

KNOWLEDGE, BELIEFS, AND ATTITUDES ABOUT THE HUMAN PAPILLOMAVIRUS  
VACCINE AMONG FEMALE COLLEGE STUDENTS: DOES MASS MEDIA EXPOSURE  
INFLUENCE VACCINE ACCEPTANCE?

By

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To my parents, Charlotte and Jim Henneberger  
Thank you for your unending love and support

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Abstract of Thesis Presented to the Graduate School  
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Human papillomavirus (HPV), which causes 99.7% of all cases of cervical cancer, is the most common sexually transmitted disease in the nation. Each year, cervical cancer strikes over 10,000 women in the United States and nearly half a million worldwide. The incidence of HPV infection peaks among women ages 22–25. Gardasil, Merck’s HPV vaccine, has proven nearly 100% effective against at least four strains of HPV responsible for most cases of cervical cancer and genital warts. In 2006, the Centers for Disease Control and Prevention recommended the vaccine for women ages 11–26.

Although much attention has been paid to the issue of HPV vaccination among young girls, no studies about the knowledge, beliefs, and attitudes of the adult target population (women ages 18–26) have been published since the vaccine became available. In order to develop better health education messages and to eventually increase vaccination rates among women, it is important to understand what factors influence their HPV vaccination decisions. In this study, research questions focused on college women’s level of knowledge about the HPV vaccine, their related beliefs and attitudes, their primary sources of information, and their decisions in favor of or against vaccination. A 55-question quantitative survey was used to

examine a variety of determinants that contribute to HPV vaccination decisions, with a particular focus on the influence of the mass media.

A hierarchical linear regression showed that three main factors accounted for 42.7% of the variance in individual intention to be vaccinated against HPV. They were: 1) belief that the vaccine is safe and that information about the vaccine provided by advertisements and the news media is trustworthy; 2) perceived family support regarding vaccination; and 3) use of interpersonal sources of information about the vaccine. Stronger beliefs in vaccine safety and information trustworthiness were also correlated with a positive overall impression of the HPV vaccine.

The results suggest that college women may be significantly influenced by HPV information provided by advertisements, the news media, and interpersonal sources—despite the fact that respondents reported relatively low use of these sources. The survey also revealed that the women were highly informed about the HPV vaccine. Their knowledge, combined with the information they gained from the news media and interpersonal sources, may have helped develop and/or reinforce their beliefs regarding HPV vaccine safety, which contributed directly to the decision to be vaccinated. This study filled a gap in knowledge about how college women have responded to the availability of an HPV vaccine and what factors most impact their vaccination decisions. These findings can help guide health educators and public health professionals as they work to promote HPV vaccination and eradicate cervical cancer.

## CHAPTER 1 INTRODUCTION

### **Human Papillomavirus**

Human papillomavirus (HPV) is an ancient and widely spread virus that affects more than 20 million women and men in the United States (CDC, 2008a). Although it is overshadowed by higher profile sexually transmitted diseases (STDs) like HIV/AIDS, herpes, and chlamydia, HPV is the most common STD in the nation. Spread primarily through skin-to-skin and genital contact during sexual activity, HPV will affect more than 50% of adults at least once during their lifetime (Koutsky, 1997; CDC, 2008a). Most cases are asymptomatic and clear up without medical intervention (Gerberding, 2004). However, HPV causes 99.7% of all cases of cervical cancer, and while the disease is often caught in its early stages in American women through Pap tests, worldwide it is the second most common cause of cancer deaths among women (Walboomers, Jacobs, & Manos, et al., 1999; Ault, 2007). In 2007, cervical cancer struck about 11,000 women in the United States and nearly half a million worldwide. HPV also causes the majority of mouth cancers, including those of the tongue and tonsils (Gregorian, 2008). Although men are carriers of HPV and can develop genital warts and HPV-related genital and anal cancers, HPV-related cancer among women is much more prevalent (Irvine, 2008). Two strains of HPV—16 and 18—cause about 70% of all cases of cervical cancer (Ault, 2007). Women and men ages 20–24, especially those attending college, are most at risk for HPV infection (D’Urso, Thompson-Robinson, & Chandler, 2007). Adolescents and college students are at greater risk for STDs than many other segments of the population, primarily due to them having more instances of unprotected sex and more partners (CDC, 2009). Among women, the incidence of HPV infection peaks among those ages 22–25 (Ludicke, Stalberg, Vassilakos, Major, & Campana, 2001).

In March 2008, the Centers for Disease Control and Prevention (CDC) released data showing that one in four women ages 14–19 in the U.S.—3.2 million girls—had at least one STD (CDC, 2008b). Of those infected, the most common STD was HPV (18%), followed by chlamydia (4%). STDs disproportionately affect minority women: The CDC study found that nearly half of African American teen girls (48%) had an STD, compared to 20% of white teens. The agency also reported that although 82% of sexually active women ages 15–24 receive contraceptive or STD/HIV testing services, only 39% receive both. An additional CDC report found that of young women seeking emergency contraceptives—indicating unprotected sex—only 27% were screened for chlamydia or gonorrhea, and of those, 12% tested positive. This suggests a high rate of undiagnosed and untreated STDs among young women. Compared to men, women suffer the most severe consequences from STDs, which, if left untreated, can lead to painful symptoms, infertility, and cancer.

### **HPV Vaccine**

Gardasil, Merck's HPV vaccine, has proven nearly 100% effective against at least four strains of HPV responsible for most cases of cervical cancer and genital warts (Ault, 2007). These results are based on four randomized trials involving more than 20,000 women ages 15–29 from more than 24 countries in Europe, North America, Latin America, and Asia. The ability of the vaccine to prevent the spread of the most dangerous strains of HPV makes it the most effective prevention method other than abstinence; condoms do not offer 100% protection against HPV (Irvine, 2008). It is unknown whether the vaccine offers lifelong protection against HPV. However, it offers 100% protection against HPV strains 16 and 18 for at least five years in women who are not already infected (Harper & Paavonen, 2008). Further trials are needed to determine whether vaccine recipients will require booster shots later in life.

In June 2006, the U.S. Food and Drug Administration (FDA) approved the vaccine, and the CDC subsequently recommended that it be given routinely to all girls ages 11–12, and that young women ages 13–26 would also benefit from vaccination (CDC, 2008c). Vaccination is intended to take place before the onset of sexual activity, and/or before a woman is exposed to the HPV strains that cause cervical cancer and genital warts (Gardasil.com, 2009a) “This vaccine represents an important medical breakthrough,” Dr. Anne Schuchat, director of the CDC’s National Center for Immunization and Respiratory Diseases, said at the time. “These vaccine recommendations address a major health problem for women and represent a significant advance in women’s health” (CDC, 2006, ¶ 4). This view was largely echoed throughout the medical and public health communities, and in October 2008, the Nobel Prize in medicine was awarded to the scientist who discovered HPV and its link to cervical cancer—findings that ultimately contributed to the development of an HPV vaccine (Altman, 2008).

Gardasil is administered through three intramuscular injections over the course of six months. “The vaccines are prophylactic and have no documented therapeutic activity”—meaning they are designed only to stop initial transmission of HPV, not to treat existing cases of the virus (Wright et al., 2008, p. S42). Despite this, programs promoting and/or funding “catch-up” vaccination programs for women ages 13–26 exist in several European nations and Australia, along with the U.S. The goal of these programs is to target women who have not yet been exposed to HPV strains 6, 11, 16, and 18—even if they are sexually active (Wright et al., 2008). Harper and Paavonen estimate that if only 12-year-old girls are vaccinated, it will take 100 years to “maximally reduce cervical cancer incidence” (Harper & Paavonen, 2008, p. A9). However, “vaccinating women older than 12 years may accelerate the reduction in cervical cancer rates” (p. A9)

Clinical trials are currently being conducted on women over the age of 26, and early results indicate that the vaccine is well-tolerated in women up to age 55 (Wright et al., 2008, p. S46). Although it is currently recommended only for younger women, “vaccination could provide significant individual benefit to many women older than 26 years of age, especially those with a relatively modest number of previous sexual contacts and those who will have new sexual exposures” (Wright et al., 2008, p. S46).

### **Legal Status of HPV Vaccine**

The HPV vaccine includes three injections and costs approximately \$375—a cost covered by most large insurance companies (CDC, 2008c). To address concerns about cost and awareness, at least 41 states and the District of Columbia have introduced bills to “require, fund, or educate the public about the HPV vaccine,” and 19 enacted the legislation, including Colorado, Indiana, Iowa, Louisiana, Maine, Maryland, Michigan, Minnesota, Nevada, New Mexico, New York, North Carolina, North Dakota, Rhode Island, South Dakota, Texas, Utah, Virginia, and Washington (National Conference of State Legislatures, 2009, ¶ 8). Both New Hampshire and South Dakota provide the vaccine free to girls younger than 18, and Washington has designated funds to vaccinate 94,000 girls during the next two years. In February 2007, Texas Governor Rick Perry signed an executive order mandating that all girls entering the sixth grade be vaccinated against HPV, but the Texas Legislature passed a law overriding the order, thereby leaving it up to parents to decide whether their daughters should receive the vaccine. The Virginia Legislature passed a vaccine mandate in 2007 but is currently considering a bill that would delay its implementation. In 2007, at least 24 states and the District of Columbia introduced bills that would have mandated the HPV vaccine for school attendance. Thus far, only the District of Columbia has enacted such a law. HPV legislation has the potential to increase the availability of the vaccine and to make it more affordable to recipients through public funding.

Legislative action and the related media coverage also help increase public awareness about the vaccine.

In February 2007, Merck announced that it would stop lobbying state legislatures to pass laws mandating the vaccine. This decision was made amid mounting public concern that the corporation was unduly influencing legislators to pass bills that would lead ultimately to a financial windfall for Merck (Pollock & Saul, 2007). The executive secretary for the FDA's Advisory Committee on Immunization Practices condoned Merck's decision to halt its lobbying program, stating that "Anything that takes away from the process of getting [the] vaccine into people is deleterious to the whole process" (Pollock & Saul, 2007, p. C1).

Although the CDC currently recommends the vaccine only for women, regulatory agencies in Australia and the European Union have approved it for boys ages 9–15, as well. Merck is currently sponsoring a clinical trial of Gardasil in 4,000 men; the results may impact the vaccine's recommended use in the U.S. In the meantime, doctors in the U.S. are legally permitted to provide the vaccine to anyone they feel is an appropriate candidate (Tuller, 2007). However, because Merck is forbidden from marketing Gardasil to men until it receives FDA approval, it is unlikely that many men in the U.S. will be informed about and receive the vaccine.

Presently, Gardasil is the only FDA-approved HPV vaccine available in the U.S. GlaxoSmithKline has developed a similar vaccine, Cervarix, which has been approved for use in women and children in more than 67 countries, including all member countries of the European Union (Philadelphia Business Journal, 2008). In March 2007, GlaxoSmithKline filed an application with the FDA for the approval of Cervarix; more than a year later, the drug company reported that it planned to submit new information about the vaccine and data from additional clinical studies to the FDA during the first half of 2009. After that, FDA approval is expected to

take at least six months. If and when Cervarix is approved, market competition may cause the cost of the HPV vaccine to go down, thereby making it more accessible to uninsured women.

### **Purpose of Study**

HPV education and prevention is a timely topic, especially given that the legislative status of the HPV vaccine remains in limbo across the nation. Much of the media coverage of the vaccine has focused on the opinions and actions of legislators and other government officials, and the beliefs and reactions of parents—speaking for or on behalf of their young daughters. The vaccine is, after all, recommended for girls ages 11–12, and unless it is made mandatory, it is up to parents to decide if their daughters will receive it. However, the vaccine is also recommended for women up to age 26. Even if Gardasil is mandated for young girls, today’s young adult women ages 18–26 still have the power to choose whether to be vaccinated, and they have a vested interest in the vaccine’s availability and cost. Many insurance plans currently cover this costly vaccine, but the number of vaccines given would likely skyrocket if more states mandate vaccination. Although the concerns and perspectives of young adult women may echo those of parents and legislators, there are undoubtedly influences that uniquely impact their beliefs and decisions about the vaccine. The voices and experiences of this age group have been largely overlooked by the media in their coverage of the HPV vaccine and its major stakeholders. Furthermore, much of the academic research conducted on this population’s health beliefs regarding HPV was done prior to the availability of Gardasil. Public awareness about HPV has risen sharply during the last three years and this has likely influenced opinions regarding vaccination (Health Information National Trends Survey, 2008). In order to develop better health education messages and to eventually increase HPV vaccination rates among college women—and, ideally, all young adult women—it is important to understand what factors influence their decisions regarding HPV vaccination.

This study was grounded in both health behavior theory and opinion formation theory. In order to determine what most significantly influences a young woman's decision to get the HPV vaccine, one must first examine her underlying knowledge, beliefs, and attitudes about Gardasil, and how those factors interact with outside influences. Although this study examined a variety of determinants that contribute to HPV vaccination decisions, it focused particularly on the influence of the mass media both on the formation of beliefs and attitudes and on behavior directly. The study revolved around the following key questions: What most influences college women's decisions regarding HPV vaccination? And, specifically, what impact, if any, do the mass media have on the decision-making process? An anonymous survey was used to measure the knowledge, beliefs, attitudes, intentions, and behaviors of college women regarding the HPV vaccine. The results of this quantitative study offer public health officials and health educators a better understanding of how information about HPV and its vaccine reaches college women and how it influences their vaccination decisions. With this new information, public health officials and health communicators are better equipped to tailor their messages and select appropriate channels through which to provide information about the HPV vaccine to a population of women that has much to gain from being vaccinated—and a limited window of time in which to do so.

### **Research Questions**

The following research questions were addressed in this study:

- RQ1: What do college women ages 18–26 know about HPV and its vaccine?
- RQ2: What are their beliefs and attitudes regarding the HPV vaccine?
- RQ3: What are their main sources of information about HPV and the HPV vaccine?
- RQ4: What has most influenced their decision-making regarding HPV vaccination?
- RQ5: How have their knowledge, beliefs, attitudes, and other factors influenced their behavior regarding HPV vaccination?

## CHAPTER 2 LITERATURE REVIEW

### **Theory**

The Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB) served as the foundational theories for this study. Both TRA and TPB are used to help predict human behavior. TRA, developed in 1975 by Martin Fishbein and Icek Ajzen, posits that intentions are the strongest determinant of behavior, and that intentions are influenced by social pressures and personal attitudes, which are in turn influenced by personal beliefs (Ajzen & Fishbein, 1980). In 1985, Ajzen expanded the theory and developed TPB by adding a third baseline factor: belief in one's control and ability to carry out a behavior (Ajzen, 1991). The concept of intention captures all motivating factors that lead to a particular behavior and reflects "how hard people are willing to try. As a general rule, the stronger the intention to engage in behavior, the more likely should be its performance" (Ajzen, 1991, p. 181). Intention is driven by "three conceptually independent determinants": attitude toward the behavior, subjective norms, and perceived behavioral control (Ajzen, 1991, p. 181).

Attitude describes a person's "favorable or unfavorable evaluation or appraisal of the behavior in question" (Ajzen, 1991, p. 188). Attitudes develop based upon one's behavioral beliefs, which are formed about something when we "associate it with certain attributes, i.e., with other objects, characteristics, or events" (p. 191). A person's beliefs and ensuing attitudes link behavior to specific outcomes. Favorable beliefs and attitudes generally mean that one will believe that the outcome of a particular behavior is also favorable. The level at which someone values a predicted outcome influences the strength of the related beliefs and attitude. For example, a young woman who believes that she is at risk of getting HPV, that HPV causes cervical cancer, and that the HPV vaccine can help prevent it may develop an attitude such as

*“Getting the HPV vaccine is a good idea”* and therefore decide to get the vaccine, based on the strong potential for a desirable outcome (protection against cervical cancer).

The second determinant of intention, subjective norm, is grounded in normative beliefs, which are “concerned with the likelihood that important referent individuals or groups approve or disapprove of performing a given behavior” (Ajzen, 1991, p. 195). The motivation to behave in a particular way is related to how strongly individuals care about how other important people in their life will react to the behavior. For example, a young woman who has the normative belief that her friends and family members will think she is promiscuous if she gets an “STD vaccine” may develop a subjective norm such as *“My loved ones do not want me to get the HPV vaccine,”* which may lead her to decide against vaccination.

