THE HPV VACCINE DECISION MAKING PROCESS: INEQUALITY, PERCEIVED RISK, AND TRUST

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I would like to dedicate this dissertation to the loving memory of Dr. Irene Taviss Thomson and Phyllis MacArthur. I can only hope to become the academic, teacher, and human being that Dr. Thomas was and I would have neither started nor completed the PhD without the unwavering support and love from my grandmother. I aspire to be more like both of you every day. I would like to thank my advisors, Drs. Susan Roxburgh and Clare Stacey, for their contributions to this dissertation and to my professional development over the years. Additionally, thank you to the other members of my dissertation committee for their feedback and support, especially Drs. Timothy Gallagher and Cheryl Elman, who offered insights and assistance in this project and my graduate career. This last year of graduate school was especially trying and I am grateful for the time and effort Susan, Clare, and Cheryl put in to ensuring my success in navigating it. I would especially like to thank my "unofficial committee member," Dr. Mary Gallagher, for sacrificing endless amounts of her work and free time to help me. Mary, I don't really know where to start, but— to name a few—thank you for reading drafts, helping me think through ideas, providing pep talks, and *completely* taking over the house/dog care. I'm not sure how this process would have gone without you and I hope I never have to find out what happens if left to my own devices. Finally, I would like to express how lucky I feel to have been a part of the Sociology Department at KSU. In addition to my advisors and committee members, I would like to thank all of the KSU Sociology

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CHAPTER ONE

INTRODUCTION

Vaccines are a unique type of drug in that they are not therapeutic medicines, but rather they reduce the likelihood of needing a drug in the future. The first "cancer vaccine," the HPV vaccine, protects against four strains of the Human Papillomavirus (HPV), which is a sexually transmitted infection (STI). If contracted, HPV may lead to certain cancers and other diseases, most notably cervical cancer (Krishnan 2008). Since its debut on the market, the HPV vaccine gained many supporters *and* opponents for reasons that extend well beyond biomedical concerns about the vaccine, such as questions about whether vaccinating against an STI will encourage early and/or promiscuous sex. In the presence of conflicting expert messages about risk, the decision to get the HPV vaccine is dependent on factors other than knowledge of biomedicine. Since about one third of girls and less than two percent of boys are vaccinated against HPV (Jemal, Simard Dorell, Noone, Markowitz, Kohler, et al. 2010), the potential of the HPV vaccine to reduce the incidence of cervical cancer and other HPV-related diseases may be hindered by socio-political controversy that has surrounded the HPV vaccine since its introduction in 2006.

Current estimates of HPV vaccination rates are considerably lower than Healthy People's 2020[1] goal of 80 percent vaccination, which is approximately the percentage that is necessary to achieve *herd immunity* for a disease, in which enough people are vaccinated to protect those who cannot be vaccinated because they are either too young or immune-compromised (Anderson and May 1985; Mnookin 2011). HPV vaccination rates increased in the first few years after 2006 when the Food and Drug Administration (FDA) approved *Gardasil* for use in girls between the ages of nine and 26 and the Centers for Disease Control and Prevention's (CDC) Advisory Committee on Immunization Practices (ACIP) recommended[2] it for girls ages 11 and 12 (Jemal et al. 2013; Liddon, Hood, and Leichter 2012a) In the U.S. in 2007, it was estimated that approximately 25 percent of young women received at least the first dose in the three-shot series. By 2010, about 49 percent of 13-17 year old females received at least the first shot (Liddon et l. 2012a). However, HPV vaccine completion rates (all three doses) have been declining. One study found that among the 271,976 females who initiated the vaccine series (got the first dose), only 50.6 percent completed the three shot series within a year, a number that declined to 21.4 percent of initiators completing the three-shot series in 2009 (Hirth, Tan, Wilkinson, and Berenson 2012). Several other studies confirm low and declining rates of HPV vaccine completion among females (Dempsey,

[1] The Healthy People initiative, which was developed by the Department of Health and Human Services in 1979, sets the U.S.' goals for health promotion and disease prevention for each decade and tracks progress toward those goals (Koh 2010).

[2] A CDC recommendation (as opposed to approval or permissive use) for a vaccine generally results in it being added to the routine vaccination schedule for children (The Vaccine for Children Program); it being required for immigration and/or citizenship in the U.S.; and it being covered by health insurance companies, including a government sponsored program for uninsured and Medicaid eligible children (Rothman and Rothman 2009).

Cohn, Dalton, and Ruffin 2011; Tan, Viera, Rowe-West, Grimshaw, Quinn, and Walter 2011; Widdice, Bernstein, Leonard, Marsolo, and Kahn 2011). Although there is some debate about whether it is cost-effective to vaccinate boys as well as girls (Chesson, Ekwueme, Saraiya, Dunne and Markowitz 2011), HPV vaccination rates among girls alone are not approaching herd immunity.

Confounding the potential problem of low HPV vaccination rates for population health is the fact that the distribution of the HPV vaccine has been uneven. That is, members of disadvantaged racial/ethnic and socioeconomic status (SES) groups are less likely to complete the three-shot vaccine series than their more advantaged counterparts (Jeudin, Liveright, del Carmen, and Perkins 2014). The same groups who are the least likely to complete the HPV vaccine series are also the most likely to acquire HPV-related diseases (Jemal et al. 2013; Jeudin et al. 2014). Furthermore, the HPV vaccine was originally approved for use in girls only and subsequently marketed as the "cervical cancer vaccine" (Markowitz, Dunne, Saraiya, Lawson, Chesson, and Unger 2007; Rothman and Rothman 2009). Rates of male HPV vaccination have not caught up to girls' already low HPV vaccination rates since 2011 when the HPV vaccine was recommended for use in boys. Thus, while population health may improve because of HPV vaccination, there is likely to be an increase in HPV-related health disparities when certain social groups (based on gender, race/ethnicity, and SES) who did not get the HPV vaccine as adolescents develop HPV-related diseases in adulthood.

Given the low, declining, and unequal distribution of HPV vaccination, this study addresses the following questions: *what are the factors that affect whether individuals*

received the HPV vaccine and, among those who did not receive the vaccine, two attitudes that lead to getting the HPV vaccine? From a public health perspective, there are three important outcome variables to consider in studies of vaccination. Vaccine *uptake* is the act of receiving a vaccine and, in the case of the HPV vaccine, how many of the three doses someone received (Allen, Corondado, Williams, Glen, Escoffery, Fernandez, et al. 2010a). For those who are not vaccinated, researchers employ the measure of vaccine *acceptance*, which is an individual's estimate of their willingness to receive the vaccine (Allen et al. 2010a). A closer proxy to actual behavior than acceptance is vaccine *intentions* (Montano 1986), which asks respondents whether they intend to receive the vaccine within a given time period, usually a year (Allen et al. 2010a). While vaccine acceptance and intentions reflect attitudes, vaccine uptake is the actual behavior. Vaccine acceptance and intentions are presumed to increase the likelihood of vaccine uptake, but empirically this relationship is contentious (Brewer, Gottlieb, Reiter, McRee, Liddon, Markowitz, et al. 2011). Nonetheless, in the absence of longitudinal studies that can effectively identify the predictors of vaccine uptake, researchers measure vaccine acceptance and/or intentions among the unvaccinated population.

To answer my research questions, I developed a survey and collected data from a sample of U.S. college students who were or are faced with the decision to receive the HPV vaccine. I focus on the roles of social inequalities (gender, race/ethnicity, and SES) and *health beliefs* about, or *perceived risk* of, HPV, HPV-related diseases, and the HPV vaccine. I also focus on the role of trust in one's doctor and health-related institutions in

the HPV vaccine decision-making process. Specifically, I examine trust in one's health care provider and five health-related institutions that explicitly and implicitly make claims about the risks and benefits of the HPV vaccine: the health care system, pharmaceutical advertising, the federal government and two of its agencies, the Centers for Disease Prevention and Control (CDC) and the Food and Drug Administration (FDA), and the news media. I argue that individuals develop risk perceptions based on the trust they have in those who make claims about the risks of HPV, HPV-related diseases, and the HPV vaccine. Following the Health Belief Model (HBM) (Rosenstock 1974), I also argue that perceived risk, or beliefs that 1) one is susceptible to HPV/HPV-related diseases; 2) HPV is a serious illness; and 3) the HPV vaccine is effective, affect whether individuals get the HPV vaccine (uptake), 2) intend to get it (intentions), and 3) are willing to get the vaccine (acceptance). Because trust is unequally distributed in the population (Arneil 2006) and because there are widespread HPV-related health disparities in the U.S. (Jemal et al. 2013), this study focuses on how social inequalities based on gender, race/ethnicity, and SES shape the HPV vaccine decision-making process.

In summary, I examine how trust in one's health care provider and health-related institutions influence people's perceptions of risk. In turn, I examine how those health beliefs affect whether individuals get, intend to get, and are willing to get the HPV vaccine. Given the low rates of HPV vaccination and the disparities in HPV vaccination, I explore the multiple ways in which inequalities may affect HPV vaccine uptake/attitudes directly, as well as through trust and perceived risk. As I explain in more detail in Chapter Two, I use the Health Belief Model (HBM) in conjunction with trust as

theoretical frameworks to explain variation in HPV vaccine uptake/attitudes. I also borrow from fundamental cause theory (Link and Phelan 1995) to highlight the multiple ways in which social inequalities affect HPV vaccine uptake/attitudes directly and through perceived risk and trust. This study seeks to contribute to public health professionals' understanding of and ability to address the two related problems of low HPV vaccination rates and disparities in HPV vaccination by using select theoretical insights from the HBM, theories on trust, and fundamental cause theory.

HPV, HPV-related Diseases, and the HPV Vaccine

HPV is the Human Papillomavirus, of which there are more than 100 strains (Krishnan 2008). HPV can cause warts on the hands, feet, and genital area and it can lead to cancers of the head, neck, anus, penis, and cervix. HPV is primarily sexually transmitted and it is the most common STI, with about 20 million people currently infected in the U.S. (Myers, McCrory, Nanda, Bastian, and Matchar 2000). Estimates of lifetime risk of HPV for Americans are between 75 and 80 percent, although most infections clear up on their own (Krishnan 2008). Like other STIs, the factors that increase risk of HPV infection are those that are related to sexual behavior, although other risk factors, such as cigarette smoking and oral contraceptive use, have also been identified (Krishnan 2008).

Cervical cancer is the second-most common cancer among women worldwide and the eleventh most common cancer among women in the U.S. (Steinbrook 2006). The "high risk" HPV strains (16 and 18) account for 70 percent of cervical cancer cases, with the other 30 percent arising from other, less common strains (Krishnan 2008). HPV

accounts for 99 percent of cervical cancer. However, very few of those with HPV become afflicted with cervical cancer. Of the 225,000 annual deaths from cervical cancer, about 4,000 are in the U.S. The other 80–85 percent of cervical cancer deaths occur in developing countries (Krishnan 2008). More than half of the women in the U.S. with cervical cancer have rarely or never received pap smears (cervical cancer screenings) (Steinbrook 2006). Therefore, within the U.S., cervical cancer mortality can mostly be attributed to a lack of health care because cervical cancer is highly treatable if detected early.

Merck & *Company* is one of the largest global pharmaceutical companies in the world and they revitalized the vaccine market by developing *Gardasil*, the first of two HPV vaccines, in a market where vaccines were not lucrative (Herskovits 2007). *Merck* subsequently marketed *Gardasil* as a vaccine to prevent cervical cancer, although the vaccine protects against HPV that *can* lead to cervical cancer, as well as genital warts and several other types of cancer (Krishnan 2008). Clinical trials established that *Gardasil* is 99 percent effective in preventing HPV among women who have never had sexual intercourse, but only 44 percent effective for those who are sexually active and have potentially already been exposed to the disease (Ault 2007). Thus, the CDC recommended the vaccine be administered to girls ages 11 and 12, before the average American adolescent has sex. Subsequently, in 2011, after more clinical trials and FDA hearings, the CDC expanded their recommendation to include boys aged 11 and 12 years old (Brady, Byington, Davies, Edwards, Glode, Jackson et al. 2012).

Of the over 100 strains of HPV, *Gardasil* protects against strains 6, 11, 16, and 18; these four strains include the two "high risk" strains that can lead to cervical cancer and two others that cause 90 percent of genital warts (Ault 2007). The other HPV vaccine, *Cervarix*, only protects against the two strains that can lead to cervical cancer (Monie, Hung, Roden, and Wu 2008). The vaccine is administered in three shots and costs approximately $360 out-of-pocket, although some insurance companies provide partial or full coverage and it is covered in the Vaccines for Children Program (VFC) for Medicaid eligible children up to age 18. Serious side effects are rare, but 18,727 adverse events have been reported to the Vaccine Adverse Event Reporting System (VAERS) in the U.S. since 2006, eight percent of which were serious, including death (Ault 2007; Tomljenovic and Shaw 2011). All of the possible side effects of the vaccine have not been identified and it is unknown whether booster shots will be required after the initial five-year immunity duration (Braun and Phoun 2010) or whether changes may need to be made to the current vaccine schedule. In fact, in light of new evidence, beginning in September 2014 in the U.K., the routine HPV vaccination schedule for both *Gardasil* and *Cervarix* will be reduced from three to two doses (Public Health England 2014).

In summary, medical research indicates that, first, HPV is a serious medical condition because it is linked to cervical cancer. Second, the incidence and prevalence of HPV suggest that people are highly susceptible to contracting HPV. Finally, clinical trials show that the HPV vaccine is effective in preventing HPV and, by extension, cervical cancer. Despite the research showing high susceptibility to HPV, high severity of HPV, and high efficacy of the HPV vaccine, HPV vaccination rates in the U.S. are low

(Marchand, Glenn, and Bastani 2012). The Health Belief Model (HBM) was designed to explain why people do not adopt a given preventative health measure, such HPV vaccination (Rosenstock 1974). Specifically, the HBM indicates that in order to accept a preventative health measure under conditions of uncertainty, such as the HPV vaccine, people must believe that they are likely to acquire a serious illness and that the intervention will be beneficial (Carpenter 2010; Maiman and Becker 1974; Rosenstock 1974). In the face of uncertainty, before people believe that they are susceptible to HPV, that HPV is a serious disease, and that the HPV vaccine is effective, they may have to trust the institutional actors who make such claims.

