

Identifying salient beliefs
toward developing promising message strategies
to promote HPV vaccination among college students:

A reasoned action approach

A THESIS
SUBMITTED TO THE FACULTY OF THE
UNIVERSITY OF MINNESOTA

BY

Lauren S. Gray

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
MASTER OF ARTS

Dr. Rebekah H. Nagler

July 2015

Lauren S. Gray

2015 copyright

Abstract

Human Papillomavirus (HPV), the most common sexually transmitted infection (STI) in the United States, is responsible for many types of cancer that affect both sexes. Though vaccines to protect against HPV have existed since 2006, they are still underutilized, leaving college students at risk of HPV infection. In order to address low vaccination rates with a strategic message, we must first understand individual-level factors associated with intention to get vaccinated. A Reasoned Action approach is used to identify attitudinal, normative, and control factors, and their underlying beliefs, associated with vaccination intention.

Table of Contents

List of Tables.....	iii
List of Figures.....	iv
Introduction.....	1
Literature Review.....	4
Theoretical Framework: Reasoned Action.....	12
Building on Reasoned Action: the Hornik and Woolf approach.....	19
The Current Study.....	21
Study 1: Belief Elicitation Survey.....	21
Study 2: Reasoned Action Survey.....	30
Conclusion and Further Research.....	42
Limitations.....	47
Bibliography.....	48
Appendix A.....	59
Appendix B.....	63

List of Tables

Table 1	
Demographic Characteristics of Belief Elicitation Participants	25
Table 2	
Salient Behavioral, Normative, and Control Beliefs	26
Table 3	
Demographic Characteristics of Reasoned Action Participants	36
Table 4	
Proximal Determinant and Intention Means and SDs	37
Table 5	
Stratified Proximal Determinant and Intention Means and SDs	38
Table 6	
Proximal Determinant Correlations	39
Table 7	
Regression Analysis	39
Table 8	
Underlying Belief Correlations with Intention	45

List of Figures

Figure 1

Standardized Regression Coefficients 40

Introduction

Human Papillomavirus (HPV) is a sexually transmitted infection (STI) that causes a number of health issues, such as genital warts and several types of cancer. HPV is preventable and two vaccines exist to protect against it. The quadrivalent vaccine, Gardasil®, protects against oncogenic HPV types 16 and 18 and nononcogenic types 6 and 11 (CDC, 2010a). The bivalent vaccine, Cervarix®, protects against oncogenic HPV types 16 and 18 (CDC, 2010a). According to the CDC, both vaccines have high efficacy against cervical precancer lesions associated with HPV types 16 and 18. In addition, the quadrivalent vaccine has high efficacy against genital warts associated with HPV types 6 and 11 and vaginal and vulvar precancer lesions associated with HPV types 16 and 18 (CDC, 2010a). Though both vaccines are licensed for use in females ages 9 through 26 years, and the quadrivalent vaccine is licensed for use in males ages 9 through 26 years (CDC, 2010b), national vaccination rates remain low (CDC, 2013a). Vaccination rates are particularly low among males and those identifying as LGBT (McRee et al., 2014; CDC 2013a). Therefore, HPV continues to be an important public health issue in the United States.

Because HPV is still an important public health issue and the vaccines to protect against it are a relatively new phenomenon, HPV has received a significant amount of media coverage in the last six years. News coverage of HPV and cervical cancer spiked in May, June, and July of 2006, just prior to and directly following the FDA approval of the vaccine (Kelly et al., 2009). A majority of the news coverage during this time was print news, with very few stories on HPV and cervical cancer found in broadcast news

(Kelly et al., 2009). A majority of news headlines framed HPV vaccination as a cancer prevention issue (as opposed to an STI prevention issue)—consistent with how Merck’s Gardasil vaccine was marketed (Rothman & Rothman, 2009)—but the stories themselves were often missing key details, such as the need for continuing cervical cancer screening after completing the vaccination series (Kelly et al., 2009). Using a nationally representative sample of adults and a longitudinal survey, the authors found HPV knowledge was significantly associated with exposure to health-related news content in the six months following FDA approval of the vaccine (Kelly et al., 2009).

Research has shown that in addition to the amount of coverage being an important factor in promoting vaccine knowledge, the way HPV vaccination is framed in the media matters because framing can influence public opinion, policy support, and vaccination intention. Studies have shown that when media present HPV vaccination mandates for school children as a controversial subject, support for mandatory HPV vaccination wanes (Fowler & Gollust, 2015; Gollust et al., 2010). On the other hand, positively-framed HPV vaccination messages (e.g., vaccine is 70% effective) has been associated with more support for vaccine mandates and higher vaccine effectiveness ratings than negatively-framed but logically equivalent HPV vaccination messages (e.g., vaccine is 30% ineffective) (Bigman, Cappella, & Hornik, 2010). In addition, politicization of HPV vaccination has been found to negatively influence support for national and state vaccination mandates and trust in doctors and government (Fowler & Gollust, 2015). As mentioned above, a majority of the HPV news coverage in 2006 used a cancer prevention frame (Kelly et al., 2009), which has been found to increase women’s intentions to

vaccinate themselves (Leader et al., 2009). Thus while it is possible that media coverage and framing of HPV has influenced vaccine uptake, this study focuses on individual-level factors that influence vaccination decisions, which may or may not be derived from media exposure.

Attitudes, perceived norms, perceived behavioral control, and their underlying beliefs are individual-level cognitive factors that can affect health behaviors (Fishbein & Ajzen, 2010), though we know little about the beliefs that could influence HPV vaccination uptake among college students. Informed by the Reasoned Action approach (Fishbein & Ajzen, 2010), the goal of this study is to identify salient beliefs about HPV vaccination and, ultimately, inform the design of pro-vaccination messages for use in a college setting. By targeting beliefs most relevant to the college student population, future research can create more persuasive strategic messages that will hopefully increase vaccine uptake in this undervaccinated catch-up population.

Literature Review

Topics discussed in the literature review include the epidemiologic data on the population burden of HPV, what is known about HPV vaccination among college students, previously identified belief correlates of HPV vaccination, the disparities in HPV vaccination among male and LGBT populations, and HPV vaccination's relationship to individuals' religiosity.

Population burden of HPV

According to the Centers for Disease Control and Prevention, the Human Papillomavirus (HPV) is the most common sexually transmitted infection (STI) in the United States, with 79 million current infections nationwide (CDC, 2014). Of the more than 100 types of the virus, 40 are sexually transmitted, and 16 are known to be high-risk, or oncogenic (CDC, 2012). The oncogenic types are associated with cancers of the cervix, vulva, vagina, penis, anus, throat, tongue, and tonsils (CDC, 2012). The association between HPV and anogenital cancers is well established and studies support its role in oropharyngeal cancers as well.

Between 2000 and 2009, incidence rates of HPV-related cancers that affect U.S. men, including cancer of the oropharynx and anus, increased (Jemal et al., 2013). Oropharyngeal cancer is the most prevalent HPV-related cancer in men, accounting for 78.2% of HPV-related cancer cases, and in 2009, anal and oropharyngeal cancers accounted for a combined 92.6% of HPV-associated cancers in men (Jemal et al., 2013).

According to the CDC, 99% of cervical cancers contain at least one of the high-risk types of HPV, with types 16 and 18 accounting for about 70% of all cervical cancers

(CDC, 2012). In addition, HPV types 16 and 18 have been found in around 90% of HPV-related non-cervical cancers (Gillison, Chaturvedi, & Lowy, 2008). Because the HPV–cervical cancer link has been so well established over the past 20 years, prevention efforts have largely ignored its link to other cancers that affect both sexes.

The bivalent HPV vaccine (Cervarix®) protects against high-risk HPV types 16 and 18, but it was not until 2009 that the U.S. Food and Drug Administration approved the quadrivalent HPV (Gardasil®) vaccine for use in boys and men ages 9 through 26 (CDC, 2010b; Sun, 2009). In the U.S., most new cases of HPV are diagnosed in youth ages 15 to 24 and catch-up vaccinations are recommended through age 26 (CDC, 2013b). Despite these recommendations, only 37.6% of girls and 13.9% of boys ages 13 to 17 received all three doses of the HPV vaccine in 2013 (CDC, 2013a). In addition, LGBT status has been correlated with HPV-related knowledge gaps, higher burden of HPV-related infections and cancers, and lower vaccination rates (McRee et al., 2014; Nyitray et al., 2011; Polek & Hardie, 2010). According to McRee et al. (2014) the HPV vaccination completion rate among a national sample of college-age bisexual and lesbian women was only 32%. Therefore, college-aged men and women, especially those identifying as LGBT, are still at risk for HPV infection.

Because HPV infection continues to be a problem among young men and women, the incidence of HPV-related cancers continues to increase in men, and vaccination rates continue to be low (particularly in the male and LGBT populations), it is important to understand the factors that influence young men's and women's HPV vaccination decisions. Understanding why vaccination rates remain low across the board and why

vaccination disparities exist is a necessary first step for designing effective HPV communication interventions.

HPV vaccination among college students

Since the HPV vaccine's¹ introduction in the United States in 2006, researchers have been interested in both distal and proximal variables associated with vaccine uptake (CDC, 2011). Because the vaccine was not approved for adolescent boys and young men until 2009,

HPV vaccination research has predominantly focused on adolescent females (Bryer, 2014; Herbert, 2014; Reiter, Katz, & Paskett, 2013; Hollander, 2010; Gerend, Wibley, & Bland, 2009; Reiter et al., 2009; Dempsey et al., 2006).

Though a body of literature exists on HPV vaccinations in adolescent (primary) populations, less is known about HPV vaccinations in college student (catch-up) populations. The adolescent-focused literature is abundant because the CDC recommends vaccination for youth prior to sexual debut, specifying ages 11 and 12 as ideal for vaccination (CDC, 2015). Due to ethical and legal constraints, most adolescent research is conducted with parents of adolescents and not the adolescents themselves. A multitude of studies have thus examined HPV vaccine acceptability among parents of youth under age 18 (Bryer, 2014; Herbert, 2014; Reiter, Katz, & Paskett, 2013; Garcini, Galvan, & Barnack-Tavlaris, 2012; Hollander, 2010; Gerend, Wibley, & Bland, 2009; Reiter et al., 2009; Dempsey et al., 2006). Because the vaccine was approved in the U.S. only 9 years

¹ There are two distinct bodies of literature on HPV: disease-focused and vaccine-focused. An abundance of the disease-focused literature, unsurprisingly, came about prior to the introduction of the vaccine. Because the aim of this study is to inform pro-vaccination messages, the vaccine literature is the focus of this review.

ago and has been slow to catch on, overall vaccination rates among youth remain low. According to Stokley et al. (2014), only 5.9% of adolescent girls had completed all three doses of the vaccine by 2007. By 2013, only 37.6% of adolescent girls and 13.9% of adolescent boys ages 13 to 17 were fully vaccinated (Stokey et al., 2014). Those who were aged 11 to 12 in 2006 would now be college students, and, given their low vaccination rates up to age 17, would still be at risk for contracting HPV.

Belief correlates of HPV vaccination

There has been limited research regarding individual-level cognitive factors that influence HPV vaccination decision-making among college students. Sociodemographic correlates of vaccination initiation and completion have received a majority of the attention, while less attention has been paid to correlates such as attitudes and their underlying beliefs. In line with epidemiologic methods and Health Belief Model frameworks, research has looked at correlates such as sexual activity, HPV knowledge, and perceived risk. Between 1995 and 2007 (the pre-approval vaccine testing period), 28 U.S.-based studies that examined HPV or HPV vaccine-related awareness, knowledge, or attitudes were identified (Brewer & Fazekas, 2007). Of the studies that included vaccine acceptability measures among “adolescents, young adults, and parents of adolescents,” only 13 focused on vaccine-related awareness, knowledge, or attitudes, and of those, only one focused on college students (Brewer & Fazekas, 2007, p. 108).

