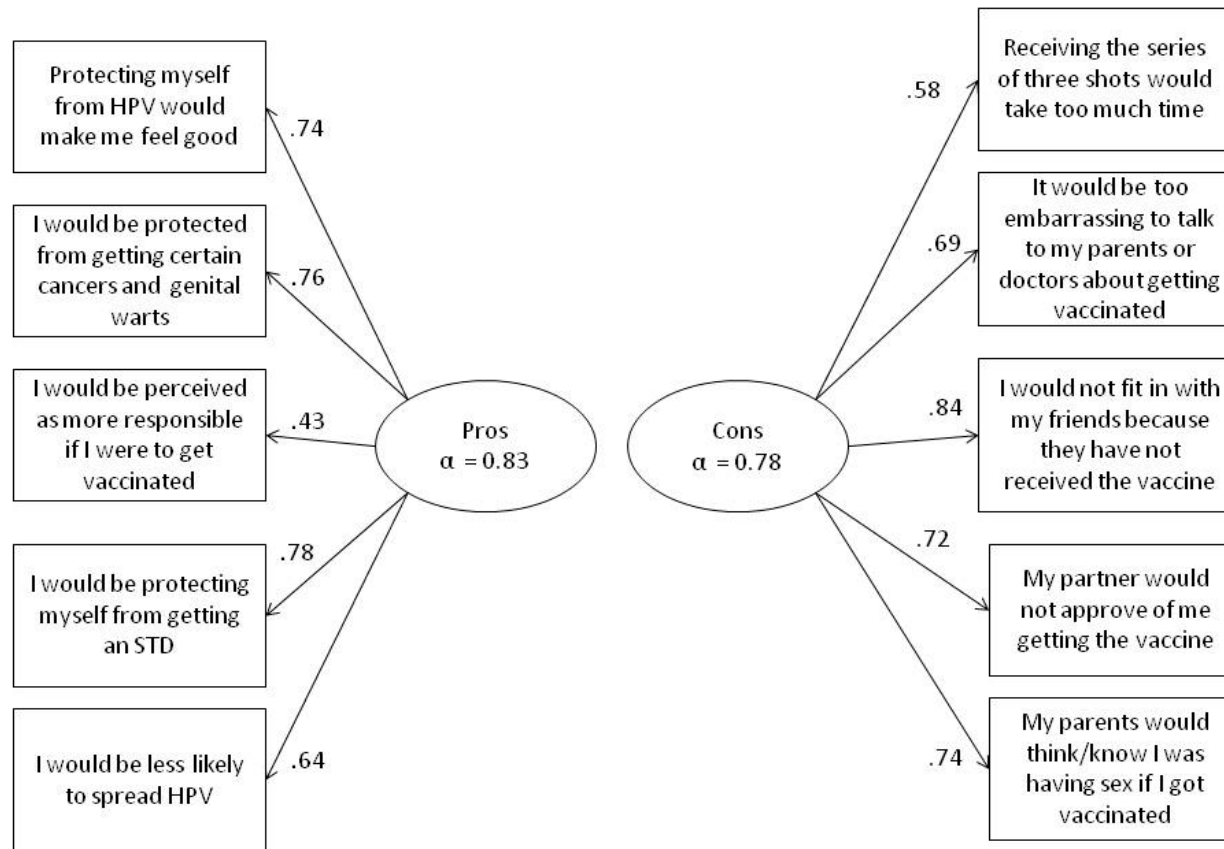


Figure 5. Male Self-Efficacy Confirmatory Model

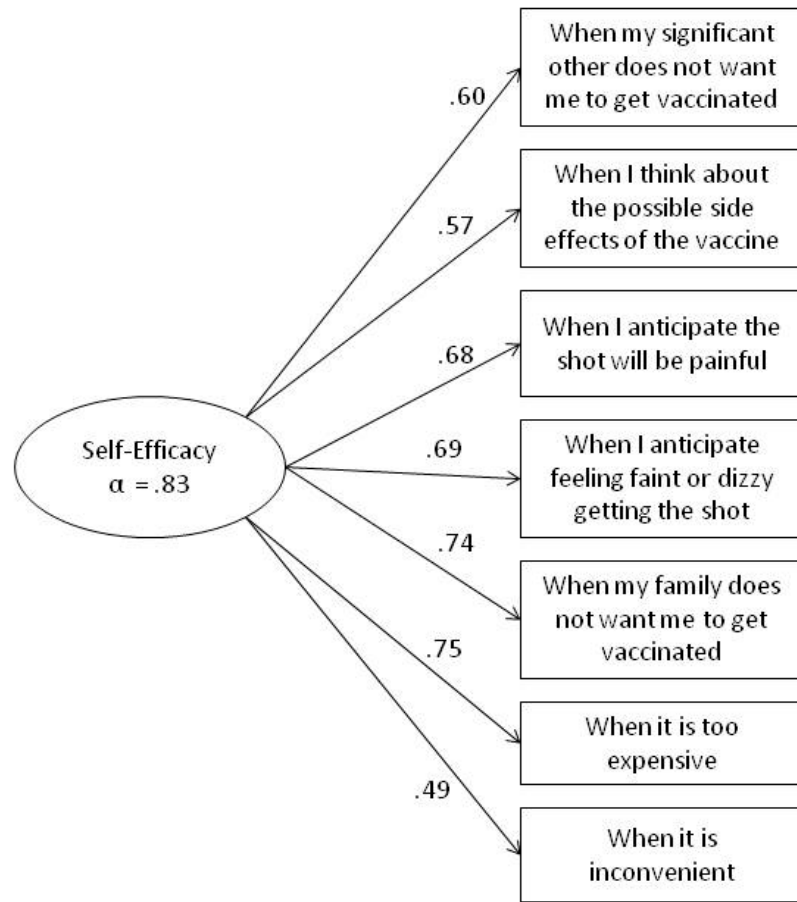
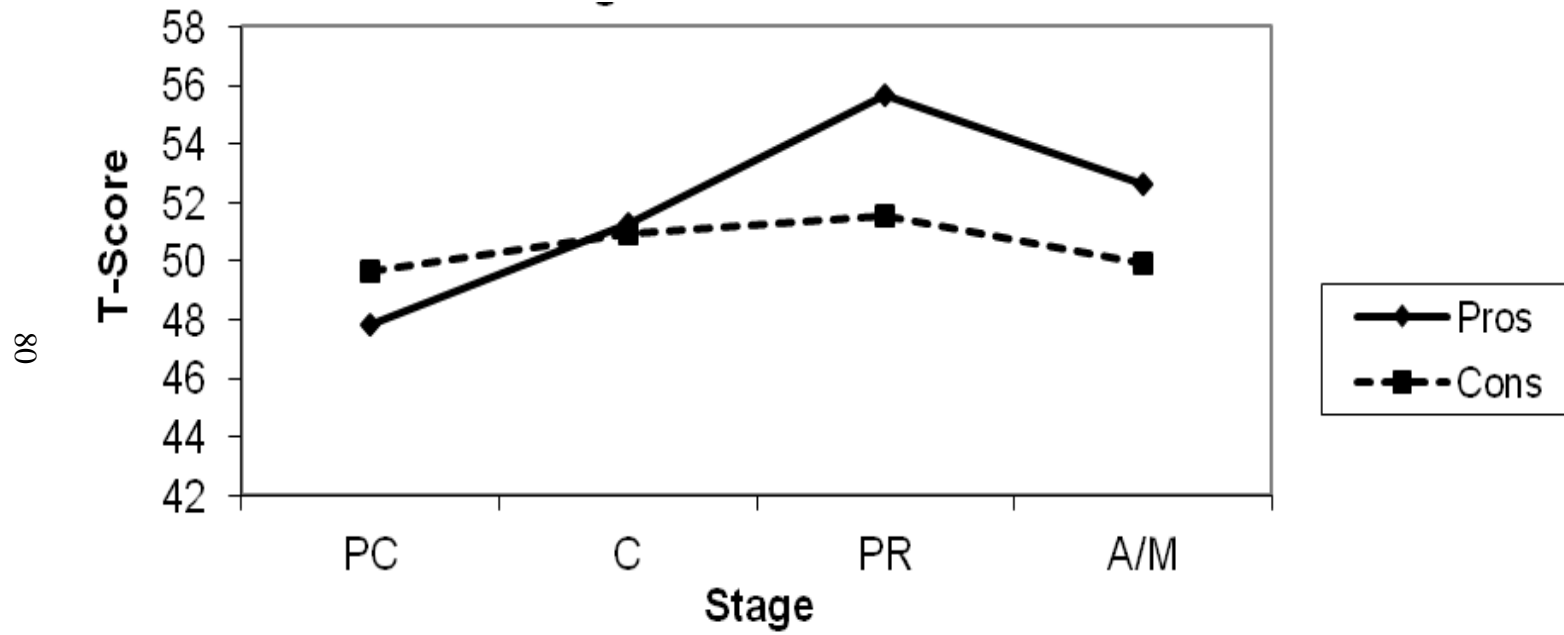