The third determinant of intention, perceived behavioral control, is based on “control beliefs”—an individual’s belief about the “presence or absence of requisite resources and opportunities” needed to carry out the behavior (Ajzen, 1991, p. 196). If people see few obstacles to achieving a behavior, they are more likely to pursue it. The belief that a certain behavior is achievable is “based in part on past experience with the behavior, [but will] also be influenced by second-hand information ... the experiences of acquaintances and friends, and by other factors that increase or reduce the perceived difficulty of performing the behavior in question” (Ajzen, 1991, p. 196). For example, a young woman may believe that she has low self-efficacy, leading to a perceived behavioral control such as *“I am unable to afford the HPV vaccine”* and a decision against vaccination. A host of external factors could contribute to low perceived behavioral control, including lack of money to pay for the HPV vaccine, lack of transportation to a health care clinic, or lack of a primary care provider.

Anderson and Lavalle (2008) tested the ability of TRA and TPB to predict athletes' adherence to training and found that perceived behavioral control may be more influential by itself than intention. Although the "athletes may have started out with good intentions," they "were unable to convert these intentions into actual behavior" due to other impediments that led to a lack of self-efficacy (Anderson & Lavalle, 2008, p. 309). The authors concluded that TPB, rather than TRA, was most relevant to their study because of its inclusion of perceived behavioral control as a factor *directly* contributing to behavior. Perceived behavioral control "becomes important in predicting behavior when volitional control is incomplete and barriers exist to prevent the individual from engaging in the behavior" (Anderson & Lavalle, 2008, p. 310). Because college women may face various barriers to vaccination (e.g., inability to pay for the vaccine or lack of time to go to the doctor) it is important to include perceived behavioral control in the analysis in order to develop a complete picture of how and why young women decide to be vaccinated.

Both behavioral beliefs and control beliefs are influenced by many factors, including access to or lack of information. It is here that mass media sources fit into the Theory of Planned Behavior—they help develop the key determinants of intention and ensuing behavior. Mass media health campaigns have been based around TPB, drawing on the idea that if information can be used to influence beliefs and attitudes, then the resulting intentions and behaviors will be favorable. In their survey of women about the use of dietary supplements, Conner, Kirk, Cade, and Barrett (2001) utilized TPB as the analytical framework and found that along with intention and its traditional trio of determinants, the mass media (books and magazines) were also perceived by the participants as a "powerful influence on a person's decision to use supplements" (Conner et al., 2001, p. 621). Users of dietary supplements rated books and

magazines as more in favor of supplement use than any of the other referents (Conner et al., p. 628). Interestingly, both users and non-users indicated that they “wished to comply” with the health information provided in books and magazines (Conner et al., p. 628).

Maddock, Silbanuz, and Reger-Nash (2008) based their study of the development of a mass media campaign to increase physical activity and nutrition among a multiethnic population on TPB, stating that similar campaigns “have been successful in changing behavior” (Maddock, Silbanuz, & Reger-Nash, 2008, p. 210). Their campaign was designed to “address the core beliefs in attitudes, perceived behavioral control, and subjective norms that differed between those who were engaging in the behavior and those who were not” (Maddock, Silbanuz, & Reger-Nash, p. 210). In the pilot study, control beliefs proved to be the most significant barrier to change. After being presented with health education campaign materials, study participants identified several perceived control beliefs, including lack of time (to exercise) and lack of availability (of fruits and vegetables). Social norms—primarily, the foods eaten by peers and family members—also played a role in discouraging participation in the healthy lifestyle program (Maddock, Silbanuz, & Reger-Nash).

The influence of the media can have both encouraging and discouraging effects on behavior. Lobb, Mazzocchi, and Traill (2007) used TPB to analyze the results of a survey about risk perception and trust in food safety information in the United Kingdom. The authors found that in the event of a food contamination scare, “trust in food safety information provided by media, alternative sources, and independent authorities significantly reduces the likelihood to purchase” (Lobb, Mazzocchi, & Traill, 2007, p. 393). Similarly, “trust in information provided by media and independent sources increases risk perception, [while] trust in public authorities decreases it” (p. 393). Risk perception negatively influences attitudes, which in turn influences

intent and behavior (in this case, the decision not to purchase a possibly contaminated food item). Lobb et al. also found that in the event of a food scare, the traditional three determinants of intention and behavior are overshadowed by other influences, such as information provided by the news media or the government (pp. 393–394).

As a new vaccine for a largely unpublicized disease, Gardasil started out with a relatively clean slate in the realm of public opinion. This has changed quickly during the past three years as doctors, legislators, parents, and interest groups of various political, religious, and philosophical backgrounds weighed in—often on the editorial pages of newspapers and magazines, on Internet discussion boards and blogs, and on commentary programs on television and radio. Although the development and use of Gardasil is a medical and scientific topic, it is also viewed by some as an ethical and values-based issue. For example, while some define Gardasil as a “cancer vaccine,” others frame it as an “STD vaccine.” How a woman’s opinions about the vaccine are formed influences its personal relevance for her, and, for women in the vaccine’s target age group, it is a first step in their decision regarding vaccination.

Taking on a longtime question in the field of public opinion formation, Nisbet (2005) explored whether increased information leads to greater public acceptance and support—in this case, for stem cell research. Explaining the rationale for his survey, he writes, “when it comes to public opinion about controversial issues related to science and technology, many policy makers and scientists assume that increased public understanding of the science will lead to increased public support” (Nisbet, 2005, p. 90). However, individuals are often more likely to rely on their “value predispositions and only the information most readily available to them from the mass media and other sources in order to formulate an opinion about science controversy” (p. 90). The hopes of scientists for an enlightened public are often unrealistic. Nisbet argues that:

the public is generally more ‘miserly’ than fully informed. Instead of an ‘omni-competent’ citizen—knowledgeable and interested about all issues—individuals are more likely to ‘satisfice’ rather than ‘optimize’ their use of information, relying on available heuristics as a means to process new information, form attitudes, and reach decisions (Nisbet, p. 94).

These observations were demonstrated in Nisbet’s analysis of national survey data. He did find, however, that in a year with heavy media coverage of stem cell research (2001), the issue was more salient to respondents, who were more likely to express positive opinions regarding the research (p. 107). A year later, when media coverage declined, the issue lost some of its saliency and respondents were more likely to express negative opinions about stem cell research. Public opinion shifted again to a more favorable position in 2004, with the death of Ronald Reagan and the media coverage about the potential for stem cell research to lead to a treatment for Alzheimer’s disease. Since then, support has once again waned. Nesbit concludes that “although an increase in awareness leads to an increase in support for research, both religious and ideological value predispositions strongly moderate the impact of awareness” (p. 90).

Ho, Brossard, and Scheufele (2008) also used the topic of embryonic stem cell research to examine the effects of value predispositions, mass media use, and knowledge on public attitudes. After analyzing data from a national survey, the authors concluded that “public opinion about the stem cell issue is largely shaped by value predispositions and heuristic cues from the news media, and demonstrates that scientific knowledge plays a minor role in influencing attitude ...” (Ho, Brossard, & Scheufele, 2008, p. 185). Based upon factors such as “religiosity, ideology, and deference to scientific authority,” respondents interpret “very differently the same type of information, depending on which predispositional lens they apply when making sense of that information” (p. 185). Ho et al. found that positive news frames regarding stem cell research led to more positive attitudes about the topic by the public. These findings “were consistent with past research that shows media use to be positively related to support for emerging science and

technology” (p. 187). This suggests that the media’s news coverage of Gardasil and HPV may have a more positive than negative effect on young woman’s attitudes and decisions regarding vaccination. However, although college women may have access to similar information about the HPV vaccine from the mass media and health care professionals, their interpretation of this information is filtered through a variety of personal values and previously held beliefs, leading to different attitudes and behaviors regarding vaccination. These factors represent an important part of the current application of TPB; along with attitudes, subjective norms, and perceived behavioral control, college woman may be significantly influenced by media cues and value predispositions. The following diagram, based on the work of Ajzen (1991), demonstrates the multiple factors that lead to intention and behavior. Along with the traditional trio of determinants (attitude, subjective norms, perceived behavioral control), mass media have also been included as a direct influence on beliefs and behavior.

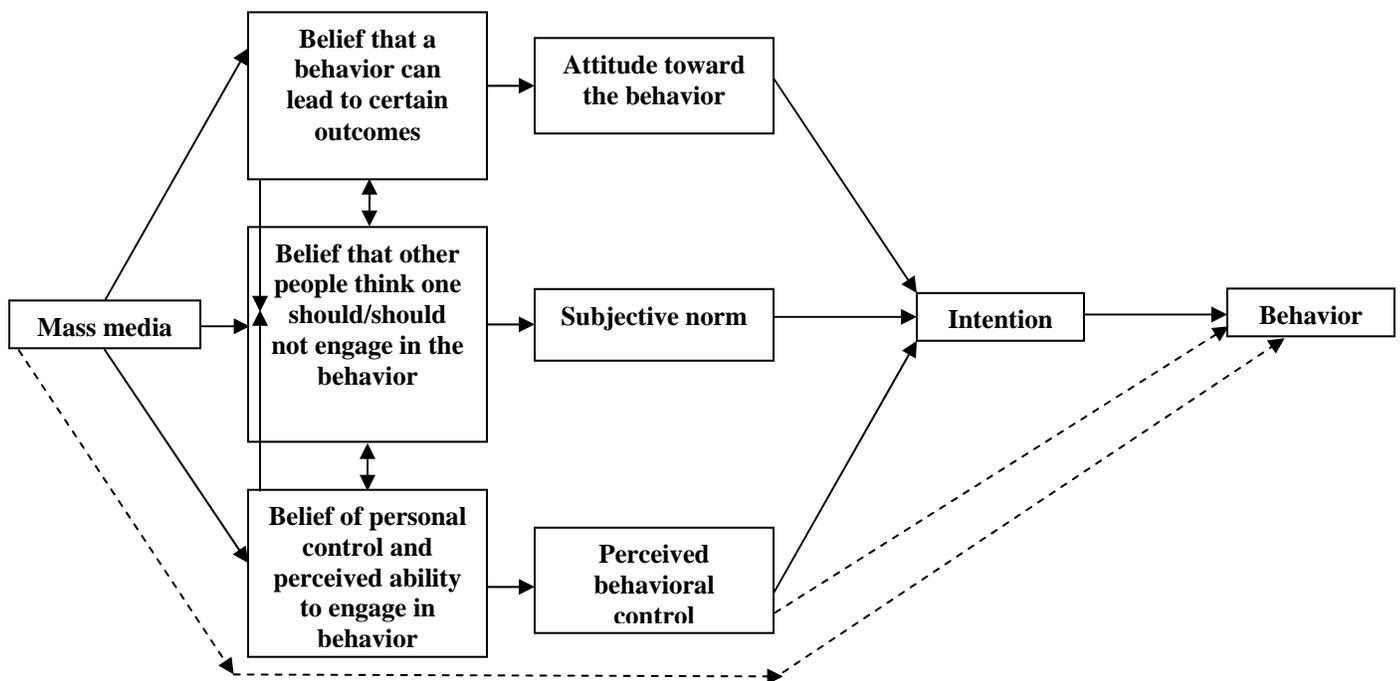


Figure 1-1. Diagram demonstrating the Theory of Planned Behavior, including the influence of the mass media

In the current study of college women's sources of information, knowledge, beliefs, attitudes, and behaviors regarding HPV vaccination, the application and relevance of the Theory of Planned Behavior can be demonstrated through the following sample scenario.

*A college woman may be likely to receive the HPV vaccine if:*

1) She believes that the HPV vaccine is safe, effective, and can prevent her from becoming infected with HPV (based in part on information provided by the mass media), or

2) She believes that her peers, family members, health care provider, etc.—whatever groups or individuals are most important to her—want her to be vaccinated, or, at the least, will not have negative feelings toward her if she does, or

3) She believes that she has control over the decision to be vaccinated, and the ability to get the vaccine.

*Leading to:*

4) A positive attitude toward the HPV vaccine, or

5) Perceived support for getting vaccinated, or

6) A sense of control and ability to get vaccinated.

*Leading to:*

7) The intention to be vaccinated against HPV.

*Leading to:*

8) Getting the HPV vaccine.

A possible alternative to the above scenario centers on the influence of the mass media. As demonstrated by Conner et al. (2001), the mass media sometimes serves as an independent determinant of intention. For example, a woman could find information presented by the mass media about the HPV vaccine so compelling that she is singularly motivated to be vaccinated.

## Mass Media's Coverage of HPV Vaccine

Immediately prior to and in the nearly three years since Gardasil's approval by the FDA, Americans have been presented with information and opinions about HPV vaccination from a variety of media sources. In November 2006, Merck launched a national print, television, and online advertising campaign for Gardasil. The "One Less" campaign urges young women to become "one less person who will battle cervical cancer" (Medical News Today, 2006). The widely run television commercials feature an ethnically diverse array of mothers and daughters engaging in a variety of activities. They skateboard, bake cookies, play checkers, ride horses, and read magazines, all while informing viewers about the benefits and risks of Gardasil (Gardasil.com, 2009b). The commercials end with the text, "Choose to get vaccinated." An article in *The New York Times* describes the daughters as "the coolest girl in the room, whatever room she's in" (Dederer, 2007, p. 2.34). In many of the commercials, the mothers list the possible side effects of vaccination—including soreness at the injection site, headache, fever, nausea, dizziness, vomiting, and fainting (Gardasil.com, 2009b). "Having mothers voice the downside of Gardasil reinforces the message that if you get this vaccination, you're a rebellious, independent thinker," writes Dederer (p. 2.34). "Forget Mom. I'm gettin' vaccinated." The Gardasil.com Web site, published by Merck, includes clips of the commercials, a printable HPV fact sheet, a slideshow, and tips on planning an event "to get the word out about HPV and cervical cancer" (Gardasil.com, 2009c, Make an Impact/Tools to Share section).

The news media provided heavy coverage of the vaccine's debut in June 2006, and reporting has since come in waves as debates have arisen over the vaccine's safety, expense, and legal status across states. Along with news stories, numerous opinion pieces about the vaccine have appeared in newspapers and magazines in print and online. Due to the relative newness of the topic, no published studies about the news media's coverage of Gardasil exist. However,

casual observation reveals that much of the content has focused on defining and explaining HPV and its risks, explaining how the vaccine works to prevent cancer, discussing the risks and benefits of HPV vaccination, and outlining the various public debates that have arisen over HPV vaccination. Major medical organizations have spoken out through the mass media in favor of universal vaccination against HPV. However, some have raised doubts about the thoroughness of the clinical testing of Gardasil. When the *New England Journal of Medicine* published two articles critical of the vaccine in its August 21, 2008, edition, these counter perspectives quickly made their way into the mainstream press via *The New York Times* (Rosenthal, 2008). Coverage of the vaccine has been repeatedly reinvigorated during the last three years through the reporting of related news items, such as concerns over vaccine safety in general, debates over abstinence-only education, and new data from the CDC about STD rates.

To better understand the dominant public perspectives on the HPV vaccine, as presented in the mainstream media, the author conducted a qualitative analysis of 31 letters to the editor, 22 op-ed or commentary pieces, and 21 newspaper board editorials published in 2006–2008 in mainstream American newspapers, including several student newspapers at secular universities, and two national news magazines (Henneberger, 2008).

Among the opinion pieces written against HPV vaccination, several authors stated that they were worried about side effects and long-term health implications for young girls. Many also said that the vaccine is prohibitively expensive and that resources should go toward promoting safe sex and/or abstinence. “The best way to prevent HPV is to be sexually responsible by being abstinent outside of marriage and faithful within marriage and getting regular Pap tests,” a woman wrote to the *Washington Times*. Several expressed the belief that HPV is not truly a “communicable disease,” since it is sexually transmitted and is generally a

result of a personal choice. This, some authors argued, means that the HPV vaccine should not be mandated nor funded by the government. “With the HPV vaccine, we are attempting to prevent a behavioral problem without addressing the problem. Cervical cancer is largely a problem of sexually active women. Infection is a byproduct of that behavior,” a man wrote to *U.S. News and World Report*. Others wrote that the vaccine will encourage promiscuity. “I think the hypothesis that people are more promiscuous after being inoculated with a HPV vaccine is completely reasonable,” a man wrote to the *Daily Collegian* at Penn State University.