Some studies on college students have identified beliefs correlated with HPV vaccination intention and behavior, but few of them have been qualitative and their samples have not been congruent. The most common sample type was female-only

(Krakow et al., 2014; Lipschitz et al., 2013; Hopfer and Clippard, 2011), and often included particular segments of the female college student population such as American Indians (Hodge et al., 2011) or Latinas (Schiffner and Buki, 2006). Also, though beliefs did arise in the literature, they were not necessarily referred to as beliefs nor were they identified using a belief elicitation approach – discussed in-depth below in the Theoretical Framework section. According to Fishbein and Ajzen (2010), qualitative belief elicitation research is important because in order “to understand why people hold certain attitudes at a given point in time, it is necessary to assess their readily accessible beliefs” about HPV vaccination (p. 100).

Identified beliefs regarding HPV vaccination among college students included feelings of security and protection from HPV (Dillard, 2011), fear of vaccine side effects (Hodge et al., 2011), desire to prevent cancer (Hopfer and Clippard, 2011), and not having to worry about HPV anymore (Mehta et al., 2013). In addition, having parental (Bendik, Mayo, & Parker, 2011; Hodge et al., 2011), family (Hopfer and Clippard, 2011; Schiffner and Buki, 2006), peer/friend (Bendik, Mayo, & Parker, 2011; Dillard, 2011; Hopfer and Clippard, 2011; Martin et al., 2011; Schiffner and Buki, 2006), partner (Bendik, Mayo, & Parker, 2011; Dillard, 2011), and healthcare provider support (Hopfer and Clippard, 2011) was often deemed important when considering vaccination. Many students felt that HPV vaccination was socially acceptable and normalized in their social circles (Krakow et al., 2014; Hodge et al., 2011; Hopfer and Clippard, 2011). The degree to which students felt that the vaccine was socially acceptable and that the aforementioned people supported HPV vaccination influenced their decisions to get

vaccinated. Knowing someone who had already been vaccinated and having a healthcare provider recommend the vaccine were predictive of already having been vaccinated (Daley et al., 2010).

Barriers to HPV vaccination among college students included cost/health insurance (Mehta et al., 2013; Dillard, 2011; Hodge et al., 2011; Dillard & Spear, 2010), lack of vaccine information and knowledge (Mehta et al., 2013; Hodge et al., 2011; Dillard & Spear, 2010), vaccine mistrust and fear of side effects (Mehta et al., 2013; Hopfer and Clippard, 2011; Martin et al., 2011; Dillard & Spear, 2010), time constraints (Hopfer and Clippard, 2011), and vaccine availability (Mehta et al., 2013; Hopfer and Clippard, 2011).

HPV vaccination among male and LGBT populations

Studies attempting to examine male or LGBT college student populations are somewhat scarce. Only a few studies have attempted to examine correlates of vaccination among male college student populations (Fontenot et al., 2014; Crosby et al., 2012) and some have compared male and female college student populations (Beshers et al., 2014; Ramirez-Rios & Bonnez, 2014; Patel et al., 2013; Bynum et al., 2011; Sandfort & Pleasant, 2009). Additionally, LGBT status has only recently become a variable of interest in the prediction of HPV vaccination, though research suggests it could be an important factor (McRee et al., 2014; Zou et al., 2014; Francis, Highland, & Thorpe, 2012; Polek & Hardie, 2010). The LGBT population shoulders a higher burden of HPV-related disease than the heterosexual population. Men who have sex with men are more

likely to contract anal HPV (CDC, 2014b) and are at a greater risk for anal cancer (Brewer, 2010).

HPV vaccination and religiosity

In addition, studies have shown that religiosity is correlated not only with sexual behavior, but also with HPV vaccination behaviors as well (Lefkowitz, Gillen, Shearer, & Boone, 2004; Hardy & Raffaelli, 2003; Meier, 2003; Nonnemaker, McNeely, & Blum, 2003; Krakow et al., 2014; Barnack, Reddy, & Swain, 2010; Constantine & Jerman, 2007). Formative research on adolescents suggests religiosity is associated with abstinence, delayed sexual intercourse, and fewer partners (Lefkowitz, Gillen, Shearer, & Boone, 2004; Hardy & Raffaelli, 2003; Meier, 2003; Nonnemaker, McNeely, & Blum, 2003). More recent research on college students found spirituality, fundamentalism, and intrinsic religiosity were negatively correlated with almost all types of measured sexual behaviors among college students (Farmer, Trapnell, & Meston, 2009). Fundamentalism, in particular, was correlated with less sexual activity among women (Farmer, Trapnell, & Meston, 2009).

Christian parents (other, born-again, and evangelical) and those who attend religious services more than once a week are among the subgroups less likely to endorse HPV vaccination for their children (Constantine & Jerman, 2007). In contrast, parents who report rarely or never attending religious services comprise one of the subgroups most likely to endorse vaccination for their children (Barnack, Reddy, & Swain, 2010). In a study among undergraduate women, Krakow et al. (2014) found religiosity was

negatively correlated with HPV vaccination intention; that is, those who scored higher on the religiosity scale were less likely to intend to vaccinate.

Summary

As discussed above, HPV is the most common STI in the United States, and some strains are known to cause cancers that affect both men and women. Though two vaccines exist to protect against the two strains that cause most HPV-related cancers, they are still underutilized, leaving college students in the catch-up vaccination age range still at risk. So far, we know that college students want to feel protected against HPV, that their social networks have important influence when it comes to vaccination decisions, and that there are a number of barriers to vaccination like cost and time. Yet there is a need for more systematic, theory-based, population-specific research to identify salient beliefs and, in turn, promote vaccination among college-age men and women. Previous research has also highlighted the HPV risk and vaccination disparities among male and LGBT populations, as well as the relationship between one's level of religiosity and sexual and HPV vaccination behaviors. Therefore, vaccination beliefs in these specific catch-up populations deserve further study.

Theoretical Framework: Reasoned Action

To best understand the relationship between HPV vaccination beliefs, attitudes, subjective norms, perceived behavioral control, and intentions, a Reasoned Action approach will be used to inform the measures and analysis. A Reasoned Action approach (Fishbein & Ajzen, 2010) is one of the only theories that contends “that there are only a limited number of variables that need to be considered in predicting and understanding any given behavior” (Fishbein & Yzer, 2003, p. 165). According to Fishbein and Yzer (2003), this approach “represents the more conventional view that changing beliefs underlying the intention to perform a behavior ultimately results in changes in intention” (p. 164). Further, “performance of a given behavior is primarily determined by the strength of a person’s intention to perform” it (Fishbein & Yzer, 2003, p. 165). Due to the inconsistent research findings on the role of perceived risk, theories such as the Health Belief Model that contain perceived risk as a proximal determinant of intention and health behavior will not be used (Fishbein & Yzer, 2003; Baume, 2000).

The usefulness of the Reasoned Action approach lies in its ability to help identify which beliefs (behavioral, normative, or control) are most salient to behavior change, and thus which beliefs to target in a pro-HPV-vaccination campaign. Using this theoretical framework to guide my study will allow me to build upon the aforementioned literature in several ways. First, beliefs relevant to the college student population will be identified and analyzed qualitatively. This is important because this essential but often skipped step allows the population of interest to dictate their own salient beliefs instead of the researcher. Second, beliefs salient to all relevant college student subpopulations, such as

men, women, and those who identify as LGBT, will be generated and included in analysis. And finally, the theory guides analysis so I may identify which beliefs are most strongly correlated with intentions to get vaccinated against HPV. The first step in creating an effective health message is to identify the key determinants that will need to be addressed in a campaign to move behavior. The second step is to look at the beliefs that underlie the key determinants identified in the analysis. The Reasoned Action approach will be used to identify the key determinants of HPV vaccination among college-age men and women.

The Reasoned Action approach (Fishbein & Ajzen, 2010) follows the Integrative Model of Behavioral Prediction and is based on the Theory of Reasoned Action (Fishbein & Ajzen, 1975) and the Theory of Planned Behavior (Ajzen, 1985). The model integrates the constructs of beliefs, attitudes, and intentions from the former and perceived behavioral control from the latter, as well as barriers to behavior. Together, these constructs predict and account for “a substantial proportion of the variance in any behavior in any population” (Yzer, 2012a, p. 22). The most current iteration of the theory is interchangeably referred to as the Theory of Reasoned Action or the Reasoned Action approach in behavior change literature. To stay consistent with the authors of this theory, I will refer to the theory as the Reasoned Action approach (Fishbein & Ajzen, 2010).

Intention

According to the Reasoned Action approach, intention is the most proximal determinant of behavior and is a function of attitude, perceived norm, and perceived behavioral control. Because “intentions are assumed to capture the motivational factors

that influence behavior,” it follows that the stronger the intention is, the more likely one is to perform the behavior (Ajzen, 1991, p. 181). Thus, intention is measured as a probability of how likely one is to perform the recommended behavior, i.e. getting an HPV vaccination. Intentions are strong predictors of behavior in the presence of personal ability and the absence of environmental constraints.

Attitude toward behavior

The theory proposes that attitudes result automatically from a person’s behavioral beliefs. As explained by the Expectancy-Value Model, attitudes are the sum of the strength of beliefs that an object has a certain attribute multiplied by the evaluation of that attribute (Fishbein and Ajzen, 2010). It follows, then, that favorable attitudes are generated when objects are associated with positively evaluated attributes and negative attitudes are generated when objects are associated with negatively evaluated attributes. As discussed below, attitude formation relies on salient beliefs.

Instrumental vs. Experiential Aspects.

Attitudes, like subjective norms and perceived behavioral control, are two-dimensional. The instrumental dimension refers to the cognitive aspect of attitude and the experiential dimension refers to the affective aspect of attitude. According to Fishbein and Ajzen (2010), “cognitive aspects of attitude involve such dimensions as *wise—foolish* and *harmful—beneficial*” and affective aspects involve “such “dimensions as *pleasant—unpleasant* and *boring—interesting*” (p. 82).

Subjective norm

Subjective or perceived norm refers to the normative social pressure surrounding

the recommended behavior. According to the theory, perceived norm has two aspects, namely injunctive and descriptive norms.

Injunctive vs. Descriptive Norms.

Injunctive norms refer to what one perceives should or ought to be done with regard to the behavior in question; that is, how supportive one feels their important social networks would be of them performing the recommended behavior (Ajzen, 1991).

Alternately, descriptive norms refer to the actual performance of the behavior within one's important social networks.; that is one's perception as to whether or not others are performing the behavior in question (Fishbein & Ajzen, 2010). Although the original Theory of Reasoned Action used the term "subjective norm" to mean injunctive norms exclusively, the current iteration of the Reasoned Action approach used here defines subjective norms as integrating "both the desires [injunctive aspect] and the actions [descriptive aspect] of important referent individuals and groups" (Fishbein & Ajzen, 2010, p. 131).

Perceived behavioral control

Perceived behavioral control, in the latest iteration of the Reasoned Action approach, is defined as "people's perception of the degree to which they are capable of, or have control over, performing a given behavior" (Fishbein & Ajzen, 2010, p. 64). Citing Bandura (1977, 1986, 1997), Yzer (2012c) asserts the constructs of perceived behavioral control and self-efficacy are conceptually the same. Perceived behavioral control, however, has two dimensions: capacity and autonomy. According to the theory, the more one believes they can successfully and autonomously perform the recommended

behavior, the more likely they are to perform it (Yzer, 2012).

Capacity vs. Autonomy.