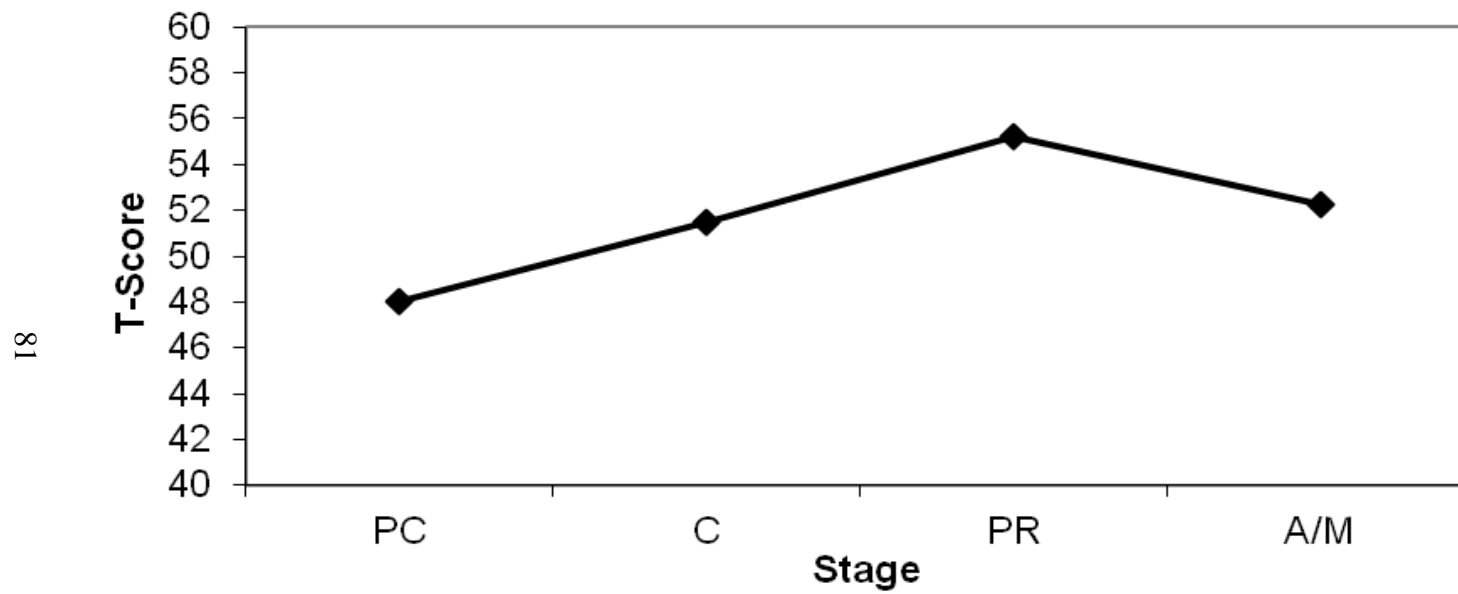


Figure 6. Stage of Change by Decisional Balance ANOVA results



Note. Results are weighted by Stage of Change

Figure 7. Stage of Change by Self-Efficacy ANOVA results



Note. Results are weighted by Stage of Change

Figure 8. Decisional Balance CFA Model with Standardized Parameter Estimates for the Male and Female Sample.