Background: Conditions of Uncertainty

Both the HBM and theories of trust attempt to explain decision-making under conditions of uncertainty (Luhmann 1979; Maiman and Becker 1974). In assessing the risks associated with a particular course of action, individuals must rely on experts, but the decision of whether to trust experts is complicated when there are competing claims about the risks and benefits of engaging in a behavior (Luhmann 1979). *Merck*, the medical community, politicians, the media, and the lay public have all contributed to a potentially confusing and conflicting discourse about the risks of HPV and the HPV vaccine (Casper and Carpenter 2008). First, there is medical uncertainty about the risks of HPV and the HPV vaccine that may have influenced people's beliefs about the severity of HPV, as well as the vaccine's necessity and efficacy. Second, people outside of the medical profession, such as politicians and the Christian non-profit organization Focus on the Family, raised questions about the possible social and economic

consequences of the HPV vaccine. For example, social conservatives claimed that vaccinating teenagers against an STI encourages them to engage in sexual activity (Stein 2005). Below I describe some of the medical and social controversies that arose about the HPV vaccine that may have contributed to uncertainty about the risks of the HPV vaccine.

Under these presumed high conditions of uncertainty, trust may be a particularly important factor in shaping people's health beliefs that: they are susceptible to HPV/HPV-related diseases; HPV is a severe illness; and the HPV vaccine is effective in preventing HPV/HPV-related diseases. The severity of HPV depends on the severity of the diseases it may cause. Clinical trials and other biomedical research have not established the causal chain from HPV to cervical cancer and other HPV-related diseases (Aronowitz 2010). It is not well understood why HPV is common, but cervical cancer is rare. Similarly, research has not established why males and females are infected with HPV at similar rates, but penile cancers are rare compared to rates of cervical cancer (Braun and Phoun 2010). How risk factors, such as cigarette smoking and older age, affect the causal chain from HPV to cervical cancer is also unclear (Krishnan 2008). According to the HBM, the decision to get the HPV vaccine is partially based on individuals' beliefs that HPV is a serious illness and that they are relatively likely to acquire it (Rosenstock 1974). However, HPV-related diseases have varying degrees of severity and it is unclear how likely it is that people will acquire one or more of them.

Before accepting a preventative health measure, such as the HPV vaccine, people must believe that the intervention is going to work (Rosenstock 1974). However, the

public may be confused about whether the HPV vaccine is effective. Clinical trials cannot have cervical cancer as their outcome so the assumption that inoculation against HPV will reduce cervical cancer is an inference based on an uncertain causal chain (Aronowitz 2010). When the vaccine removes the high-risk strains 16 and 18 from the causal chain, other strains may become activated and lead to cervical cancer instead. It is not known whether strains 16 and 18 are actually more powerful or if they have just been the most "successful" at infection so far (Aronowitz 2010). Nonetheless, recent estimates suggest that HPV vaccination has led to a decrease in HPV and cervical cancer incidence (Jemal et al. 2013; Mesher, Howell-Jones, Panwar, Manyenga, Jit, Beddows, et al. 2013; Niccolai, Julian, Bilinski, Mehta, Meek, Zelterman, Hadler, et al. 2013; Hariri, Unger, Powell, Bauer, Bennett, Bloch, et al. 2012). While clinical trials show that the HPV vaccine is 100 percent effective in preventing HPV, this is only the case for those who have never been exposed to HPV (Ault 2007). Given that exposure to HPV is so prevalent, the efficacy of the vaccine is compromised for a large portion of the population. Thus, whether people believe that the HPV vaccine is effective depends on interpretations of inconsistent medical science and subjective assessments of their sexual behavior.

Because HPV is sexually transmitted, there is also socio-political controversy about the HPV vaccine. Concerns about compulsory HPV vaccination have been met with a lot of public controversy, with some arguing that it will promote early and unsafe sex among adolescents by contradicting abstinence-only messages and giving young people a false sense of security (Munro Prescott 2010). Other questions include whether

it will be cost-effective to vaccinate both boys and girls or whether vaccinating girls only will sufficiently reduce the prevalence of HPV (Ribeiro-Müller and Müller 2014). One argument for mandatory vaccination of girls is that it *is* cost effective, especially compared to the high costs associated with medical treatment after cancerous cervical lesions are detected through pap smears (Vamos, McDermott, and Daley 2008). However, the first and only gender-specific vaccine mandate would place the burden of responsible citizenship on women and send a message that feminists, among others, find problematic, especially given that most women who contract HPV do so through sexual intercourse with men (Mara 2010; Munro Prescott 2010; Thompson 2010). Another issue concerns the high cost of the vaccine; it is unclear how underserved populations who are underinsured and/or do not qualify for the VFC program will gain access to the vaccine (Vamos et al. 2008). Thus, it is possible that the HPV vaccine will exacerbate HPV-related health disparities. The competing claims regarding compulsory HPV vaccination, adolescent female sexuality, and limited and unequal access to the vaccine may have contributed to a socio-political context that is characterized by a great deal of uncertainty.

Trust can be thought of as a resource that helps individuals manage these uncertainties about HPV, HPV-related diseases, and the HPV vaccine. Individuals' trust in their doctor, the health care system, pharmaceutical advertising, the federal government, the CDC and the FDA, and the news media may influence their health beliefs and subsequent actions regarding the HPV vaccine. Widespread HPV vaccination has the potential to decrease cervical cancer rates, as well as genital warts and other

cancers caused by HPV. Furthermore, universal HPV vaccination could reduce existing HPV-related health disparities, based on gender, race/ethnicity, and SES. However, the potential of the HPV vaccine to improve population health and simultaneously reduce HPV-related health disparities is dependent on the degree to which individuals trust the institutions that make risk claims concerning susceptibility to HPV/HPV-related diseases, the severity of HPV, and the efficacy of the HPV vaccine. Because of the conditions of uncertainty surrounding the HPV vaccine, I focus on the mechanisms of perceived risk and six types of trust.

Overview of Chapters

In *Chapter Two: Literature Review*, I discuss why, taken together, the Health Belief Model (HBM), fundamental cause theory, and the sociology of trust provide a theoretical framework that helps explain low HPV vaccination rates, as well as disparities in HPV vaccination. In accordance with these three theoretical perspectives, at the end of Chapter Two, I propose a conceptual model that specifies how the HPV vaccine decision-making process will operate such that trust in one's doctor and health-related institutions affects perceived risk, which in turn affects HPV vaccine uptake/attitudes, all of which (trust, perceived risk, and HPV vaccine uptake/attitudes) are structured by social inequalities.

In *Chapter Three: Data and Methods,* I describe the survey instrument and data collection methods employed. I also describe the sample characteristics, including the measurement properties of the key analytic variables. Additionally, for the analyses chapters (Chapters Four through Six), I employ Structural Equation Modeling (SEM) and

so I discuss the procedures involved in SEM, including how to specify a structural model and the appropriate fit indices to use for evaluation of the structural model. I use both factor analysis SEM (Chapter Four) and multi-group SEM (Chapter Six) and I describe these methodologies and the justifications for employing them.

In *Chapter Four: Perceived Risk and Trust in Context*, I use factor analysis SEM to determine if the six measures of trust represent distinct, latent concepts. I also conduct t-tests and ANOVA to explore how perceived risk and interpersonal/institutional trust are stratified by gender, race/ethnicity, and SES. After confirming that the measurement model is adequate and that risk and trust are unequally distributed across social groups in Chapter Four, I examine the relationships between *social causes* (gender, race/ethnicity, and SES), interpersonal/institutional trust, perceived risk, and HPV vaccine uptake/attitudes. I use the findings in Chapter Four to form and test hypotheses concerning the specific ways in which social inequalities will operate in the HPV vaccine decision-making process.

In *Chapter Five: The HPV Vaccine Decision-Making Process*, I test the conceptual model discussed in Chapter Two by estimating two structural models, one with HPV vaccine uptake as the main dependent variable and the other with HPV vaccine acceptance and intentions as the main dependent variables. There are several direct and indirect pathways from social causes to HPV vaccine uptake/attitudes, although, taken as a whole, the results of these analyses point to the significance of gender in HPV vaccine uptake/attitudes. Following from the findings in Chapter Five, in *Chapter Six: Gender and the HPV Vaccine,* I estimate a multi-group structural model to test for possible

gender variation in the relationships identified in previous models. I find that there are significant differences between women and men in the relationships between social inequalities, trust, risk, and HPV vaccine attitudes.

Finally, in *Chapter Seven: Discussion and Conclusions*, I discuss the limitations of this study and the main conclusions I draw from the results. I suggest that the HPV vaccine decision-making process should be studied longitudinally in which time and context are central and inequalities, perceived risk, and interpersonal/institutional trust are all considered. I conclude by discussing how public health campaigns will inevitably fall short of their goals and exacerbate HPV-related health disparities if there is a continued focus on individual-level risk perceptions. Finally, I argue that this study suggests that to positively affect HPV vaccination rates, it is important for research to consider the role of social causes and trust and thus shift the focus from altering individual's risk perceptions to reducing broader social inequalities.

CHAPTER TWO

LITERATURE REVIEW

Theoretical Motivation

To explain variation in HPV vaccine uptake/attitudes, I draw on three theoretical perspectives. First, I use the Health Belief Model (HBM) to identify individuals' health beliefs that may provide motivation to get the HPV vaccine: their perceived susceptibility to HPV/HPV-related diseases, the severity of HPV, and the efficacy of the HPV vaccine. Second, because the HBM does not account for the structural inequalities that shape health beliefs, I utilize fundamental cause theory to highlight the multiple ways that *social causes*— gender, race/ethnicity, and SES— affect HPV vaccine uptake/attitudes through perceived risk and trust. Finally, I rely on the sociological literature on trust, which suggests that one important, yet under-examined, mechanism through which social causes affect HPV vaccine uptake/attitudes is through individuals' perceptions of the trustworthiness of the people and institutions who made risk claims about HPV and the HPV vaccine. Based on the HBM, fundamental cause theory, and the sociology of trust, I propose a conceptual model for how I hypothesize the HPV vaccine decision-making process will operate.

The Health Belief Model (HBM)

Since *Gardasil* was introduced in 2006, a number of studies have addressed the factors that are correlated with HPV vaccine uptake and attitudes. A great deal of these studies utilize the Health Belief Model (HBM), which is a widely used framework that is used to explain why people do not adopt a given preventative health measure under conditions of uncertainty (Carpenter 2010; Maiman and Becker 1974 Rosenstock 1974). Specifically, the HBM claims that perceptions about individuals' perceptions of susceptibility to a disease; severity of the outcome; and effectiveness, or benefits, of a given health behavior (Rosenstock 1974) predict whether people will accept a given health care intervention. That is, the more individuals believe that: 1) they are going to get HPV and/or HPV-related diseases, such as cervical cancer and genital warts (perceived susceptibility); HPV will seriously interrupt their life or damage their health (perceived severity); and 3) the HPV vaccine will be effective in preventing HPV and HPV-related diseases (perceived efficacy), the more likely it is that individuals will get the HPV vaccine. These health beliefs, taken together, capture individuals' perceived risk of HPV, HPV-related diseases, and the HPV vaccine.

There is evidence that perceived risk, or health beliefs, is a strong predictor of a variety of preventative health measures (Janz and Becker 1984). Additionally, research suggests that public health interventions tailored toward health beliefs are effective in promoting participation in a preventative health measure (Sohl and Moyer 2007). In addition to a variety of preventative health outcomes, research shows that health beliefs predict vaccination behavior (Blue and Valley 2002; Brewer, Chapman, Gibbons,

Gerrard, McCaul, and Weinstein 2007; Chapman and Coups 1999; Smith, Humiston, Marcuse, Zhao, Dorell, Howes, et al. 2011), as well as HPV vaccine receipt in particular (Brewer and Fazekas 2007; Bynum, Brandt, Sharpe, Williams, and Kerr 2011; Hsu, Fetzer, Hsu, Chang, Huang, and Chou 2009; Liau, Stupiansky, Rosenthal, and Zimet 2010; Marchand et al. 2012; Marlow, Wardle, Forster, and Walker 2009; Patel, Zochowski, Peterman, Dempsey, Ernst, and Dalton 2012; Reiter, Brewer, Gottlieb, McRee, and Smith 2009). Several studies find that perceived susceptibility is associated with HPV vaccine acceptance (Boehner, Howe, Bernstein, and Rosenthal 2003; Friedman and Shepeard 2007; Olshen, Woods, Austin, Luskin, and Bauchner 2005), but not perceived severity (Boehner et al. 2003; Dempsey, Zimet, Davis, and Koutsky 2006; Kahn, Zimet, Bernstein, Riedesel, Lan, Huang, et al. 2005; Nan, Zhao, and Briones 2014; Patel et al. 2012). Additionally, research on the HPV vaccine that employs health belief constructs indicate that perceived efficacy predicts HPV vaccine uptake and intentions (Brabin, Roberts, Farzaneh, and Kitchener 2006; Brewer and Fazekas 2007; Davis Dickman, Ferris, and Dias 2004; Dempsey et al 2006; Ferris, Cromwell, Waller, and Horn 2010; Patel et al. 2012; Reiter, Brewer et al. 2009; Zimet, Mays, Winston, Kee, Dickes, and Su 2000). In a review of HPV vaccine acceptance using the HBM as a guide, Brewer and Fazekas (2007) conclude that perceived efficacy is a "key predictor" of willingness to get the HPV vaccine.