Capacity refers to one's belief that they have the capacity, or the skills necessary and ability to perform the recommended behavior. The capacity dimension of perceived behavioral control is captured asking participants how sure they are that they can get at least one HPV vaccination in the next twelve months in the face of obstacles, such as lack of time or health insurance. Autonomy refers to one's belief that they have control over their performance of the recommended behavior (Fishbein & Ajzen, 2010; Yzer, 2012c). The autonomy dimension of perceived behavioral control is captured using statements like: "getting at least one HPV vaccination in the next twelve months is: up to me—not up to me."

Beliefs

The Reasoned Action approach proposes that beliefs underlie attitudes, subjective norms, and perceived behavioral control, which in turn influence intentions to perform a given health behavior (Fishbein & Yzer, 2003).

According to Fishbein and Ajzen (2010) and Yzer (2012b), beliefs are central constructs to the explanation of behavior. The term "reasoned" in the theory comes from the expectation that there is a rational process behind acting on beliefs about a particular behavior. For example, one might get an HPV vaccination if they believe it will truly protect them against contracting HPV. Beliefs serve as the "cognitive basis" for reasoned behavior (Yzer, 2012b, p. 121).

Beliefs are central to the theory because they inform everything in the model that

follows, including attitudes, perceived norms, perceived behavioral control, and ultimately intentions. According to the theory, behavior cannot be directly influenced, but beliefs can. This is important because, following the flow of the model, influencing beliefs can directly influence attitudes, perceived norms, and perceived control, which can influence intention and ultimately behavior. The goal of this study is to identify the proximal determinants (attitudes, subjective norms, or perceived behavioral control) in the target population that are most strongly associated with intention to get an HPV vaccination. This is important because influencing the beliefs that underlie these proximal determinants could lead to the greatest magnitude of behavior change (to get the HPV vaccination if they have not) or reinforcement (to finish getting all three vaccinations if they have already gotten one or two).

According to the theory, the three types of beliefs that influence attitudes toward the behavior, perceived norms, and perceived behavioral control are behavioral, normative, and control beliefs, respectively.

Behavioral beliefs. Behavioral beliefs are the beliefs one has about the outcomes of the recommended behavior and his or her evaluations of these beliefs. These beliefs are defined as “the subjective probability that an object has a certain attribute” and represent the information a person has about an object, in this case, the HPV vaccine (Fishbein & Ajzen, 2010, p. 96; 1975). This information, aka beliefs, forms the basis of an attitude. Behavioral beliefs yield negative or positive attitudes toward the recommended behavior (Ajzen, 1991). For example, one might believe that getting an HPV vaccination (the object) will protect them against HPV infection in the future (the

attribute).

Normative beliefs. Normative beliefs are the beliefs one has about others' expectations and how motivated they are to comply with these normative expectations. Normative beliefs produce perceived social norms or pressure (Ajzen, 2006).

Control beliefs. Control beliefs are beliefs one has about what may help or hinder his or her efforts to perform the recommended behavior and how much power these factors have. Control beliefs yield perceived behavioral control, or the perception of how much control one has over performing the recommended behavior (Ajzen, 1991).

According to Fishbein and Ajzen (2010), a person holds many beliefs, but only a few are relevant to attitude formation at any given time. The few that are relevant, termed salient beliefs, are the ones that are easily cognitively accessible and “serve as the prevailing determinants of the attitude” (Fishbein & Ajzen, 2010). Elicitation research allows us to get salient beliefs directly from our target audience through a qualitative survey. This first step allows us to ask the following question:

RQ1: Which behavioral, normative, and control beliefs regarding HPV vaccination are most salient within the college student population?

In addition to measuring the beliefs that underlie attitudes, subjective norms, and perceived behavioral control, we also measure these proximal determinants directly. Correlating each overarching construct with intention will allow us to determine which one matters the most in terms of getting at least one HPV vaccination in the next twelve months. Thus, we must ask the following question:

RQ2: Are attitudes toward vaccination, subjective norms regarding vaccination, or perceived behavioral control regarding vaccination most strongly associated with intention to get vaccinated against HPV?

Building on Reasoned Action: the Hornik and Woolf Approach

Extending the Reasoned Action approach involves identifying promising message by determining which beliefs are most strongly correlated with vaccination intention, which of these beliefs is most moveable, and whether or not these beliefs could be influenced by a strategic message (Hornik & Woolf, 1999). Using beliefs as a central concept, Hornik and Woolf (1999) extend the Reasoned Action approach by mapping out a two-stage plan for identifying promising message strategies. The first stage involves cross-sectional survey design, which begins with “hypotheses about factors that might explain the behavior” (Hornik & Woolf, 1999, p. 35). Hypothesis generation, according to the authors, can be based on “available theory, on the best advice of informants, on discussions with groups representing the target audience, or on their [the researcher’s] own judgment” (p. 35). This study will draw on the qualitative belief elicitation survey of the target audience to generate hypotheses. Once these salient beliefs have been identified, we will ask the following question:

RQ3: Which salient beliefs (behavioral, normative, or control) are most strongly associated with intention to get the HPV vaccination?

The second stage involves analysis of the quantitative reasoned action survey, which will inform message strategy recommendations. The Hornik and Woolf (1999)

extension of the Reasoned Action approach is important because although a proximal determinant may not be highly correlated with intention, some or all of its underlying beliefs could be. When designing effective pro-vaccination messages it is important to consider all potential predictors of intention, as beliefs are what one targets in campaigns. To identify promising message strategies we must determine which beliefs are most likely to be affected by a strategic message:

RQ4: Which intention-correlated beliefs are most likely to be affected by a strategic pro-vaccination message?

The Current Study

Data analysis took part in two phases: 1) belief elicitation survey data analysis (RQ1), and 2) reasoned action survey analysis (RQ2). The first phase consisted of a qualitative, hand-coding analysis. Once the first phase was complete, the most salient beliefs culled from the belief elicitation data analysis were added to the reasoned action survey to form the closed-ended belief questions. The second phase consisted of software-assisted quantitative data analysis (correlations and regressions) and one sub-analysis by gender. This two-phase approach has been applied in recent research (e.g., Yzer et al., 2015). Identification of promising message strategies for promoting HPV vaccination among college students will be addressed in the Conclusion and Further Research section (RQ3 and RQ4); for the purposes of this thesis, only select preliminary analyses have been completed, but all data have been collected to enable future study.

Study 1: Belief Elicitation Survey

Phase one of our analysis examines the belief elicitation survey meant to glean salient beliefs about HPV vaccination from our college student sample to help us answer RQ1.

Methods

A qualitative, open-ended belief elicitation survey was developed in accordance with Fishbein and Ajzen (2010) (Appendix A). The 14-item survey consisted of four demographic questions (sex, age, race, and LGBT identification), a religiosity scale, an eligibility question (number of lifetime HPV vaccinations received), and eight belief

elicitation questions. To be eligible, participants could not have had more than two lifetime HPV vaccinations and had to be age 18 through 26.

Participants and Procedure. The University of Minnesota's School of Journalism and Mass Communication's Research Subject Pool was used to recruit participants. The SJMC's Research Division and the University's Human Subjects Committee jointly maintain the Subject Pool. The Subject Pool runs throughout the academic year using students enrolled in journalism classes. All students enrolled in any of the SJMC's classes are eligible for participation in the subject pool. Once they sign up for the Subject Pool, students receive emails alerting them of available studies for which they can sign up to participate. For their participation in each study, students receive finite extra credit points in their specified SJMC course.

Institutional Review Board approval for this study was received on Monday, April 13th, 2015 and data were collected from participants ($N = 58$) between April 15th and April 19th, 2015. After excluding a participant who did not answer any questions beyond age ($n = 1$), participants who were older than 26 years of age ($n = 3$), and participants who had already received all three HPV vaccinations in their lifetime ($n = 22$), the analytic sample contained data from 32 unique, qualified participants.

Measures. Once participants consented to participate in the survey, we first defined HPV and then outlined the CDC's vaccination recommendations for men and women through age 26 (see Appendix A). Next, we asked a set of demographic questions: "What is your age?" (text box), "What is your sex?" (male/female), "Which of these groups best describes your racial or ethnic background?" (Latino/Hispanic,

Black/African American, Asian/Asian American, White/Caucasian, Native American, Other), and “Do you identify as LGBT?” (yes/no). To assess religiosity, we used the Abbreviated Santa Clara Strength of Religious Faith Questionnaire (Plante, Vallaeys, Sherman, & Wallston, 2002), which contains the following items on a four-point Likert scale (1 = strongly disagree; 4 = strongly agree): “I pray daily”, “I look to my faith as providing meaning and purpose in my life”, “I consider myself active in my faith or church”, “I enjoy being around others who share my faith”, and “My faith impacts many of my decisions.”

Following the religiosity scale, we asked participants how many HPV vaccinations they had gotten in their lifetimes and a series of open-ended HPV vaccination-related questions. In addition to the age question above, question: “How many HPV vaccinations have you gotten in your lifetime?” was used to determine participant eligibility. Those whose responses to the vaccination eligibility question were 0, 1, 2, or “I don’t know” were included in the analytic sample.

To elicit behavioral beliefs, we asked several open-ended questions: “What do you see as the advantages of you getting at least one HPV vaccination in the next 12 months? What are the good things that might happen if you would get at least one HPV vaccination in the next 12 months?” and “What do you see as the disadvantages of you getting at least one HPV vaccination in the next 12 months? What are the bad things that might happen if you would get at least one HPV vaccination in the next 12 months?” To elicit normative beliefs, we asked participants to: “Please list all the individuals or groups who would approve or think that you should get at least one HPV vaccination in the next

12 months” and “Please list all the individuals or groups who would disapprove or think that you should NOT get at least one HPV vaccination in the next 12 months”. We also asked: “Are there any other individuals or groups who come to mind when you think about you getting at least one HPV vaccination in the next 12 months?”. To elicit perceived behavioral control beliefs, we asked: “What factors, circumstances or settings might enable or make it easier for you to get at least one HPV vaccination in the next 12 months?” and “What factors, circumstances, or settings would make it difficult or prevent you from getting at least one HPV vaccination in the next 12 months?” To make sure we did not miss any salient beliefs, we concluded the survey by asking: “Is there anything else that you associate with you getting at least one HPV vaccination in the next 12 months?”

Analytic Approach. Qualitative data from these surveys was analyzed using a content analysis approach. Consistent with this approach, emergent coding (Lindlof & Taylor, 2011) and constant comparative (Strauss & Corbin, 1990) methods were used to identify themes within each type of belief domain (behavioral, normative, and control). These methods allow themes to be identified inductively through constant comparison of concepts until saturation is reached. Unlike Robbins and Niederdeppe (2015), who defined themes as recurring belief sets held by more than half of the respondents, we used saturation to define our themes. According to Strauss & Corbin (1990), saturation is reached when no new themes emerge from the data. Salient beliefs in each domain are reported below.

Results

Of the 32 participants, 19 were male and 11 were female, and the mean age was 20.06 years. Participants were not particularly religious ($M = 2.46$, $SD = 0.96$) and mostly Caucasian (61.3%). Additional demographic data are provided in Table 1.

Table 1

Demographic Characteristics of Belief Elicitation Participants

<u>Characteristic</u>	<u>Frequency</u>	<u>Percent</u>
Sex		
Male	19	63.3%
Female	11	36.7%
Age		
18	3	9.4%
19	14	43.8%
20	8	25%
21	2	6.3%
22	2	6.3%
23	0	0%
24	1	3.1%
25	1	3.1%
26	1	3.1%
Race		
Latino/Hispanic	1	3.1%
Black/African American	0	0%
Asian/Asian American	9	29%
White/Caucasian	19	61.3%
Native American	0	0%
Other	2	6.5%
LGBT		
Yes	3	9.7%
No	28	90.3%
HPV Vaccinations		
0	13	41.9%
1	5	16.1%
2	4	12.9%
3	0	0%
I don't know	9	29.0%

NOTE: $N = 30-32$ due to missing data

In Research Question 1, we asked: “Which behavioral, normative, and control beliefs regarding HPV vaccination are most salient within the college student population?”. Table 2 summarizes the most salient beliefs reported by participants.