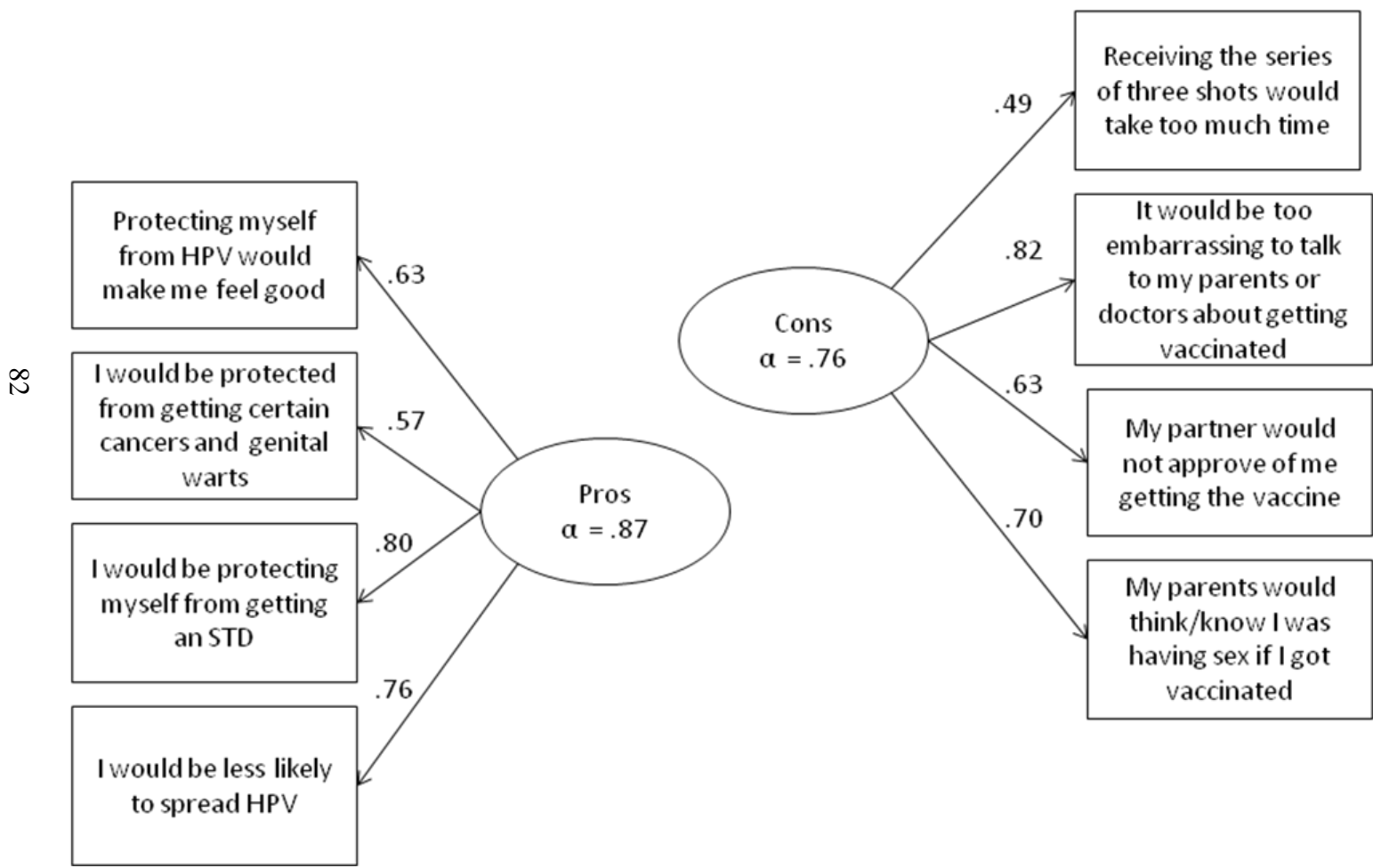
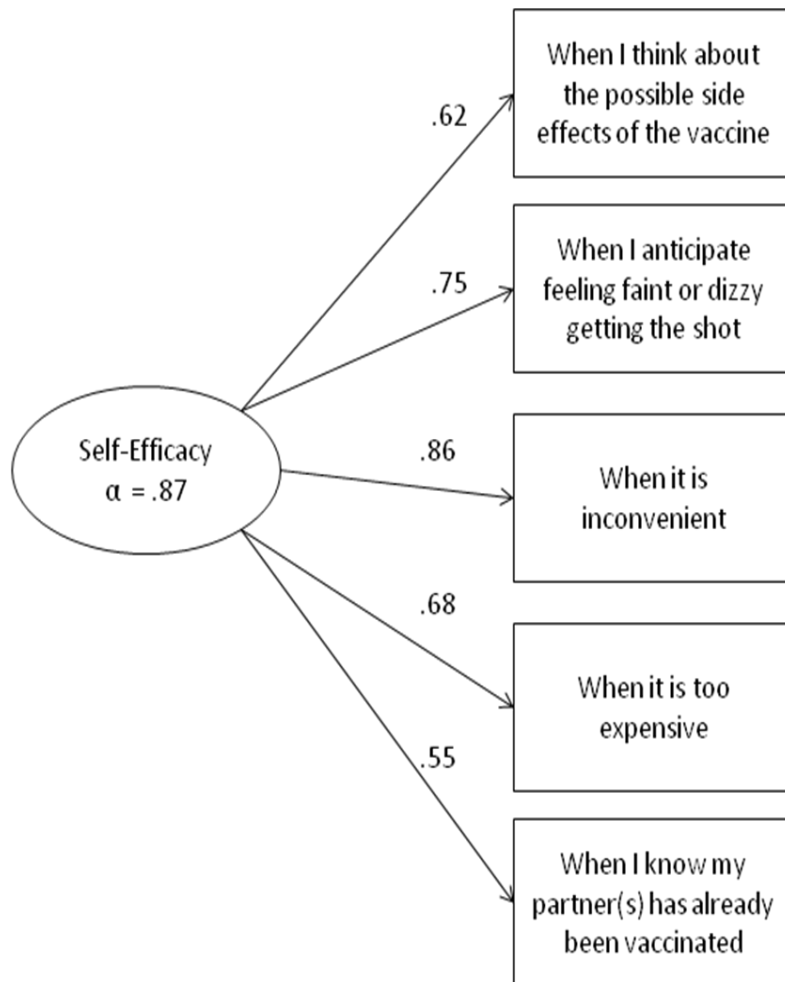
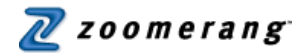


Figure 9. Self-Efficacy CFA model with Standardized Parameter Estimates for the Male and Female Sample.



## APPENDIX A



# HPV STUDY QUESTIONNAIRE

Created: January 27 2012, 1:55 PM  
Last Modified: February 13 2012, 11:15 AM  
Design Theme: Clean  
Language: English  
Button Options: Custom: Start Survey: "Start Survey!" Submit: "Submit"  
Disable Browser "Back" Button: False

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## College Student Health Study

Page 1 - Heading

### INFORMED CONSENT FORM

Title of Research Protocol: Prevention of the Human Papillomavirus (HPV) Among Male and Female College Students

---

Page 1 - Heading

You have been asked to take part in a research study described below. If you have questions at any time, you may discuss them with principal investigator Dr. James Prochaska or co-investigator Dr. Colleen Redding. They may be reached at 401-874-2830.