While the HBM is one the most widely used theories to explain preventative health-related behavior (Rosenstock, Strecher, and Becker 1994), including getting the HPV vaccine, studies that employ health belief constructs often report results that differ

between perceived susceptibility, efficacy, and severity (Carpenter 2010; Janz and Becker 1984). Studies on the HPV vaccine also report differential effects of perceived susceptibility, severity, and efficacy on HPV vaccine acceptance (see Brewer and Fazekas 2007). Additionally, several studies show weak effects of the health beliefs' ability to explain variance in a preventative health measure (Harrison, Mullen and Green 1992; Sturm et al. 2005; Vadaparampil, Thomas, Champion, Miller, Menon, and Skinner 2004; Yarbrough and Braden 2001). The weak predictive power found in these studies may reflect the HBM's inability to account for how structural factors, such as gender, race/ethnicity, and SES, influence preventative health behavior.

Rosenstock's (1974) original full model includes structural factors, but in practice studies employing the HBM largely neglect the role of social inequalities (Taylor, Bury, Campling, Carter, Garfield, Newbould, et al. 2006). There have only been a few studies that examine gender (Zetu, Zetu, Dogaru, Duţă, and Dumitrescu 2014; Wong, Lian Wong, Chan, Feng, Wai, and Yeoh 2013), race/ethnicity (Vadaparampil 2004), and SES (Chen and Land 1990; Rutter and Quine 1996; Steptoe and Wardle 1999) differences in perceived risk. These studies provide support for the claim that the weak effect sizes of health belief constructs found in some studies may be due to the lack of inclusion of structural variables. In fact, in a meta-analysis of studies that use the HBM to predict breast cancer screening, Yarbrough and Braden (2001) find that the HBM's predictive utility doubles when, in addition to health beliefs, SES is included. Thus, despite Rosenstock's (1974) incorporation of socio-demographic factors in his original model, in practice the HBM is limited by the exclusion of structural variables (Taylor et al. 2006).

The HBM is also limited by its conceptualization of *how* structural variables affect health behavior. The HBM posits that SES, race/ethnicity, and gender affect a preventative health behavior through their effects on health beliefs, but not necessarily in other ways, such as having direct effects on a health behavior or through mechanisms other than perceived risk. Chen and Land (1990) argue that the role of socioeconomic conditions on a preventative health behavior is more extensive than the HBM claims in that:

> under a stronger sociological model, however, SES variables would indirectly and directly affect health behavior. In fact, the socioeconomic circumstances of individuals may even partially or completely explain the effects of health beliefs on preventative health action (p.264).

The inattention to structural variables in previous research that uses the HBM, as well as the limited use to predict health beliefs, ignores the social context in which people make decisions about their health. However, as Chen and Land (1990) suggest, gender, race/ethnicity, and SES should be central in studies of HPV vaccine uptake/attitudes.

Inequalities in HPV, HPV-related diseases, and HPV vaccination. The reason I suggest that structural factors are crucial in understanding HPV vaccine uptake/attitudes is because of the gender, racial/ethnic, and SES disparities in HPV, HPV-related diseases, and HPV vaccination. The groups who are more likely to get the HPV vaccine do not correspond to the groups that epidemiologists identify as being at increased risk for HPV-related diseases (Brewer and Fazekas 2007; Dempsey et al. 2011; Jemal et al. 2003). In fact, those who are at elevated risk for HPV and HPV-related disease tend to have lower rates of HPV vaccine completion. In other words, the social groups who arguably need

the HPV vaccine more are less likely to get the vaccine than those who are at relatively low risk.

There are gender disparities in HPV vaccine uptake and attitudes, with women having significantly higher rates of HPV vaccination than men (Jemal et al. 2013). The HPV vaccine was first developed, FDA approved, and CDC recommended for use in girls only (Markowitz et al. 2007). Subsequently, *Merck* marketed *Gardasil* as the "cervical cancer vaccine," which inherently makes HPV a women's issue despite that it is an STI and that HPV can cause diseases not specific to females. Research on male HPV vaccine uptake/attitudes after it was approved for use in boys in 2009 and then recommended in 2011 is limited. Although women's rates of HPV vaccination (about 30 percent) are significantly higher than are men's (less than 2 percent) (Jemal et al. 2013), public health advocates lament the low rates among both women and men (Head, Vanderpool, and Mills 2003), as they are well-below the necessary 80 percent to achieve herd immunity.

In addition to gender disparities in HPV vaccination rates, research suggests that men are not as willing to get the HPV vaccine as are women (Jemal et al. 2013). However, the majority of studies on HPV vaccine attitudes do not include male respondents and so research on males' attitudes toward the HPV vaccine is limited. Among the available literature that includes men or parents of boys, rates of HPV vaccine acceptance range from 33-78 percent (Newman, Logie, Doukas, and Asakura 2013). In a recent meta-analysis of HPV vaccine acceptance, Newman and colleagues (2013) identified 309 studies on HPV vaccine acceptance, twenty-nine of which included HPV

vaccine acceptance among men. On a scale of 0-100, the results of this meta-analysis (16 studies were included in the analysis) showed great variation in HPV vaccine acceptance for males, ranging from 8.2 to 94, with a mean of 56.6 (SD 21.3) (Newman et al. 2013). The mean acceptance rate was higher among gay men than heterosexual men, but the difference was not significantly significant. Across seven domains and 23 correlates of HPV vaccine acceptance, the variables that had a high correlation (>4) with HPV vaccine acceptance were perceived benefits of vaccine, a recommendation to get the vaccine by a health care provider, and a partner who thinks the other should get the vaccine (Newman et al. 2013)

There are very few studies that directly compare women and men's levels of HPV vaccine acceptance or intentions in the U.S. in which data were collected after CDC licensure for males in October 2009. Using a college sample, Patel et al. (2013) examined gender differences in a series of attitudinal beliefs that lead to HPV vaccination; results indicated that both women and men had generally favorable attitudes toward the HPV vaccine, but women estimated their likelihood of acquiring HPV and HPV-related cancer to be significantly higher than men did. In studies of parents and/or health care providers, a majority of studies show a greater propensity to favor vaccinating females (See Liddon, Good, Wynn, and Markowitz 2010).

While there are few studies with samples of both females and males after the CDC's permissive use of the HPV vaccine in males in 2009, there are even fewer studies that include samples of both women and men after October 2011 when the CDC recommended the vaccine for use in males. One study found that women were

significantly more likely to intend to receive the HPV vaccine than were men when they hypothetically had to pay for the vaccine at regular cost. Nan (2012) also found that females reported significantly higher levels of concern about the vaccine's safety than men reported, but there were no gender differences in perceived susceptibility to HPV; perceived severity of genital warts; perceived severity of cervical cancer; or perceived HPV vaccine efficacy. Since research is limited on HPV vaccine uptake/attitudes that uses a sample of both men and women after the CDC recommendation for HPV vaccine use in males, (Zimet and Rosenthal 2010), more research is needed to understand gender disparities in HPV vaccination.

There are also racial disparities in HPV, HPV-related diseases, and HPV vaccination. Racial/ethnic minority groups, in particular African Americans, are at elevated risk of acquiring HPV and HPV-related diseases (Jeudin et al. 2014). African American women contract HPV at significantly higher rates than do whites (Dunne, Unger, Sternberg, McQuillan, Swan, Patel et al. 2007; Seth, Wingood, Robinson, and DiClemente 2009). Accordingly, cervical cancer incidence among blacks is higher than among whites (Barnholtz-Sloan, Patel, Rollison, Kortepeter, MacKinnon, and Giuliano 2009). Compared to whites, African Americans have significantly higher rates of cervical cancer mortality (Jemal et al. 2013). African American adolescents are also less likely to complete the 3-shot HPV vaccine series than are white adolescents (Chao, Velicer, Slezak, and Jacobsen 2010; Demspey et al. 2011; Jeudin et al. 2014; Liddon, Leichliter, and Markowitz 2012b). However, the extent of racial disparities in HPV vaccination is inconclusive as there is evidence showing higher rates of HPV vaccine

initiation among African American adolescents compared to white adolescents (Bednarczyk, Curran, Orenstein, and Omer 2014; Jeudin et al. 2014). Since African American adolescents are more likely to initiate, but less likely to complete, the three-shot series than are white adolescents, black and white completion rates are similar (Jeudin et al. 2014).

Among those who have not received the HPV vaccine, studies show inconsistent results indicating whether there are racial differences in willingness to get the vaccine and intent to get it within the upcoming year (Liddon et al. 2012a). Several studies find no racial differences between whites and African Americans regarding HPV vaccine acceptance (Boehner et al. 2003; Davis et al., 2004; Kahn, Zimet, Bernstein, Riedsel, Lan, Huang et al. 2005; Mays Sturm, and Zimet 2004; Slomovitz, Sun, Frumovitz, Soliman, Schmeler, Pearson, et al. 2006) or between non-Hispanic whites and Hispanics (Gerend, Cruz Lee, and Shepherd 2007 and Slomovitz et al. 2006). Although racial differences in HPV vaccine uptake, intentions, and attitudes are not clear, racial disparities in HPV-related diseases, such as cervical cancer incidence and mortality, are well-established (Barnholz-Sloan et al. 2009; Jemal et al. 2013).

Research shows that there are also disparities in HPV vaccination and HPV-related diseases by SES. Those of lower SES have higher rates of HPV, cervical cancer, cervical cancer mortality, and other HPV-related diseases than do those of higher SES (Howlader, Ries, Mariott, Reichman, Ruhl, and Cronin 2010; Jemal et al. 2013; Newmann and Garner 2005; Ward, Jemal, Cokkinides, Singh, Cardinez, Ghafoor et al. 2004). SES also positively affects the likelihood that adolescents complete the HPV

vaccine (Jemal et al. 2013; Jeudin et al. 2014; Marchand et al. 2012), although not for children below the poverty line who qualify for free HPV vaccination through the VFC program (Bednarczyk et al. 2014). Similar to the results of studies on racial disparities, studies show that, compared to high-income, low-income adolescents are more likely to receive at least one dose of the HPV vaccine, but less likely to get all three doses. These counteractive trends result in similar levels of HPV vaccine series completion rates across SES levels (Jeudin et al. 2014)

The relationship between SES and attitudes toward the HPV vaccine is undetermined. There is evidence of an inverse relationship between SES and HPV vaccine acceptance among mothers of daughters (Jeudin et al. 2014). However, other studies show that SES increases individuals' willingness to get the vaccine (Davis et al. 2004; Newman et al. 2013) and their intent to do so in the next year (Liddon et al. 2012b). One study finds that the strength of the relationship between perceived risk and HPV vaccine acceptance significantly decreases as a function of the cost of the vaccine (i.e., free, $30 or $120) (Liau, Stupiansky, Rosenthal, and Zimet 2012). However, depending on the indicator of SES employed (education, income, insurance status, public versus private clinics or payment method), some studies show an inverse relationship between SES and acceptance (Constantine and Jerman 2007; Davis et al. 2004; Mays, Sturm, and Zimet 2004; Slomovitz et al. 2006) or no effect at all of SES on HPV vaccine acceptance (Kahn et al., 2005; Slomovitz et al. 2006). Although it depends on how SES is measured, these studies showing SES disparities in HPV, HPV-related diseases, and HPV vaccination are consistent with the robust finding in medical sociology that SES, as

well as race, is associated with health (Link and Phelan 1995; Phelan, Link, and Tehranifar 2010).

Fundamental Cause Theory

The reliance on the HBM to the exclusion of structural factors ignores the widespread disparities in HPV-related diseases and HPV vaccination described above. Link and Phelan's (1995) *fundamental cause theory* provides a useful paradigm to study HPV vaccine uptake and attitudes that compensates for what the HBM lacks, which is the multiple ways in which socioeconomic circumstances affect health outcomes. Fundamental cause theory posits that health disparities persist despite remarkable improvements in the ability to prevent and control disease because of the fundamental relationship between *social causes* and health. Link and Phelan (2010) defend their claim that social causes, such as gender, race/ethnicity, and SES, are "fundamental" by saying "the reproduction of the connection between SES and mortality in vastly different circumstances speaks to its irreducibility and is the justification for calling social causes "fundamental" causes of health inequalities" (p.5). The role of *flexible resources* is central to understanding why social causes are fundamental causes of disease. According to fundamental cause theory, new medical innovations, such as the HPV vaccine, tend to increase health disparities because disadvantaged groups who already experience worse health than their more privileged counterparts have fewer flexible resources that allow them to take advantage of a new health-protective measure (Link and Phelan 2010). A wide range of resources, including money, power, social support, and knowledge, are used accordingly as new intervening mechanisms linking social causes to health develop

(Link and Phelan 1995). For example, when pap smear screening was the main intervening mechanism in the SES-cervical cancer mortality causal chain, those of lower SES received pap smears at lower rates than those of higher SES (Jemal et al. 2013). Because of the proximate relationship between pap smears and cervical cancer morality, those of lower SES had higher rates of cervical cancer mortality than those of higher SES (Jemal et al. 2013). Fundamental cause theory predicts that now that pap smears have been replaced by a new intervening mechanism (the HPV vaccine) between social causes and HPV-related diseases, unequal access to flexible resources will reproduce HPV-related health disparities. The same flexible resources that accounts for disparities in pap smear tests will be used to gain a health advantage through HPV vaccination.