Table 2

Salient Behavioral, Normative, and Control Beliefs

Behavioral (+) = positive, (-) = negative	Normative (+) = approve, (-) = disapprove	Perceived Behavioral Control (+) = enabler, (-) = barrier
Prevent diseases like HPV/cervical cancer (+)	Family (+) and (-)	Anonymity (+)
Protect my health (+)	Peers (+)	Availability/Accessibility (+)
Protect the health of my partner(s) (+)	Friends (+)	Vaccine Knowledge (+)
Peace of mind (+)	Partners (+)	Physician Recommendation (+)
Sore arm (-)	Coworkers/Colleagues (+)	Time (-)
Worry about side effects (-)	Professors (+)	Cost (-)
Judgment (-)	Religious Groups (-)	Embarrassment (-)
Sexual promiscuity (-)	Political Conservatives (-)	
Vaccine cost (-)		
Appointment scheduling (-)		

Salient behavioral beliefs included both positive and negative aspects of getting at least one HPV vaccination in the next twelve months (Table 2). Participants noted that getting the vaccine would prevent disease and protect their health. As one participant noted, “It [the vaccine] would keep me safe from cervical cancer and other diseases caused by HPV.” Participants also expressed the importance of protecting others by getting vaccinated. As one participant stated, “I could protect my sexual partners [by getting vaccinated].” Peace of mind also emerged as one of the most salient positive aspects of getting an HPV vaccination. Participants explained that getting vaccinated would help them be “worry free about this disease” and would allow them “peace of mind” due to the “security of not being susceptible to HPV.” Despite holding many positive beliefs about HPV vaccination, participants also held some negative beliefs. Most of the negative beliefs surrounding HPV vaccination had to do with the vaccine itself, such as fear of pain, fear of side effects, and fear of needles. Many participants expressed worry that their “arm would be sore” and that the vaccine would “potentially

cause some other health issues” or have “some negative side effects [such as] fainting, headaches, or dizziness.” Other participants voiced concern regarding the cost of the vaccine and how much time it would take to get one. One participant noted that “the vaccination costs a lot of money” and they were “not sure if health insurance will cover it.” Another participant noted, “It takes time to schedule an appointment.” And lastly, participants worried about parental and social disapproval, as well as increased sexual promiscuity following vaccination.

Salient normative beliefs included beliefs about those who would approve or disapprove of participants getting an HPV vaccination. Most participants mentioned that their families would approve of them getting an HPV vaccination, though for coding purposes, the family category included siblings, parents, grandparents, and extended family. Most participants also noted that their peers, friends, and partners would approve of their getting vaccinated. Though not mentioned as often as family and friends, coworkers/colleagues and professors were named as those who would approve of vaccination. Interestingly enough, parents were listed most often under the “who would disapprove” survey question. Some participants thought their grandparents or members of older generations would disapprove of their getting vaccinated. Though only mentioned occasionally, it is important to note that some participants felt certain religious groups and political conservatives would disapprove of their getting vaccinated.

Salient control beliefs included beliefs about factors would make it easier and factors that would make it more difficult to get at least one HPV vaccination in the next year. Factors that would enable participants to get vaccinated were anonymity (“Having it

[the vaccination] be private [and] not allowing my parents to find out”), access to convenient locations that offered free vaccines (“If there were more places to get the vaccination...multiple places on campus would help since I only know of Boynton on the Minneapolis campus”), knowledge about HPV and the vaccine (“More knowledge on what is in the vaccine and how it works”), and physician recommendation (“Have a doctor to tell me to have it [the vaccination] done when I am in for a checkup”). On the other hand, participants believed factors such as time, cost, and embarrassment would make it difficult or prevent them from getting an HPV vaccination. Some participants mentioned specific time constraints that would prevent them from obtaining the vaccine (“Credit load, juggling assignments, [and] going home for the summer”), and others were more general (“Just fitting it [the vaccination appointment] into my schedule would be the hardest part”). Other participants voiced concern regarding the vaccine being “costly” and that they were “unaware of insurance coverage.”

Discussion

Results indicate participants believe that getting at least one HPV vaccination in the next twelve months will protect their health, with most specifically mentioning HPV and cervical cancer. Interestingly enough, none of the participants (male or female) mentioned protection from any of the other HPV-related cancers. This could be due to the fact that the vaccine has been branded and marketed as preventing cervical cancer and HPV, not as preventing anal, penile, and throat cancers. Not only did participants believe the vaccine would help protect themselves, they also seemed concerned about protecting their current and future sexual partners and believed getting vaccinated would also help

them do that. Several participants mentioned casual sex and the “hookup culture” as important reasons to protect themselves and others through vaccination. Though “peace of mind” was mentioned by several participants as a reason to get a vaccination in the next twelve months, only one acknowledged that the vaccine doesn’t protect against all types of HPV, nor is it 100% effective. Negative beliefs about obtaining the vaccine indicated that participants did not fully trust its safety. Almost all participants believed time and cost were barriers to vaccination, suggesting they are unaware that Boynton Health Services on campus offers HPV vaccinations and most health insurance companies cover the cost.

Results also indicated participants believe their friends and family are generally supportive of vaccination and would approve of them getting a vaccination in the next year. Parents were believed to be supportive by some participants and not supportive by others, but were frequently mentioned in both categories. This fits with previous research that suggests one’s social networks are hugely influential when it comes to health and HPV vaccination decisions. Many participants felt more comfortable with the idea of getting a vaccination in the next year if it was anonymous or if their parents would not find out. This could be because many participants mentioned embarrassment as a barrier to vaccination and perhaps this is why they would want to be vaccinated anonymously.

Study 2: Reasoned Action Survey

Phase two of our analysis involves creating a reasoned action survey using the belief elicitation results from above, using the second survey to gather quantitative data from another college student sample, and then analyzing it and using the results to answer RQ2.

Methods

Following Yzer's (2012a) process for applying the Reasoned Action Approach to health message design, qualitative belief elicitation survey data were used to identify salient beliefs that were then included in a reasoned action survey (Fishbein and Ajzen, 2010). That is, quantitative, closed-ended reasoned action questions were formulated based on the salient belief data obtained from the belief elicitation survey. As with the Belief Elicitation study above, to maintain eligibility, participants could not have had more than two lifetime HPV vaccinations and had to be age 18 through 26.

Participants and Procedure. The University of Minnesota's School of Journalism and Mass Communication's Research Subject Pool was used to recruit participants (see the belief elicitation study methods section for details).

Institutional Review Board approval for this study was received on April 9th, 2015 and data were collected from participants (N = 226) between April 27th and May 3rd, 2015. In order to be eligible for this study, respondents could not have participated in the Belief Elicitation study, could not have more than 2 lifetime HPV vaccinations, and had to be age 18 through 26. After excluding participants who did not answer any questions beyond consent ($n = 3$), participants who did not answer any questions beyond sexual

history ($n = 2$), and participants who had already received all three HPV vaccinations in their lifetime ($n = 22$), the analytic sample contained data from 199 unique, qualified participants.

Measures. The survey consisted of two eligibility questions (age and number of HPV vaccinations received), three demographic questions, three sexual history questions, a religiosity scale, two direct measures of intention, twelve behavioral belief questions, five direct measures of instrumental attitude, three direct measures of experiential attitude, two direct measures of perceived behavioral control - autonomy, one direct measure of perceived behavioral control – capacity, one direct measure of injunctive norms, one direct measure of descriptive norms, eight normative belief questions, and nine perceived behavioral control belief questions (See Appendix B).

Once participants consented to participate in the survey, we asked a set of questions to determine participant eligibility: “How many HPV vaccination have you received?” and “What is your age?”. Those whose responses to the vaccination eligibility question were 0, 1, 2, or “I don’t know” were included in the analytic sample. Next, we defined HPV and then outlined the CDC’s vaccination recommendations for men and women through age 26. We then asked the same set of demographic questions found in the belief elicitation study: “What is your sex?” (male/female), “Which of these groups best describes your racial or ethnic background?” (Latino/Hispanic, Black/African American, Asian/Asian American, White/Caucasian, Native American, Other), and “Do you identify as LGBT?” (yes/no). Next, we asked a series of sexual history questions: “Have you ever had sexual intercourse?” (yes/no), “Have you ever engaged in oral sex?”

(yes/no), and “Have you ever been diagnosed with HPV?” (yes, no, I don’t know). To assess religiosity, we used the Abbreviated Santa Clara Strength of Religious Faith Questionnaire (Plante, Vallaey, Sherman, & Wallston, 2002), as described in the belief elicitation study.

We then asked participants a series of closed-ended HPV vaccination-related questions. To directly measure intention to get vaccinated, we asked, “How likely is it that you will get at least one HPV vaccination in the next twelve months?” (7-point semantic differential scale where 1 = definitely will not and 7 = definitely will) and had them respond to the following statement: “I intend to get at least one HPV vaccination in the next twelve months” (7-point semantic differential scale where 1 = very unlikely and 7 = very likely). To directly measure instrumental attitude, experiential attitude, and perceived behavioral control – autonomy we asked participants to respond to: “My getting at least one HPV vaccination in the next twelve months would be” with 11 7-point semantic differential scales²:

1. Extremely bad – Extremely good
2. Extremely foolish – Extremely wise
3. Extremely negative – Extremely positive
4. Extremely harmful – Extremely beneficial
5. Extremely unnecessary – Extremely necessary
6. Extremely unenjoyable – Extremely enjoyable
7. Extremely stressful – Extremely relaxing
8. Extremely unpleasant – Extremely pleasant
9. Extremely difficult – Extremely easy³
10. Not under my control – Under my control
11. Not up to me – Up to me

² Numbers 1-5 measure instrumental attitude, 6-8 measure experiential attitude, 9 arguably measures either experiential attitude or perceived behavioral control – autonomy, and 10 and 11 measure perceived behavioral control – autonomy.

³ There is some debate regarding the “difficult—easy” semantic differential and whether or not it measures attitude or perceived behavioral control. Because of this debate, it has been dropped from analysis.

To directly measure perceived behavioral control – capacity, we asked: “There can be a variety of obstacles to your getting at least one HPV vaccination in the next twelve months. Even in the face of such obstacles, how sure are you that if you really wanted to you can get at least one HPV vaccination in the next twelve months?” Participants responded on a 7-point semantic differential scale: completely sure I cannot – completely sure I can. To directly measure descriptive norms, we asked: “How many of the people who are most important to you do you think had at least one HPV vaccination in the last twelve months?” and had participants respond with “none,” “a few,” “some”, “most”, or “all.” And finally, to directly measure injunctive norms, we asked: “How do you think most people important to you would feel about you getting at least one HPV vaccination in the next twelve months?”, and had participants respond on a 7-point semantic differential scale: strongly approve – strongly disapprove.

To assess behavioral beliefs, we asked: “How likely is it that the following would happen to you if you got at least one HPV vaccination in the next twelve months?” We then listed the following beliefs gleaned from the Belief Elicitation study and asked participants to rate them on a 5-point semantic differential scale (where 1 = very unlikely and 5 = very likely): “Prevent HPV, feel judged, protect my health, worry less about HPV, protect my partner/future partner’s health, spend a lot of money on the vaccine, feel safer, be more sexually active, please my parents, have a sore arm, worry about the side effects, and spend a lot of time at the doctor.”

To assess normative beliefs, we asked: “How do you think the following people would feel about you getting at least one HPV vaccination in the next twelve

months?” and listed “close friends, parents, grandparents, siblings, my partner(s)/future partner(s), professors, coworkers/colleagues, and my doctor.” Participants responded on a 7-point semantic differential scale: strongly disapprove (= 1?) – strongly approve (= 7?).