Description of the Project: The purpose of this research is to test a survey intended to assess stage of change progress toward receiving the human papillomavirus (HPV) vaccine in college-age men and women.

What will be Done: You are one of 800 men and women who will be asked to complete a survey that asks about human papillomavirus (HPV) vaccination, HPV-related knowledge, demographics, sexual activity, and attitudes toward the HPV vaccination. To participate, you must be a student at URI, able to read and speak English, and at least 18 years of age. The survey is administered online and should take approximately 45 minutes, and you will be receiving research-credit points towards your grade in this class for your participation.

Page 1 - Heading

**Risks or Discomforts:** You might experience some discomfort discussing your sexual behaviors. If you do not wish to share sexual history information you may skip any or all questions in the "sexual history section" of the survey. There are no other known risks associated with participating in this study.

**Expected Benefits of the Study:** You may not receive any direct benefit from taking part in this study. Taking part in the study, however, may help others like you in the future. Some people may find participation in this research informative and personally beneficial.

**Confidentiality:** Participation in this project is completely confidential and anonymous. Your information will not be shared with anyone except study personnel working for the Cancer Prevention Research Center. Survey responses to assessment questions will be stored by the secure database of the survey company server (Zoomerang). We will not collect or store IP addresses. Zoomerang make no effort to identify individual responders by IP address and their privacy practices are reviewed for compliance by TRUSTe. Zoomerang databases are protected by passwords and database and network firewalls to protect survey information. After online data collection is complete, the data will be transferred to a secure server at URI which is firewall protected with restricted access to study personnel through a virtual private network (VPN). These data will be destroyed within ten years of the collection date.

Page 1 - Heading

**Decision to Quit at Any Time:** Taking part in this study is entirely voluntary. If you wish, you may discontinue the survey at any time. You need not give any reasons for discontinuation. Your decision about whether or not to complete the survey will in no way affect on your relationship with the Cancer Prevention Research Center, the personnel associated with this study, or employees of the University of Rhode Island.

**Rights and Complaints:** If you are not satisfied with the way this study is performed, or if you have questions about your rights as a research subject, you may discuss your concerns with Dr. James Prochaska (401-874-2830), anonymously, if you choose. In addition, you may contact the office of the Vice President of Research, 70 Lower College Road, Suite 2, University of Rhode Island, Kingston, RI 02882 (401-874-4328).

Page 1 - Question 1 - Yes or No

You have read this Consent Form and currently have no further questions concerning your participation in this project. You understand that you may ask any additional questions at any time and that your participation in this project is voluntary. By participating in the project, you agree that your answers can be used without your signed consent.

By clicking "yes" on this form I am indicating that I understand the information provided and I agree to participate in this project. If I do not wish to participate, I can click "no" with no penalty.

- Yes
- No [Screen Out]

Page 2 - Question 2 - Choice - One Answer (Bullets)

How old are you?

- Under 18 [Screen Out]
- 18
- 19

- 20
- 21
- 22
- 23
- 24
- 25
- 26
- Over 26 [Screen Out]

Page 3 - Question 3 - Choice - One Answer (Bullets)

Where did you hear about this survey?

- URI class
- e-mail
- Facebook
- Survey Sampling Company

Page 3 - Question 4 - Choice - One Answer (Bullets)

What is your religion? (Please write 'none' if you do not identify with a particular religious group.)

- Catholic
  - Christian (not Catholic)
  - Jewish
  - Muslim
  - Buddhist
  - Hindi
  - Atheist or Agnostic
  - Don't Know/Not Sure
  - Other, please specify
- 

Page 3 - Question 5 - Yes or No

Are you Hispanic or Lanino/Latina?

- Yes
- No

Page 3 - Question 6 - Choice - One Answer (Bullets)

What is your race?

- White
- Black
- Asian
- Native American/Alaskan Native
- Hawaiian/Pacific Islander
- Other, please specify

---

Page 3 - Question 7 - Choice - One Answer (Bullets)

What year are you in school?

- Freshman
- Sophomore
- Junior
- Senior
- 5th Year Undergraduate
- Other

Page 3 - Question 8 - Yes or No

Are you a member of the Greek system (i.e. fraternity/sorority?)

- Yes
- No

Page 3 - Question 9 - Yes or No

Are you a member of a URI sports team?

- Yes
- No

Page 3 - Question 10 - Choice - One Answer (Bullets)

What is your estimated GPA?

- < 1.5
- 1.6 - 2.0
- 2.1 - 2.5
- 2.6 - 3.0
- 3.1 - 3.5
- 3.6 - 4.0
- Don't Know/Not Sure
- Other, please specify

---

Page 3 - Question 11 - Choice - One Answer (Bullets)

Which best describes your current place of residence?

- Dormitory/On-campus Housing
- Off-campus Apartment/House
- Parent's/Legal Guardian's Home
- Other Family Member's Home
- Other



Page 3 - Question 12 - Open Ended - One Line

What is the zip code in which your primary parent or guardian resides?

Page 3 - Question 13 - Choice - One Answer (Bullets)

Do you have health insurance?

- Yes
- No
- Don't Know

Page 4 - Heading

The next series of questions will ask you about HPV. HPV is also known as the human papillomavirus. It is a common sexually transmitted disease. There is a vaccine that can protect you against the most common types of HPV. This vaccine was first available only for girls and women but is now also available for boys and young men ages 9 - 26 year-old.

Page 4 - Question 14 - Choice - One Answer (Bullets)

Have you heard of the human papillomavirus (HPV) before today?

- Yes
- No [Skip to 8]

Page 5 - Question 15 - Open Ended - Comments Box

Is so, what comes to mind when you think of HPV?

Page 6 - Question 16 - Choice - One Answer (Bullets)

Did you know that the HPV vaccine was approved for use among men before today?

- Yes
- No [Skip to 8]

Page 7 - Question 17 - Choice - Multiple Answers (Bullets)

How did you find out that the HPV vaccine was approved for use among men (select as many answer options as applicable)

- Parent or Other Family Member
- Friend
- Health Class
- College Class

- Doctor or Health Care Provider
  - Advertisement/Media
  - News
  - Other, please specify
- 

Page 8 - Question 18 - Choice - One Answer (Bullets)

Have you completed the HPV vaccine series (3 shots)?

- Yes [Skip to 11]
- No

Page 9 - Question 19 - Yes or No

Have you received any of the HPV vaccine shots?

- Yes
- No [Skip to 19]

Page 10 - Question 20 - Choice - One Answer (Bullets)

How many of the HPV vaccine shots have you received?

- 1
- 2

[Skip Unconditionally to 12]

Page 11 - Question 21 - Yes or No

Did you receive the last of your three HPV vaccine shots within the past year?