Among the letters in favor of HPV vaccination, many authors cited statistics about the prevalence of HPV and cervical cancer—and about the success of the vaccine based on clinical trials. Many also expressed concern about paying for the vaccine and called for Gardasil to be made mandatory as a way to force insurance companies and state health care plans to pay for it: “The HPV vaccine should become an affordable, routine part of health care—because the decisions we make today about preventing cervical cancer will directly affect the health of our daughters and our daughters’ daughters,” a woman wrote to the *Journal Gazette* of Fort Wayne, Indiana. Another called for mandatory school-based immunization as “the only effective way to achieve widespread immunization and close racial, ethnic and socioeconomic gaps in immunization rates” in a letter to *The New York Times*. One author described her own battle with cervical cancer in a letter to the *San Francisco Chronicle*, concluding, “You can bet my daughter will be receiving the new HPV vaccine!” Some authors also suggested that the entire debate over HPV vaccination is based upon sexist assumptions: “My guess is that if they found an immunizing agent for 15-year-old boys to prevent future prostate cancer, they would pass the law with flying colors and administer it without argument,” a man wrote to the *San Diego Union-Tribune*. “We find a radical breakthrough in women’s health controversial simply because

its working mechanism suggests that women have sex,” a woman wrote in a column for the *Daily Princetonian*.

Newspaper board editorials were more likely to endorse the vaccine than editorials penned by members of the public. This is likely a reflection of the “predispositional lens” discussed by Ho et al. (2008). Despite largely positive news coverage about the vaccine, individuals continue to filter what for some is a controversial issue through their own set of values and beliefs, leading them to different conclusions regarding the necessity, safety, accessibility, and legality of HPV vaccination. Larger, more thorough content analyses are needed to better analyze the mainstream news media’s coverage about Gardasil; however, general observations reveal that much of the news coverage acknowledges or expands upon the dominant perspectives offered in letters to the editor, columns, and op-eds on this topic.

### **Knowledge About HPV**

Studies consistently show that adolescents and adults lack basic knowledge about HPV and other STDs. An anonymous survey of 322 first-year college students revealed that although more than 95% of both women and men indicated they had heard of genital warts, about two-thirds of the women and three-quarters of the men did not know their cause, which is HPV (Baer, Allen, & Braun, 2000). Furthermore, only 35.5% of women and 29.1% of men said they had heard of HPV infection of the cervix, and 22% of women and 23.3% of men said they had heard of HPV infection of the penis (Baer, Allen, & Braun, 2000, p. 70). Most worrisome, 45.6% of women and 82.6% of men stated that they did not know how HPV is transmitted (p. 72). The survey results also indicated that HPV lacks saliency among this age group. Only 4.6% of women and 2% of men listed HPV as a “common STD,” despite its status as the world’s *most prevalent* STD (p. 72). The survey found that 87% of participants had learned about STDs in health education classes in middle or high school, and that 43.7% of women identified magazines

as an important source of information about STDs, compared to 23% of men (73). Twice as many men as women identified television as an important source of information about STDs (p.p. 74–75).

An anonymous survey of 351 black students revealed that a majority lacked awareness of the very existence of HPV (D’Urso, Thompson-Robinson, & Chandler, 2007). Sixty-four percent of respondents stated that they had never heard of HPV prior to the survey (D’Urso, Thompson-Robinson, & Chandler, 2007, p. 161). Among those who had heard of it, only 52% said that they knew what it was. Even among students who reported that they knew about HPV, many incorrectly answered basic questions about HPV symptoms and transmission (e.g., over one-third stated that HPV causes herpes). Among students who reported that they knew about HPV, 62% received their information from a health care provider; 59% from a health education program; 39% from a newspaper or magazine; 29% from the Internet; and 20% from a friend or family member (p. 161). The remainder cited radio/television, the CDC STD hotline, the American Social Health Association, or other, unidentified sources.

A qualitative study of Latina college students’ beliefs about HPV revealed that approximately 11 out of 16 focus group participants did not know anything about HPV (Schiffner & Buki, 2006, p. 691). Among the sexually active participants, 73% said they were “somewhat to not at all concerned about contracting the infection” (p. 691). This ambivalence was likely rooted in their overall lack of awareness about the potentially deadly consequences of HPV: 80% were unaware that cervical cancer can be fatal, and 40% did not know that cervical cancer can be asymptomatic (p. 692).

Studies have shown that both adolescent and adult women prefer to receive information about STDs and/or HPV from their health care providers. A qualitative study of 18-year-old

college women's communication about STDs found that 13 of 15 participants preferred interpersonal information sources (Rouner & Lindsey, 2006, p. 34). Seven out of 15 said they preferred information to come from a doctor or other health care provider because those individuals "would know the most or would be the most trustworthy" (p. 34). Four of 15 said they would talk with their friends about STDs, and four said they would speak with their mother. The women were divided in their use of the Internet for information about STDs. Seven of 15 said they would *not* use it due to either not having access, not trusting the information, or not having been successful at past attempts to access health information online. The other half of the group had a more favorable view of the Internet as an information source. Several even selected it as their first choice for STD information. The top reasons included privacy, confidentiality, and easy access. Thirteen of 15 said they did not trust women's magazines as a source of information about STDs. Despite their stated confidence in their ability to acquire knowledge, the women were found to have a poor understanding of STDs. About one-third of respondents said they could not identify any symptom of any STD (p. 33). The researchers described the participants as self-confident and "resolute in their ability to make sound decisions because of their perceived knowledge about STDs," despite their demonstrated lack of knowledge (p. 32). The authors suggest this could be characteristic of college women, "who may actually be less informed and less aware of their ignorance than noncollege women" (p. 34). Information access did not necessarily lead to correct knowledge and practice. Rouner and Lindsey summed up the participants as "empowered but ill informed" about STDs (p. 34).

Another study examined the information preferences of low-income women who had had an abnormal Pap test within the previous five years (McCree, Sharpe, Brandt, & Robertson, 2006, p. 166). Less than half the study participants reported that their health care provider had

told them that they had HPV, demonstrating a missed education opportunity with potentially dangerous health consequences. The women's preferences for information regarding HPV were based on "convenience, privacy, trust, format, appeal, and comprehension" (p. 169). Most of the women stated that "conversation with a trusted clinician along with the opportunity to ask questions was preferable to the use of educational materials" (p. 169). The women also suggested that other women with HPV and/or abnormal Pap test results were "valuable sources of information," in that they offered both support and easily comprehensible information (p. 169). Among other sources of information about HPV, the women said they preferred brochures and pamphlets, particularly those provided by their health care providers. The main reason given for this preference was that the brochures could be taken home and read in private (p. 169).

The women had negative impressions of television and radio as reliable sources of information about HPV. Participants "suggested that they could not trust the information provided via television" and that the messages were often confusing and contained conflicting information (p. 168). The women also stated that they lacked "trust in the validity of health information" provided on the radio, and that information from the Internet "was too confusing and not very reliable"—and that many of them lacked access (pp. 168–169). Magazines and books also received negative ratings, with some participants stating that the materials were too complex and hard to comprehend, particularly for people with low levels of literacy. Although this study focused on low-income women, the overarching themes regarding information preferences may be similar for other groups. No matter what their income level, women likely prefer that information about HPV—and STDs, and health issues in general—be trustworthy, confidential, easy to understand, and convenient. This study was also consistent with other

studies in reporting that women prefer to receive health information directly from their health care providers (Rouner and Lindsey, 2006; HINTS, 2008).

### **Beliefs, Attitudes, and Behaviors Regarding HPV and Its Vaccine**

Women's lack of awareness about the existence and effects of HPV negatively impacts beliefs and attitudes about the disease and its vaccine. Lack of knowledge often translates into lack of concern about transmission and infection, despite evidence that young adults are generally concerned about their risk of contracting an STD (Baer, Allen, & Braun, 2000). In their survey of first-year college students, Baer, Allen, and Braun found that although 80% of respondents stated that they considered themselves to be at low risk for contracting an STD, 70.6% of women and 73.5% of men said they were "somewhat or very concerned about STDs" (Baer, Allen, & Braun, 2000, p. 72). More than 95% of those surveyed said they were most concerned about contracting HIV/AIDS. From a list of eight STDs (including HIV/AIDS, herpes, Hepatitis B, syphilis, genital warts, gonorrhea, chlamydia, and HPV), 4% of respondents said that they were most concerned about HPV (p. 73). Based on these results, the authors suggest that although the AIDS epidemic has increased awareness of and preventive measures against HIV/AIDS, this trend has not extended to other STDs, including HPV (p. 75). Furthermore, because HPV can be spread through skin-to-skin contact, "the classic 'safe sex' campaigns popularized during the AIDS epidemic are of only limited value for prevention of infection with HPVs" (p. 76). This theme was echoed by D'Urso, Thompson-Robinson, and Chandler (2007) who found that 94% of surveyed students believed that condoms prevent the spread of HPV. Belief in condoms' efficacy in preventing the spread of HPV and other STDs did not necessarily impact behavior: Nearly one-fourth of surveyed students reported that they took no precautions against contracting STDs (D'Urso, Thompson-Robinson, & Chandler, 2007, p. 161).

This trend was also reported by Schiffner and Buki (2006) in their study of Latina students. Although all of the sexually active participants said they believed it is important to use condoms, less than half did so consistently. “The discrepancies between their reported attitudes and actual behaviors suggest that they have the potential to engage in risky behaviors,” write Schiffner and Buki (2006, p. 694). “This fact means that they are unable to protect themselves fully from acquiring HPV because they are not taking advantage of a resource that can provide some protection” (2006, p. 694). Similarly, although 88% of the women reported knowing how often they should have a Pap test, only half reported ever having had one (p. 692). The women said they would feel guilty, regretful, angry, and stigmatized if they were to be diagnosed with an STD; however, their concerns about being screened for HPV through a Pap test seemed to outweigh those factors. Primarily, they feared that if they went to a doctor for a Pap test they would be perceived negatively by their family and friends, and their privacy and sexual autonomy would be compromised.

In 2003, the CDC commissioned a series of 36 focus groups nationwide to assess the knowledge, attitudes, beliefs, and communications preferences of the general public about HPV (Friedman & Sheppard, 2007). More than 300 people participated in the focus groups, which were stratified by gender, race/ethnicity, and geographic location. When participants were asked to describe what they thought of when they heard the terms “sexually transmitted disease” or “STD” the most common responses included promiscuity, infidelity, shame, embarrassment, guilt, and divorce (Friedman & Sheppard, p. 475). When asked to list common STDs, HPV was rarely brought up, and “when it was mentioned, only one or two people in the group had heard of the virus; the others reacted in surprise, noting that they had never heard of it” (p. 475). Awareness was slightly higher among women than men. Those women reported having learned

about HPV from doctors, friends with HPV, and magazine articles. Overall knowledge about HPV was very low: Among all focus group participants, only three knew that HPV can cause cervical cancer. When moderators informed the groups of this link, female participants in particular responded with fear and shock, and asked numerous follow-up questions. Some participants also questioned why they had never been told about HPV. Some African American participants suggested a government conspiracy, referencing both the Tuskegee syphilis experiment and what some people view as the government's attempt to withhold information about HIV/AIDS during the early stages of the epidemic.

When asked how they would feel about a hypothetical vaccine against HPV, participants expressed ambivalence. First, they listed concerns about the safety, side effects, and personal necessity of such a vaccine. Many of the participants did not view themselves as candidates for an HPV vaccine. Their "lack of perceived susceptibility to HPV emerged as a barrier to vaccine acceptability" (p. 477). Married participants said they were not at risk for HPV. Many parents stated that their children were not at risk, and/or that vaccination may encourage promiscuity. Participants also worried that they would be viewed as promiscuous if they received the vaccine. Embarrassment was cited as a possible barrier to vaccination. Some participants also feared that the vaccine would be prohibitively expensive. All groups stated that they wanted more information about HPV and its "hypothetical vaccine." Friedman and Sheppard write that "general lack of knowledge about HPV served as a barrier to participant acceptance of a hypothetical vaccine, as they did not know the prevalence or potential consequences of HPV, nor did they understand their own level of HPV risk and susceptibility" (p. 480).

Although most participants said that the stigma of STDs might prevent them from seeking out more information in the future, they said that if they wanted information about HPV,

they would turn primarily to the Internet and their health care providers. They also suggested “clinics, schools, magazines, local television news, and national television advertisements as appropriate vehicles and settings for delivering this information” (p. 479). Citing concerns about privacy and stigma, the majority stated that they would not want to receive information about STDs in the mail. Participants in all groups said that they “would not trust information developed by pharmaceutical companies” (p. 480). The most trusted sources of information about HPV included the American Red Cross, Planned Parenthood, community-based organizations, doctors’ offices, health departments, clinics, health insurance companies, and the CDC, although some African American participants said they would not trust information from government agencies (pp. 479–480).

A later survey of 400 mid-adult women ( $\geq 25$  years old) found higher levels of acceptance of HPV vaccination (Ferris, Waller, Owen, & Smith, 2008). Once again, knowledge about HPV directly influenced acceptance. Women who knew that HPV can cause cervical cancer were more likely to want the HPV vaccine than those who did not. They were also more likely to believe that it is important for their children or partner to be vaccinated. “Many ... considered vaccination of their sexual partner(s) to be very important” (Ferris et al., 2008, p. 36). Also, mothers who wanted their children to be vaccinated were more likely to want the vaccine themselves. Women who considered it “too late” to get the vaccination, due to the likelihood that they had already been exposed to HPV, were less likely to want the vaccine, as were monogamous mid-adult women. Overall, these results suggest the need for increased HPV education for women not currently in the target age group for vaccination. Not only are these women key in deciding whether their children will be vaccinated, but “catch-up” vaccines for older women may be recommended by the CDC in the future.

An anonymous survey of 340 college students found a high level of intent to receive an HPV vaccine—prior to the availability of Gardasil (Jones & Cook, 2008). Eighty-eight percent of women and 77% of men expressed an interest in being vaccinated (Jones & Cook, 2008, p. 26). Several factors positively influenced vaccine acceptance, including ever having an STD, having a close friend or relative have HPV, ever having had sex, and having had more than five sex partners, along with availability of a free vaccine, a doctor’s recommendation, and recommendations from a spouse, parent, or friend. (p. 25). People who perceived themselves as being at higher risk for contracting HPV were more likely to express an interest in vaccination. Conversely, sexually inexperienced participants were less likely to want the vaccine—a problem, since the vaccine is most effective when given before the onset of sexual activity. Being told that they would have to pay \$50 for the vaccine (much lower than the actual cost) also decreased acceptability. Acceptance was not associated with age, race, HPV status, perceived severity of HPV, or perceived knowledge of HPV (71% of women and 79% of men described themselves as not at all knowledgeable about HPV) (pp. 25–26). However, women ages 18–19 were more likely to accept the vaccine than women ages 20–32. Jones and Cook suggest that health educators leverage college students’ overall high levels of intention and ensure that they follow through with vaccination, since administration of the vaccine is “key to its success” (p. 28).

### **Health Information Sources**

The Health Information National Trends Survey (HINTS), developed and maintained by the National Cancer Institute, reveals similar trends regarding preferred sources for health information. Data collected in 2007 in a nationally representative telephone survey of the general population found that people prefer to receive health or medical information from health care workers. Asked how much they would trust information about health or medical topics from a doctor or other health care professional, 68% said a lot, 25% said some, and 6% said a little or

not at all (HINTS, 2008). In comparison, when asked how much they trusted health care information provided by family or friends, only 15% of respondents said a lot, 47% said some, and 37% said a little or not at all.