To assess control beliefs, we asked: “How sure are you that you can get at least one HPV vaccination in the next twelve months if you really wanted to, if:” and listed a number of obstacles: “you do not have health insurance, it takes time to schedule doctors appointments, the vaccine hurts, you are afraid of vaccines, you are busy, the vaccine has side effects, your parents would find out, you go home for the summer, the vaccine is not free.” Participants responded on a 5-point semantic differential scale: not at all sure I can (= 1) – completely sure I can (= 5).

Analytic Approach. The Reasoned Action approach allows us to begin the process of identifying promising message strategies by helping us distinguish which proximal determinants are most strongly correlated with vaccination intention. Thus the statistical software package SPSS was used to analyze quantitative data.

Attitudes, norms, perceived behavioral control, and intention were each measured directly with multiple questions. First, as discussed above, intention was directly measured with two questions: “How likely is it that you will get at least one HPV vaccination in the next twelve months” and “I intend to get at least one HPV vaccination in the next twelve months”. Responses from these two questions were first correlated ($r = 0.923$) to ensure they were highly related and then combined to create a mean intention score (1-7, where 1 = very unlikely/definitely will not and 7 = very likely/definitely will). Second, the five measures of instrumental attitude ($\alpha = 0.925$) and the three measures of

experiential attitude ($\alpha = 0.834$) were correlated to ensure they were highly related and then combined to create mean scores for each. Third, the two measures for perceived behavioral control – autonomy were correlated ($r = 0.816$) to ensure they were highly related prior to being averaged into a mean score. And finally, additional mean scores were generated for the one direct measure of perceived behavioral control – capacity, the one direct measure of injunctive norms, and the one direct measure of descriptive norms (Table 4) and then stratified by sex (Table 5). These six mean scores were first correlated with each other (Table 6) and then, through multivariable linear regression analyses to assess the adjusted strength of association, with vaccination intention (Table 7 and Figure 1).

Results

As Table 3 below indicates, participants were fairly evenly divided among males and females and a majority had engaged in sexual intercourse and/or oral sex, though all reported never (98%) or not knowingly (2%) being diagnosed with HPV. Participants were mostly Caucasian (74.9%) and between the ages of 19 and 22. Of the 199 participants, only 6.5% identified as LGBT and the overall mean religiosity was low ($M = 2.07$, $SD = 0.86$), making LGBT and religiosity subanalyses difficult. This will be discussed in further detail in the Conclusion and Future Research section below. Importantly, 78.9% of participants answered that they had less than three HPV vaccinations (21.1% did not know how many vaccinations they had received).

Table 3

Demographic Characteristics of Reasoned Action Participants

	Frequency	Percent
Sex		
Male	92	46.2%
Female	107	53.8%
Age		
18	18	9%
19	63	31.7%
20	58	29.1%
21	27	13.6%
22	20	10.1%
23	4	2%
24	4	2%
25	2	1%
26	3	1.5%
Race		
Latino/Hispanic	3	1.5%
Black/African American	1	0.5%
Asian/Asian American	42	21.1%
White/Caucasian	149	74.9%
Native American	1	0.5%
Other	3	1.5%
LGBT		
Yes	13	6.5%
No	186	93.5%
Sexual Intercourse		
Yes	125	63.1%
No	73	36.9%
Oral Sex		
Yes	128	64.3%
No	71	35.7%
HPV Diagnosis		
Yes	0	0%
No	195	98%
I don't know	4	2%
HPV Vaccinations		
0	63	31.7%
1	48	24.1%
2	46	23.1%
3	0	0%
I don't know	42	21.1%

NOTE: N = 198-199 due to missing data

As Table 4 indicates, participants had fairly favorable instrumental attitudes ($M = 5.05$), but lower experiential attitudes ($M = 3.64$). This suggests that although participants think that getting an HPV vaccination would be a smart thing to do, it would

not necessarily be pleasant or enjoyable. Interestingly, participants reported that although most of the people closest to them had not received an HPV vaccination ($M = 2.31$), they felt these people would be supportive of them getting vaccinated ($M = 5.21$). In addition, participants reported feeling confident in both aspects of perceived behavioral control ($M = 5.62$ and 5.49) regarding HPV vaccination. That is, they felt confident in their abilities to get the vaccination, and they felt getting the vaccination was ultimately up to them. Despite having favorable attitudes, social support, and high perceived behavioral control regarding vaccination, intention to get at least one HPV vaccination in the next twelve months remained low ($M = 3.77$).

Table 4

Proximal Determinant and Intention Means and SDs

<u>Construct</u>	<u>Mean</u>	<u>SD</u>
Instrumental Attitude	5.05	1.18
Experiential Attitude	3.64	1.03
Descriptive Norms	2.31	0.95
Injunctive Norms	5.21	1.29
Perceived Behavioral Control - Autonomy	5.62	1.27
Perceived Behavioral Control - Capacity	5.49	1.46
Intention	3.77	1.87

As Table 5 indicates, proximal determinant means varied by the sex of the participant. With the exception of experiential attitudes, females tended to have greater intentions, more favorable attitudes, higher norms, and greater perceived behavioral control than males.

Table 5

Stratified Proximal Determinant and Intention Means and SDs

<u>Construct</u>	<u>Sex</u>	<u>Mean</u>	<u>SD</u>
Instrumental Attitude	Male	4.737	0.120
	Female	5.315	0.111
Experiential Attitude	Male	3.679	0.107
	Female	3.616	0.100
Descriptive Norms	Male	2.152	0.098
	Female	2.453	0.092
Injunctive Norms	Male	4.978	0.133
	Female	5.415	0.124
Perceived Behavioral Control - Autonomy	Male	5.484	0.132
	Female	5.726	0.123
Perceived Behavioral Control - Capacity	Male	5.217	0.150
	Female	5.708	0.140
Intention	Male	3.380	0.191
	Female	4.137	0.178

In Research Question 2, we asked: Are attitudes, perceived norms, or perceived behavioral control regarding vaccination most strongly associated with intention to get vaccinated against HPV? To answer this, we must see how the proximal determinants are correlated with each other and intention (Table 6), and then examine each proximal determinant's adjusted association with intention (Table 7 and Figure 1).

Table 5 indicates that one of the two dimensions of attitude (instrumental, $r = 0.553$) was moderately correlated with intention to get vaccinated. Although both dimensions of subjective norm were moderately correlated with intention, injunctive norms were more so ($r = 0.503$). And again, even though both dimensions of perceived behavioral control were correlated with intention, the magnitude of the capacity dimension-intention correlation was greater ($r = 0.348$).

Table 6

Proximal Determinant Correlations

	1	2	3	4	5	6	7
1. Instrumental Attitude	1.000						
2. Experiential Attitude	0.393*	1.000					
3. Descriptive Norms	0.271*	0.139***	1.000				
4. Injunctive Norms	0.722*	0.255*	0.325*	1.000			
5. Perceived Behavioral Control – Autonomy	0.410*	0.058	0.033	0.361*	1.000		
6. Perceived Behavioral Control – Capacity	0.424*	-0.056	0.240**	0.510*	0.378*	1.00	
7. Intention	0.553*	0.225**	0.379*	0.503*	0.142***	0.348*	1.000

NOTE: $N = 198-199$, *significant at $p < 0.001$, **significant at $p = 0.001$, ***significant at $p = 0.05$

Consistent with the correlation analysis (Table 6), results from the regression analysis (Table 7) show a strong, positive relationship between instrumental attitude and intention to get vaccinated ($b = 0.631$). Though not quite as strong, results indicate a moderate, positive relationship between descriptive norms and intention to get vaccinated ($b = 0.396$). Figure 1 shows the relative association of each determinant vis-à-vis intention.

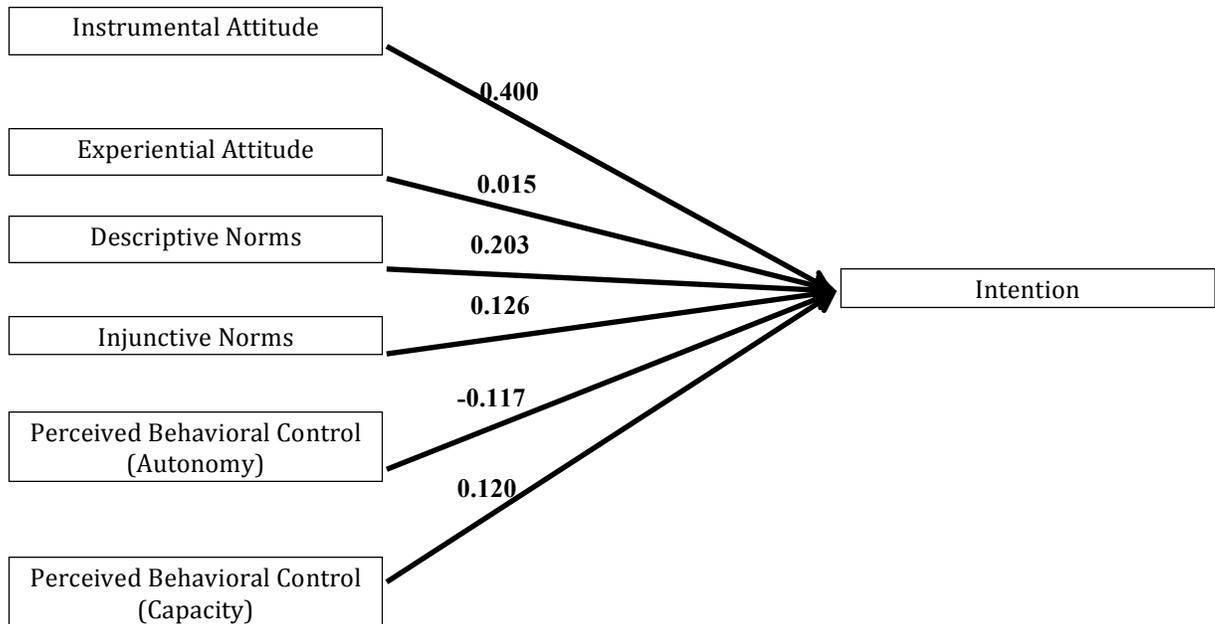
Table 7

Regression Analysis

Explanatory Variables	b	SE b	Beta	P
Intercept	1.238	(0.661)		0.063
Instrumental Attitude	0.631	(0.661)	0.400	0.000
Experiential Attitude	0.028	(0.141)	0.015	0.810
Descriptive Norms	0.396	(0.116)	0.203	0.001
Injunctive Norms	0.181	(0.126)	0.126	0.153
Perceived Behavioral Control - Autonomy	0.171	(0.095)	-0.117	0.072
Perceived Behavioral Control - Capacity	0.153	(0.090)	0.120	0.091

NOTE: $r^2 = 0.391$ $N = 199$

Figure 1

Standardized Regression Coefficients

The regression model accounted for about 39% of the variance in vaccination intention, with instrumental attitude and descriptive norms being the most predictive. This is important because if these two constructs are responsible for a majority of the variance in intention to get vaccinated, their underlying beliefs should be considered as potential targets for a pro-vaccination campaign (see the future research section for discussion).

Discussion

Results suggest that there is room to improve intention to get vaccinated ($M = 3.77$). Among this sample of college students, instrumental attitude is the greatest predictor of intention to get at least one HPV vaccination in the next twelve months. This indicates participants who believed vaccination was good, wise, positive, beneficial, and

necessary were more likely to intend to get one in the next twelve months. Another strong predictor of vaccination intention was descriptive norms. This indicates participants who believed others in their social networks were getting vaccinated were more likely to intend to get at least one HPV vaccination in the next twelve months.