- Yes [Skip to 13]
- No [Skip to 15]

Page 12 - Question 22 - Yes or No

Did you receive your last HPV vaccine shot within the past year?

- Yes [Skip to 14]
- No [Skip to 16]

Page 13 - Question 23 - Choice - One Answer (Bullets)

In what month did you get the last of your three HPV vaccine shots?

- January
- February
- March
- April

- May
- June
- July
- August
- September
- October
- November
- December

[Skip Unconditionally to 21]

Page 14 - Question 24 - Choice - One Answer (Bullets)

In what month did you get your last HPV vaccine shot?

- January
- February
- March
- April
- May
- June
- July
- August
- September
- October
- November
- December

[Skip Unconditionally to 17]

Page 15 - Question 25 - Choice - One Answer (Bullets)

How old were you when you recieved the last of your three HPV vaccine shots?

- < 12
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- 21
- 22
- 23
- 24
- 25

[Skip Unconditionally to 21]

Page 16 - Question 26 - Choice - One Answer (Bullets)

How old were you when you received your last HPV vaccine shot?

- < 12
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- 21
- 22
- 23
- 24
- 25

Page 17 - Question 27 - Choice - One Answer (Bullets)

Are you intending to complete the HPV vaccination series?

- No, I do not plan to complete the HPV vaccination series.
- Yes, I plan to complete the HPV vaccination series but NOT within the next 6 months. [Skip to 21]
- Yes, I plan to complete the HPV vaccination series within the next 6 months. [Skip to 21]

Page 18 - Question 28 - Open Ended - One Line

Why are you NOT planning on finishing the HPV vaccination series?

---

[Skip Unconditionally to 21]

Page 19 - Question 29 - Choice - One Answer (Bullets)

Are you intending to start the HPV vaccination series?

- No, I do not plan on starting the HPV vaccination series in the next 6 months.
- Yes, I plan on starting the HPV vaccination series within the next 6 months. [Skip to 23]
- Yes, I plan on starting the HPV vaccination series within the next 30 days. [Skip to 23]

Page 20 - Question 30 - Open Ended - One Line

Why are you not planning to start the HPV vaccination series?

[Skip Unconditionally to 23]

Page 21 - Question 31 - Choice - One Answer (Bullets)

Who initiated/recommended the HPV vaccination series?

- Mother
- Father
- Yourself
- Health Care Provider/Doctor
- Other, please specify

Page 22 - Question 32 - Choice - One Answer (Bullets)

Were you aware of what you were being vaccinated for when you received the HPV vaccination series?

- Not at all aware
- Somewhat aware
- Completely aware

Page 23 - Question 33 - Choice - One Answer (Bullets)

What gender are you?

- Male
- Female [Skip to 28]

Page 24 - Heading

Instructions: The next series of questions will ask you about your personal/sexual history.

Page 24 - Question 34 - Choice - Multiple Answers (Bullets)

Have you ever had vaginal, anal, or oral sex with a woman? PLEASE CHECK ALL THAT APPLY

- Vaginal Sex [Skip to 25]
- Anal Sex [Skip to 25]
- Oral Sex [Skip to 26]
- None of the Above [Skip to 26]

Page 25 - Question 35 - Open Ended - One Line

How old were you the first time you had vaginal or anal sex with a woman?

Page 25 - Question 36 - Open Ended - One Line

Approximately how many women have you had vaginal or anal sex with?

Page 25 - Question 37 - Choice - One Answer (Bullets)

How often do you use condoms when having vaginal or anal sex with women?

- Never
- Rarely
- Sometimes
- Often
- Always

Page 26 - Question 38 - Choice - Multiple Answers (Bullets)

Have you ever had anal or oral sex with a man? PLEASE CHECK ALL THAT APPLY

- Anal Sex [Skip to 27]
- Oral Sex [Skip to 27]
- None of the Above [Skip to 32]

Page 27 - Question 39 - Open Ended - One Line

How old were you the first time you had anal sex with man?

Page 27 - Question 40 - Open Ended - One Line

Approximately how many men have you had anal sex with?

Page 27 - Question 41 - Choice - One Answer (Bullets)

How often do you use condoms when having anal sex with men?

- Never
- Rarely
- Sometimes
- Often
- Always

[Skip Unconditionally to 32]

Page 28 - Heading

The next series of questions will ask you about your personal/sexual history.

Page 28 - Question 42 - Choice - Multiple Answers (Bullets)

Have you ever had vaginal, anal, or oral sex with a man? PLEASE CHECK ALL THAT APPLY.

- Vaginal Sex [Skip to 29]
- Anal Sex [Skip to 29]
- Oral Sex [Skip to 30]
- None of the above [Skip to 30]

Page 29 - Question 43 - Open Ended - One Line

How old were you the first time you had vaginal or anal sex with a man?

Page 29 - Question 44 - Open Ended - One Line

Approximately how many men have you had vaginal or anal sex with in your lifetime?

Page 29 - Question 45 - Choice - One Answer (Bullets)

How often do you use condoms when having vaginal or anal sex with men?

- Never
- Rarely
- Sometimes
- Often
- Always

Page 30 - Question 46 - Choice - One Answer (Bullets)

Have you ever had any sexual contact with a woman?

- Yes
- No [Skip to 32]

Page 31 - Question 47 - Open Ended - One Line

Approximately how many women have you had sexual contact with in your lifetime?

Page 32 - Question 48 - Choice - One Answer (Bullets)

What is your sexual orientation?

- Heterosexual
- Homosexual

- Bisexual
  - Other, please specify
- 

Page 33 - Question 49 - Yes or No

Have you ever been diagnosed with HPV?

- Yes
- No

Page 33 - Question 50 - Yes or No

Have you ever had/been diagnosed with genital warts?

- Yes
- No

Page 33 - Question 51 - Yes or No

Do you know anyone who has been diagnosed with HPV?

- Yes
- No

Page 33 - Question 52 - Choice - One Answer (Bullets)

How often do you currently smoke or use other tobacco products?

- Daily
- Weekly
- Monthly
- Less than Monthly
- Not at All

Page 34 - Heading

Instructions: Next are some questions related to your knowledge about the human papillomavirus (HPV). If you are not sure of the answer to a questions please mark 'Don't Know.'

---

Page 34 - Question 53 - Choice - One Answer (Bullets)

A person may be infected with HPV and not know it.

- True
- False
- Don't Know



Page 34 - Question 54 - Choice - One Answer (Bullets)

HPV does not cause cervical cancer.