In data collected in 2005 and 2007, the survey assessed respondents' trust in medical information provided by various media sources. Newspapers, magazines, and the Internet were the most trusted sources and received similar ratings, with, on average, 19% trusting them a lot, 50% trusting them some, 19% trusting them a little, and 9% not trusting them at all (HINTS, 2008). Survey data from 2005 found that of respondents who reported that they use the Internet, 61.5% of them had looked for health or medical information for themselves online during the past 12 months. Radio and television were rated significantly lower as trustworthy sources of health information, with only 5% of respondents trusting them a lot, 33% trusting them some, 39% trusting them a little, and 22% not trusting them at all.

Respondents also reported that they paid attention to information on health or medical topics reported in the media. Twenty-five percent said they paid a lot of attention and 31% paid some attention to health stories reported by newspapers and magazines. Television proved more popular—despite its ranking as a less trustworthy source of health information—with 34% paying a lot of attention and 38% paying some attention to broadcasts about medical topics. Although the Internet was shown to be a relatively trusted source among respondents, only 13% said they paid a lot of attention and 16% paid some attention to online medical information. Because this particular data was collected in 2003, a higher percentage of respondents may now report going online for medical information, as Internet access has increased nationwide.

Although respondents reported that their first choice for health or medical information is a health care professional, when it came to HPV and the HPV vaccine, most had received

information from other sources. Twenty-six percent reported hearing about HPV from a newspaper or magazine, 24% from a television advertisement, and 11.5% from television news (HINTS, 2008). Among other media sources, only 0.6% learned about HPV from the Internet, 1.2% from the radio, and 0.3% from pamphlets, posters, etc. Among non-media sources, 18% had learned about HPV from a medical professional and 9% had learned about it from family or friends. This data suggests that although respondents would prefer to hear about a topic like HPV from their health care provider, they are instead learning about it from other, less trusted sources. When female respondents were asked if a health care professional had ever talked to them about the HPV vaccine, only 12% said yes.

Data comparisons between 2005 and 2007 show a significant increase in the population's knowledge of HPV and the HPV vaccine. In 2005, only 38% of respondents had heard of HPV, compared to 65% in 2007 (HINTS, 2008). Basic knowledge about HPV also increased during this time period. In 2005, 47% of respondents knew that HPV can cause cervical cancer, compared to 78% in 2007. Also in 2005, 64% knew that HPV can be spread through sexual contact, compared to 67% in 2007. In 2007, 71% of respondents reported that they had heard of the HPV vaccine. Within two years (coinciding with the FDA approval of Gardasil), the population saw a dramatic increase in its knowledge about HPV and the HPV vaccine; however, it appears that much of that knowledge was gained from non-medical, media sources. Because respondents expressed less trust in the mass media as a source of medical information, this raises questions about how people process and respond to their new knowledge about HPV and its vaccine. There is a clear disconnect between information sources and possible avenues for personal health behaviors (getting vaccinated, taking precautions to avoid HPV infection, etc.) when so few respondents report having ever heard their health care provider mention HPV or the

vaccine. When 71% of respondents say that they are familiar with the HPV vaccine, yet 88% of women report that their health care provider has never discussed it with them, this represents a missed opportunity for further education and ensuing action. Although the vaccine is not currently designated for most of the female adult population, many women are still impacted by the vaccine's availability, particularly as mothers.

### **HPV Vaccine Acceptance**

Because it has been available in the United States for less than two years, overall trends in HPV vaccination acceptance are still unknown. In October 2008, the CDC reported that 25.1% of female teenagers had started the three-shot vaccination series in 2007 (CDC, 2008d). By comparison, 87.6% of teens received the three-dose Hepatitis B vaccination series during the same period. Total numbers of HPV vaccinations have not yet been reported, although a meta-analysis by Herzog, Huh, Downs, Smith, and Monk (2008) found “considerable interest in HPV vaccination among adults and young adults, including college students” (p. S5). Of the 5 million doses of Gardasil given out by March 2007, nearly three-quarters of the recipients were between the ages of 9 and 17 (Herzog et al., 2008, p. S8). Overall, HPV acceptability has been high “despite generally low levels of knowledge of HPV” (p. S5).

One potential problem identified with Gardasil uptake is patient compliance with the three-dose vaccination schedule (Herzog et al., 2008). Because adolescents do not frequently visit their health care providers, it can be difficult to ensure that patients receive the required three doses of the vaccine over the course of six months. According to Herzog et al., “first-dose vaccine compliance does not pose as great a problem as continuation through second and third doses of the vaccine” (p. S8). The burden falls on health care providers—and, in some cases, parents—to enforce compliance with the protocol. Another obstacle to uptake is lack of awareness about the HPV vaccine. Herzog et al. write that less than 25% of patients, or mothers

of patients, reported receiving information from their physicians about HPV and/or HPV vaccination (p. S5). Instead, they got their information from “nonscientific media sources,” including television (p. S5). Although this information gap does not appear to have negatively impacted uptake thus far, it is a problem that must be addressed by health communicators and health care providers in the future to ensure widespread acceptance.

Health care providers know that vaccine acceptance among the public can be a slow, painful process. After the first Hepatitis B vaccine was approved for use in 1981, it took a decade for the vaccine to become widely accepted. In the interim, the U.S. experienced a 37% increase in the incidence of Hepatitis B, with some 300,000 new infections each year (Morbidity and Mortality Weekly Report, 1991). The vaccine is recommended by the CDC for all infants and children, and since 1991, the United States has seen a 90% reduction in infections among children and adolescents and a 67% reduction overall (Altman, 2005). Based on the public’s initial reluctance toward the Hepatitis B vaccine, health care providers can expect a similarly slow acceptance of the HPV vaccine. One of the goals of this study is to help speed that process and to contribute to improved awareness and acceptance of the HPV vaccine among college women during the years when they are most vulnerable to infection (Ludicke et al., 2001).

HPV vaccine acceptance may also be impacted by increasing backlash against childhood immunizations. In 1998, research published in *The Lancet* suggested a possible link between the measles, mumps, and rubella (MMR) vaccine and autism (10 of the 13 authors later retracted their hypothesis) (Park, 2008, p. 38). Since then, public debate has mounted about the overall safety of childhood vaccines, with some parents refusing to allow their infants or children to receive any vaccines. Today, 2–3% of all children enrolled in public school are unvaccinated due to philosophical or religious beliefs, and the number is believed to be growing (p. 38). Various

scientific studies and the National Institutes of Health have reported repeatedly that there is no evidence of a link between vaccines and autism. Thimerosal, a preservative used in vaccines until 2001, has also been shown to have no link to the disease (p. 40). Although much of the debate over vaccine safety focuses on the potential risks to very young children, it could negatively impact adults' views on vaccines and serve as a discouragement from receiving new vaccines. In order to successfully inoculate a population of young women against HPV, health care providers and educators must combat negative messages regarding vaccines and address patients' concerns about safety and long-term side effects.

The current study fills a gap in knowledge about how college women decide to get the HPV vaccine and how information provided by the news media influences vaccine acceptance. It also helps expose possible gaps in perceived versus real knowledge about HPV among college women and how that impacts their behaviors. Previously discussed studies indicate that women are lacking in accurate information about HPV and the HPV vaccine; data has also shown that public knowledge about HPV has increased during the past three years. This is a pivotal time in the education of the public about the HPV vaccine, and this study offers an initial examination of how the media's coverage of the HPV vaccine has influenced the knowledge, beliefs, attitudes, and decisions of college women regarding vaccination. The study results may be helpful to those developing and disseminating more effective messages about the HPV vaccine, thereby improving vaccine awareness and acceptance and eventually reducing rates of HPV and cervical cancer.

## CHAPTER 3 METHODS

### **Quantitative, Online Survey**

An online survey was developed to assess the knowledge, beliefs, attitudes, and behaviors of University of Florida female students regarding HPV vaccination. Although this was a sample of convenience, a university campus is an appropriate and highly relevant location to gather information about young women ages 18–26, given that this age group comprises nearly 87% of college students in the United States (Student Affairs Administrators in Higher Education, 2008) and the women are within the HPV vaccine’s target population.

Web-based surveys have become increasingly common during the past decade as more of the population has gained access to the Internet. In 2008, the Pew Internet & American Life Project reported that 73% of Americans are Internet users, and 55% of adult Americans have a high-speed Internet connection at home—an increase of 8% since early 2007 (Horrigan, 2008). All University of Florida students have free access to computers and the Internet on campus, and most own computers and have broadband Internet access at home. The university’s computer requirement policy states: “Access to and on-going use of a computer is required for all students to complete their degree programs successfully. ... While the university offers limited access to computers through its computer labs, most students will be expected to purchase or lease a computer that is capable of dial-up or network connection to the Internet (and) graphical access to the World Wide Web ....” (University of Florida, 2008a). Computer and Internet access was expected to impact neither the number of survey respondents nor their answers. To confirm this, a survey question was included asking what computer the respondent was using to take the survey (e.g., private versus public).

In a study examining whether print and Web-based surveys yield the same results, Huang found no significant differences in participants' responses (Huang, 2006, p. 346). Huang cautions that differences in respondents to print versus Web-based surveys may skew results. Because "the typical Web survey user has private access to a computer, shows greater responsibility, and is better paid," they may have different knowledge, beliefs, attitudes, and behaviors than the general population (p. 346). Likewise, because university students tend to have higher levels of income and education and greater access to health care and health insurance than the general population, they may be more informed about health issues, including HPV and its vaccine (Student Affairs Administrators in Higher Education, 2008). These potential biases are mitigated by the fact that the vaccine is recommended only for women up to the age of 26—not the general population. The survey was administered to members of the vaccine's adult target population.

Due to the sensitive nature of some of the questions, anonymity was crucial to the success of the survey and also helped dictate the quantitative versus qualitative methodology. Ong and Weiss define "sensitive" questions as those for "which privacy manipulation yields a difference in response proportions" (Ong & Weiss, 2000, p. 1703). When studying stigmatized behaviors, anonymous surveys (in which the researcher does not know the identity of the respondent) have proven more accurate than confidential surveys (in which the researcher knows the identity of the respondent but has promised confidentiality) (Ong & Weiss, 2000).

"When potentially sensitive matters are explored, the perceived privacy inherent in the data-collection mode may be the most important property," write Ong and Weiss (p. 1693). When presented with sensitive survey questions, respondents try to "minimize their discomfort" by presenting favorable—and sometimes inaccurate—information about themselves in order to preserve their positive self-image (p. 1693). According to Ong and Weiss, "anonymity reduces

concern with self-presentation because one's actions are no longer monitored by others" (p. 1694). In their study of cheating behaviors in students ages 18–25, Ong and Weiss found that anonymous surveys "induced many more revelations" than confidential surveys—specifically, "anonymity yielded 34% more instances of cheating" (pp. 1701–1702). Based upon the findings in the preceding literature review, it was expected that some of the survey respondents in the present study would have negative feelings about HPV and its vaccine. Anonymity increased the likelihood that they would be willing, truthful participants despite these concerns.

The 55-question survey assessed participants' actual and perceived knowledge, beliefs and attitudes about HPV and the HPV vaccine, vaccination status and desire, and influences on decisions regarding vaccination. (*See Appendix A.*) It included three true/false questions to test actual knowledge about HPV and its vaccine—a method employed by Jones and Cook (2008) in their study of the intent of college students to receive an HPV vaccine. In that study, participants who answered at least two of the three knowledge assessment questions correctly were classified as "knowledgeable" about HPV (Jones & Cook, 2008, p. 25). They subsequently found that participants with the highest actual knowledge about HPV expressed a "significantly greater ... intent to receive the vaccine" (p. 23). In the current survey, the answers to all three true/false questions have been widely reported in the news media and in Gardasil advertisements. Questions were also included assessing perceived knowledge about HPV and self-confidence in protecting oneself against infection. Several questions also assessed media consumption patterns for HPV-specific and general health information.

The majority of the survey was closed-ended, and included Likert-scale, multiple-choice, categorical, and numerical questions. Benefits of this design include greater "ease of scoring, analysis, and interpretation" (Fink, 2008, p. 17). It also allowed for analysis of factors predicting

individual intention to be vaccinated. The survey included one qualitative, open-ended question to give participants the opportunity to share their feelings about vaccines in general.

Prior to launching the survey, the investigator tested it on 10 women in the target population in order to identify and remedy confusing, misleading, or irrelevant questions. Pilot test participants were asked to submit comments critiquing the questions. Based upon this input, combined with the preliminary data, the survey was modified accordingly and placed on the Web using SurveyMonkey.

Students were recruited for participation via paper flyers advertising the survey and its Web address. After obtaining University of Florida Institutional Review Board approval for the survey, the investigator distributed the flyers to students in classes in the colleges of Journalism and Communications, Liberal Arts and Sciences, Health and Human Performance, and Health and Health Professions, and to one campus sorority. Each flyer included a unique, random number that the participant needed to access the online survey. This step was designed to ensure that each participant took the survey only once, as no identifying information (e.g., name, student identification number, email address) was collected. The survey took approximately 15 minutes to complete. Respondents were not compensated for completing the survey, although they each received two to three small pieces of candy upon recruitment. They also had the opportunity to increase their knowledge about the HPV vaccine via a link to a CDC Web page at the end of the survey.

The survey was open from April 17 through June 8, 2009, and yielded 127 respondents out of 415 recruits—a response rate of 30.6%. Twelve of the submitted surveys (11.8%) were rejected as invalid or unusable. (Five respondents were over the age of age 29, and therefore ineligible to participate. Seven respondents did not answer 75–100% of the questions, rendering

their data unusable.) Eight respondents were between the ages of 27 and 29. These women were within the vaccine's recommended age group when the vaccine became available in June 2006. Therefore, their data was considered relevant for this study. Data from 112 respondents were included in the final analysis.

### **Descriptive Information**

Of the sample population ( $n = 112$ ), 93% were ages 18–26 (84%  $\leq$  age 23) and 71% were undergraduates. (See *Table 3-1*.) Sixty-four percent were white, 14% African American, 9% Hispanic, and 8% Asian. The sample population's racial/ethnic profile is comparable to that of the University of Florida's female student population. In the fall of 2008, among all female students ( $n = 27,756$ ), 61% were white, 13% Hispanic, 10% African American, and 8% Asian (University of Florida, 2008b). Differences may be due to over-sampling among specific academic programs, i.e., health education.

Forty-three percent of respondents reported an annual income of less than \$25,000. Seventy-one percent stated that they used their own computer to complete the survey; 18% used a public computer, such as those found in computer labs on campus. Fifty-one percent identified as moderately liberal or strongly liberal on social issues, 20% as neutral or independent, and 29% as moderately conservative or strongly conservative. Forty-nine percent reported being moderately or very religious. Eighty-four percent of respondents had health insurance, and 68% had a primary care provider. Sixty percent had had a gynecological exam in the past 12 months. Eighty-four percent reported having ever engaged in oral sex or sexual intercourse. Forty-three respondents (38%) had received the HPV vaccine (at least one injection out of the required three).

### **Dependent Variable**

The dependent variable in this study was vaccination status. A single variable was created from two survey questions: “Have you received the HPV vaccine?” (Yes/No) and “Do you want to get the HPV vaccine?” (Yes/No/Undecided). Respondents were classified into four groups and assigned a corresponding value on a scale of 0–3. The categories were: 0) Does not want to get the vaccine; 1) Undecided about getting the vaccine; 2) Wants to get the vaccine; and 3) Has received the vaccine. (*See Appendix B.*) This variable had a mean of 1.49 and a standard deviation of .67.

### **Independent Variables**

Independent variables were divided into three groups: Demographics (controls), information-seeking behaviors, and beliefs and attitudes about the HPV vaccine. The demographics group was comprised of five single variables constructed from condensed survey data. (*See Appendix B.*) Variables were developed from reconstructed demographic data in which respondents were divided into dichotomous groups largely equal in number. For each variable, minor, similar categories were collapsed into two major categories (e.g., “white” and “non-white.”) The purpose of this was to improve ease of analysis by limiting the number of possible categories and to increase the likelihood that statistically significant predictors would be revealed. Reconfigured demographic variables were defined as follows:

- Race/ethnicity: white and not white (mean = .64; sd = .48);
- Annual income: above \$25,000 and below \$25,000 (mean = .57; sd = .50);
- Social issue ideology: liberal or neutral/conservative (mean = .51; sd = .50);
- Religiosity: religious or not religious (mean = .50; sd = .50); and
- Sexual experience: has had oral sex or sexual intercourse or has not (mean = .84; sd = .37).