Interestingly enough, both the autonomy and capacity aspects of perceived behavioral control were the least predictive of intention to get vaccinated. Perhaps counter-intuitively, those who thought getting the vaccination was up to them were less likely to intend to get vaccinated than those who did not. That is, feeling like they had more control over their action made them less likely to intend to get vaccinated. This could possibly be the result of participants feeling like they did not need the vaccine or the vaccine wasn't for them even though they felt the decision to get one was theirs. Though the participants were not the same in both studies, evidence of this was also found in the belief elicitation.

Lastly, the stratified proximal determinant means suggest that female participants may have greater intentions to get vaccinated, more favorable instrumental attitudes, believe more of their social network has been vaccinated, believe their social networks would support them more, and feel like they are capable of getting the vaccination and it is ultimately up to them. This may not be surprising, given that the vaccination did not get gender-neutral approval until 2009. It is possible that since it was only marketed toward women initially, that it is still seen as a "women's vaccine." This could explain why intention to get the vaccine among males is lagging. It is important to point out, however, that since significance testing was not part of the analysis, the differences

observed in the stratified analysis might not be statistically significant. Future research could explore this possibility.

Conclusion and Further Research

Conclusions derived from Reasoned Action studies

This mixed-method project explored both distal (salient beliefs) and proximal (attitudes, subjective norms, and perceived behavioral control) determinants of HPV vaccination intention in a college student population sample.

The qualitative belief elicitation survey allowed us to determine the most salient behavioral, normative, and control beliefs in this college student sample. Positive salient behavioral beliefs regarding vaccination included beliefs about protecting one's own health, as well as the health of one's partners and future partners. Participants also felt like getting the vaccination would allow them peace of mind regarding HPV and cervical cancer. Interestingly, participants made no mention of other types of HPV-related cancer, nor did they express concern that the vaccine only protects against two types of HPV. This could be due to lack of knowledge or the fact that the vaccine has been consistently marketed as an anti cervical cancer vaccine.

Negative salient behavioral beliefs included fear of the vaccination (pain and side effects), the cost of the vaccination, and the time it takes to schedule an appointment. Though a few participants mentioned fear of increased sexual activity post-vaccination, this was not a commonly held belief. Also, participants who mentioned this as a fear did not express that they were afraid for *themselves*, but rather, it sounded like they were

afraid it would increase sexual activity in *others*. It is possible that this is due to the “third person effect” – the belief that the vaccine will negatively affect other people, “but not me.”

Positive salient normative beliefs included feeling as though friends, peers, coworkers/colleagues, professors, and partners supported vaccination. Though many participants reported feeling supported by their families (mostly parents) as well, many did not. This appeared again in the perceived behavioral control section of the survey – participants felt more comfortable with the idea of getting vaccinated if their parents would not find out. Perhaps participants were afraid their parents would think they were sexually active and/or promiscuous if they got vaccinated. Some participants also reported feeling like religious groups and political conservatives would not support their choice to get vaccinated. It is important to note here that participants had a relatively low mean religiosity score, suggesting most of them did not rely heavily on their faith in their daily lives.

Enablers to vaccination included the vaccine being accessible, widely available, and anonymous. Many participants also felt having more knowledge on HPV and the vaccine and a recommendation from a physician would encourage them to get a vaccination. Barriers to vaccination included the time it takes to get a vaccination, the cost of the vaccination if it were not covered by health insurance, and embarrassment. Though most participants reported feeling supported in their vaccination decision by those closest to them, most were still concerned about embarrassment (peers) and anonymity (parents). Perhaps this is because participants associated the vaccine with

sexual activity and felt that only those who are sexually active should get one. By getting vaccinated, they would be broadcasting their sexual activity to their social networks, which many found embarrassing.

The quantitative reasoned action survey built on the belief elicitation survey, allowing us to determine which proximal determinants were most strongly associated with intention to get at least one HPV vaccination in the next twelve months. Regression analysis shows that instrumental attitudes and descriptive norms are the strongest predictors of intention to get vaccinated. The more participants believed that getting the vaccination was wise and the more people in their social networks they believed had already been vaccinated, the more likely they were to intend to get vaccinated themselves. Perhaps this is a product of the college student sample. Being in college, one relies heavily on their cognitive abilities and attempts to enhance their critical thinking skills. Relying on rationality (i.e. “evidence shows the vaccine is a good idea”) as the basis for decision-making makes sense in this population.

Now that we have identified instrumental attitude through the Reasoned Action Approach as the strongest proximal determinant of intention to get at least one HPV vaccination in the next twelve months, the final step in the process of identifying promising message strategies will be to turn to Hornik and Woolf’s (1999) extension of the Reasoned Action approach.

Future directions: Identifying promising message strategies

Hornik and Woolf’s (1999) extension of the Reasoned Action Approach is instrumental in helping us identify which of the underlying beliefs (not just proximal

determinants) are most correlated with intention (RQ3) and whether or not these beliefs could be influenced by a strategic message (RQ4).

As Table 8 indicates, the beliefs most strongly associated with intention to get vaccinated are “I will protect my health” ($r = 0.379$), and feeling like “close friends” ($r = 0.380$) and “my partner(s)/future partner(s)” ($r = 0.394$) support vaccination.

Table 8

<i>Underlying Belief Correlations with Intention</i>		
Belief	N	r
How likely is it that the following would happen to you if you got at least one HPV vaccination in the next twelve months? I would:		
I will prevent HPV	199	0.258*
I will feel judged	199	-0.180***
I will protect my health	199	0.379*
I will worry less about HPV	199	0.278*
I will protect my current/future partner's health	198	0.349*
I will spend a lot of money on the vaccine	199	-0.227**
I will feel safer	199	0.335*
I will be more sexually active	199	0.096
I will please my parents	199	0.267*
I will have a sore arm	199	0.065
I will worry about the side effects of the vaccine	199	-0.139
I will spend a lot of time at the doctor	199	-0.221***
How do you think the following people would feel about you getting at least one HPV vaccination in the next twelve months? They would: (strongly disapprove(1) to strongly approve(7))		
Close friends	199	0.380*
Parents	199	0.339*
Grandparents	198	0.230**
Siblings	198	0.289*
My partner(s) / Future partner(s)	199	0.394*
Professors	198	0.163***
Coworkers / Colleagues	199	0.167***
My doctor	199	0.340*
How sure are you that you can get at least one HPV vaccination in the next twelve months if you really wanted to, if:		
You do not have health insurance	199	0.106
It takes time to schedule doctors appointments	199	0.251*
The vaccine hurts	199	0.152***
You are afraid of vaccines	197	0.201***
You are busy	197	0.185***
The vaccine has side effects	198	0.208***
Your parents would find out	199	0.239**
You go home for the summer	199	0.165***
The vaccine is not free	198	0.181***

NOTE: *significant at $p < 0.001$, **significant at $p = 0.001$, ***significant at $p = 0.05$

In order to answer RQ4, we would next need to determine if any of these beliefs are moveable and if they can be influenced by a strategic message. To determine if the beliefs are moveable, we would need to calculate the percentages of participants who hold and do not hold the belief. For example, we would calculate the percentage of participants who believe they would be protecting their health by getting a vaccination and those who do not believe so. If there is a large percentage of participants who do not believe they would be protecting their health by getting vaccinated, and we think we can convince them otherwise with a strategic message, this belief would be a good candidate for targeting in a pro-vaccination campaign. These analyses will be conducted moving forward.

Another important consideration when targeting beliefs for a strategic message campaign is whether or not highly correlated beliefs differ among participants (Parvanta et al., 2013). As discussed in the Literature Review, studies have suggested that HPV vaccination beliefs could differ along gender, religiosity, and LGBT lines. Also, as we saw in the reasoned action analysis, proximal determinants may differ along gender lines. Therefore, it would be crucial to conduct these subanalyses to determine if different messages need to be created for different segments of the target population (i.e. different messages for men and women). Future research would include a larger, or perhaps targeted, LGBT sample so that the results could be contrasted with the results from this study to see if beliefs and/or proximal determinants differed at all in this high-risk population.

Limitations

Though this study can be used to inform message strategies regarding HPV vaccination in college student populations, it has some limitations that are worth noting. First, the constant comparative method used in the belief elicitation study often utilizes more than one coder to guard against idiosyncratic coding. In future studies, I would employ other coders so that this could be achieved. Also, with both the belief elicitation and the reasoned action surveys, sample sizes were small, especially among subpopulations of interest (high religiosity, LGBT, and certain racial categories). In order to make the results from both surveys more generalizable, I would conduct this study again with a larger and, if possible, more representative sample.

References

- Ajzen, I. (2006). *Behavioral Interventions Based on the Theory of Planned Behavior*. Retrieved from <http://people.umass.edu/aizen/tpb.html>
- Ajzen I. (1991). The Theory of Planned Behavior. *Organizational behavior and human decision processes*, 50, 179-211.
- Barnack, J.L.; Reddy, D.M., & Swain, C.S. (2010). Predictors of parents' willingness to vaccinate for human papillomavirus and physicians' intentions to recommend the vaccine. *Women's Health Issues*, 20, 28-34.
- Baume, C.A. (2000). The relationship of perceived risk to condom use: Why results are inconsistent. *Social Marketing Quarterly*, 6(1), 33-42.
- Bendik, M.K., Mayo, R.M., & Parker, V.G. (2011). Knowledge, perceptions, and motivations related to HPV vaccination among college women. *Journal of Cancer Education*, (26), 459-464.
- Beshers, S.C., Murphy, J.M., Fix, B.V., & Mahoney, M.C. (2014). Sex differences among college students in awareness of the HPV vaccine and vaccine options. *Journal of American College Health: Accepted Manuscript*.
- Bigman, C.A.; Cappella, J.N. & Hornik, R.C. (2010). Effective or ineffective: Attribute framing and the human papillomavirus (HPV) vaccine. *Patient Education and Counseling*, 81S, S70-S76.
- Bryer, J. (2014). Black parents' beliefs, attitudes, and HPV vaccination intentions. *Clinical Nursing Research*, 23(4), 369-383.

Brewer, N.T, Terence, W.N, McRee, A., Reiter, P.L. (2010). Men's beliefs about HPV-related disease. *Journal of Behavioral Medicine*, 33, 274-281.

Bynum, S.A., Brandt, H.M., Friedman, D.B., Annang, L., & Tanner, A. (2011). Knowledge, beliefs, and behaviors: Examining human papillomavirus-related gender differences among African American college students. *Journal of American College Health*, 59(4), 296-302.

Centers for Disease Control and Prevention. (2015). HPV vaccines. Retrieved from <http://www.cdc.gov/hpv/vaccine.html>

Centers for Disease Control and Prevention. (2014). Human papillomavirus. Retrieved from <http://www.cdc.gov/std/hpv/default.htm>

Centers for Disease Control and Prevention. (2014b). Human papillomavirus. Retrieved from <http://www.cdc.gov/std/hpv/stdfact-hpv-and-men.htm>

Centers for Disease Control and Prevention. (2013a). Teen vaccination coverage: 2013 national immunization survey-teen. Retrieved from <http://www.cdc.gov/vaccines/who/teens/vaccination-coverage.html>

Centers for Disease Control and Prevention (2013b). HPV and men – fact sheet. Retrieved from <http://www.cdc.gov/std/HPV/STDFact-HPV-and-men.htm>

Centers for Disease Control and Prevention. (2012). *Epidemiology and prevention of vaccine-preventable diseases: The pink book*. Retrieved from <http://www.cdc.gov/vaccines/pubs/pinkbook/downloads/hpv.pdf>

Centers for Disease Control and Prevention. (2011). Progress toward implementation of human papillomavirus vaccination – the Americas, 2006-2010. Retrieved from

<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6040a2.htm>

Centers for Disease Control and Prevention. (2010a). FDA licensure of bivalent human papillomavirus vaccine (HPV2, Cervarix) for use in females and updated HPV vaccination recommendations from the Advisory Committee on Immunization Practices (ACIP). Retrieved from

http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5920a4.htm?s_cid=mm5920a4_e

Centers for Disease Control and Prevention. (2010b). FDA licensure of quadrivalent human papillomavirus vaccine (HPV4, Gardasil) for use in males and guidance from the Advisory Committee on Immunization Practices (ACIP). Retrieved from

http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5920a5.htm?s_cid=mm5920a5_e

Constantine, N.A. & Jerman, P. (2007). Acceptance of human papillomavirus vaccination among Californian parents of daughters: A representative statewide analysis.