- True
- False
- Don't Know

Page 34 - Question 55 - Choice - One Answer (Bullets)

Vaccination can help prevent HPV infection in men and women.

- True
- False
- Don't Know

Page 34 - Question 56 - Choice - One Answer (Bullets)

HPV can lead to cancers of the anus, vagina, penis, throat, and mouth

- True
- False
- Don't Know

Page 34 - Question 57 - Choice - One Answer (Bullets)

Only women are at risk for health problems related to HPV

- True
- False
- Don't Know

Page 34 - Question 58 - Choice - One Answer (Bullets)

HPV can only be spread through sexual intercourse

- True
- False
- Don't Know

Page 34 - Question 59 - Choice - One Answer (Bullets)

HPV is transmitted or spread via genital contact.

- True
- False
- Don't Know

Page 34 - Question 60 - Choice - One Answer (Bullets)

Men are not routinely tested for HPV

- True

- False
- Don't Know

Page 34 - Question 61 - Choice - One Answer (Bullets)

Genital warts are unrelated to HPV.

- True
- False
- Don't Know

Page 34 - Question 62 - Choice - One Answer (Bullets)

For most people an HPV infection goes away on its own

- True
- False
- Don't Know

Page 34 - Question 63 - Choice - One Answer (Bullets)

A person cannot transmit HPV if he/she does not have symptoms.

- True
- False
- Don't Know

Page 34 - Question 64 - Choice - One Answer (Bullets)

Most persons with HPV have no visible signs or symptoms.

- True
- False
- Don't Know

Page 34 - Question 65 - Choice - One Answer (Bullets)

Condoms fully prevent against HPV transmission.

- True
- False
- Don't Know

Page 34 - Question 66 - Choice - One Answer (Bullets)

HPV testing is part of routine STD testing for women.

- True
- False
- Don't Know

Page 34 - Question 67 - Choice - One Answer (Bullets)

People who already have HPV cannot benefit from getting the vaccine.

- True
- False
- Don't Know

Page 34 - Question 68 - Choice - One Answer (Bullets)

If you started the HPV vaccination series, and missed a shot, you have to re-start the series from the beginning.

- True
- False
- Don't Know

Page 34 - Question 69 - Choice - One Answer (Bullets)

HPV vaccination is covered by private insurance for women but not men.

- True
- False
- Don't Know

Page 35 - Heading

Please read before completing the next questions.....

The human papillomavirus (HPV) is a sexually transmitted disease. There are more than 40 types of HPV that are passed through sexual contact. These types can infect the genital areas of men and women, including the skin on and around the genitals or anus. They can also infect the mouth and throat. Most people who get HPV (of any type) never develop any symptoms or health problems, but some types of HPV can cause genital warts. Other types can cause cervical, vaginal, penile, anal, or head and neck cancers. The 3-shot HPV vaccine series is administered over a 6-month period. It costs between \$300 and \$400 and is covered by insurance for women but not for men.

Page 36 - Heading

Instructions: Next are some thoughts and feelings people may have about HPV vaccination. Please tell us how important each one is to you in your decision of whether or not you get the HPV vaccination series.

If an answer does not apply to you please mark "Not important at all." If you have already received the vaccine, please think about how important each one was in your decision to get the HPV vaccination series.

Page 36 - Question 70 - Choice - One Answer (Bullets)

The vaccination would cost me too much money.

- Not Important At All
- A Little Important

- Important
- Very Important
- Extremely Important

Page 36 - Question 71 - Choice - One Answer (Bullets)

Getting the vaccine would make me uncomfortable because I hate shots.

- Not Important At All
- A Little Important
- Important
- Very Important
- Extremely Important

Page 36 - Question 72 - Choice - One Answer (Bullets)

Getting the vaccine could help keep HPV from spreading.

- Not Important at All
- A Little Important
- Important
- Very Important
- Extremely Important

Page 36 - Question 73 - Choice - One Answer (Bullets)

Getting the vaccine would reduce the risk of future partners developing genital warts or cancer.

- Not Important at All
- A Little Important
- Important
- Very Important
- Extremely Important

Page 36 - Question 74 - Choice - One Answer (Bullets)

Protecting myself from HPV would make me feel good.

- Not Important at All
- A Little Important
- Important
- Very Important
- Extremely Important

Page 36 - Question 75 - Choice - One Answer (Bullets)

Having the vaccine would allow future partners to feel more comfortable having sex with me.

- Not Important at All
- A Little Important

- Important
- Very Important
- Extremely Important

Page 36 - Question 76 - Choice - One Answer (Bullets)

I would be protected from getting certain cancers and genital warts.

- Not Important at All
- A Little Important
- Important
- Very Important
- Extremely Important

Page 36 - Question 77 - Choice - One Answer (Bullets)

The vaccination could cause side-effects and unknown long-term risks.

- Not Important at All
- A Little Important
- Important
- Very Important
- Extremely Important

Page 36 - Question 78 - Choice - One Answer (Bullets)

I would be perceived as more responsible if I were to get vaccinated.

- Not Important at All
- A Little Important
- Important
- Very Important
- Extremely Important

Page 36 - Question 79 - Choice - One Answer (Bullets)

I would not fit in with my friends because they have not received the vaccine.

- Not Important at All
- A Little Important
- Important
- Very Important
- Extremely Important

Page 37 - Question 80 - Choice - One Answer (Bullets)

I would cause shame to my family/religion.

- Not Important at All
- A Little Important
- Important

- Very Important
- Extremely Important

Page 37 - Question 81 - Choice - One Answer (Bullets)

Receiving the series of three shots would take too much time.

- Not Important at All
- A Little Important
- Important
- Very Important
- Extremely Important

Page 37 - Question 82 - Choice - One Answer (Bullets)

My doctor would approve of me getting the vaccination series.

- Not Important at All
- A Little Important
- Important
- Very Important
- Extremely Important

Page 37 - Question 83 - Choice - One Answer (Bullets)

People close to me would be happy with me if I received the vaccination series.

- Not Important at All
- A Little Important
- Important
- Very Important
- Extremely Important

Page 37 - Question 84 - Choice - One Answer (Bullets)

I would be protecting myself from getting an STD.

- Not Important at All
- A Little Important
- Important
- Very Important
- Extremely Important

Page 37 - Question 85 - Choice - One Answer (Bullets)

It would be too embarrassing to talk to my parents or doctor about getting vaccinated.

- Not Important at All
- A Little Important
- Important
- Very Important

- Extremely Important

Page 37 - Question 86 - Choice - One Answer (Bullets)

My partner would not approve of me receiving the vaccine.