The information-seeking behavior variables were comprised of four indices. The first index summed together respondents’ use of six media sources (newspapers, magazines, local TV,

national TV, blogs, and Web sites of official medical organizations) for information about the HPV vaccine. Respondents were asked to rate their level of use on a five-point scale ranging from “never” to “always.” This scale has a Cronbach’s alpha of .81 (mean = 13.13; sd = 4.66). A second, similar index summed respondents’ frequency of use of the same six media sources for information about health issues in general. This scale has a Cronbach’s alpha of .95 (mean = 15.72; sd = 4.63). The third index summed together respondents’ perceived knowledgeability about HPV and confidence in their ability to protect against infection on a five-point scale ranging from “not at all” to “very.” These two measures have a Pearson correlation coefficient of .34 ( $p < .05$ ). The fourth index summed together respondents’ communication about the HPV vaccine with four interpersonal sources (peers, health care providers, family members, and boyfriends/girlfriends/spouses). Respondents were asked to rate the frequency of their communication on a five-point scale, ranging from “never” to “always.” This scale has a Cronbach’s alpha of .84 (mean = 7.12; sd = 2.44).

The belief and attitude variables included two indices and one single variable. The first index summed together respondents’ belief in the HPV vaccine’s safety and in the trustworthiness of information about the vaccine. Respondents were asked to rate their level of agreement on a five-point scale ranging from “strongly disagree” to “strongly agree” if they believed that the vaccine is safe and that they could trust information about the vaccine presented in Gardasil advertisements and in the news media. (A primary focus of the information provided in Gardasil advertisements and in the news media is the vaccine’s safety.) This scale has a Cronbach’s alpha of .76 (mean = 11.15; sd = 1.81). The second index summed together respondents’ beliefs about how their peers would judge them on the issue of HPV vaccination. Respondents were asked to rate their level of agreement on a five-point scale ranging from

“strongly disagree” to “strongly agree” if they believed that their peers would judge them negatively and that their boyfriend/girlfriend/spouse would no longer trust them if they got the vaccine. This scale has a Pearson correlation coefficient of .60 ( $p < .05$ ) (mean = 3.34; sd = 1.75). The final, single variable measured respondents’ level of agreement on a five-point scale ranging from “strongly disagree” to “strongly agree” if they believed that their family would be supportive of them getting the HPV vaccine (mean = 1.49; sd = .67).

These variables and indices were developed specifically to test the Theory of Planned Behavior. The trio of determinants were reflected and operationalized within the independent variables. The belief and attitude variables were used to measure how attitude toward vaccination influenced intention. The same variables were also used to test how subjective norms influenced intention. Media-specific influences were included within these variables, both as a possible factor in the development of attitudes and subjective norms and as a direct influence upon behavior. Demographic variables—specifically, income level and insurance status—measured how perceived behavioral control influenced intention. Each of these independent variables were analyzed through hierarchical regression analysis to determine how they contributed to intention to be vaccinated and, ultimately, positive vaccination status.

Table 3-1. Demographic information about survey respondents

Demographic indicator	Percent	Frequency
<i>Age</i>		
18–19	13.4%	15
20–21	44.6%	50
22–23	26.0%	29
24–25	5.3%	6
26–29	10.7%	12
<i>Year in school</i>		
Freshman	4.5%	5
Sophomore	9.8%	11
Junior	25%	28
Senior	32.1%	36
Graduate or professional degree student	28.6%	32
<i>Race/ethnicity</i>		
White	64.3%	72
Black/African American	14.3%	16
Hispanic/Latino	8.9%	10
Asian/Asian American	8.0%	9
All other races/ethnicities	4.5%	5
<i>Income level</i>		
Less than \$10,000	27.7%	31
\$10,000–\$25,000	15.2%	17
\$25,000–\$50,000	17%	19
\$50,000–\$100,000	12.5%	14
\$100,000–\$200,000	18%	20
\$200,000+	9.8%	11
<i>Computer used to complete survey</i>		
Own computer	70.5%	79
Public computer (like in a computer lab)	18%	20
Office or work computer	7.1%	8
Family's computer	4.5%	5
<i>Social ideology</i>		
Strongly conservative	3.6%	4
Moderately conservative	25%	28
Neutral or independent	20.5%	23
Moderately liberal	35.7%	40
Strongly liberal	15.2%	17

Table 3-1. Continued

Demographic indicator	Percent	Frequency
<i>Religiosity</i>		
Very religious	9.8%	11
Moderately religious	39.3%	44
A little religious	32.1%	36
Not at all religious	16.1%	18
I don't know	2.7%	3
<i>Health insurance status</i>		
Has health insurance	83.9%	94
Does not have health insurance	15.2%	17
<i>Primary care provider status</i>		
Has primary care provider	67.9%	76
Does not have primary care provider	21.4%	24
Does not know	10.7%	12
<i>HPV vaccination status</i>		
Has received any part of the HPV vaccine (one to three shots)	38.4%	43
Has not received any part of the HPV vaccine	61.6%	69

*n* = 112

## CHAPTER 4 RESULTS

This study addressed the knowledge, beliefs, attitudes, and behaviors of college women ages 18–26 regarding HPV vaccination. Results were tabulated and analyzed using quantitative statistical methods including calculation of frequency rates and hierarchical linear regression with SPSS predictive analytics software.

### **RQ1: What Do College Women Ages 18–26 Know About HPV and Its Vaccine?**

Three true/false questions about HPV and the HPV vaccine and two questions measuring general awareness about Gardasil were tested for real knowledge. The majority of respondents answered the true/false questions correctly. On two of the questions, at least 98% answered correctly, and on the third, 74% selected the right answer. (*See Table 4-1.*) The responses to the “yes/no” general awareness questions were also overwhelmingly positive (97% and 72% of respondents indicated they were aware of the information being presented). Two other questions tested for perceived knowledge about HPV. When asked how much they felt they knew about HPV, 71% reported having at least some knowledge. Asked how confident they felt in their ability to protect themselves against HPV, 93% reported being at least moderately confident.

### **RQ2: What Are Their Beliefs and Attitudes Regarding the HPV Vaccine?**

Respondents were asked to rate their level of agreement with a variety of belief and attitude statements. Fifty percent of respondents said that they were not at risk for getting HPV and were not worried about getting HPV and/or cervical cancer, 31% said they were at risk and were worried, and 16% were undecided. (*See Table 4-2.*) Eighty-five percent agreed that the HPV vaccine can help protect them against cervical cancer, and 61% agreed that the vaccine is safe. Seventy-eight percent said that their families would be supportive of them getting the HPV vaccine. Eighty-one percent said they were not afraid that other people would judge them

negatively if they got the vaccine, and 88% said that getting the vaccine would not lead their partner (boyfriend/girlfriend/spouse) to distrust them. Fifty-four percent said they believed that information presented in the news media about the HPV vaccine is accurate, while 43% were undecided. Sixty-eight percent said they believed that information presented in advertisements for Gardasil is accurate. Fifty-eight percent agreed that information from the mainstream news media influences their health decisions; 40% said the same of information presented in advertisements. When asked their overall impression of the HPV vaccine, 71% said it was positive, 3% said it was negative, and 26% were undecided.

### **RQ3: What Are Their Main Sources of Information About HPV and the HPV Vaccine?**

When participants were asked to identify their most likely sources of information on health issues in general, 77% said they would ask their doctor, and 77% said they would look it up using an Internet search engine. (See Table 4-3.) Sixty-four percent indicated they would ask a family member, 60% would look it up on the Web site of an official medical organization, and 46% would ask a friend.

When asked to select the sources from which they received the majority of their information about HPV, 58% of respondents listed their doctor, 54% chose advertisements, and 53% named the mainstream news media (including online sources). Other sources included family members (34%) and official medical organizations, like the CDC (30%). (See Table 4-4.) When asked which sources had provided them with the most information about the HPV vaccine, 61% said advertisements, 60% said their doctor, 46% said the mainstream news media, and 32% said family members. (See Table 4-5.)

When respondents were asked specifically which mass media sources had provided them with the most information about the HPV vaccine, the top three choices were television (77%), advertisements (31%), and magazines (30%). (See Table 4-6.) Ninety percent of respondents

reported having seen advertisements for Gardasil on television, 69% saw them in magazines, 55% saw them in their doctor's office, 38% saw them online, and 35% saw them at the student health clinic. (See Table 4-7.)

Respondents were asked to rate on a one to five scale how frequently they talked with various interpersonal sources about the HPV vaccine. (See Table 4-8.) Peers had the greatest mean frequency of use (2.45), followed by family members (2.37), doctors and other health care providers (2.30), and partners (boyfriend/girlfriend/spouse) (1.76). (See Figure 4-1.) All of these responses were below the midpoint of the scale.

Using the same scale, respondents were also asked to rate how frequently they used various types of mass media for information about the HPV vaccine and health issues in general. (See Table 4-9.) For information about the HPV vaccine, Web sites of official medical organizations such as the CDC had the greatest mean frequency of use (2.67), followed by national TV stations (2.48), magazines (online or print) (2.29), local TV stations (2.10), newspapers (online or print) (1.88), and blogs (1.67). (See Figure 4-2.) For information about health issues in general, Web sites of official medical organizations again came out on top, with a mean frequency of 3.41, followed by national TV stations (2.78), magazines (2.75), newspapers (2.57), local TV stations (2.26), and blogs (1.98). (See Table 4-10 and Figure 4-3.)

#### **RQ4: What Has Most Influenced Their Decision-Making Regarding HPV Vaccination?**

Research question four was designed to determine which factors had most influenced respondents' HPV vaccination decisions. For respondents who indicated that they had decided to get the HPV vaccine or had already been vaccinated ( $n = 65$ ), 97% said protection against HPV was the factor that had most influenced their decision. Other influential factors included their belief that the vaccine is effective (75%) and safe (68%), that the vaccine had been

recommended by their family (63%) or doctor (62%), and that the vaccine was easy to get (52%). (See Table 4-11.)

Among respondents who said they had decided against getting the HPV vaccine ( $n = 11$ ), eight said that their belief that they were not at risk for HPV had influenced their decision. Four said they were not worried about getting HPV and/or cervical cancer, and three said that they believed the vaccine is unnecessary. (See Table 4-12.)

Among respondents who indicated they were undecided about whether to get the HPV vaccine ( $n = 35$ ), 77% said that the cost of the vaccine was a factor that is likely to influence their eventual decision regarding HPV vaccination. Other potentially influential factors were the recommendation of the vaccine by their doctor (74%), the safety of the vaccine (74%), their personal risk of getting HPV and/or cervical cancer (66%), the effectiveness of the vaccine (63%), and their level of concern about getting HPV and/or cervical cancer (54%). (See Table 4-13.)

All respondents were asked to indicate which media sources most influenced their decision regarding HPV vaccination. Forty-seven percent said advertisements for Gardasil (in print, on television, or online) and 35% said news articles (in newspapers or magazines, either in print or online) had influenced them. (See Table 4-14.)

#### **RQ5: How Have Their Knowledge, Beliefs, Attitudes, and Other Factors Influenced Their Behavior Regarding HPV Vaccination?**

To assess how respondents' knowledge, beliefs, attitudes, and other factors influenced their behavior, a hierarchical linear regression predicting intention to get the HPV vaccine was conducted. The dependent variable was positive vaccination status or desire to receive the vaccine.

The first block (race/ethnicity, annual income, social ideology, religiosity, and sexual experience) looked at control variables (demographics) and accounted for 14.1% of the variance. (See Table 4-15.) Within the TPB model, the annual income variable tested whether perceived behavioral control affected intention and behavior. The second block (media use frequency for HPV vaccine information; media use frequency for health information; perceived knowledge and self-confidence about HPV and its vaccine; and interpersonal communication about the HPV vaccine) focused on information-seeking behavior and accounted for 12.4% of the variance. When the block was entered into the analysis, interpersonal communication about the HPV vaccine ( $\beta = .41$ ) was a significant predictor ( $p < .01$ ) of individual intention to get vaccinated. In the third block (trust of HPV vaccine safety and information; peer judgment regarding the HPV vaccine; and family support), beliefs and attitudes regarding the vaccine were added and accounted for 16.4% of the variance. Within the TPB model, the peer judgment and family support variables—along with the interpersonal communication variable from the second block—tested whether subjective norms affected vaccination intention and behavior. Also, the safety/trustworthiness variable tested how attitudes toward HPV vaccination influenced intention and behavior. When the third block was entered into the model, interpersonal communication about the HPV vaccine ( $\beta = .24$ ) remained a significant predictor ( $p < .05$ ), along with family support ( $\beta = .27, p < .05$ ). The most significant predictor of intention to be vaccinated was trust of HPV vaccine safety and related information ( $\beta = .29, p < .01$ ). The independent variables included in the regression accounted for 42.7% of the variance in individual intention to be vaccinated.

Table 4-1. Real and perceived knowledge about HPV and the HPV vaccine

<i>Correctly answered true/false questions about HPV vaccine</i>	Percent
HPV is the most common sexually transmitted disease. (True)	74% (84)
HPV is linked to genital warts and cervical cancer. (True)	99% (112)
Ideally, women should be given the HPV vaccine before they become sexually active. (True)	98% (111)
<i>Indicated basic awareness about HPV vaccine.</i>	
Have you heard of the HPV vaccine Gardasil? (Yes)	97% (110)
Did you know that Gardasil is the only FDA-approved HPV vaccine available in the U.S.? (Yes)	72% (81)
<i>How much do you feel you know about HPV (Human Papillomavirus)?</i>	
Very knowledgeable	10% (11)
Knowledgeable	24% (27)
Some knowledge	38% (43)
Little knowledge	23% (26)
No knowledge	5% (5)
<i>How confident do you feel in your ability to protect yourself against HPV?</i>	
Very confident	25% (28)
Confident	38% (42)
Moderately confident	30% (34)
Little confidence	5% (6)
No confidence	2% (2)

Values rounded to the nearest whole percentage.

Table 4-2. Beliefs and attitudes about HPV and the HPV vaccine

<i>Please rate your level of agreement with the following statements.</i>	Agree	Disagree	Undecided
<i>Safety and assurance index</i>			
The HPV vaccine is safe.	61% (68)	4% (4)	35% (40)
I believe that the information presented in the news media about the HPV vaccine is accurate.	54% (60)	3% (3)	43% (48)
I believe that the information presented in advertisements for the HPV vaccine Gardasil is accurate.	68% (75)	3% (3)	29% (32)
<i>Peer judgment index</i>			
I am afraid people will judge me negatively if I get the HPV vaccine.	12% (13)	81% (91)	7% (8)
My partner (boyfriend/girlfriend/spouse) will not trust me if I get the HPV vaccine.	4% (4)	88% (99)	8% (9)

Table 4-2. Continued

<i>Please rate your level of agreement with the following statements.</i>	Agree	Disagree	Undecided
<i>Other assessed beliefs and attitudes</i>			
My family would be supportive of me getting the HPV vaccine.	78% (87)	5% (6)	17% (19)
I am at risk for getting HPV.	31% (35)	53% (59)	16% (18)
I am worried about getting HPV and/or cervical cancer.	31% (35)	50% (55)	19% (21)
The HPV vaccine can help protect me against cervical cancer.	85% (93)	9% (10)	6% (6)
Information from the mainstream news media influences my health decisions.	58% (65)	22% (25)	20% (22)
Information presented in advertisements influences my health decisions.	40% (44)	36% (40)	24% (27)
	Positive	Negative	Undecided
My overall impression of the HPV vaccine is:	71% (78)	3% (3)	26% (29)

Values rounded to the nearest whole percentage.