Journal of Adolescent Health, 40, 108-115.

Crosby, R.A., DiClemente, R.J., Salazar, L.F., Nash, R., Younge, S., & Head, S. (2012).

Human papillomavirus vaccine intention among college men: What's oral sex got to do with it? *Journal of American College Health, 60*(1), 8-12.

- Daley, E.M., Vamos, C.A., Buhi, E.R., Kolar, S.K., McDermott, R.J., Hernandez, N., & Fuhrmann, H.J. (2010). Influences on human papillomavirus vaccination status among female college students. *Journal of Women's Health, 19*(10), 1885-1891.
- Dempsey, A.F. Zimet, G.D., Davis, R.L., & Koutsky, L. (2006). Factors that are associated with parental acceptance of human papillomavirus vaccines: a randomized intervention study of written information about HPV. *Pediatrics, 117*(5), 1486-1493.
- Dillard, J.P. & Spear, M.E. (2010). Knowledge of human papillomavirus and perceived barriers to vaccination in a sample of US female college students. *Journal of American College Health, 59*(3), 186-190.
- Farmer, M.A., Trapnell, P.D., & Meston C.M. (2009). A relation between sexual behavior and religiosity subtypes: A test of the secularization hypothesis. *Archives of Sexual Behavior, 38*, 852-865.
- Fishbein, M., & Ajzen, I. (2010). *Predicting and changing behavior: The reasoned action approach*. New York: Psychology Press.
- Fishbein, M. & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. MA: Addison-Wesley.
- Fishbein, M. & Yzer, M. (2003). Using theory to design effective health behavior interventions. *Communication Theory, 13*(2), 164-183.
- Fontenot, H.B., Fantasia, H.C., Charyk, A., Sutherland, M.A. (2014). Human papillomavirus (HPV) risk factors, vaccination patterns, and vaccine perceptions

- among a sample of male college students. *Journal of American College Health*, 62(3), 186-192.
- Ford, J.L. (2011). Racial and ethnic disparities in human papillomavirus awareness and vaccination among young adult women. *Public Health Nursing*, 28(6), 485-493.
- Fowler, A.F. & Gollust, S.E. (2015). The content and effect of politicized health controversies. *The Annals of the American Academy of Political and Social Science*, 658, 155-171.
- Francis, S., Highland, J., & Thorpe, Jr., R. (2012). Exploring gender differences on risk taking behaviors, attitudes, knowledge, and perception of risk for human papillomavirus. *The Internet Journal of Academic Physician Assistants*, 9(1).
- Garcini, L.M. ; Galvan, T. ; Barnack-Tavlaris, J.L. (2012). The study of human papillomavirus (HPV) vaccine uptake from a parental perspective: A systematic review of observational studies in the United States. *Vaccine*, 30(31), 4588-4595.
- Gerend, M.A., Wibley, E., & Bland, H. (2009). Parental response to human papillomavirus vaccine availability: Uptake and intentions. *Journal of Adolescent Health*, 45, 528–531.
- Giambi, C., Donati, S., Declich, S., Salmaso, S., Ciofi degli Atti, M.L., Alibrandi, M.P., ...the PreGio Working Group. (2011). Estimated acceptance of HPV vaccination among Italian women aged 18-26 years. *Vaccine*, 29, 8373-8380.
- Gillison, M.L.; Chaturvedi, A.K.; & Lowy, D.R. (2008). HPV prophylactic vaccines and the potential prevention of noncervical cancers in both men and women. *Cancer*, 113(10 Suppl), 3036–3046.

- Gollust, S.E.; Dempsey, A.F.; Lantz, P.M.; Ubel, P.A.; & Fowler, E.F. (2010). Controversy undermines support for state mandates on the human papillomavirus vaccine. *Health Affairs*, 29(11), 2041-2046.
- Gollust, S.E.; Attanasio, L.; Dempsey, A.; Benson, A.M.; & Fowler, E.F. (2013). Political and news media factors shaping public awareness of the HPV vaccine. *Women's Health Issues*, 23(3), e143-e151.
- Hardy, S.A. & Raffaelli, M. (2003). Adolescent religiosity and sexuality: An investigation of reciprocal influence. *Journal of Adolescence*, 26, 731-739.
- Herbert, N. (2014). Parental attitudes and beliefs about human papillomavirus (HPV) vaccination and vaccine receipt among young adolescents in Richmond County, Georgia. *Journal of Adolescent Health*, 54(2), S82-S82.
- Hollander, D. (2010). Parents' beliefs about HPV vaccine are correlated with teenagers' initiation. *Perspectives on Sexual and Reproductive Health*, 42(1), 65-66.
- Jemal, A.; Simard, E.; Dorell, C.; Noone, A.M.; Markowitz, L.E.; Kohler, B.;...Edwards, B.K. (2013). Annual report to the nation on the status of cancer, 1975–2009, featuring the burden and trends in human papillomavirus (HPV)-associated cancers and HPV vaccination coverage levels. *Journal of the National Cancer Institute*, 105(3), 175-201.
- Juntasopeepun, P., Suwan, N., Phianmongkhol, Y., & Srisomboon, J. (2012). Factors influencing acceptance of human papillomavirus vaccine among young female college students in Thailand. *International Journal of Gynecology and Obstetrics*, 118, 247-250.

- Kang, H.S. & Moneyham, L. (2010). Attitudes toward and intention to receive the human papilloma virus (HPV) vaccination and intention to use condoms among female Korean college students. *Vaccine*, 28, 811-816.
- Kelly, B.J., Leader, A.E., Mittermaier, D.J., Hornik, R.C., & Capella, J.N. (2009). The HPV vaccine and the media: How has the topic been covered and what are the affects on knowledge about the virus and cervical cancer? *Patient Education and Counseling*, 77, 308-313.
- Lefkowitz, E.S., Gillen, M.M., Shearer, C.L., & Boone, T.L. (2004). Religiosity, sexual behaviors, and sexual attitudes during emerging adulthood. *The Journal of Sex Research*, 41(2), 150-159.
- Lindlof, T.R. & Taylor, B.C. (2011). *Qualitative Communication Research Methods* (3rd ed.). Los Angeles, CA: SAGE Publications, Inc.
- Lipschitz, J.M., Fernandez, A.C., Larson, H.E., Blaney, C.L., Meier, K.S., Redding, C.A....Paiva, A.L. (2013). Validation of decisional balance and self-efficacy measures for HPV vaccination in college women. *American Journal of Health Promotion*, 27(5), 299-307.
- Manhart, L.E., Burgess-Hull, A.J., Fleming, C.B., Bailey, J.A., Haggerty, K.P., & Catalano, R.F. (2011). HPV vaccination among a community sample of young adult women. *Vaccine*, 29, 5238-5244.
- Marchand, E., Glenn, B.A., & Bastani, R. (2012). Low HPV vaccine coverage among female community college students. *Journal of Community Health*, 37, 1136-1144.

- McRee, A.L., Katz, M.L., Paskett, E.D., Reiter, P.L. (2014). HPV vaccination among lesbian and bisexual women: Findings from a national survey of young adults. *Vaccine, 32*, 4736-4742.
- Meier, A.M. (2003). Adolescents' transition to first intercourse, religiosity, and attitudes about sex. *Social Forces, 81*(3), 1031-1052.
- Montano, D.E. & Kasprzyk, D. (2008). Theory of reasoned action, theory of planned behavior, and the integrated behavioral model. In K. Glanz, B.K. Rimer, & K. Viswanath (Eds.), *Health Behavior and Health Education : Theory, Research, and Practice (4th Edition)* (pp. 67-96). Hoboken, NJ, USA: John Wiley & Sons.
- Nonnemaker, J.M., McNeely, C.A., & Blum, R.W. (2003). Public and private domains of religiosity and adolescent health risk behaviors: Evidence from the National Longitudinal Study of Adolescent Health. *Social Science and Medicine, 57*, 2049-2054.
- Nyitray, A.G., Carvalho da Silva, R.J., Baggio, M.L., Smith, D., Abrahamsen, M., Papenfuss, M., ...Giuliano, A.R. (2011). Six-month incidence, persistence, and factors associated with persistence of anal human papillomavirus in men: The HPV in men study. *The Journal of Infectious Diseases, 204*, 1711-1722.
- Parvanta, S., Gibson, L., Forquer, H., Shapiro-Luft, D., Dean, L., Freres, D.,...Hornik, R. (2013). Applying quantitative approaches to the formative evaluation of antismoking campaign messages. *Social Marketing Quarterly, 19*(4), 242-264.
- Patel, D.A., Grunzweig, K.A., Zochowski, M.K., Dempsey, A.F., Carlos, R.C., Dalton, V.K. (2013). Human papillomavirus vaccine stages of change among male and

- female university students: Ready or not? *Journal of American College Health*, 61(6), 336-346.
- Patel, D.A., Zochowski, M., Peterman, S., Dempsey, A.F., Ernst, S., & Dalton, V.K. (2012). Human papillomavirus vaccine intent and uptake among female college students. *Journal of American College Health*, 60(2), 151-161.
- Plante, T.G. & Boccaccini, M.T. (1997). The Santa Clara Strength of Religious Faith Questionnaire. *Pastoral Psychology*, 45(5), 375-387.
- Plante, T.G., Vallaey, C.L., Sherman, A.C., & Wallston, K.A. (2002). The development of a brief version of the Santa Clara Strength of Religious Faith Questionnaire. *Pastoral Psychology*, 50(5), 359-368.
- Polek, C. & Hardie, T. (2010). Lesbian women and knowledge about human papillomavirus. *Oncology Nursing Forum*, 37(3), E191-E197.
- Ramirez-Rios, A.D. & Bonnez, W. (2014). Attitudes affecting the potential use of human papillomavirus vaccination: A survey of health promotion students in Mexico City. *Journal of Community Health*, 39, 266-273.
- Reiter, P.L., Katz, M.L., & Paskett, E.D. (2013). Correlates of HPV vaccination among adolescent females from Appalachia and reasons why their parents do not intend to vaccinate. *Vaccine*, 31(31), 3121-3125.
- Reiter, P.L., Brewer, N.T., Gottlieb, S.L., McRee, A., & Smith, J.S. (2009). Parents' health beliefs and HPV vaccination of their adolescent daughters. *Social Science and Medicine*, 69, 475-480.

- Rothman, S.M. & Rothman, D.J. (2009). Marketing HPV vaccine: Implications for adolescent health and medical professionalism. *Journal of the American Medical Association*, 302(7), 781-786.
- Sandfort J.R. & Pleasant, A. (2009). Knowledge, attitudes, and informational behaviors of college students in regard to the human papillomavirus. *Journal of American College Health*, 58(2), 141-149.
- Stokley, S., Jeyarajah, J., Yankey, D., Cano, M., Gee, J., Roark, J., C. Curtis, R., Markowitz, L. (2014). Human Papillomavirus Vaccination Coverage Among Adolescents, 2007–2013, and Postlicensure Vaccine Safety Monitoring, 2006–2014 — United States. Retrieved from <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6329a3.htm#fig>
- Strauss, A., & Corbin, J.M. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. Newbury Park, London: Sage Publications, Inc.
- Sun, W. U.S. Food and Drug Administration. (2009). *Vaccines, blood & biologics: Approval letter – Gardasil®*. Retrieved from <http://www.fda.gov/BiologicsBloodVaccines/Vaccines/ApprovedProducts/ucm186991.htm>
- Yzer, M. (2012a). Chapter 2: The integrative model of behavioral prediction as a tool for designing health messages. In H. Cho (Ed.), *Designing Messages for Health Communication Campaigns: Theory and Practice* (pp. 21-40). Thousand Oaks, CA, USA: Sage.
- Yzer, M. (2012b). Chapter 8: Reasoned action theory: Persuasion as belief-based

behavior change. In J.P. Dillard & L. Shen (Eds), *The SAGE Handbook of Persuasion: Developments in Theory and Practice, Second Edition* (pp. 120-137).