Instead of identifying risk and protective factors for a disease and encouraging individuals to modify them, as the HBM encourages, Link and Phelan (1995) suggest that researchers should "contextualize risk factors," or determine what puts people "at risk of risks." It follows from fundamental cause theory that although perceived risk may predict HPV vaccine receipt, interventions that are designed in alignment with the HBM could exacerbate health disparities even while improving population health (Link and Phelan 2010). In summary, while it is useful to consider health belief constructs to predict HPV vaccine uptake and attitudes, fundamental cause theory shifts the focus from a psychologically-based explanation of preventative health behavior to a more sociological perspective in which the role of social inequalities and flexible resources are central. Therefore, I follow the public health and health psychology literature by exploring how perceived susceptibility, efficacy, and severity shape the HPV vaccine

decision-making process. I also provide a more sociological perspective by focusing on how perceived risk is shaped by social causes. I combine the strengths of the HBM with that of fundamental cause theory in order to contribute to a better understanding of the mechanisms through which there are inequalities in HPV vaccination based on gender, race/ethnicity, and SES. One important mechanism through which social causes affect HPV vaccine uptake/attitudes is through individuals' perceptions of the trustworthiness of those who have made competing risk claims about the HPV vaccine. I argue that trust affects perceived risk, which in turn affects HPV vaccine uptake/attitudes, all of which (trust, perceived risk, and HPV vaccine uptake/attitudes) are structured by social causes.

Interpersonal and Institutional Trust as Flexible Resources

The concept of trust has become a major focus of theoretical and empirical study in medical sociology in the last few decades (Meyer, Ward, Coveney, and Rogers 2008). Scholars point to trust as crucial for the overall functioning of society (Luhmann 1979) and, specifically, for the functioning of the health care system (Meyer et al. 2008). As modernity advances, there is more reliance on expert systems and the possibility of objective and complete knowledge becomes less feasible (Giddens 1991). Since individuals outside of expert systems, like patients, have little knowledge or control over them, trust becomes more salient in reducing complexity, aiding individuals in their decisions, and fostering a cohesive society (Luhamann 1979). As Luhmann (1979) explains, "one should expect trust to be increasingly in demand as a means of enduring the complexities of the future which technology will generate" (p.16). As I discuss in Chapter One, there is a great deal of uncertainty around the HPV vaccine and these

conditions of uncertainty increase the salience of trust in making decisions about the HPV vaccine.

Risk is a central feature of trust because trust allows people to accept risk when uncertainty is high. Perceptions of risk influence individuals' behavior and can influence the acceptance of a medical innovation (Siegrist, Gutscher, and Earle 2005), such as the HPV vaccine. When there is little to no risk, trust is unnecessary, but when perceived risk does exist, individuals must, to some degree, rely on trust (Luhmann 1979). Thus, I propose that individuals use trust as a resource that increases the chances that they will believe the risk messages coming from expert systems, which subsequently increases the likelihood that they will be willing to get the HPV vaccine.

Despite the widespread use of the concept of trust in sociology and a number of other disciplines, including economics, public health, political science, communications, and psychology, there is no single definition of trust (Korczynski 2000). In fact, Seppänen and colleagues (2007) found that there are over 70 definitions of trust (Seppänen, Blomqvist, and Sundqvist 2007). Nonetheless, scholars who study trust generally agree that trust involves an action where there is the risk of adverse consequences (Korczynski 2000). That is, in order for individuals to assume the risks that are involved in everyday life, they need to be confident that their vulnerability will not be exploited. The specific definition of trust that this study draws on is "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party" (Mayer, Davis, and

Schoorman 1995:712). In order to submit to being vulnerable to the risks involved in getting the HPV vaccine, individuals must trust the risk claims made by various people and institutions. In this way, trust is a kind of "flexible resource" that, through health beliefs, allows individuals to be willing to get the HPV vaccine despite the uncertainty about its consequences.

As opposed to trust in other people generally (i.e., social trust), this study examines the influence of trust in health-related organizations whose institutional actors make risk claims about the HPV vaccine. Therefore, I focus on interpersonal and institutional trust and distinguish between trust in particular people and trust in systems, or institutional trust (Giddens 1990; Luhmann 1979). While interpersonal trust is based on familiarity with a particular person through interactions over time, institutional trust does not presuppose any interactions, which is why Giddens (1991, 1994) refers to institutional trust as trust in "abstract" or "faceless" systems. Interpersonal trust is necessary for the development of trust in institutions (Fukuyama 1999; Giddens 1990; Khodyakov 2007; Russell 2005). For example, individuals must trust their doctors before they can trust the health care system. Trust is usually stronger in primary relationships (i.e. interpersonal trust), but in an increasingly complex society, having to trust in secondary relationships (institutional trust), such as strangers and organizations, becomes difficult to avoid (Mechanic 2006).

In this study, I focus on the specific function of trust to shape individuals' health beliefs and facilitate cooperation for the sake of the public good to potentially achieve herd immunity against HPV. However, trust cannot be functional for society if this

flexible resource is unequally distributed and operates to reproduce health disparities. As I describe in more detail below, with the exception of interpersonal trust in one's doctor, trust in the five health-related institutions seems to be low and/or declining. Given the function of institutional trust to promote public health (Meyer et al. 2008), low levels of trust represent a threat to increasing HPV vaccination rates. However, in alignment with fundamental cause theory, I suggest that, as opposed to low levels of institutional trust, it is more important for understanding the HPV vaccine decision-making process to focus on what Arneil (2006) calls "the gap in trust." Arneil (2006) and others (Uslaner 2002; Wuthnow 2002) argue that it is important to shift the focus from the decline of trust to inequalities in trust; marginalized groups do not have as much trust as do privileged groups. Arneil (2006) attributes this gap in trust to a sense of betrayal in which those who are socially and economically disadvantaged do not trust the system in which they are marginalized. Similarly, Wuthnow (2002) argues that trust is a reflection of the social structure, which is stratified by gender, race/ethnicity, and SES, meaning that the unequal distribution of the flexible resource, trust, reflects broader social inequalities.

To the extent that trust predicts perceived risk, which in turn is associated with HPV vaccine uptake/attitudes, the unequal distribution of trust has the potential to increase HPV-related health disparities. Consequently, differential rates of HPV vaccination according to gender, race/ethnicity, and SES could exacerbate inequalities in HPV, cervical cancer, and other HPV-related diseases. Below I describe the types of trust that are likely to influence decisions about the HPV vaccine: interpersonal trust in one's health care provider and institutional trust in the health care system, pharmaceutical

direct-to-consumer advertising (DTCA), the federal government, government health agencies (the CDC and the FDA), and the news media.

Interpersonal Trust in One's Health Care Provider. Physicians are the "access points" to the medical system through which social relations between doctor and patient are embedded in a local context in a particular time and space (Giddens 1990). Patients trust their doctors more than they trust the health care system (Mechanic 2006). While this might be due to past experiences with one's doctor, it may also be due to the general nature of interpersonal trust as based on familiarity, as opposed to trust in institutions that is based on legitimate authority (Khodyakov 2007; Luhmann 1979). Because interpersonal trust is based on social interaction over time, trust in one's physician is associated with continuity of care (Mainous, Baker, Love, Gray, and Gill 2001).

Interpersonal trust in health care providers is particularly salient for health behaviors for several related reasons. Patients need to trust their doctors in order to receive successful treatment. When patients trust their doctors, there is more effective communication because patients are more likely to present personal information to their doctors, which in turn helps doctors make an accurate diagnosis and suggest appropriate treatment (Bell, Kravitz, Thom, Edward, and Rahman 2001; Carpenter, Godley, Clark, Talcott, Finnegan, Mishel et al. 2009). Furthermore, patients who trust their doctors are more likely to adhere to a prescribed medical regimen and, consequently, will enjoy better health outcomes (Thom, Kravitz, Bell, Krupat, and Azari 2002). Physicians also benefit when their patients trust them because patients are less likely to initiate malpractice litigation when they trust their doctors (Mechanic 2006).

One dependent variable associated with trust in one's physician is the utilization of medical services. Mollborn and colleagues (2005) found that those who reported lower levels of trust in their physicians also reported having more unmet medical needs (Mollborn, Stepanikova, and Cook 2007). Similarly, Ling and colleagues (2006) found that greater trust in information provided by one's physician increases the patients' acceptance of colorectal cancer screening tests (Ling, Klein, and Dang 2006). Several other studies confirm that trust is an important predictor of patients' willingness to receive medical services for preventive care (Collins, Clark, Petersen, and Kressin 2002; Finney, Wanke, and Augustson 2005). Because of the studies discussed above that link trust in a physician to the utilization of preventive medical services, perceived risk of HPV and HPV-related diseases is likely to be associated with trust in one's health care provider (Rosenthal, Weiss, Zimet, Ma, Good, and Vichnin 2011).

Institutional Trust in the Health Care System. While physicians are the access points through which patients are embedded in a local context, the medical profession is a "faceless" system located in indefinite time and space (Giddens 1990). Although I predict that trust in one's physician will explain part of the variance in HPV vaccine uptake/attitudes, I also predict that individuals' need to trust the health care system and several other health-related insitutions to believe they are at risk of the HPV and that the HPV vaccine is necessary and effective. Because of the complex structure of health care delivery in the U.S., doctors are not the only professionals who communicate risk messages to the public, nor do they financially control most health care facilities (Mechanic 2006).

Confidence in medical leaders dropped from 73 percent in 1965 to 22 percent in 1993 (Mechanic 1996). Most explanations for the decrease in trust focus on the structure of the profession of medicine (Mechanic 2006). Health Maintenance Organizations (HMOs), or managed care, were designed as a cost containment strategy that created incentives for doctors, hospitals, and patients to limit unnecessary utilization of medical services. As a consequence over time, patients may have become aware of the financial incentives doctors have to provide what patients often perceive as less than ideal health care. For example, one study showed that patients who believed that physicians accept gifts from the pharmaceutical industry reported significantly higher levels of health care system distrust (Grande, Shea, and Armstrong 2012). The structure of health care that maximizes profit may have contributed to a public that is skeptical of the medical profession, perhaps making individuals less likely to believe risk claims they think are coming from corporate executives and not necessarily health care professionals.

With corporate interests dictating health care, there has been a concurrent trend for patients to be informed consumers of health care (Haug and Lavin 1983). Although patient consumerism is not new, the public may have concerns that doctors do not act in their best interests. Their decreased trust leads them to view medicine as a commodity in which they "shop" for the best services, seek "second opinions," turn to complementary and alternative medicine (CAM), and/or actively search for information before consulting a doctor (Timmermans and Oh 2010). In a survey study of consumerist attitudes and behavior, Haug and Lavin (1983) found that those who rejected authority in general were significantly more likely to express consumerist attitudes toward health care. If people

view the health care system as a product they pay for rather than an altruistic service by professionals, they may not believe the risk claims about HPV and the HPV vaccine made by the institutional actors within the health care system.

Institutional Trust in Pharmaceutical Direct-to-Consumer Advertising (DTCA). In order to accept the HPV vaccine, individuals must first trust the institutions whose representatives made claims about the risks and benefits of the HPV vaccine. The primary medium that such messages about the HPV vaccine first reached the public was through advertising funded by *Merck*. *Merck* began its unbranded awareness campaigns a year before *Gardasil* was released on the market in an effort to raise awareness about the link between HPV and cervical cancer, as well as to urge women to tell others about the association (Siers-Poisson 2008). After *Gardasil* was approved by the FDA, *Merck* ran an extensive branded advertising campaign. Both the unbranded awareness campaigns and the advertisements for *Gardasil* were primarily television campaigns, but they were also in magazines, newspapers, and on the Internet. In fact, in 2007, *Pharmaceutical Executive* awarded *Merck* the *Brand of the Year* for "embod[ying] the kind of links between science, commercialization, and humanity that typify great pharmaceutical breakthroughs" (Herskovits 2007:60). Despite the accolades from the pharmaceutical industry, journalists and academics accused *Merck* of being aggressive and deceptive in their advertising strategies (Braun and Phoun 2010; Fisher and Ronald 2010; Mishra and Graham 2012; Rothman and Rothman 2009; Siers-Poisson 2008; Szabo 2009). The manner in which *Merck* marketed *Gardasil* had the effect of "making this vaccine's target disease cervical cancer, the sexual transmission of HPV was

minimized, the threat of cervical cancer to all adolescents maximized, and the subpopulations most at risk practically ignored" (Rothman and Rothman 2009:785).

It is difficult to tease out media effects on behavior (Hansen and Droege 2005) and media effects are not the focus of this study. Nonetheless, exposure to advertisements for *Gardasil* likely influenced public perceptions of the vaccine, making the pharmaceutical industry an important institution to consider in the factors that influence people's risk perceptions. Some scholars argue that exposure to drug advertisements (DTCA) leads to patient requests to doctors for a specific drug that they arguably would not have asked for in the absence of exposure to an advertisement (Abraham 2010). However, others argue that drug advertisements are beneficial because they encourage informed and participatory health care (Holmer 1999; Huh, DeLorme, and Reid 2005; Mehta and Purvis 2003; Weissman, Blumenthal, Silk, Zapert, Newman, and Leitman 2003). Before DTCA can lead to seeking health care, individuals may have to trust in the information in those advertisements.

Not only does DTCA make it easier to be informed and involved in one own health care, but it can also have the effect of making it the patient's duty to do so. Pharmaceutical companies often play on people's sense of responsible citizenship in their advertisements (Fisher and Ronald 2008). In the case of *Gardasil*, the force of pharmaceuticalization through DTCA had the goal of convincing young women that they were all at risk of HPV and cervical cancer. *Gardasil* commercials portray young girls as being at high risk not because of any predisposing medical condition, but simply because they are females of a certain age (Mamo, Nelson, and Clark 2010; Mara 2010). Before

Gardasil was approved by the FDA, *Merck*'s unbranded awareness campaign, "Tell Someone," tried to make it women's duty to tell others about the link between HPV and cervical cancer; once *Gardasil* was released on the market, audiences were primed to extend that duty to feeling obligated to go get the HPV vaccine.