Table 4-3. Sources of information about health issues

Rank	<i>When I have a question about a health issue, I am most likely to:*</i>	Percent	Frequency
1	Ask my doctor	77%	86
1	Look it up using an Internet search engine, like Google	77%	86
2	Ask a family member	64%	72
3	Look it up on the Web site of an official medical organization, like the Centers for Disease Control and Prevention	60%	67
4	Ask a friend	46%	52

Values rounded to the nearest whole percentage.

\* Respondents asked to select all that apply.

Table 4-4. Sources of information about HPV

Rank	<i>The majority of my information about HPV has come from:*</i>	Percent	Frequency
1	My doctor	58%	65
2	Advertisements	54%	60
3	Mainstream news media, including online sources	53%	59
4	Family members	34%	38
5	Official medical organizations, like the CDC	30%	34

Values rounded to the nearest whole percentage.

\* Respondents asked to select all that apply.

Table 4-5. Sources of information about HPV vaccine

Rank	<i>The majority of my information about the HPV vaccine has come from:*</i>	Percent	Frequency
1	Advertisements	61%	68
2	My doctor	60%	67
3	Mainstream news media, including online sources	46%	51
4	Family members	32%	36

Values rounded to the nearest whole percentage.

\* Respondents asked to select all that apply.

Table 4-6. Mass media sources of information about HPV vaccine

Rank	<i>What type of mass media has provided you with the most information about the HPV vaccine?*</i>	Percent	Frequency
1	Television	77%	86
2	Advertisements	31%	35
3	Magazines	30%	33

Values rounded to the nearest whole percentage.

\* Respondents asked to select all that apply.

Table 4-7. Observed locations of Gardasil advertisements

Rank	<i>Where have you seen advertisements for Gardasil?*</i>	Percent	Frequency
1	On television	90%	101
2	In magazines	69%	77
3	In my doctor's office	55%	61
4	Online	38%	43
5	At the student health clinic	35%	39

Values rounded to the nearest whole percentage.

\* Respondents asked to select all that apply.

Table 4-8. Interpersonal sources of information about HPV vaccine

<i>How often have you talked with the following people about the HPV vaccine?</i>	Never	Rarely	Occasionally	Frequently	Always
Peers	15% (17)	35% (39)	41% (46)	8% (9)	1% (1)
Doctor or other health care provider	31% (35)	20% (22)	37% (42)	11% (12)	1% (1)
Family members	23% (26)	27% (30)	40% (45)	10% (11)	0% (0)
Partner (boyfriend/girlfriend/spouse)	53% (59)	23% (26)	19% (21)	4% (4)	1% (1)

Values rounded to the nearest whole percentage.

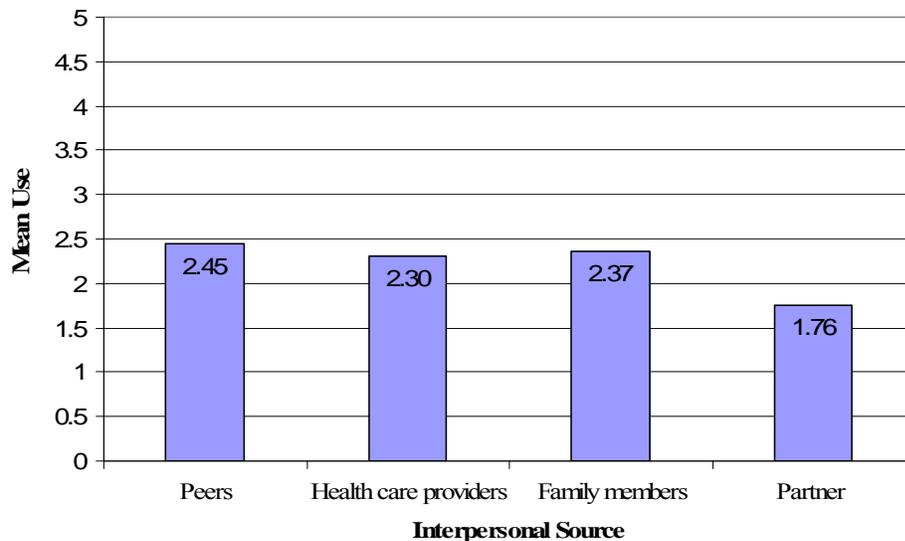


Figure 4-1. Mean frequency of talking with interpersonal sources about HPV vaccine. (Note: 1 = Never, 2 = Rarely, 3 = Occasionally, 4 = Frequently, 5 = Always)

Table 4-9. Frequency of media use for HPV information

<i>How often do you use the following types of media for information about the HPV vaccine?</i>	Never	Rarely	Occasionally	Frequently	Always
Newspapers (online or print)	42% (47)	32% (36)	22% (24)	2% (2)	2% (2)
Magazines (online or print)	28% (30)	29% (32)	31% (34)	10% (11)	2% (2)
Local TV stations	38% (42)	27% (30)	24% (26)	7% (8)	4% (4)
National TV stations	22% (24)	27% (30)	33% (36)	15% (16)	3% (3)
Blogs	57% (62)	25% (27)	13% (14)	3% (3)	2% (2)
Web sites of official medical organizations	26% (29)	16% (18)	31% (34)	19% (21)	8% (9)

Values rounded to the nearest whole percentage.

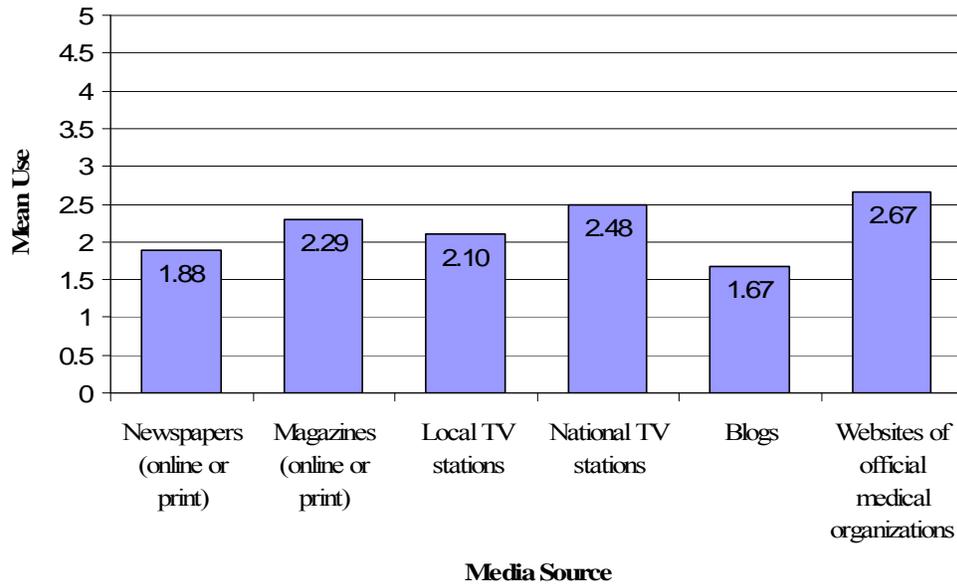


Figure 4-2. Mean frequency of media use for HPV vaccine information. (Note: 1 = Never, 2 = Rarely, 3 = Occasionally, 4 = Frequently, 5 = Always)

Table 4-10. Frequency of media use for health information

<i>How often do you use the following types of media for information about health issues in general?</i>	Never	Rarely	Occasionally	Frequently	Always
Newspapers (online or print)	24% (27)	23% (25)	26% (29)	24% (26)	3% (3)
Magazines (online or print)	22% (24)	17% (19)	30% (33)	25% (28)	6% (6)
Local TV stations	29% (32)	32% (35)	23% (25)	15% (16)	1% (1)
National TV stations	16% (17)	20% (22)	35% (38)	28% (30)	1% (1)
Blogs	48% (53)	21% (23)	17% (19)	12% (13)	2% (2)
Web sites of official medical organization	7% (7)	15% (16)	28% (31)	32% (35)	18% (20)

Values rounded to the nearest whole percentage.

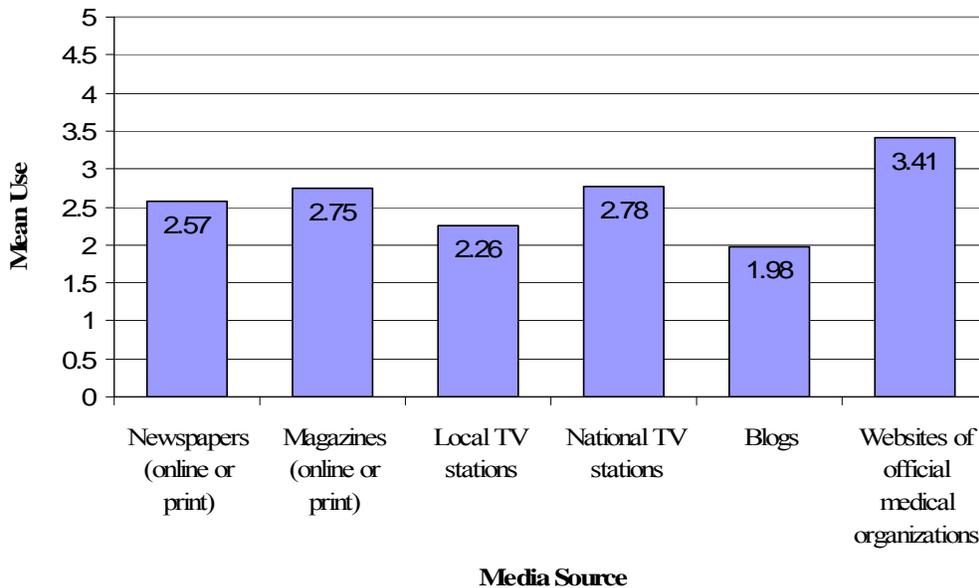


Figure 4-3. Mean frequency of media use for health information in general. (Note: 1 = Never, 2 = Rarely, 3 = Occasionally, 4 = Frequently, 5 = Always)

Table 4-11. Primary influences on decision to get HPV vaccine

Rank	<i>What factors most influenced your decision in favor of getting the HPV vaccine?*</i>	Percent	Frequency
1	I want to protect myself against HPV	97%	63
2	I believe the vaccine is effective	75%	49
3	I believe the vaccine is safe	68%	44
4	My family said I should	63%	41
5	My doctor recommended it	62%	40
6	The vaccine is easy to get	52%	34

*n* = 65

\* Respondents asked to select all that apply.

Table 4-12. Primary influences on decision to not get HPV vaccine

Rank	<i>What factors most influenced your decision against getting the HPV vaccine?*</i>	Percent	Frequency
1	I am not at risk for HPV	73%	8
2	I'm not worried about getting HPV and/or cervical cancer	36%	4
3	I believe that it is an unnecessary vaccine	27%	3

*n* = 11

\* Respondents asked to select all that apply.

Table 4-13. Primary influences on future decision regarding HPV vaccination

Rank	<i>What factors are most likely to influence your eventual decision regarding the HPV vaccine?*</i>	Percent	Frequency
1	The cost of the vaccine	77%	27
2	The recommendation of my doctor	74%	26
2	The safety of the vaccine	74%	26
3	My personal risk of getting HPV and/or cervical cancer	66%	23
4	The effectiveness of the vaccine	63%	22
5	My level of concern about getting HPV and/or cervical cancer	54%	19

*n* = 35

\* Respondents asked to select all that apply.

Table 4-14. Media sources that have most influenced HPV vaccination decision

Rank	<i>Of the following media sources, which have most influenced your decision about whether to get the HPV vaccine?*</i>	Percent	Frequency
1	Advertisements for Gardasil (in print, on television, or online)	47%	53
2	News articles (in newspapers or magazines, either online or in print)	35%	39

*n* = 112

\* Respondents asked to select all that apply.

Table 4-15. Hierarchical linear regression predicting individual intention to get HPV vaccine

Independent variables	Standardized beta coefficients			Incremental R <sup>2</sup>
<i>Block 1:</i>				
Race/ethnicity	.14	.12		14.1%
Annual income	.19	.14	.12	
Social issue ideology	.20	.15	.07	
Religiosity	.09	.10	.03	
Sexual experience	.13	.06	.02	
<i>Block 2:</i>				
Media use frequency for HPV vaccine information		-.03	.00	12.4%
Media use frequency for health information		.05	-.06	
Perceived HPV knowledge and self-confidence		.12	.07	
Interpersonal communication about HPV vaccine		.41**	.24*	
<i>Block 3:</i>				
Trust of vaccine safety and information			.29**	16.4%
Peer judgment			.03	
Family support			.27*	
<i>Total Variance (R<sup>2</sup>)</i>				42.7%

\* =  $p < .05$

\*\* =  $p < .01$

## CHAPTER 5 DISCUSSION

This study revealed several statistically significant factors predicting college women's intention to be vaccinated against HPV. The three key findings were that 1) belief in HPV vaccine safety and trust in its related information, 2) family support regarding vaccination, and 3) interpersonal sources of information about HPV all predicted likelihood of vaccination intention. The greater the level of belief in vaccine safety/information trustworthiness, level of perceived family support, and frequency with which the respondent used interpersonal sources, the greater the likelihood that she would either want to be vaccinated or would have done so already.

Sixty percent of the sample population said they either wanted to get the HPV vaccine or had already received it. The most significant predictor of vaccination intention was belief in vaccine safety and in the trustworthiness of related information presented in advertisements and the news media. Respondents who said they believed that the HPV vaccine is safe and that they trusted information about the vaccine presented in Gardasil advertisements and the news media were more likely to want to be (or to have already been) vaccinated. These findings suggest that belief in vaccine safety and belief in the trustworthiness of vaccine information relate to one another through message reinforcement. Information presented not only in Gardasil advertisements but also in much of the related mainstream news coverage focuses on the safety, effectiveness, and necessity of the vaccine. Respondents' trust in these information sources reinforced their belief in the safety of the HPV vaccine. (Indeed, when respondents who expressed a desire to be vaccinated were asked what had most influenced their decision, 97% said they wanted to protect themselves against HPV; 75% said they believed the vaccine is effective; and 68% said they believed the vaccine is safe.) Interestingly, media use was not a predictive factor in this analysis; in fact, respondents did not indicate the media as a top source of

information on HPV, the HPV vaccine, or health issues in general. The frequency of media use for information on these topics was consistently low—usually ranging between “never” and “occasionally.” Yet, this population felt a significant level of trust in the media’s HPV vaccine-related information—if and when they encountered it.

The beliefs and attitudes measured in this safety/trustworthiness index were strongly correlated with overall impression of the HPV vaccine: The higher the level of agreement in the belief that the vaccine is safe and that its related information sources can be trusted, the more positive the respondents’ impression of the vaccine. Some of these findings are consistent with those of other researchers (D’Urso, Thompson-Robinson, & Chandler, 2007; Rouner & Lindsey, 2006), who found that the mass media were not a primary source of information about STDs and/or HPV for young adult women. It was not surprising, therefore, that the current sample population reported low levels of media use. HINTS (2008) found, however, that the general population has only low to moderate levels of trust in the media for information about health or medical issues. The current study—which examined a narrower population than that studied by HINTS—found much higher levels of trust in the media for HPV vaccine information.

These results raise the question of whether the respondents were especially trusting of Gardasil advertisements and vaccine-related news media, even if they had low exposure to those sources, or whether they were so information-savvy about HPV and its vaccine that media sources served only to confirm their previously held knowledge and beliefs. Contrary to earlier findings about young women’s lack of awareness about HPV and STDs in general (Baer, Allen, & Braun, 2000; D’Urso, Thompson-Robinson, & Chandler, 2007), this sample population was remarkably well-informed about HPV and the HPV vaccine. The majority of respondents answered the basic HPV knowledge and awareness questions correctly. As found by Jones and

Cook (2008), real knowledge was not a statistically significant predictor of respondents' intention to be vaccinated. However, because there was so little variance in the respondents' knowledge levels, this may have obscured the analysis. Schiffner and Buki (2006) theorized that low levels of awareness about STDs, including HPV, contribute to a lack of self-protective behaviors among college-age women. This population, by contrast, appeared to have high levels of both awareness and self-efficacy: 72% reported being at least somewhat knowledgeable about HPV, 63% expressed confidence in their ability to protect themselves against infection, and 60% either wanted to get the vaccine or had already received it. The first two variables should be interpreted with caution, since high levels of perceived knowledge and ability may reflect a false sense of confidence. However, the fact that the majority of respondents expressed intention to be vaccinated suggests that the group was, overall, empowered and informed.