- Not Important at All
- A Little Important
- Important
- Very Important
- Extremely Important

Page 37 - Question 87 - Choice - One Answer (Bullets)

I would be a role model for my peers if I got vaccinated.

- Not Important at All
- A Little Important
- Important
- Very Important
- Extremely Important

Page 37 - Question 88 - Choice - One Answer (Bullets)

I would be less likely to spread HPV.

- Not Important at All
- A Little Important
- Important
- Very Important
- Extremely Important

Page 37 - Question 89 - Choice - One Answer (Bullets)

My parents would think/know I was having sex if I got vaccinated.

- Not Important at All
- A Little Important
- Important
- Very Important
- Extremely Important

Page 37 - Question 90 - Choice - One Answer (Bullets)

Getting vaccinated would reduce my current/future partner(s) fear of contracting HPV.

- Not Important at All
- A Little Important
- Important
- Very Important
- Extremely Important

Page 37 - Question 91 - Choice - One Answer (Bullets)

People would think I was having risky sex if I got vaccinated.

- Not Important at All
- A Little Important
- Important
- Very Important
- Extremely Important

Page 38 - Heading

Instructions: In the following kinds of situations it may be harder to make a decision to get the HPV vaccination and to stay on schedule when getting the shots. Please tell us how confident you are you would get the vaccine in the following situations.  
HOW CONFIDENT ARE YOU THAT YOU WOULD GET THE VACCINE WHEN.....

---

Page 38 - Question 92 - Choice - One Answer (Bullets)

When I don't know how others will respond to my getting the vaccine.

- Not at All Confident
- A Little Confident
- Confident
- Very Confident
- Extremely Confident

Page 38 - Question 93 - Choice - One Answer (Bullets)

When my significant other does not want me to get the vaccine.

- Not at All Confident
- A Little Confident
- Confident
- Very Confident
- Extremely Confident

Page 38 - Question 94 - Choice - One Answer (Bullets)

When my friends are unsupportive of me getting the HPV vaccine.

- Not at All Confident
- A Little Confident
- Confident
- Very Confident
- Extremely Confident



Page 38 - Question 95 - Choice - One Answer (Bullets)

When it seems too difficult to fit into my schedule.

- Not at All Confident
- A Little Confident
- Confident
- Very Confident
- Extremely Confident

Page 38 - Question 96 - Choice - One Answer (Bullets)

When I think about the possible side effects of the vaccine.

- Not at All Confident
- A Little Confident
- Confident
- Very Confident
- Extremely Confident

Page 38 - Question 97 - Choice - One Answer (Bullets)

When I have to go somewhere unfamiliar to get the shot.

- Not at All Confident
- A Little Confident
- Confident
- Very Confident
- Extremely Confident

Page 38 - Question 98 - Choice - One Answer (Bullets)

When I am stressed.

- Not at All Confident
- A Little Confident
- Confident
- Very Confident
- Extremely Confident

Page 38 - Question 99 - Choice - One Answer (Bullets)

When I anticipate that the shot will be painful.

- Not at All Confident
- A Little Confident
- Confident
- Very Confident
- Extremely Confident

Page 38 - Question 100 - Choice - One Answer (Bullets)

When my family is against me getting vaccinated.

- Not at All Confident
- A Little Confident
- Confident
- Very Confident
- Extremely Confident

Page 38 - Question 101 - Choice - One Answer (Bullets)

When I anticipate feeling faint or dizzy when getting the shot.

- Not at All Confident
- A Little Confident
- Confident
- Very Confident
- Extremely Confident

Page 38 - Question 102 - Choice - One Answer (Bullets)

When it is inconvenient.

- Not at All Confident
- A Little Confident
- Confident
- Very Confident
- Extremely Confident

Page 38 - Question 103 - Choice - One Answer (Bullets)

When it is too expensive.

- Not at All Confident
- A Little Confident
- Confident
- Very Confident
- Extremely Confident

Page 38 - Question 104 - Choice - One Answer (Bullets)

I know my partner(s) has already been vaccinated

- Not at All Confident
- A Little Confident
- Confident
- Very Confident
- Extremely Confident

Page 39 - Heading

The following statements describe different beliefs people may have about vaccines in general. They do not necessarily reflect the beliefs of the researchers or the Centers for Disease Control (CDC). Please rate how much you agree with each statement.

Page 39 - Question 105 - Choice - One Answer (Bullets)

If others get vaccinated I don't need to

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 39 - Question 106 - Choice - One Answer (Bullets)

Vaccines cause autism and other disorders

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 39 - Question 107 - Choice - One Answer (Bullets)

A vaccine may cause the disease it is intended to prevent

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 39 - Question 108 - Choice - One Answer (Bullets)

Vaccines protect the public health

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 39 - Question 109 - Choice - One Answer (Bullets)

Healthcare organizations only recommend vaccines that are safe and effective

- Completely Disagree

- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 39 - Question 110 - Choice - One Answer (Bullets)

Vaccines cause more harm than good

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 39 - Question 111 - Choice - One Answer (Bullets)

Getting too many vaccines can overwhelm the immune system causing adverse reactions or serious illness

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 39 - Question 112 - Choice - One Answer (Bullets)

Vaccines are a conspiracy so drug companies can make money

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 39 - Question 113 - Choice - One Answer (Bullets)

If my doctor recommends a vaccine I should probably get it

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 39 - Question 114 - Choice - One Answer (Bullets)

Vaccines contain dangerous preservatives (like mercury) that can harm the body

- Completely Disagree

- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 39 - Question 115 - Choice - One Answer (Bullets)

The news/media exaggerates the risks associated with vaccines

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 39 - Question 116 - Choice - One Answer (Bullets)

The benefits of vaccination outweigh the risks

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 40 - Heading

The following statements describe different beliefs people may have about the HPV vaccine. They do not necessarily reflect the beliefs of the researchers or the Centers for Disease Control (CDC). Please rate how much you agree with the following statements.

Page 40 - Question 117 - Choice - One Answer (Bullets)

There is not enough research on the safety of the HPV vaccine

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 40 - Question 118 - Choice - One Answer (Bullets)

The HPV vaccine shots are very painful

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 40 - Question 119 - Choice - One Answer (Bullets)

The HPV vaccine may cause lasting health problems

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 40 - Question 120 - Choice - One Answer (Bullets)

The HPV vaccine has not been available long enough for the medical community to know the long-term risks

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 40 - Question 121 - Choice - One Answer (Bullets)

The HPV vaccine may cause short-term problems like fever or discomfort

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 40 - Question 122 - Choice - One Answer (Bullets)

The HPV vaccine could cause dangerous side effects

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 40 - Question 123 - Choice - One Answer (Bullets)

The HPV vaccine can cause serious health problems or even death

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 40 - Question 124 - Choice - One Answer (Bullets)

The HPV vaccine is just a way for drug companies to make money.