Since the HPV vaccine is a preventive drug, pharmaceutical advertisements do not lead patient-consumers to self-diagnose symptoms in the same way DTCA might for a therapeutic drug. However, if consumers believe the risk messages in the advertisements, they *can* be persuaded to believe they are at risk for HPV and HPV-related diseases. This is especially true given that *Gardasil* advertisements portrayed *all* young women as being at risk of HPV and cervical cancer, rather than certain groups according to race/ethnicity and SES or as based on the riskiness of their sexual behavior (Braun and Phoun 2010; Mamo et al. 2010). However, viewers of Gardasil commercials are not passive receptors of media messages, as one study shows that, after exposure to a *Gardasil* commercial, teenage girls were critical of the message that they were at risk for HPV (Vardeman-Winter 2011). Several of the participants were upset that boys were absent from the commercial once they realized HPV is sexually transmitted (Vardeman-Winter 2011). Furthermore, there is evidence that the *Gardasil* commercials are confusing to young women and that the health information in the commercials is spoken too fast to understand or remember (Leader, Cashman, Voytek, Baker, Brawner, and Frank 2011). As opposed to examining the direct effects of *Gardasil* advertisements on viewers, I suggest that a general trust or distrust in pharmaceutical advertising will

explain variation in perceived risk because it precedes any effect that a specific advertisement can have on its audience.

Americans are exposed to a great deal of DTCA of pharmaceuticals (Conrad and Leiter 2009; Hansen and Droege 2005; Huh et al. 2005), which the public may have become increasingly skeptical of since the FDA lifted the ban on broadcast DTCA in 1997, a deregulation policy that, among industrialized countries, is only found in the U.S. and New Zealand (Conrad and Leiter 2009). A few studies show that Americans actually have positive attitudes toward pharmaceutical advertisements (Alperstein and Peyrot 1993; Menon, Deshpande, Perri Iii, and Zinkhan 2003) and that they believe the risk messages portrayed in DTC advertisements (Diehl, Mueller, and Terlutter 2008). Only a few studies have specifically examined the construct of trust in DTCA as a predictor of health care seeking behavior (Diehl et al. 2008; Huh, DeLorme, and Reid 2005). Even though these studies show relatively low trust in DTCA, they also indicate that people nonetheless believe the information contained in them. However, a few studies conclude that individuals do not trust the information about the HPV vaccine that comes from the pharmaceutical industry (Allen, Othus, Shelton, Li, Norman, Tom et al. 2010b; Friedman and Shepeard 2007).

Institutional Trust in the Federal Government and Health Agencies. Trust in the federal government is considered important for outcomes such as voter turnout, but only one study has examined the relationship between trust in government and HPV vaccine attitudes. This school-based study in England found a positive relationship between trust in government and HPV vaccine acceptance (Marlow, Waller, and Wardle 2007). While

trust in the government has been declining for decades in the U.S. (Chanley, Rudolph, and Rahn 2000), several governmental agencies that approve, recommend, and regulate drugs may not have experienced such declines in trust because their mission is to protect public health and thus may not be associated with corruption to the same degree as, for example, the U.S. Congress.

The development of technologies (e.g., the HPV vaccine) brings up questions about *governance*, broadly understood to be the guidance or control over a certain activity, (Fox, Ward, and Rourke 2006). The federal government and its agencies have a clear role in governance. In relation to the HPV vaccine, the government is involved in approving its use and in legislating compulsory HPV vaccination. Governance often elicits resistance, as it did when the power of politicians to issue HPV vaccine mandates was countered by parent groups and other politicians who emphasized neoliberal ideals of parental autonomy and individual choice (Wailoo, Livingston, Epstein, and Aronowitz 2010).

The Centers for Disease Prevention and Control (CDC) is responsible for making recommendations concerning vaccines and guiding the decisions of state legislatures whether to mandate a vaccine (Colgrove 2010). Soon after *Gardasil* was approved by the Food and Drug Administration (FDA) and formally recommended by the CDC, Texas Governor Rick Perry bypassed the state legislature and issued an executive order mandating *Gardasil* for six grade girls (Mamo et al. 2010). Then the *Boston Globe* reported that Perry had accepted money from *Merck* and that his chief of staff was a lobbyist for *Merck* (Siers-Poisson 2008). In the wake of these perceived deceptions,

Perry received a lot of criticism, mostly from other GOP presidential contenders, for bypassing the state legislature, accepting money from *Merck*, and having political connections to *Merck* lobbyists, all of which were heavily covered in television and print news (Eggen 2011; West 2011).

Competing claims like those of Perry's and his opponents may contribute to a continued skepticism toward the federal government (even though Perry was a state governor). However, it is possible that people do not associate corruption with government agencies that work toward the betterment of public health. The FDA approved the HPV vaccine and the CDC formally recommended it for young girls aged 11 and 12 (Brady et al. 2012), but only one quantitative study addresses whether trust in these government agencies affect people's decisions to follow their advice (i.e., receive the HPV vaccine). Nan and colleagues (2014) find that trust in government health agencies is significantly and positively associated with parents' acceptance of the HPV vaccine for their children. There is also some qualitative evidence that parents oppose the HPV vaccine because they believe the approval and regulation process of drugs is corrupt. One parent in an interview-based study expressed her doubt that government agencies are trustworthy, as she said the HPV vaccine is "too new. I don't care if it's FDA approved. I don't necessarily trust the FDA. You know, EPA, FDA, they all have their interests that they protect" (Reich 2010:175). Given the role that the federal government, the CDC, and the FDA have in the approval, recommendation, and regulation of the HPV vaccine, trust in the government is likely related to individuals' assessments of risk associated with the drugs that the FDA and CDC regulate.

Institutional Trust in the News Media. Similar to the above justifications for how and why trust in pharmaceutical advertising will explain variation in HPV vaccine uptake/attitudes, trust in the media may also be a significant predictor of HPV vaccine attitudes. The media plays a central role in disseminating information about science and medicine, as it did in the case of the HPV vaccine (Anhang, Stryker, Wright, and Goldie 2004). One study found that broadcast media, after drug company advertisements, was the most frequently reported source of hearing about the HPV vaccine (Hughes, Cates, Liddon, Smith, Gottlieb, and Brewer 2009).

Several studies have examined what risk messages the news media claimed regarding HPV and the HPV vaccine. In a content analysis of news magazine articles, Abdelmutti and Hoffman-Goetz (2010) found that messages about the risk of HPV played on people's fear of cancer; they also found that reports about *Gardasil* focused on how it was not understood well by science and the threat of side effects. In a sample of parents, respondents were more likely to have had their daughters vaccinated if they perceived that they heard mostly positive media coverage of the HPV vaccine (Hughes et al. 2009). Another content analysis of newspapers and broadcast networks showed that, of the 222 stories analyzed, "cervical cancer" (50 percent) appeared in the headlines of articles more than "STI" or "Sexually Transmitted Infection" (3.6 percent). Ninety-nine percent of the articles that were analyzed mention the link between cervical cancer and HPV, yet only 20 percent noted the need for continued pap screening after HPV vaccination (Kelly, Leader, Mittermaier, Hornik, and Cappella 2009). This omission of the importance of pap screening has been noted by others as well (Abdelmutti and

Hoffman-Goetz 2010; Chesler and Kessler 2010). As news coverage of the HPV vaccine increased around the time the FDA announced its approval of *Gardasil* in June 2006, knowledge about the link between cervical cancer and HPV also increased and knowledge remained high even after news coverage declined (Kelly et al. 2009). These studies suggest that, in addition to pharmaceutical advertising, the news media plays a significant role in shaping perceptions about the risks and benefits of the HPV vaccine.

It matters for public health what types of risk messages the media are reporting about the HPV vaccine. By all accounts, news coverage has not provided accurate and balanced information (Forster, Wardle, Stephenson, and Waller 2010; Kelly et al. 2009; Quintero Johnson, Sionean, and Scott 2011). Several content analyses confirm the findings described above, which conclude that the news media portrays incomplete and inaccurate information about the HPV vaccine (Calloway, Jorgensen, Saraiya, and Tsui 2006; Habel, Liddon, and Stryker 2009). The public may not trust the media enough to base their assessments of individual risk on information from news reports. Trust in the news media has been declining in the U.S. since the mid-1970s, from 30 percent of Americans having a "great deal" of confidence in "the press" to 15 percent in 1988 and then dropping to 10 percent in 1994 (Jones 2004). Jones (2004) found moderate levels of trust in the news media, with 8.5 percent of respondents reporting "almost never" to the question: "How much of the time do you think you trust the media to report the news fairly?" and 7.1 percent of respondents answering "just about always." The majority of respondents said they trust the media to report the news fairly "some of the time" (43.1

percent) and "most of the time" (41.3 percent). Thus, people's trust in the news media is low to moderate.

Regardless of the reasons for low levels or a decline in trust in the media, there was a lot of coverage of the HPV vaccine, some of which focused on adolescent sexual politics (Forster et al. 2010), while others contained messages that may have elicited fear about cancer (Abdelmutti and Hoffman-Goetz 2010). Given the inherent uncertainty of any drug about safety and side effects (Brown and Calnan 2012), news reports may have informed people's perceptions about the risks and benefits of the HPV vaccine. Based on the extensive news coverage of the HPV vaccine and the findings of previous studies discussed above about the risk messages contained in news reports (Forster et al. 2010; Hilton, Hunt, Langan, Bedford, and Petticrew 2010), the media has arguably played a significant role in shaping public perceptions of the HPV vaccine's risks and benefits.

Based on the discussion above regarding trust in one's health care provider and five health-related institutions, I expect that trust will affect individuals' health beliefs: perceived susceptibility, severity, and efficacy, which in turn will be associated with HPV vaccine uptake/attitudes. The present approach recognizes that trust is a multidimensional interactive process, rather than a unidirectional static variable. Thus, trusting people or institutions in the present is based on perceptions about their past and predictions about the future (Khodyakov 2007). Whether to trust one person or institution may be based on whether one trusts other people or institutions, forming a system a trust (or distrust). Additionally, I conceptualize trust as a "social context variable" that bridges individuals (agency) and the social structures in which they are embedded (Chiles and

McMackin 1996; Giddens 1991). Individuals realize trust, but the realization of trust occurs only in social contexts (Ward 2008). This social context is characterized by the unequal distribution of the flexible resource, trust, which reflects broader social inequalities tied to gender, race/ethnicity, and SES (Wuthnow 2002).

Conceptual Model for the HPV Vaccine Decision-Making Process

The principle of fundamental cause theory states that inequality will affect health in multiple ways, yet there are inconsistent findings regarding the specific ways that gender, race, and SES affect HPV vaccine uptake/attitudes. In Chapter Four, I explore the role of social causes on HPV vaccine uptake/attitudes, interpersonal/institutional trust, and perceived risk. I then use these observed group differences in Chapter Four as a guide to specify the specific ways in which social causes affect the HPV vaccine decision-making process, which I test in Chapter Five. Based on the literature review above and stated in Hypotheses one through nine, I predict that women, African Americans, and lower SES will report higher perceived risk and lower interpersonal and institutional trust than men, whites, and higher SES, respectively.

H_1: Women will report higher levels of (a) HPV vaccine uptake, (b) intentions, and (c) acceptance than will men.

H_2: African Americans will report lower levels of (a) HPV vaccine uptake, (b) intentions, and (c) acceptance than will whites.

H_3: Lower SES will report lower levels of (a) HPV vaccine uptake, (b) intentions, and (c) acceptance than will higher SES.

H_4: Women will report higher levels of (a) perceived HPV/HPV-related diseases susceptibility, (b) perceived HPV severity, and (c) perceived HPV vaccine efficacy than will men.

H_5: African Americans will report higher levels of (a) perceived HPV/HPV-related diseases susceptibility, (b) perceived HPV severity, and (c) perceived HPV vaccine efficacy than will whites.

H_6: Lower SES will report higher levels of (a) perceived HPV/HPV-related diseases susceptibility, (b) perceived HPV severity, and (c) perceived HPV vaccine efficacy than will higher SES.

H_7: Women will report lower levels of trust in (a) their health care provider, (b) the health care system, (c) pharmaceutical DTCA, (d) the federal government, (e) health agencies, and (f) the news media than will men.

H_8: African Americans will report lower levels of trust in (a) their health care provider, (b) the health care system, (c) pharmaceutical DTCA, (d) the federal government, (e) health agencies, and (f) the news media than will whites.

H_9: Lower SES will report lower levels of trust in (a) their health care provider, (b) the health care system, (c) pharmaceutical DTCA, (d) the federal government, (e) health agencies, and (f) the news media than will higher SES.

After I test how social causes (gender, race/ethnicity, and SES) structure perceived risk and interpersonal/institutional trust in Chapter Four, I test Hypotheses 10-18 in Chapter Five. As shown in Figure 1 and described in Hypotheses 10-18, I simultaneously test the various relationships between interpersonal/institutional trust,

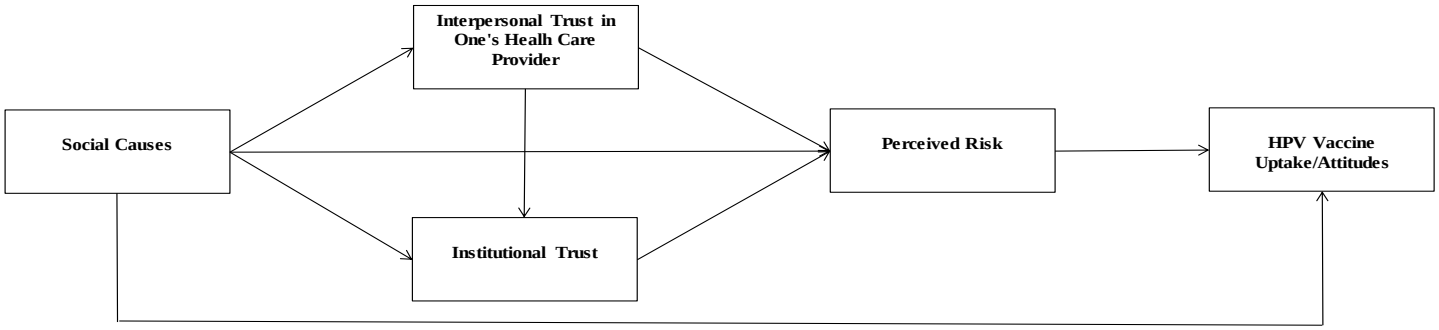

Figure 1. Conceptual Model for HPV Vaccine Decision-Making Process

perceived risk, and HPV vaccine uptake/attitudes. Based on the premises of the HBM, fundamental cause theory, and the sociology of trust, I predict that the HPV vaccine decision-making process will operate through the following pathways: social causes will be positively associated with interpersonal/institutional trust, perceived risk, and HPV vaccine uptake/attitudes. All six forms of trust will be positively associated with perceived risk, which in turn will be positively associated with HPV vaccine uptake/attitudes.