Several factors may contribute to these higher levels of real and perceived knowledge. Firstly, 90% of respondents reported having seen Gardasil advertisements on television. These ads have likely served to educate young women about HPV and reinforce messages about the vaccine's necessity, safety, and effectiveness. (This finding is confirmed by a HINTS study showing a 30% jump in public awareness about HPV's link to cervical cancer in the two years after Gardasil hit the market.) Secondly, Gardasil is a relatively new product, and both it and HPV appear to have received more media coverage during the past three years than most other STDs combined, with the likely exception of HIV/AIDS. The novelty of an STD-prevention vaccine—designed just for women—has probably attracted some young women who would otherwise not have paid attention to an STD-related advertisement or news story. The respondents did not seem to have been negatively influenced by recent media coverage about the questioned safety of childhood vaccinations. Of the 108 respondents who chose to answer the

open-ended question about their feelings on vaccines in general, 86 offered positive statements about vaccines' necessity and/or safety (e.g., "I feel they are good and very influential in the world"; "I feel they are necessary in today's society"). Negative responses touched on potential side effects, lack of information, and the pain of injections. Only one respondent mentioned autism in relation to childhood vaccinations. It appears that negative messages about vaccine safety have not influenced this population, perhaps because many of the concerns do not relate directly to them or their health.

Another factor predictive of vaccination intention was family support—respondents' belief that their family members would be supportive of them getting the vaccine. This may appear unusual, given that the sample population is made up of adults and that the vaccine is designed to protect against an STD—a topic that some families may feel uncomfortable discussing. However, it is important to consider how the vaccine has been framed in both Gardasil advertisements and in news coverage. First and foremost, it is presented as a cancer-prevention vaccine. Gardasil advertisements urge young women (and/or their parents) to "protect (themselves) against cervical cancer and other HPV diseases" (Gardasil.com, 2009). The ads discuss HPV not as an STD but simply as a disease. This rhetoric—largely echoed in news media coverage—may make families more likely to discuss the vaccine, and for young adult women to feel that they would be supported in their decision to be vaccinated. High levels of perceived family support may also suggest that the respondents communicated openly with their families about the vaccine and its related issues, and that the women's families—or at least their mothers—were aware that their daughters are (or will be) sexually active. However, for families who are uncomfortable with this topic, framing Gardasil as a cancer preventative may remove some of the unease and allow for more open dialogue. In contrast to family support, peer

reactions appeared to have little impact on the respondents. Most of them disagreed that they would be judged negatively by their peers or boyfriend/girlfriend/spouse if they got the vaccine. Ultimately, the respondents felt they would be bolstered by family support in their vaccination decision and would not be deterred by negative peer pressure.

A related factor, interpersonal sources of information about the HPV vaccine, was also a significant predictor of vaccination intention. These sources included peers, family members, and doctors or other health care professionals. Paradoxically, respondents also reported low use of these sources for HPV information. Mean use frequencies ranged from “never” to “rarely.” As demonstrated similarly with the safety/trustworthiness index, it appears that the respondents did not often engage in interpersonal communication about the vaccine, but when they did, it had a significant impact. These results are consistent with previous studies showing that young women prefer to receive information about STDs from interpersonal information sources (including health care providers, friends, mothers, and women who have had an STD), largely due to the perception that those sources are trustworthy, knowledgeable, and supportive (McCree, Sharpe, Brandt, & Robertson, 2006; Rouner & Lindsey, 2006). They are also consistent with the findings of Jones and Cook (2008), who reported that college students were more likely to want the HPV vaccine if it was recommended by a doctor, spouse, parent, or friend.

The fact that the current sample population spent so little time talking with interpersonal sources about the vaccine yet was motivated toward vaccination when it did suggests a self-fulfilling tendency. The participants may have been more likely to talk with people who shared their views about the vaccine or who could confirm or contribute to their previously held beliefs and knowledge about it. Therefore, a single conversation with a trusted interpersonal source could serve as the tipping point toward the decision to be vaccinated. Because the participants

were highly informed about the HPV vaccine it is unlikely that they sought out friends, family members, and health care providers as primary information sources; rather, these sources served as trusted confidants who could help reinforce the women's vaccination decisions. Overall, these results suggest that the decision to get vaccinated was not a difficult one. Those who had decided in favor of vaccination did not require much convincing—a factor that could be explored in more depth in future studies assessing the persuasive role of Gardasil advertisements or of other information sources.

The behavior prediction model presented through the Theory of Planned Behavior is largely upheld in these results. Firstly, belief in the safety of the vaccine and in the trustworthiness of related information presented by advertisements and the news media was correlated with an overall positive impression of the vaccine. This attitude predicted a desire (intention) to be vaccinated. Secondly, family members, peers, and other interpersonal sources contributed to a belief that other people supported the respondents' vaccination decisions. This subjective norm also predicted intention to be vaccinated. The third traditional determinant of behavior, perceived behavioral control, was not represented in the findings. There were no significant results based on income level, insurance status, primary care provider status, or any other potential barrier to access. However, because of their status as college students, the respondents likely faced fewer barriers to access that hinder other segments of the population. (Eighty-four percent of respondents reported having health insurance and 68% reported having a primary care provider. By contrast, about 73% of U.S. adults ages 18–34 had insurance in 2007 (U.S. Census Bureau, 2007).)

Based upon the specific characteristics of the sample population, the TPB model was supported. Behavioral, normative, and control beliefs and their related attitudes, subjective

norms, and perceived behavioral controls were all tested for their ability to predict vaccination intention. The influence of the mass media was also included throughout the model. Two of the three determinants (attitudes and subjective norms, plus the media) proved significant in their ability to predict intention, and the absence of the third determinant (perceived behavioral controls) may simply reinforce the strength of the first two. Despite their relatively limited use of media and interpersonal sources for information about HPV, the sample population proved to be highly knowledgeable about the disease and vaccine and empowered in its ability to consider and seek out vaccination. The TPB states that behavioral, normative, and control beliefs feed into one another, as well as contributing to related attitudes and behaviors. Perceived behavioral controls may have been circumvented because knowledge about Gardasil, beliefs and attitudes about the vaccine's safety, and the support of family members and other interpersonal sources were so strong. Perceived behavioral controls also may have been overshadowed by the influence of the mass media as a trusted source of information about the vaccine. This trust helped drive belief in the vaccine's safety and an overall positive impression about the vaccine, which in turn contributed to a positive intention to be vaccinated. Further studies may expand upon the influence of the mass media as both an indirect and direct determinant of HPV vaccination intention and behavior.

### **Limitations**

This study's primary limitation centers on its sample population. The size ( $n = 112$ ) was relatively small and the sample was not random; this limits the generalizability of the results. The sample's racial/ethnic profile was, however, very similar to that of the University of Florida's student body. Another concern is the broad age range included in the sample. Women ages 18 to 29 may have significant differences in maturity, health awareness and behaviors, income, self-efficacy, and more. The study may have benefited from narrowing in on one particular adult age

group, e.g., older adolescents ages 18–21. Despite this potential limitation, age was not a statistically significant predictor of vaccination intention in the current study.

Although students from a variety of classes were recruited, over-sampling probably occurred among students in the College of Health and Human Performance. Self-selection bias was a likely factor, in that students interested in health education may have a greater interest in and awareness of issues such as the HPV vaccine. Also, although compensation was equal (and minimal) for all recruits, some professors encouraged their students to participate more enthusiastically than others. This appeared to occur most often in health-related classes. Evidence of self-selection bias may be reflected in the respondents' high level of knowledge about the HPV vaccine. Women who knew more about the vaccine might have been more willing to take the survey. However, the fact that 90% of respondents reported having seen Gardasil advertisements on television suggests that women of various interests and backgrounds have been exposed to basic information about the HPV vaccine.

Mitigating some of the self-selection bias was the high rate of response from one campus sorority, which included women from a variety of degree programs. After the recruitment flyers were distributed among sorority members, the online survey responses peaked for several days. (The investigator estimates that at least 30 members participated.) In the interest of preserving complete anonymity, no potentially identifying information was collected. However, it would have been helpful to know the respondents' academic majors in order to better control for self-selection and recruitment bias.

While the anonymous nature of the survey may have encouraged some respondents to be more forthcoming, it also created several limitations. Although care was taken to ensure that respondents did not take the survey more than once, there is no way to guarantee that this type of

manipulation did not occur. The validity of the results is also vulnerable because the survey relied entirely upon self-reported data. Although there was no incentive to answer questions in any specific way, participants could have lied, exaggerated, responded carelessly, or misunderstood the questions. The dependent variable used in the regression analysis—vaccination status and desire—would be especially harmed by such inaccuracies. Ideally, specific survey data would be confirmed via respondents' medical records, perhaps as part of a study done in partnership with the student health clinic. Recruitment for such a study would likely face considerable challenges unless more significant compensation was offered.

Limitations in the evaluation tool were revealed during analysis of the data. The survey provided the most information about women who had decided in favor of vaccination. The number of those who had decided against it was too small to allow for significant analysis; however, those who described themselves as “undecided” about the vaccine represented 30% of the respondents. More in-depth data collection and analysis focused specifically on this population could have yielded results of particular interest to health educators attempting to “win over” women who have not yet decided whether to be vaccinated. Another limitation in the survey design occurred in the questions regarding mass media and interpersonal information sources. Questions focused on frequency of use—not on how much the respondent valued those sources. The survey results suggest that although the respondents spend little time using these information sources, they are significantly influenced by them. Asking the respondents to list their most valuable or trusted information sources may have helped explain the seemingly paradoxical relationship between the respondents' low use of the media and interpersonal information sources for information about the HPV vaccine and the influential effect these

sources had upon their decision to be vaccinated. It also may have yielded more thorough results applicable to testing the TPB's subjective norm component.

Despite its limitations, this study served its role as an exploratory study. Given that the HPV vaccine is a recent medical development and has been available in the U.S. for only three years, there is a shortage of academic research on the topic and its related issues. This study serves as a springboard for future studies about the acceptance of the HPV vaccine not only among college women but adult women in general.

### **Future Areas of Study**

Future research on this topic should utilize a larger, random sample. If more detailed information is desired about the vaccination decisions of college students, additional and varied universities should be included. Perhaps more importantly, future research should look at the 18-26-year-old population in general—along with women older than age 26—rather than just focusing on college students. Significant differences may exist between those who are in college and those who are not regarding vaccination knowledge, beliefs, attitudes, and decisions. A larger, more in-depth study would provide health educators with information on how to reach the vaccine's target adult population as a whole. On the other hand, additional studies of select sub-populations may allow for more targeted, culturally appropriate outreach efforts.

Because the HPV vaccine is still a relatively new product, future studies would also benefit from qualitative analysis to provide a more in-depth look at respondents' feelings and opinions on the vaccine. One group of particular interest is women who believe they are not at risk for HPV and therefore do not seek out vaccination. A better understanding of this perspective could help health educators and medical professionals more effectively address women who do not view themselves as good candidates for vaccination, based perhaps on incorrect information. The

survey results raise several questions that may be better examined through a mixed methods or qualitative approach.

Although the vaccine is currently targeted only to girls and women, researchers need not be limited to these populations. With clinical trials ongoing, it is likely that the vaccine will one day be recommended to other groups. Potential areas for future study include the appeal of HPV vaccination among women over the age of 30 and among boys and young adult men. Another key group for future study is women who describe themselves as “undecided” about the vaccine. Determining if and how they can be motivated to get vaccinated is an important step in achieving maximum vaccination coverage.

As this study suggested, Gardasil advertisements may play an important role in reinforcing young women’s beliefs and attitudes about the vaccine and impacting their decision to get vaccinated. In order to better understand this influential factor there is a need for content analyses of Gardasil advertisement on television and in print, and also of the news media’s reporting on the issue throughout the last three years. Focus groups could also provide helpful input on how young women respond to Gardasil advertisements and/or related media coverage.

### **Conclusion**

This study provides an important first step in the study of HPV vaccination intention among young adult women. The window of opportunity for similar research is limited; due to state and federal policies, it is likely that within a decade, most young women will receive the HPV vaccine prior to turning 18 and assuming legal responsibility for their health care decisions. This unique time and topic has the potential to provide health care educators with rich information about how to best reach and influence young adult women on a variety of sexual and reproductive health-related issues. This study filled a gap in knowledge about how college women have responded to the availability of an HPV vaccine, and what factors most impact their

vaccination decisions. Using the Theory of Planned Behavior, key influences upon vaccination intention were discovered. The results suggest that college women may be significantly influenced by HPV information provided by advertisements, the news media, and interpersonal sources—despite the fact that respondents reported relatively low use of these sources. The survey also revealed that the women were highly informed about the HPV vaccine. Their knowledge, combined with the information they gained from the news media and interpersonal sources, may have helped develop and/or reinforce their beliefs regarding HPV vaccine safety, which contributed directly to their decision to be vaccinated. These conclusions, along with the findings of future and related research, can help guide health educators and public health professionals as they work to promote HPV vaccination and eradicate cervical cancer.

APPENDIX A  
SURVEY

**Informed Consent**

**Protocol Title:** HPV Vaccination Acceptance Among College Women Study  
*Approved by University of Florida Institutional Review Board 02  
Protocol #2009-U-0288*

**Please read this consent document carefully before you decide to participate in this study.**

**Purpose of the research study:** The purpose of this study is to examine knowledge, beliefs, attitudes, and decisions regarding the Human Papillomavirus (HPV) vaccine.

**What you will be asked to do in the study:** You will be asked to participate in an anonymous online survey describing your knowledge, beliefs, attitudes, and decisions regarding the HPV vaccine. You can take the survey from any computer with Internet access.

**Time required:** 15 minutes

**Risks and Benefits:** There are no anticipated risks involved with this study. It is unlikely that you will benefit directly from participating.

**Compensation:** No compensation is offered for completing the survey, other than the piece of candy given when you were recruited for participation.

**Confidentiality:** Your identity will not be known by the researchers, as you will use the random access number provided to you to participate in the study. This number will not be linked to your name, email address, or any other identifying information. When you take the survey, your email and IP address will not be collected. Surveys will be decoupled from any such information.

**Voluntary participation:** Your participation in this study is completely voluntary. There is no penalty for not participating. You may choose to not answer any questions you wish.

**Right to withdraw from the study:** You have the right to withdraw from the study at any time without consequence.

**Whom to contact if you have questions about the study:** Cory Armstrong, assistant professor, Department of Journalism, University of Florida, P.O. Box 118400, Gainesville, FL 32611, (352) 392-0847, or [carmstrong@jou.ufl.edu](mailto:carmstrong@jou.ufl.edu); or Sara Henneberger, graduate student, Department of Journalism, [sjberger@ufl.edu](mailto:sjberger@ufl.edu).

**Whom to contact about your rights as a research participant in the study:** UFIRB Office, Box 112250, University of Florida, Gainesville, FL 32611-2250; phone (352) 392-0433.

**1) I have read the procedure described above. I voluntarily agree to participate in the procedure. I understand that I may print this page for my own records.**

- I agree
- I do not agree. I will not participate in the study.