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 40 - Question 125 - Choice - One Answer (Bullets)

The HPV vaccine could make me infertile

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 40 - Question 126 - Choice - One Answer (Bullets)

People in monogamous relationships don't need the HPV vaccine

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 40 - Question 127 - Choice - One Answer (Bullets)

Getting the HPV vaccine sends the message that pre-marital sex is acceptable

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 40 - Question 128 - Choice - One Answer (Bullets)

I think the HPV vaccine is unsafe

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 40 - Question 129 - Choice - One Answer (Bullets)

The HPV can cause mental retardation in children

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 41 - Question 130 - Choice - One Answer (Bullets)

Imagine that you got genital warts and the HPV vaccine could have prevented it. How much would you regret that you did NOT get the HPV vaccine? (If you have already received the vaccine, please answer this question as if you had not received the HPV vaccination series.)

- Not At All
- A Little
- A Moderate Amount
- Alot

Page 41 - Question 131 - Choice - One Answer (Bullets)

Imagine that you got an HPV infection that could lead to oral, anal, or genital cancer and the HPV vaccine could have prevented it. How much would you regret that you did NOT get the HPV vaccine? (If you have already received the vaccine, please answer this question as if you had not received the HPV vaccination series.)

- Not At All
- A Little
- A Moderate Amount
- Alot

Page 41 - Question 132 - Choice - One Answer (Bullets)

Imagine that you are diagnosed with a cancer that was likely caused by and HPV infection and the HPV vaccine could have prevented it. How much would you regret that you did NOT get the HPV vaccine? (If you have already received the vaccine, please answer this question as if you had not received the HPV vaccination series.)

- Not At All
- A Little
- A Moderate Amount
- Alot

Page 42 - Heading

The following statements describe different beliefs people may have about HPV vaccination. Please rate how much you agree with the following statements.



Page 42 - Question 133 - Choice - One Answer (Bullets)

Anyone engaging in sexual activity (male or female) should get the HPV vaccine

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 42 - Question 134 - Choice - One Answer (Bullets)

If women get the HPV vaccine men don't need to

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 42 - Question 135 - Choice - One Answer (Bullets)

Men AND women should receive the HPV vaccine

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 42 - Question 136 - Choice - One Answer (Bullets)

Insurance companies should pay for the HPV vaccine for MEN

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 42 - Question 137 - Choice - One Answer (Bullets)

A woman should tell her partners if they know/suspects she has HPV

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 42 - Question 138 - Choice - One Answer (Bullets)

A man should tell his partner if he knows/suspects he has HPV

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 42 - Question 139 - Choice - One Answer (Bullets)

Insurance companies should pay for the HPV vaccine for WOMEN

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 43 - Heading

The following set of questions refer to your perceived risk for contracting HPV or experiencing an HPV-related health problem.

---

Page 43 - Question 140 - Choice - One Answer (Bullets)

I am not at risk for developing an HPV-related cancer

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 43 - Question 141 - Choice - One Answer (Bullets)

I am not at risk for contracting HPV

- Completely Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 43 - Question 142 - Choice - One Answer (Bullets)

I am not at risk for developing genital warts.

- Completely Disagree
- Somewhat Disagree

- Neither Agree nor Disagree
- Somewhat Agree
- Completely Agree

Page 43 - Question 143 - Choice - One Answer (Bullets)

Relative to the average college student, my risk of contracting HPV is:

- Much Lower
- Slightly Lower
- About the Same
- Slightly Higher
- Much Higher

Page 44 - Heading

The following set of questions refers to your perceptions of HPV prevalence on campus. Most people do not know these answers, but we are interested in your best answer.

---

Page 44 - Question 144 - Choice - One Answer (Bullets)

What percentage of FEMALE students at URI do you think have received the HPV vaccine?

- 0% to 10%
- 10% - 20%
- 20% - 30%
- 30% - 40%
- 50% - 60%
- 60% - 70%
- 70% - 80%
- 80% - 90%
- 90% - 100%

Page 44 - Question 145 - Choice - One Answer (Bullets)

What percentage of MALE students at URI do you think have received the HPV vaccine?

- 0% to 10%
- 10% - 20%
- 20% - 30%
- 30% - 40%
- 50% - 60%
- 60% - 70%
- 70% - 80%
- 80% - 90%
- 90% - 100%

Page 44 - Question 146 - Choice - One Answer (Bullets)

What percentage of FEMALE students at URI do you think has had an HPV infection? (Please estimate prevalence for all women, not just those who were diagnosed).

- 0% to 10%
- 10% - 20%
- 20% - 30%
- 30% - 40%
- 50% - 60%
- 60% - 70%
- 70% - 80%
- 80% - 90%
- 90% - 100%

Page 44 - Question 147 - Choice - One Answer (Bullets)

What percentage of MALE students at URI do you think has had an HPV infection? (Please estimate prevalence for all men, not just those who were diagnosed).

- 0% to 10%
- 10% - 20%
- 20% - 30%
- 30% - 40%
- 50% - 60%
- 60% - 70%
- 70% - 80%
- 80% - 90%
- 90% - 100%

Page 44 - Question 148 - Choice - One Answer (Bullets)

What percentage of FEMALE students at URI do you think has had genital warts?

- 0% to 10%
- 10% - 20%
- 20% - 30%
- 30% - 40%
- 50% - 60%
- 60% - 70%
- 70% - 80%
- 80% - 90%
- 90% - 100%

Page 44 - Question 149 - Choice - One Answer (Bullets)

What percentage of MALE students at URI do you think has had genital warts?

- 0% to 10%
- 10% - 20%
- 20% - 30%
- 30% - 40%

- 50% - 60%
- 60% - 70%
- 70% - 80%
- 80% - 90%
- 90% - 100%

Thank You Page

THANK YOU FOR PARTICIPATING IN OUR SURVEY.<br /><br />IF YOU ARE COMPLETING THIS SURVEY AS PART OF A CLASS PRINT THIS PAGE AND BRING IT TO YOUR PROFESSOR TO RECEIVE EXTRA CREDIT.<br /><br />This screen will serve as verification that you completed the college student health survey: IRB approval # HU1011-107<br /><br />

Screen Out Page

We are sorry, but based on your responses you are not eligible to participate in this study. Thank you for your time. If you would like more information on the study or your eligibility feel free to contact the principal investigator Dr. James Prochaska at 401-874-2830.

Over Quota Page

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Survey Closed Page

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