H_{10}: Health care provider trust will be positively associated with trust in the two institutions measured here that are most directly involved with the delivery of health care, (a) the health care system and (b) pharmaceutical DTCA; and positively associated with (c) perceived HPV/HPV-related diseases susceptibility, (d) perceived HPV vaccine efficacy, and (e) perceived HPV severity.

H_{11}: Health Care System trust will be positively associated with (a) perceived HPV/HPV-related diseases susceptibility, (b) perceived HPV vaccine efficacy, and (c) perceived HPV severity.

H_{12}: Pharmaceutical DTCA trust will be positively associated with (a) perceived HPV/HPV-related diseases susceptibility, (b) perceived HPV vaccine efficacy, and (c) perceived HPV severity.

H_{13}: Federal Government trust will be positively associated with (a) perceived HPV/HPV-related diseases susceptibility, (b) perceived HPV vaccine efficacy, and (c) perceived HPV severity.

H_{14}: Health Agencies trust will be positively associated with (a) perceived HPV/HPV related diseases susceptibility, (b) perceived HPV vaccine efficacy, and (c) perceived HPV severity.

H_{15}: News Media trust will be positively associated with (a) perceived HPV/HPV related iseases susceptibility, (b) perceived HPV vaccine efficacy, and (c) perceived HPV severity.

H_{16}: Perceived HPV/HPV-related diseases susceptibility will be positively associated with HPV vaccine (a) uptake, (b) intentions, and (c) acceptance.

H_{17}: Perceived HPV vaccine efficacy will be positively associated with HPV vaccine (a) uptake, (b) intentions, and (c) acceptance.

H_{18}: Perceived HPV severity will be positively associated with HPV vaccine (a) uptake, (b) intentions, and (c) acceptance.

Using the HBM, fundamental cause, and the sociology of trust, the conceptual model I develop for the HPV vaccine decision-making process recognizes that social causes affect a multitude of outcomes, as well as the mechanisms of perceived risk and six types of trust. I hypothesize that the mechanisms of interpersonal and institutional trust will affect people's health beliefs and thus put individuals "at risk of risks." In turn, I predict that perceived risk is a proximate cause of HPV vaccine uptake and attitudes. The conceptual model reflects the goal of this study to understand the HPV vaccine decision-making process by drawing on the strengths of the HBM, fundamental cause theory, and the sociology of trust.

CHAPTER THREE

DATA AND METHODS

Introduction

The purpose of this chapter is to introduce the analytic procedures I use in subsequent chapters. First, I describe the data collection process among a college sample at a Midwestern university and the survey instrument that I developed and subsequently administered. Next, I discuss the characteristics of the analytic sample, as well as the measurement properties of the key analytic variables. I then provide a description of the steps involved in structural equation modeling (SEM), including confirmatory factor analysis and multi-group SEM.

Sample

To examine the factors involved in the HPV vaccine decision-making process, I collected survey data among a convenience sample of college students at a state university in the Midwest United States. I recruited participants by, first, contacting instructors via email through informal networks and requesting permission to visit their classes and distribute the paper and pencil survey. I then visited 26 classes, mostly in the department of Sociology, but also in Biology, Pan-African Studies, English, and Philosophy, in the 2012 Fall and 2013 Spring semesters (between November 2012 and January 2013). Of the 21 professors of whom I asked permission to administer my

survey in their classes, all but one responded and agreed. I presented the students with an explanation of my research and obtained informed consent. It is not possible to determine the exact response rate because of absentee students on the day I administered the survey and because of students who were in multiple classes I visited who had already completed the survey. However, I estimate the approximate response rate to be 62 percent, which is the percentage of completed surveys compared to student enrollment in each class, which I obtained through the university's online "course lookup" system.

Although this is a convenience sample of college students, it is ideal for this analysis for two reasons. First, the typical age of college students is within the CDC-recommended range of ages to receive the HPV vaccine and so receiving the vaccine is (or was) an actual option for this group. Second, most current college students were adolescents (approximately 12 to 16 years of age) when *Gardasil* was first approved for girls. Therefore, especially for girls, exposure to debates about whether people should receive the HPV vaccine have likely made issues surrounding the vaccine more salient for these individuals than for a community sample. In summary, the convenience sample of college students is ideal because they are autonomous young adults who have been or are currently faced with the decision of whether to receive the HPV vaccine.

The original sample had 1,257 respondents, but there was a considerable amount of missing data. Since SEM requires that there is no missing data (Kline 2005), I eliminated cases that had missing values on any of the variables used in the SEM analyses, which constituted 421 cases. Beginning with the three main dependent variables, I eliminated the following number of cases due to missing values: HPV vaccine

uptake: 107; HPV vaccine intentions: 44; HPV vaccine acceptance: 2; perceived HPV susceptibility: 15; perceived HPV vaccine efficacy: 36; gender: 16; race/ethnicity: 4; childhood financial hardship (SES): 34; health care provider trust: 47; health care system trust: 67; pharmaceutical direct-to-consumer advertising (DTCA) trust: 19; government trust: 3; government health agencies trust: 14; news media trust: 2. I also eliminated the remaining 11 international students from the analytic sample because of the possibility that their attitudes toward American institutions may be different than those of U.S. citizens. Using logistic regression, an analysis of missing data shows that African Americans and males are significantly more likely to be missing on the three dependent variables (HPV vaccine uptake, acceptance, and intentions) than are non-African Americans and females.

Descriptive statistics for the key analytic variables are shown in Table 1. The analytic sample of 836 college students is predominantly female (71 percent) and white (83 percent). This sample contains more women and whites compared to the general population (United States Census Bureau 2010), and compared to the university at which I collected data. Sixty-three percent of respondents report no financial difficulty ("high SES") while growing up. The socio-economic status (SES) is likely higher than is found in a community sample because of socioeconomic selection into college (Walpole 2003).

Measures

I developed all of the measures from a review of the relevant literatures, as discussed in more detail below. I then conducted a pilot test of the survey in one college class, and asked respondents in that class to provide written feedback on their surveys if

Table 1. Descriptive Statistics for Key Analytic Variables (N=836)

Construct	Mean (SD) *or* N (%)	Items, Alpha	Range
Social Causes			
Gender	589 (70.5)	--	1=female
African American	81 (9.7)	--	1= African American
"Other" Race/Ethnicity	65 (7.8)	--	1= "Other" Race/Ethnicity
White	690 (82.5)	--	1= White
SES	2.60 (.564)	--	1= low SES to 3= high SES
Trust[1]			
Health Care Provider	4.19 (.891)	10 items, *a*=.923	1=strongly disagree to 6=strongly agree
Health Care System	3.57 (.762)	9 items, *a*=.842	1=strongly disagree to 6=strongly agree
Pharmaceutical DTCA	2.89 (.907)	7 items, *a*=.918	1=strongly disagree to 6=strongly agree
Federal Government	2.73 (.794)	1 item	1=never to 5=always
Health Agencies	3.41 (.733)	2 items, *r*=.783	1=never to 5=always
News Media	2.96 (.644)	3 items, *a*=.762	1=never to 5=always
Perceived Risk			
Susceptibility[2]	1.40 (.473)	3 items, *a*= .807	1=not at all to 3=extremely
Efficacy	2.15 (.437)	3 items, *a*= .707	1=not at all to 3=extremely
Severity	2.63 (.322)	3 items, *a*= 4.31	1=not at all to 3=extremely
HPV Vaccine Uptake/Attitudes			
Uptake	1.11 (1.38)	--	0-3 doses
Intentions	1.93 (.769)	--	1=definitely won't to 4=definitely will
Acceptance	1.88 (.670)	--	1=not at all willing to 3=extremely willing

[1]For all types of trust, higher values indicate more trust. [2]Only those who did not complete the 3-shot HPV vaccine series (n=566) answered the questions: perceived HPV/HPV-related disease susceptibility, HPV vaccine acceptance, and HPV vaccine intentions.

there were any questions or response categories that were unclear or confusing to them. They identified a couple of minor typos that I corrected before administering the survey to the remainder of the sample. The complete survey instrument can be found in Appendix A.

Social Causes

There are four social causes I examine in this study: gender, race/ethnicity, and SES. Gender is coded 0= male, 1= female. Race/Ethnicity consists of two dummy variables with African American =1 and "Other" race/ethnicity=1, with whites as the excluded group. Asking college students their current level of income or education would not reflect their past or future socioeconomic circumstances. Therefore, I use Kahn and Pearlin's (2006) measure of socioeconomic status (SES) and ask respondents to retrospectively report on their perceptions of their family's financial hardship while they were a child. This item states: "Thinking back to your years up to age 18, how difficult was it for your family to meet expenses for basic needs like food, clothing and housing? Would you say it was:" 1="not at all difficult," 2= "somewhat difficult," and 3= "very difficult." I reverse-coded this item so that higher values reflect higher SES.

Interpersonal Trust

Health Care Provide Trust. I measure one type of interpersonal trust (as opposed to institutional trust), which is trust in one's health care provider. The Health Care Provider Trust Scale is based on the findings of a study by Hall and colleagues (2002), which compares previous scales of trust in doctors to generate a 10-item scale that has

better internal consistency and variability than other scales (Hall, Zheng, Dugan, Camacho, Kidd, Mishra et al. 2002). Trust in one's doctor includes five domains of trust: fidelity, competence, honesty, confidentiality, and global trust.

I adapt Hall and colleagues' (2002) scale by using the phrase "health care provider" instead of "doctor" to reflect that students in this college sample may utilize the campus health center and see nurses rather than physicians. The 10 items ask respondents to report their level of agreement with each statement on a 5 point scale ranging from 1= "strongly disagree" to 6= "strongly agree," with higher scores indicating higher trust in one's health care provider. Examples of items in the scale are "Your health care provider is totally honest in telling you about all of the different treatment options available for your condition" and "You have no worries about putting your concerns in your health care provider's hands." I summed the 10 items and divided by 10 and Cronbach's alpha indicates high reliability (a=.923). College students report generally high levels of trust in their health care provider ($\overline{x}$= 4.19, SD= .891).

Institutional Trust

In this study, I examine trust in five institutions in which representatives of these institutions have made claims about the HPV vaccine. These institutions are: the health care system, pharmaceutical DTCA, the federal government, government health agencies (the CDC and the FDA), and the news media. All of the institutional trust measures have high reliability, as indicated by Cronbach's alpha, ranging from .762- .918[3].

[3] This range only refers to institutional trust measures that consist of two or more items; federal government trust and the Health Agencies Trust Indicies are not included in this range of reliabilities.

Health Care System Trust. In this study, I examine the role of five different types of institutional trust in the HPV vaccine decision-making process. I measure trust in the health care system using the Revised Health Care System Distrust Scale, which is a 9-item scale with high reliability that assesses respondents' perceived values and competence of the health care system (Shea, Micco, Dean, McMurphy, Schwartz, and Armstrong 2008). Responses for each statement range from 1= "strongly disagree" to 6 = "strongly agree" and the scale includes statements such as "The health care system lies to make money" and "The health care system does its best to make patients' health better." I summed the 9 items and divided by 9. On average, college students trust the health care system ($\overline{x}$=3.57, SD= .762)

Pharmaceutical DTCA Trust. I utilize Delorme and colleagues (2009) conceptualization of pharmaceutical DTCA, which is the extent to which people believe or disbelieve prescription drug advertising claims (Delorme, Jisu, and Reid 2009). I measure trust in pharmaceutical DTCA using a 9-item scale created by Obermiller and Spangenberg (1998), called SKEP, which assesses skepticism in advertising in general. Diehl and colleagues (2008) adapted the scale to measure skepticism toward prescription drug advertising specifically. Items include "Prescription drug advertising's aim is to inform the consumer" and "We can depend on getting the truth in most prescription drug advertising." Response categories range from 1= "strongly disagree" to 6= "strongly agree"; the 9 items are summed and divided by 9. Compared to health care system trust, trust in pharmaceutical DTCA is low ($\overline{x}$= 2.89, SD= .907).

Federal Government and Health Agencies Trust. I examine respondents' trust in the United States government with three items. Respondents are asked "How much of the time do you think you can trust the government in Washington to do what is right?" with answers ranging from 1= "never" to 5= "always." I take this item from the National Election Survey that included this item in each of its surveys since 1964 (at two year intervals) (Chanley et al. 2000).

Although trust in the federal government in the United States has been decreasing for decades (Chanley et al. 2000), I suspect that college students may not have the same low levels of trust in government agencies as they do of those "in Washington". Therefore, in addition to trust in the federal government, I also measure trust in the Center for Disease Prevention and Control (CDC) and the Food and Drug Administration (FDA), two government agencies that played a role in the approval and regulation of the HPV vaccine. Like trust in the federal government, this scale, which I call the Health Agencies Trust Index, measures fiduciary trust in these health agencies by asking "How much of the time do you think you can trust the FDA to do what is right?" and "How much of the time do you think you can trust the CDC to do what is right?" Responses range from 1= "never" to 5= "always." Trust in the federal government is one item asking about "the government in Washington" ($\bar{x}$= 2.73, SD= .794) and trust in government health agencies is a summed 2-item index of trust in the CDC and the FDA (*r*=.783).