**2) Please enter the five-digit access number printed on your recruitment flyer.**

\_\_\_\_\_

*First, you'll be asked to share some basic information about yourself.*

**3) What is your sex?**

- Female
- Male

**4) What is your age? \_\_\_\_\_**

**5) What is your student status?**

- Freshman
- Sophomore
- Junior
- Senior
- Master's
- Doctoral
- Other: \_\_\_\_\_

**6) What is your race/ethnicity?**

- American Indian or Alaskan Native
- Asian or Asian American
- Black or African American
- Hispanic or Latino
- Native Hawaiian or other Pacific Islander
- White
- Multiracial
- Other: \_\_\_\_\_

**7) What computer are you using to take this survey?**

- My own computer
- A public computer (like in a computer lab or at a library)
- My family's computer
- My roommate's or friend's computer
- Other: \_\_\_\_\_

**8) What is your annual income? (Or, if you are primarily supported by your parents, what is their annual income?)**

- Less than \$10,000
- \$10,000–\$25,000
- \$25,000–\$50,000
- \$50,000–\$100,000
- \$100,000–\$200,000
- \$200,000+

**9) In terms of social issues, do you consider yourself to be:**

- Strongly conservative
- Moderately conservative
- Neutral or independent
- Moderately liberal
- Strongly liberal

**10) How religious do you consider yourself to be?**

- I don't know
- Not at all religious
- A little religious
- Moderately religious
- Very religious

*Next, you'll be asked a few health questions.*

**11) Do you have health insurance?**

- Yes
- No

**12) Do you have a primary care provider?**

- Yes
- No

**13) Have you had a gynecological exam in the past 12 months?**

- Yes
- No

**14) Have you received the HPV (Human Papillomavirus) vaccine (all three shots)? (If yes, skip to question 16.)**

- Yes
- No

**15) Have you received part of the HPV vaccine (received one or two shots)?**

- Yes
- No

**16) Have you ever engaged in oral sex or sexual intercourse?**

- Yes
- No

**17) Within the last three months, have you engaged in oral sex or sexual intercourse?**

- Yes
- No

**18) How knowledgeable do you feel about HPV?**

- Very knowledgeable
- Knowledgeable
- Some knowledge
- Little knowledge
- No knowledge

**19) How confident do you feel in your ability to protect yourself against HPV?**

- Very confident
- Confident
- Moderately confident
- Little confidence
- No confidence

**20) Human Papillomavirus (HPV) is the most common sexually transmitted disease.**

- True
- False

**21) HPV is linked to genital warts and cervical cancer.**

- True
- False

**22) Ideally, women should be given the HPV vaccine before they become sexually active.**

- True
- False

**23) Have you heard of the HPV vaccine Gardasil?**

- Yes
- No

**24) Did you know that Gardasil is the only FDA-approved HPV vaccine available in the U.S.?**

- Yes
- No

*Next, you'll be asked to rank your level of agreement with the following statements.*

**25) I am at risk of getting HPV.**

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

**26) Before Gardasil came on the market, I knew nothing about HPV.**

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

**27) The HPV vaccine can help protect me against cervical cancer.**

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

**28) I am worried about getting HPV and/or cervical cancer.**

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

**29) I am afraid people will negatively judge me if I get the HPV vaccine.**

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

**30) The HPV vaccine is safe.**

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

**31) My partner (boyfriend/girlfriend/spouse) would not trust me if I got the HPV vaccine.**

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

**32) My family would be supportive of me getting the HPV vaccine.**

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

**33) I believe that the information presented in the news media about the HPV vaccine is accurate.**

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

**34) I believe that the information presented in advertisements for the HPV vaccine Gardasil is accurate.**

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

**35) My overall impression of the HPV vaccine is:**

- Very negative
- Negative
- Undecided
- Positive
- Very positive

**36) I regularly seek out information about health issues.**

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

**37) Information from the mainstream news media influences my health decisions.**

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

**38) Information presented in advertisements influences my health decisions.**

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

*Now, you'll be asked how often you engage in each of the following behaviors.*

**39) How often have you talked with people like you about the HPV vaccine?**

- Never
- Rarely
- Occasionally
- Frequently
- Always

**40) How often have you talked with your doctor or other health care provider about the HPV vaccine?**

- Never
- Rarely
- Occasionally
- Frequently
- Always

**41) How often have you talked with your family about the HPV vaccine?**

- Never
- Rarely
- Occasionally
- Frequently
- Always

**42) How often have you talked with your partner (boyfriend/girlfriend/spouse) about the HPV vaccine?**

- Never
- Rarely
- Occasionally
- Frequently
- Always

**43) How do you feel about vaccines in general?**

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**44) Please select one of the following:**

- I want to get the HPV vaccine. (Or, I have already received it.)
- I do not want to get the HPV vaccine. (*If so, skip to question 46.*)
- I am undecided on whether to get the HPV vaccine. (*If so, skip to question 47.*)

**45) Which factors most influenced your decision in favor of getting the HPV vaccine?**

**(Select all that apply.)** (*After this, skip to question 48.*)

- I want to protect myself against HPV
- My doctor recommended it
- I believe the vaccine is effective
- My family said I should
- My insurance covers at least part of the cost of the vaccine
- The news media portrayed the vaccine positively
- I fear that I am at risk for HPV and/or cervical cancer
- My friends said I should
- I believe the vaccine is safe
- My partner (boyfriend/girlfriend/spouse) said I should
- I know someone who has/had cervical cancer
- The vaccine is easy to get
- Other: \_\_\_\_\_

**46) Which factors most influenced your decision against getting the HPV vaccine? (Select all that apply.)** (*After this, skip to question 48.*)

- I am not at risk for HPV
- The vaccine is too expensive
- I don't think the vaccine is effective
- My doctor said not to
- I don't know anything about the vaccine
- The vaccine has too many potential side effects
- My friends said not to
- I've probably already been exposed to HPV, so it's too late for me
- I'm not worried about getting HPV and/or cervical cancer
- I don't think the vaccine is safe
- My family said not to
- I am against vaccinations in general
- The news media portrayed the vaccine negatively
- I think I'm too old to get the vaccine
- The vaccine is difficult to get
- I believe that it is an unnecessary vaccine
- My partner (boyfriend/girlfriend/spouse) said not to
- Other: \_\_\_\_\_

**47) Which factors are most likely to influence your eventual decision regarding the HPV vaccine? (Select all that apply.)**

- My personal risk of getting HPV and/or cervical cancer
- The cost of the vaccine
- The availability of the vaccine
- My feelings about vaccines in general
- The recommendations of my doctor
- My level of concern about getting HPV and/or cervical cancer
- Information about the vaccine presented by the news media
- The opinions of my friends
- The safety of the vaccine
- The opinions of my family
- The effectiveness of the vaccine
- My age
- My friend's or family member's experience with cervical cancer
- The opinion of my partner (boyfriend/girlfriend/spouse)
- Other: \_\_\_\_\_

*Lastly, you'll be asked how you get health-related information.*

**48) When I have a question about a health issue, I am most likely to:**

- Ask my doctor
- Look it up using an Internet search engine, like Google
- Go to a library
- Ask a friend
- Look it up in an online newspaper or magazine
- Ask a family member
- Look it up on the Web site of an official medical organization, like the Centers for Disease Control and Prevention
- Ask my partner (boyfriend/girlfriend/spouse)
- Other: \_\_\_\_\_

**49) The majority of my information about HPV has come from:  
(Select all that apply.)**

- Peers
- Mainstream news media, including online sources
- My doctor
- Advertisements
- Family members
- Official medical organizations, like the Centers for Disease Control and Prevention
- My partner (boyfriend/girlfriend/spouse)
- Blogs
- Other Web sites
- None of these
- Other: \_\_\_\_\_

**50) The majority of my information about the HPV vaccine has come from:  
(Select all that apply.)**

- My doctor
- Advertisements
- Peers
- Mainstream news media, including online sources
- Family members
- Official medical organizations, like the Centers for Disease Control and Prevention
- My partner (boyfriend/girlfriend/spouse)
- Blogs
- Other Web sites
- None of these
- Other: \_\_\_\_\_

**51) What type of mass media has provided you with the most information about the HPV vaccine? (Select all that apply.)**

- Newspapers (online or print)
- Magazines (online or print)
- Television
- Radio
- Blogs
- Other Web sites
- Advertisements
- None of these
- Other: \_\_\_\_\_

**52) Where have you seen advertisements for the HPV vaccine Gardasil? (Select all that apply.)**

- On television
- In magazines
- In newspapers
- In my doctor's office
- Online
- At the student health clinic
- Nowhere
- Other: \_\_\_\_\_

**53) Of the following media sources, which has most influenced your decision about whether to get the HPV vaccine? (Select all that apply.)**

- News articles (in newspapers or magazines, either online or in print)
- Opinion pieces (like letters to the editor or columns, either online or in print)
- Television news programs (like “Anderson Cooper 360” or “Good Morning America”)
- Television commentary programs (like “Countdown with Keith Olbermann” or “The O’Reilly Factor”)
- Television entertainment programs (like “Greys Anatomy”)
- Radio news programs (like “Evening Edition” on NPR)
- Radio commentary programs (like “The Rush Limbaugh Show”)
- Advertisements for Gardasil (in print, on television, or online)
- Blogs
- Other Web sites
- None of these
- Other: \_\_\_\_\_

**54) How often do you use the following types of media for information about the HPV vaccine?**

**a) Newspapers (online or print)**

- Never
- Rarely
- Occasionally
- Frequently
- Always

**b) Magazines (online or print)**

- Never
- Rarely
- Occasionally
- Frequently
- Always

**c) Local television stations, like Gainesville TV 20 or Orlando WESH**

- Never
- Rarely
- Occasionally
- Frequently
- Always

**d) National network television stations, like ABC, CBS, CNN, Fox, and NBC**

- Never
- Rarely
- Occasionally
- Frequently
- Always

**e) Blogs**

- Never
- Rarely
- Occasionally
- Frequently
- Always

**f) Web sites of official medical organizations**

- Never
- Rarely
- Occasionally
- Frequently
- Always

**55) How often do you use the following types of media for information about health issues in general?**

**a) Newspapers (online or print)**

- Never
- Rarely
- Occasionally
- Frequently
- Always

**b) Magazines (online or print)**

- Never
- Rarely
- Occasionally
- Frequently
- Always

**c) Local television stations, like Gainesville TV 20 or Orlando WESH**

- Never
- Rarely
- Occasionally
- Frequently
- Always

**d) National network television stations, like ABC, CBS, CNN, Fox, and NBC**

- Never
- Rarely
- Occasionally
- Frequently
- Always

**e) Blogs**

- Never
- Rarely
- Occasionally
- Frequently
- Always

**f) Web sites of official medical organizations**

- Never
- Rarely
- Occasionally
- Frequently
- Always

*Thank you for your participation!*

*For more information about the HPV vaccine, visit the following Web site:*

<http://www.cdc.gov/std/hpv/STDFact-HPV-vaccine-young-women.htm>

APPENDIX B  
CONSTRUCTION OF VARIABLES USED IN REGRESSION ANALYSIS

Dependent Variable

Vaccination status and desire	Percent
Has received HPV vaccine	37% (41)
Wants to get HPV vaccine	23% (26)
Undecided on whether to get HPV vaccine	30% (33)
Does not want to get HPV vaccine	10% (11)

(mean = 1.49; sd = .672)

Independent Variables

Race/ethnicity	Percent
White	64% (72)
Not white	36% (40)

(mean = .64; sd = .48)

Annual income	Percent
Less than \$25,000	43% (48)
More than \$25,000	57% (64)

(mean = .57; sd = .50)

Social ideology	Percent
Liberal	51% (57)
Neutral or conservative	49% (55)

(mean = .51; sd = .50)

Religiosity	Percent
Religious	49% (55)
Not religious	51% (57)

(mean = .50; sd = .50)

Sexual experience	Percent
Has engaged in oral sex or sexual intercourse	84% (93)
Has not engaged in oral sex or sexual intercourse	16% (19)

(mean = .84; sd = .37)

Media use frequency for HPV vaccine information index

<i>How often do you use the following types of media for information about the HPV vaccine?</i>	Never	Rarely	Occasionally	Frequently	Always
Newspapers (online or print)	42% (47)	32% (36)	22% (24)	2% (2)	2% (2)
Magazines (online or print)	28% (30)	29% (32)	31% (34)	10% (11)	2% (2)
Local TV stations	38% (42)	27% (30)	24% (26)	7% (8)	4% (4)
National TV stations	22% (24)	27% (30)	33% (36)	15% (16)	3% (3)
Blogs	57% (62)	25% (27)	13% (14)	3% (3)	2% (2)
Web sites of official medical organizations	26% (29)	16% (18)	31% (34)	19% (21)	8% (9)

(Cronbach's alpha = .81; mean = 13.13; sd = 4.66)

Media use frequency for health information index

<i>How often do you use the following types of media for information about health issues in general?</i>	Never	Rarely	Occasionally	Frequently	Always
Newspapers (online or print)	24% (27)	23% (25)	26% (29)	24% (26)	3% (3)
Magazines (online or print)	22% (24)	17% (19)	30% (33)	25% (28)	6% (6)
Local TV stations	29% (32)	32% (35)	23% (25)	15% (16)	1% (1)
National TV stations	16% (17)	20% (22)	35% (38)	28% (30)	1% (1)
Blogs	48% (53)	21% (23)	17% (19)	12% (13)	2% (2)
Web sites of official medical organization	7% (7)	15% (16)	28% (31)	32% (35)	18% (20)

(Cronbach's alpha = .95; mean = 15.72; sd = 4.63)

Perceived knowledge and self-confidence index

<i>Perceived knowledge about HPV</i>	Percent
Very knowledgeable	10% (11)
Knowledgeable	24% (27)
Some knowledge	38% (43)
Little knowledge	23% (26)
No knowledge	5% (5)
<i>Confidence in ability to protect one's self against HPV</i>	
Very confident	25% (28)
Confident	38% (42)
Moderately confident	30% (34)
Little confidence	5% (6)
No confidence	2% (2)

( $r = .34$ ; mean = 5.10; sd = 1.61)

Interpersonal sources index

<i>How often have you talked with the following people about the HPV vaccine?</i>	Never	Rarely	Occasionally	Frequently	Always
Peers	15% (17)	35% (39)	41% (46)	8% (9)	1% (1)
Doctor or other health care provider	31% (35)	20% (22)	37% (42)	11% (12)	1% (1)
Family members	23% (26)	27% (30)	40% (45)	10% (11)	0% (0)

(Cronbach's alpha = .84; mean = 7.12; sd = 2.44)

Trust of HPV vaccine safety and information index

<i>Please rate your level of agreement with the following statements.</i>	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
The HPV vaccine is safe.	1% (1)	3% (3)	35% (40)	45% (50)	16% (18)
I believe that the information presented in the news media about the HPV vaccine is accurate.	0% (0)	3% (3)	43% (48)	44% (49)	10% (11)
I believe that the information presented in advertisements for the HPV vaccine Gardasil is accurate.	0% (0)	3% (3)	29% (32)	55% (61)	13% (14)

(Cronbach's alpha = .76; mean = 11.15; sd = 1.81)

Peer judgment index

<i>Please rate your level of agreement with the following statements.</i>	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
I am afraid people will judge me negatively if I get the HPV vaccine.	58% (65)	23% (26)	7% (8)	9% (10)	3% (3)
My partner (boyfriend/girlfriend/spouse) will not trust me if I get the HPV vaccine.	58% (65)	30% (34)	8% (9)	2% (2)	2% (2)

( $r = .60$ ; mean = 3.34; sd = 1.75)

Family support

<i>Please rate your level of agreement with the following statement.</i>	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
My family would be supportive of me getting the HPV vaccine.	3% (3)	3% (3)	17% (19)	31% (35)	46% (52)

(mean = 1.49; sd = .67)

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## BIOGRAPHICAL SKETCH

Sara J. Henneberger graduated in 2003 from Carnegie Mellon University, where she double majored in professional writing and ethics, history, and public policy. She then worked for three years in nonprofit communications, journalism, and social work in the San Francisco Bay Area before beginning her graduate studies at the University of Florida in the fall of 2006. Sara completed concurrent master's degrees in mass communication and public health, along with a graduate certificate in women's studies. Her areas of concentration included journalism, social and behavioral sciences, and health management and policy. She will graduate with her MAMC (with distinction) and MPH in August 2009. For the last four years she has worked as the copy editor of the *Globe*, an Oakland, California-based weekly newspaper. During the 2009 spring semester, she interned with the Florida Public Health Association's Sexually Transmitted Disease Section. There she completed a health indicators report and best practices report focusing on sexual and reproductive health in Florida. The results of this project were presented during the 2009 Florida Public Health Association and Southern Health Association Joint Annual Educational Conference.