Thousand Oaks, CA, USA: Sage.

Yzer, M. (2012c). Perceived behavioral control in reasoned action theory: A dual-aspect interpretation. *Annals of the American Academy of Political and Social Science*, *640*(1), 101-117.

Yzer, M., Weisman, S., Mejia, N., Hennrikus, D., Choi, K., & DeSimone, S. (2015). Informing tobacco cessation benefit use interventions for unionized blue-collar workers: A mixed-methods reasoned action approach. *Prevention Science*, *16*(4).

Appendix A

Belief Elicitation Survey

INFORMATION SHEET FOR RESEARCH CONSENT

You are invited to be in a research study of college students' human papillomavirus (HPV) vaccination beliefs, attitudes, and experiences. You were selected as a possible participant because you have signed up for the School of Journalism and Mass Communication subject pool and/or are enrolled in undergraduate courses in the SJMC. We ask that you read this form and ask any questions you may have before agreeing to be in the study.

Procedures: If you agree to participate in this study, we will ask you a series of questions about yourself and perceptions of your getting at least one HPV vaccination in the next 12 months. The survey should take approximately 15-30 minutes to complete.

Confidentiality: All information gathered will be anonymous. In any sort of report we might publish, we will not include any information that will make it possible to identify you. Research records will be stored securely and only researchers will have access to the records. You will not be linked to your responses in any way; it will not be possible to identify you based on your responses to this survey.

Voluntary Nature of the Study: Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota or the School of Journalism and Mass Communication. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

Risks and Benefits of being in the Study: The study has one risk: we will be asking a few sensitive questions that might cause you to feel embarrassed or uncomfortable. Though this risk is possible, your answers will not be traceable back to you and you do not have to answer questions you feel uncomfortable answering. By participating in this study you will help us understand how college students think about HPV vaccination.

Contacts and Questions: Please make sure you understand the risks and benefits of participation in your own words. The researcher conducting this study is Lauren Gray. If you have questions, you are encouraged to contact her before agreeing to participate at 300 Murphy Hall, the University of Minnesota-Twin Cities, (612)625-9824, grayx231@umn.edu. The advisor is Dr. Rebekah Nagler, who can be reached at (612)625-9388, nagle026@umn.edu.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), you are encouraged to contact the Research Subjects' Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, Minnesota 55455; (612)625-1650. I have read, understood, and printed a copy of, the above consent form and desire of my own free will to participate in this study.

- Yes
- No

Thank you for agreeing to participate in this study about HPV vaccination beliefs. Human Papillomavirus is the most common sexually transmitted infection in the United States. Currently, there is a three-dose vaccine for men and women to protect against HPV infection. The Centers for Disease Control and Prevention recommends that young adults through age 26 get vaccinated against HPV. Remember that your answers will be strictly confidential, which means we will never connect them with your name in any way. To protect your privacy, we ask that you refrain from typing anything in your responses that would make it possible to identify you. We hope that you will answer all of our questions. However, if there are some that you do not want to answer, you may leave them blank. In this study, we will ask you some questions about yourself and how you feel about getting at least one Human Papillomavirus vaccination in the next 12 months.

We first want to ask you some quick questions about yourself.

Q1 What is your age?

Q2 What is your sex?

- Male
- Female

Q3 Which of these groups best describes your racial or ethnic background?

- Latino/Hispanic
- Black/African American
- Asian/Asian American
- White/Caucasian
- Native American
- Other

Q4 If "other," please specify:

Q5 Do you identify as LGBT?

- Yes
- No

Q6 Please answer the following questions about your religious faith using the scale below. Indicate the level of agreement (or disagreement) for each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
I pray daily.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I look to my faith as providing meaning and purpose in my life.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I consider myself active in my faith or church.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I enjoy being around others who share my faith	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My faith impacts many of my decisions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The next series of questions are about getting at least one HPV vaccination. There is a lot of talk these days about this subject and we still have a lot to learn about the actual experiences and attitudes of people your age.

It is recommended that adolescents and young adults up to age 26 get a series of three vaccinations to protect against HPV.

Q7 How many HPV vaccinations have you gotten in your lifetime? Please mark the answer that best applies to you.

- 0
- 1
- 2
- 3
- I don't know

The next series of questions are about your perceptions of **your getting at least one HPV vaccination in the next 12 months**. Please write down everything that comes to mind.

Q8 What do you see as the advantages of your getting at least one HPV vaccination in the next [**1 month, 3 months, 12 months**]? What are the good things that might happen if you would get at least one HPV vaccination in the next 12 months?

Q9 What do you see as the disadvantages of your getting at least one HPV vaccination in the next [**1 month, 3 months, 12 months**]? What are the bad things that might happen if you would get at least one HPV vaccination in the next 12 months?

Q10 Please list all the individuals or groups who would approve or think that you should get at least one HPV vaccination in the next [**1 month, 3 months, 12 months**].

Q11 Please list all the individuals or groups who would disapprove or think that you should not get at least one HPV vaccination in the next [**1 month, 3 months, 12 months**].

Q12 Are there any other individuals or groups who come to mind when you think about your getting at least one HPV vaccination in the next [**1 month, 3 months, 12 months**]?

Q13 What factors, circumstances or settings might enable or make it easier for you to get at least one HPV vaccination in the next [**1 month, 3 months, 12 months**]?

Q14 What factors, circumstances, or settings would make it difficult or prevent you from getting at least one HPV vaccination in the next [**1 month, 3 months, 12 months**]?

Q15 Is there anything else that you associate with your getting at least one HPV vaccination in the next [**1 month, 3 months, 12 months**]?

END

Thank you very much for your participation.

Appendix B

Reasoned Action Survey

INFORMATION SHEET FOR RESEARCH CONSENT

You are invited to be in a research study of college students' human papillomavirus (HPV) vaccination beliefs, attitudes, and experiences. You were selected as a possible participant because you are between the ages of 18 and 26 and have signed up for the School of Journalism and Mass Communication subject pool and/or are enrolled in undergraduate courses in the SJMC. We ask that you read this form and ask any questions you may have before agreeing to be in the study.

Procedures: If you agree to participate in this study, we will ask you a series of questions about yourself and perceptions of your getting at least one HPV vaccination in the next 12 months. The survey should take approximately 15-30 minutes to complete.

Confidentiality: All information gathered will be anonymous. In any sort of report we might publish, we will not include any information that will make it possible to identify you. Research records will be stored securely and only researchers will have access to the records. You will not be linked to your responses in any way; it will not be possible to identify you based on your responses to this survey.

Voluntary Nature of the Study: Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota or the School of Journalism and Mass Communication. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

Risks and Benefits of being in the Study: The study has one risk: we will be asking a few sensitive questions that might cause you to feel embarrassed or uncomfortable. Though this risk is possible, your answers will not be traceable back to you and you do not have to answer questions you feel uncomfortable answering. By participating in this study you will help us understand how college students think about HPV vaccination.

Compensation: You will be granted two extra credit points for participating in this study. You are still eligible for extra credit if you skip some questions or quit the survey early.

Contacts and Questions: Please make sure you understand the risks and benefits of participation in your own words. The researcher conducting this study is Lauren Gray. If you have questions, you are encouraged to contact her before agreeing to participate at 300 Murphy Hall, the University of Minnesota-Twin Cities, (612)625-9824,

grayx231@umn.edu. The advisor is Dr. Rebekah Nagler, who can be reached at (612)625-9388, nagle026@umn.edu.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), you are encouraged to contact the Research Subjects' Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, Minnesota 55455; (612)625-1650. I have read, understood, and printed a copy of the above consent form, certify that I am between the ages of 18 and 26, and desire of my own free will to participate in this study.

- Yes
- No

Thank you for agreeing to participate in this study about HPV vaccination. Human Papillomavirus is the most common sexually transmitted infection in the United States. Currently, there is a three-dose vaccine for men and women to protect against HPV infection. The Centers for Disease Control and Prevention recommends that young adults through age 26 get vaccinated against HPV. Remember that your answers will be strictly confidential, which means we will never connect them with your name in any way. We hope that you will answer all of our questions. However, if there are some that you do not want to answer, you may leave them blank. There are no correct or incorrect answers to the questions in this survey; it's really your opinion that matters. Remember that your first responses are usually the most accurate.

We would like to begin by asking you a little information about yourself.

Q1 What is your age?

Q2 What is your sex?

- Male (1)
- Female (2)

Q3 Which of these groups best describes your racial or ethnic background?

- Latino/Hispanic (1)
- Black/African American (2)
- Asian/Asian American (3)
- White/Caucasian (4)
- Native American (5)
- Other (6)

Q4 If "other," please specify:

Q5 Do you identify as LGBT?

- Yes
 No

Q6 How many HPV vaccinations have you received?

- 0
 1
 2
 3
 I don't know

Q7 Please answer the following questions about your religious faith using the scale below. Indicate the level of agreement (or disagreement) for each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
I pray daily.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I look to my faith as providing meaning and purpose in my life.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I consider myself active in my faith or church.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I enjoy being around others who share my faith.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My faith impacts many of my decisions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q8 Have you ever had sexual intercourse?

- Yes (1)
 No (2)

Q16 There can be a variety of obstacles to your getting at least one HPV vaccination in the next twelve months. Even in the face of such obstacles, how sure are you that if you really wanted to you can get at least one HPV vaccination in the next twelve months?

	1	2	3	4	5	6	7	
Completely sure I cannot	<input type="radio"/>	Completely sure I can						

Q17 How many of the people who are most important to you do you think had at least one HPV vaccination in the last twelve months? If you are not sure, make your best guess.

- None
- A few
- Some
- Most
- All

Q18 How do you think most people important to you would feel about you getting at least one HPV vaccination in the next twelve months? They would:

	1	2	3	4	5	6	7	
Strongly disapprove	<input type="radio"/>	Strongly approve						

Q19 How do you think your close friends would feel about you getting at least one HPV vaccination in the next twelve months? They would:

	1	2	3	4	5	6	7	
Strongly disapprove	<input type="radio"/>	Strongly approve						

Q20 How do you think your family would feel about you getting at least one HPV vaccination in the next twelve months? They would:

	1	2	3	4	5	6	7	
Strongly disapprove	<input type="radio"/>	Strongly approve						

Q21 How do you think your doctor or other health care provider would feel about you getting at least one HPV vaccination in the next twelve months? They would:

	1	2	3	4	5	6	7	
Strongly disapprove	<input type="radio"/>	Strongly approve						

Q22 How do you think your classmates would feel about you getting at least one HPV vaccination in the next twelve months? They would:

	1	2	3	4	5	6	7	
Strongly disapprove	<input type="radio"/>	Strongly approve						

Q23 How sure are you that you can get at least one HPV vaccination in the next twelve months if you really wanted to, if:

	Not at all sure I can	Not sure I can	Neither sure or unsure I can	Sure I can	Completely sure I can
You do not have health insurance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It takes time to schedule doctors appointments	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The vaccine hurts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
You are afraid of vaccines	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
You are busy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The vaccine has side effects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your doctor is at your hometown clinic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

This concludes the survey. Thank you for your participation!