News Media. Trust in the news media is a 3-item scale that measures respondent's trust in the accuracy and fairness of the information they receive from news

sources. I adapt the items from one item in the National Election Study that asks "How much of the time do you think you trust the media to report the news fairly? (Jones 2004). I specify three different types of news sources (newspapers, television broadcast, and Internet news) to account for the possibility that college students may rely on the Internet for their news and that they may differentially trust various news mediums. Responses range from 1= "never" to 5= "always." The 3 items are summed and divided by 3 ($\bar{x}$= 2.96, SD= .664).

Perceived Risk

I conceptualize perceived risk as the Health Belief Model (BM) does and measure perceived susceptibility, efficacy, and severity regarding HPV, cancer caused by HPV, and genital warts caused by HPV. That is, I ask respondents to estimate the likelihood that they will acquire HPV and HPV-related diseases in the future if they do not get the vaccine; how serious of an illness they think HPV and HPV-related diseases are; and how effective the HPV vaccine is in preventing HPV, cancer caused by HPV, and genital warts caused by HPV. All three types of perceived risk are 3-item scales. Only respondents who had not completed the 3-shot HPV vaccine series were asked the perceived susceptibility questions because it seems counterintuitive to ask people to estimate their risk of getting a disease for which they have already been vaccinated. Responses for the three types of perceived risk range from 1= "not at all" to 3 = "extremely."

Cronbach's alphas for the perceived susceptibility (a= .807) and efficacy (a=.707) scales indicate high reliability, but the perceived severity scaled does not (a=.431). Mean

levels for perceived HPV severity ($\bar{x}$=2.63, SD=.322) and perceived HPV vaccine efficacy ($\bar{x}$=2.15, SD=.437) are higher than that of individual perceptions of susceptibility to HPV and HPV-related diseases ($\bar{x}$=1.39, SD=.473). Thus, on average, respondents think that HPV and HPV-related diseases are serious and that the vaccine is effective in preventing these diseases. However, respondents who have not completed the 3-shot HPV vaccine series estimate the likelihood that they will acquire HPV/HPV-related diseases in their lifetime to be relatively low[4].

Dependent Variables

HPV Vaccine Uptake and Attitudes. There are three main[5] dependent variables that I use in the SEM analyses in Chapters Five and Six. Vaccine uptake is the number of doses of the HPV vaccine that respondents report they received, ranging from 0-3 doses. The 566 individuals who report they have not completed the 3-shot series are asked about two attitudes toward the HPV vaccine that are assumed to lead to getting the HPV vaccine: HPV vaccine intentions and HPV vaccine acceptance. The HPV vaccine intentions item asks respondents how likely they think they are to get the HPV vaccine in the next year, with responses ranging from 1= "definitely won't" to 4="definitely will." I measure HPV vaccine acceptance by asking respondents how willing they are to receive the HPV vaccine, with answers ranging from 1= "not at all" to 3= "extremely."

[4] There is also low susceptibility compared to efficacy and severity among just the 566 respondents who did not initiate the 3-shot HPV vaccine series.

[5] I call uptake, intentions, and acceptance the "main" dependent variables because the six types of trust and the three types of perceived risk are also dependent variables in the SEM analyses (as well as independent variables).

Three hundred and fifty-six individuals (43 percent) received at least one dose of the HPV vaccine, seventy-six percent of whom completed the 3-shot series (32% of entire sample, N=836). Of the 566 individuals who did not complete the 3-shot series, twenty-six percent are not at all willing to do so. While 72 percent of respondents estimate that they either will "probably" or "definitely" *not* receive the HPV vaccine, only 28 percent report that they "probably" or "definitely" *will* receive the vaccine. Thus, while 44 percent of women and about 5 percent of men completed the 3-shot HPV vaccine series, the 566 women and men who did not receive it are generally neither willing to nor intend to get the vaccine in the upcoming year

Plan of Analysis

I now turn to a description of the analytic procedures used in Chapters Four through Six. In Chapter Four, I use Confirmatory Factors (CFA) within SEM to assess the validity and reliability of the risk and trust measurement models. I then use independent samples t-tests and Analysis of Variance (ANOVA) to determine how perceived risk and interpersonal/institutional trust are stratified by race/ethnicity, SES, and gender. In Chapter Five, I use SEM to explore the HPV vaccine decision-making process by examining the indirect and direct effects of social causes, trust, and risk on HPV vaccine uptake, intentions, and acceptance. Finally, in Chapter Six, I use multi-group SEM to test for gender differences in the HPV vaccine decision-making process. All analyses are conducted using SPSS 21 and Amos 21.

Structural Equation Modeling (SEM)

SEM is similar to standard statistical approaches, such as correlation, multiple regression, and ANOVA, in that they are all linear models and none of them can statistically test for causality or directionality (Hoyle 1995). However, SEM differs from traditional approaches in several ways. SEM is a superior method for testing hypotheses compared to multiple regression because relationships between *all* variables, not just direct relationships with one dependent variable, can be tested. Thus, SEM allows the researcher to simultaneously test the effects of exogenous variables on multiple endogenous variables, making SEM a more comprehensive method to test specific hypotheses than traditional statistical approaches (Hoyle 1995).

Specifying the Model. To specify a structural model means to express hypotheses in the form of a structural equation model by drawing a diagram. In addition to specifying the structural paths, the researcher must model the measurement error of all endogenous variables, making the error terms latent variables. The researchers can correlate the error terms with each other for theoretical or empirical reasons. For example, in the models I estimate in the following analyses, I correlate the error terms between African American race and "other" race/ethnicity because they are dummy variables. I also correlate the error terms between HPV vaccine acceptance and intentions because the bivariate correlation between acceptance and intentions is statistically significant (a= .728, p <.000). I conceptualize acceptance and intentions as distinct, yet related, beliefs about the HPV vaccine and the ability to model the error

terms ensures that the variation in acceptance is not due to the variation in intentions, and vice versa.

After running the initial model, one can then use the *modification indices* as a guide for determining which structural paths could be added to significantly improve model fit. A modification index is calculated for each path that is set to zero and the value of the modification index predicts the improvement in model fit if a path were freely estimated (Kline 2005). While modification indices can be used as a guide to improve model fit, they must be used in conjunction with theoretical justifications.

Assessment of Model Fit. A structural model is *identified* when it is theoretically possible to derive a unique estimate for each parameter (Kline 2005). A structural equation model is considered to *fit* when the relationships in the structural model are not statistically different than the relationships found in the data. The most common measure of overall fit is the chi-square statistic (Kline 2005). This *goodness-of-fit* test is the product of the *fitting function* and the sample size minus one. I use Maximum Likelihood Estimation (MLE) to estimate the models because it has become the standard estimation method for SEM, as it produces robust estimates even when assumptions, such as the assumption of normal distribution, are violated (Hoyle 1995; Kline 2005). If the chi-square statistic is significant, it indicates that the structural model specifies a pattern of relationships that is significantly different from that found in the data, and thus, needs to be either rejected or modified.

Researchers question the validity of the chi-square goodness-of-fit test under conditions of assumption violations (Hu and Bentler 1995). In response, researchers

report several other fit indices that evaluate the fit of structural models, but that do not rely on comparisons between the hypothesized model and the relationships found in the data. Since there is not a consensus about the best fit indices to use to evaluate model fit and because each index only examines a particular aspect of a model, it is recommended that researchers use multiple fit indices (Hoyle and Panter 1995; Kline 2005). Therefore, for all of the structural models I estimate, I report the chi-square statistic, as well as several other fit indices, each of which I will discuss in more detail below.

The root mean square error of approximation (RMSEA) is a commonly used fit index that indicates model misspecification in which higher values indicate worse fit and values of $\leq .05$ are considered acceptable (Kline 2005). The formula for the RMSEA takes into account whether the model is parsimonious. As opposed to comparisons to the data, some fit indices compare the hypothesized model and the independence, or null, model. The Tucker-Lewis index (TLI) and the Incremental Fit Index (IFI) compare the lack of fit of the specified model to the fit of the independence model. The Comparative Fit Index (CFI) examines the relative reduction of lack of fit between the hypothesized model and the independence model (Hoyle and Panter 1995). Except for the RMSEA, all of the other fit indices range from 0 to 1 where a value of one indicates perfect fit and a value of .90 or higher indicates reasonable fit (Hu and Bentler 1995). For all of the structural models I analyze below, I report the chi-square statistic, TLI, IFI, CFI, and RMSEA.

Confirmatory Factor Analysis (CFA). In Chapter Four, I test the validity and reliability of the perceived risk and interpersonal/institutional trust measurement models

by conducting CFA within SEM. The procedure is similar to those described above for specifying the model, model modification, and evaluating model fit. In CFA, unstandardized estimates are interpreted as the direct effects of an indicator on a factor, which are also called *factor loadings*. The standardized estimates, or standardized factor loadings, represent correlations in which each indicator measures a single factor. For example, each of the 10 items in the Health Care Provider Trust scale load together, but not on any of the other types of trust. As with a structural model, the measurement model tested in CFA may be re-specified according to the modification indices in conjunction with theory. Evaluating the fit of the measurement model is the same as for structural models, as described above, and I report the chi-square statistic, TLI, IFI, CFI, and RMSEA for the risk and trust measurement models.

To evaluate whether the latent constructs of perceived risk and trust are valid and reliable, I first examine if the fit indices indicate reasonable fit, using established standards of chi-square $p>.05$; TLI, IFI, and CFI $\geq .9$; and RMSEA= $\leq .05$ (Hu and Bentler 1995). Second, I examine the unstandardized factor loadings to ensure that the parameters are statistically significant and in the correct direction. Third, I examine each of the standardized factor loadings, using the standard of >.5 (Kline 2005), which suggests that the items load on the appropriate factor. Fourth, I calculate the average variance extracted (AVE) for each latent construct to determine if there is more error from the items than there is variance explained by the construct; values of >.5 indicate that there is not and that there is reasonable *convergent validity*, which measures the extent to which indicators of a construct share a high proportion of variance in common.

To further evaluate convergent validity, I next calculate the internal consistency of each construct, using >.6 as acceptable internal consistency, meaning that the items are consistently measuring each factor.

Finally, I evaluate the measurement models' *discriminant validity*, or the extent to which the factors are measuring distinct, latent constructs. In other words, discriminant validity is present when each construct is truly different from others. To examine discriminant validity, I examine the correlations between constructs, using the standard that none of the correlations should exceed .4. I also conclude that there is discriminate validity if the difference between unity (1) and the correlation among constructs is higher than the standard error of that correlation multiplied by 1.96 (Bagozzi and Kimmel 1995).

If, taken together, there is evidence for *construct validity* and reliability, modification of the measurement models is unwarranted. If tests of validity and reliability indicate a need for model respecification, I modify the model and proceed through the steps above until I achieve validity and reliability. While the literature on CFA and SEM provides "rules of thumb" for fit indices and measures of validity and reliability, there are no set standards. Acceptance or rejection of a model should always be done in conjunction with theory.

Multi-Group SEM. After identifying the indirect and direct effects of social causes, interpersonal/institutional trust, and perceived risk on HPV vaccine *uptake*/attitudes in Chapter Five, I estimate a multi-group structural model in Chapter Six to determine whether there are significant gender differences in HPV vaccine attitudes found in the previous analyses. A multi-group model has several advantages compared to

running the models separately for each group. Multi-group models produce more accurate parameter estimates than in models where groups are combined (Kline 2005). Furthermore, by running the model on the two groups simultaneously but separately, I will be able to determine whether group differences for each path are significantly different.

I conduct the multi-group analysis in three steps. First, I estimate whether the model with no cross-group constraints fits the data equally well for females and males. By examining these estimates, I can identify where there might be gender differences. Since I have no specific hypotheses regarding gender differences, this portion of the analysis is exploratory. Thus, I test the null hypothesis that there are no significant differences between women and men in the relationships between social causes (race/ethnicity and SES), interpersonal/institutional trust, perceived risk, and HPV vaccine acceptance/intentions. If a chi-square difference test indicates that the unconstrained model fits the data better than the model in which all of the parameters are constrained to be equal, then I can reject the null hypothesis. Second, I constrain all of the paths to be equal and determine whether the unconstrained and constrained models fit the data equally well by looking at the chi-square statistic and the other fit indices. If I find that the chi-square is significant; the RMSEA is higher; and the other fit indices are lower in the constrained model than in the unconstrained model, I can I conclude that there are significant differences between males and females and proceed to step three. Third, to identify the specific relationships on which men and women differ, I examine the modification indices to determine whether releasing certain constraints would

improve model fit. By releasing these constraints, these parameters are allowed to be estimated differently for men and women. With a few of the equality constraints released, I then examine whether the model fits the data better than when all structural paths were constrained to be equal. If the modified model fits the data better than the constrained model, I can reject the null hypothesis that there are no group differences.

Summary

In summary, I constructed and administered a survey to college students at a Midwestern university to explore the HPV vaccine decision-making process and, in particular, the role of social causes and multiple types of trust. The analysis with HPV vaccine uptake as the main dependent variable utilizes the full analytic sample of 836 respondents, while the analyses of HPV vaccine attitudes is based on a subsample of the 480 individuals who have not initiated the 3-shot HPV vaccine series. I investigate three social causes; one measure of interpersonal trust; five measures of institutional trust, and three measures of perceived risk that are all valid and reliable, which I will discuss in more detail in the following chapter.

In Chapter Four, I assess whether the interpersonal/institutional trust measurement models are valid and reliable and whether the six types of trust are stratified by social causes (race/ethnicity, SES, and gender). First, I evaluate the measurement models using CFA and, second, I use t-tests and ANOVA to examine the stratification of perceived risk and interpersonal/institutional trust. In Chapter Five, I examine the HPV vaccine decision-making process by identifying the indirect and direct effects of social causes, perceived risk, and interpersonal/institutional trust by estimating two structural models.

HPV vaccine uptake is the main dependent variable of interest in the first structural model and vaccine attitudes (intentions and acceptance) are the main dependent variables in the second structural model. Finally, in Chapter Six, I employ multi-group SEM to explore whether there is gender variation in the relationships between social causes, trust, risk, and HPV vaccine uptake/attitudes.

CHAPTER FOUR

PERCEIVED RISK AND TRUST IN CONTEXT

Introduction

The purpose of this chapter is to explore the measurement and stratification of perceived risk and interpersonal/institutional trust as it relates to HPV vaccine uptake and attitudes. This chapter addresses two research questions: 1) *Are the measurement models of perceived risk and interpersonal/institutional trust valid and reliable?* and 2) *Are HPV vaccine uptake/attitudes, perceived risk, and interpersonal/institutional trust stratified by race/ethnicity, SES, and gender?* I answer these research questions by, first, assessing the validity and reliability of the measurement models through confirmatory factor analysis (CFA). Second, I test Hypotheses one through nine using independent samples t-tests and Analysis of Variance (ANOVA) to test for group differences in HPV vaccine uptake/attitudes, perceived risk, and interpersonal/institutional trust by gender, race/ethnicity, and SES.

Before I explore the HPV vaccine decision-making process in Chapter Five, it is important to conduct the analyses in this chapter for three reasons. First, I need to verify the measurement model for perceived risk, which includes susceptibility, efficacy, and severity, in the context of the HPV vaccine among a sample of college students. Second, given the various ways that trust has been conceptualized and measured in past research

and that several of the trust measures I use are not validated measures, it is also necessary to verify that the trust measurement model is valid and reliable. Third, I explore how social causes— gender, race/ethnicity, and SES— shape perceived risk and interpersonal/institutional trust to better understand the role of social causes in the HPV vaccine decision-making process. That is, before I test the indirect and direct relationships of social causes on HPV vaccine uptake/attitudes in Chapter Five, I first explore how HPV vaccine uptake/attitudes, perceived risk, and interpersonal/institutional trust are stratified by gender, race/ethnicity, and SES. I predict that privileged social conditions (men, whites, and higher SES) will report higher uptake and attitudes, higher risk perceptions, and lower interpersonal/institutional trust than disadvantaged social conditions (women, African Americans, and lower SES). At the end of this chapter, I summarize the findings and whether I find support for the hypotheses that privileged social conditions are associated with more uptake/attitudes, less perceived risk, and more trust than disadvantaged social conditions.

Results: The Risk and Trust Measurement Models

I test the measurement models depicted in Figures 2 and 3 for perceived risk and interpersonal/institutional trust. I model the indicators for each construct, as well as correlations among each of the three perceived risk constructs and the five trust constructs. As mentioned in Chapter Three, the Cronbach's alphas indicate high internal consistency for all of the risk and trust scales except for the perceived HPV/HPV-related diseases severity scale. However, Cronbach's alpha is only partial evidence that the scales are reliable, as it measures internal consistency, but not convergent or discriminant

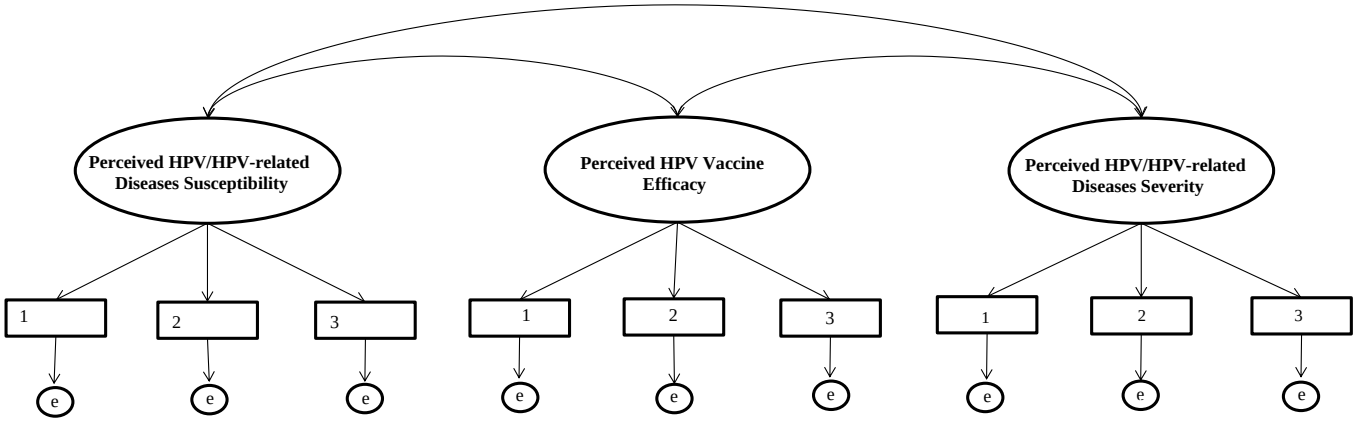

Figure 2. Conceptual Measurement Model for Perceived Risk

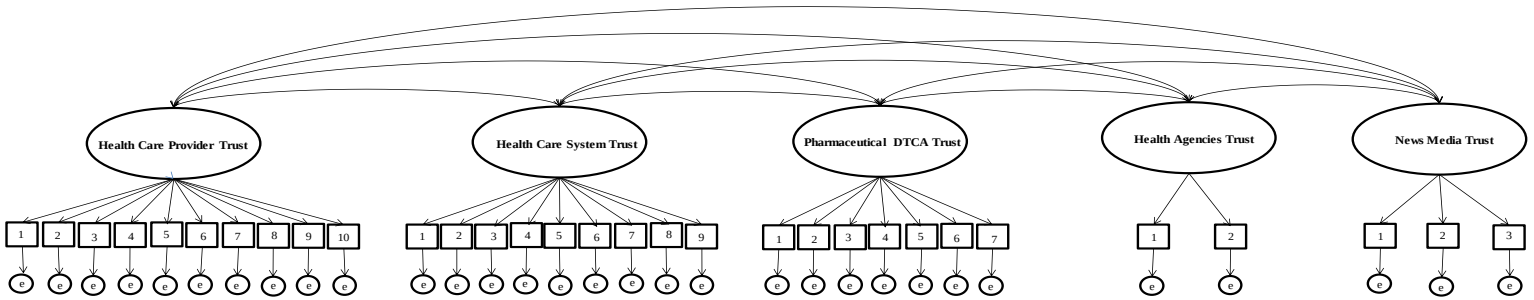

Figure 3. Conceptual Measurement Model for Interpersonal/Institutional Trust

validity (see Chapter Three for a description of these measures). Therefore, a more in-depth analysis of the validity and reliability of the risk and trust measurement models is warranted

Perceived Risk Measurement Model

According to the fit indices, the hypothesized three-factor measurement model of perceived risk (susceptibility, efficacy, and severity) fits the data relatively well (X^2=51.866, df=24, p=.001; TLI=.953; IFI=.969; CFI=.969; RMSEA=.049). All of the unstandardized factor loadings are significant and in the correct direction, which suggests that the items for each factor represent a latent factor. However, as shown in Table 2, the standardized factor loadings suggest that two of the three indicators of perceived HPV/HPV-related diseases severity do not measure the same latent construct. The two items "How serious an illness do you think genital warts is?" and "How serious an illness do you think cancer caused by HPV is" have standardized factor loadings that are less than the standard of $\geq$ .05 (λ=.428 and λ=.317, respectively). Furthermore, the AVE from the perceived severity scale is signficantly less than the standard of $\geq$.05 (AVE=.261), which means that there is more error associated with the indicators than there is variance explained by the latent construct. Given that the standardized factor loadings of two of the items do not load on severity at an acceptable level and that there is more error in the items than there is variance explained, I choose to remove those two items. I measure perceived severity with just the one item that theoretically and emprically have the most face validity, which is the question that asks about HPV in general (as opposed to HPV-related diseases). The squared multiple correlations (SMCs)

indicate that this one item explains about 50 percent of the variance in perceived severity, suggesting that using just the one item is adequate.

Table 2. Standardized Factor Loadings, Standard Errors, and Squared Multiple Correlations of Perceived Risk Factor Indicators

Item Number	λ	SE	SMC
Perceived HPV/HPV-related Diseases Susceptibility			
1	.646	--	.417
2	.721	.067	.520
3	.925	.095	.856
Perceived HPV/HPV-related Diseases Severity			
1	.706	--	.499
2	.428	.215	.183
3	.317	.063	.101
Perceived HPV Vaccine Efficacy			
1	.806	--	.649
2	.685	.096	.470
3	.521	.085	.272

λ = standardized factor loading; SE= standard error of factor loading; SMC= squared multiple correlation of factor indicator

After removing the perceived severity scale from the CFA model, a chi square test indicates that the measurement model with just perceived HPV/HPV-related diseases susceptibility and perceived HPV vaccine efficacy is signficantly better ($p \leq .01$). The fit indices also improved (X^2=18.051, df=.021, p=.021; TLI=.976; IFI=.987; CFI=.987; RMSEA=.051). The removal of perceived severity from the CFA model does not compromise the discriminant validity of perceived susceptiblity or efficacy, as all of the standardized factor loadings exceed .5.

Interpersonal/Institutional Trust Measurement Model

I now turn to evaluating the covergent validity and discriminant validity of the the five-factor measurement model of interpersonal/institutional trust. The hypothesized CFA model of trust reproduced the observed covariance matrix adequately according to the fit indices (X^2=1621.443, df=424, p=.000; TLI=.903; IFI=.912; CFI=.911; RMSEA=.058). The chi-square statistic is significant; the RMSEA is not below .05; and the other fit indices are not above .95, which provides partial support that this measurement model is an adequate, but not an ideal, fit (Kline 2005). I choose not to modify the model to improve model fit because there is no theoretical justification to do so.

The CFA trust measurement model achieves convergent validity, which is the degree to which indicators measure a common latent factor. All of the unstandardized factor loadings are significant and in the correct direction, which suggests construct validity. As shown in Table 3, the standardized factor loadings for the measures are generally high (range: .415-.868). However, there are two indicators out of 31 that indicate acceptable, but not ideal, convergent validity. In the Health Care System Trust scale, Item Two ("The health care system covers up its mistakes") and Item Nine ("The health care system experiments on patients without them knowing") have relatively low standardized loadings (λ=.415 and λ=.495, respectively). The AVE for the Health Care System Trust scale is not acceptable (34 percent), meaning that there is more error remaining in the items than there is variance explained by the latent factor. However, the construct reliability is good (CR=.8867), meaning that all measures are consistently

representing the latent construct of health care system trust. Except for the two items in the Health Care System Trust scale, factor loadings are above .5 for all of the other 29 items in the measurement model; all of the indicators for each trust construct measure that respective construct.

Table 3. Standardized Factor Loadings, Standard Errors, and Squared Multiple Correlations of Interpersonal/Institutional Trust Factor Indicators

Item Number	λ	SE	SMC	Item Number	λ	SE	SMC
Health Care Provider Trust				Health Care System Trust			
1	.751	--	.564	1	.710	--	.505
2	.634	.049	.402	2	.415	.049	.173
3	.632	.044	.400	3	.672	.054	.451
4	.744	.041	.554	4	.616	.050	.379
5	.808	.044	.653	5	.644	.060	.415
6	.777	.044	.604	6	.681	.048	.463
7	.742	.042	.550	7	.584	.066	.341
8	.663	.050	.440	8	.687	.058	.472
9	.783	.046	.614	9	.495	.055	.245
10	.868	.045	.754				
Pharmaceutical DTCA Trust				Health Agencies Trust			
1	.774	--	.599	1	.844	--	.713
2	.842	.041	.709	2	.763	.083	.582
3	.864	.041	.746				
4	.832	.043	.691	News Media Trust			
5	.828	.041	.685	1	.795	--	.632
6	.643	.049	.414	2	.844	.063	.712
7	.722	.044	.522	3	.527	.043	.277

λ = standardized factor loading; SE= standard error of factor loading; SMC= squared multiple correlation of factor indicator

In addition to convergent validity, the measurement model achieves discriminant validity, which means that each of the five trust factors is a distinct latent construct. As shown in Table 4, the correlations among factors are generally not high (range: .267-.558). All of the AVEs (range: .383-.648) are higher than the squared interconstruct

Table 4. Factor correlations among Latent Trust Variables

	(1)	(2)	(3)	(4)	(5)
(1) Health Care Provider Trust	1.000				
(2) Health Care System Trust	.558***	1.000			
(3) Pharmaceutical DTCA Trust	.334***	.474***	1.000		
(4) Health Agencies Trust	.299***	.323***	.288***	1.000	
(5) News Media Trust	.267***	.277***	.296***	.309***	1.000

***p≤ .000

correlation estimates (range: .077-.311), indicating that each of the five trust constructs are indeed distinct latent constructs.

The factor loadings, AVEs, and construct reliabilities provide support for the convergent validity of the five-construct trust measurement model. Although two factor loadings are below .5, they do not appear to be significantly decreasing model fit or internal consistency. The AVE estimates all exceed .5 and the construct reliability estimates all exceed .7. In addition, the hypothesized measurement model fits the data adequately well based on the fit indices. Therefore, I retain all of the indicator items.

The hypothesized CFA model of interpersonal/institutional trust is valid and reliable, as is the modified model of perceived risk. While the health beliefs (susceptibility, efficacy, severity) measured here have been used in previous studies, it was necessary to validate the scales with this college sample and in regards to the HPV vaccine. I find that perceived HPV/HPV-related diseases susceptibility and HPV vaccine efficacy are distinct latent constructs, but perceived HPV/HPV-related diseases severity is not. Because there are so many available scales and measurements of the different types of trust and because some of the measures had not been used and/or validated before, I test the validity the measurement model for interpersonal/institutional trust. I conclude that the interpersonal/institutional trust measurement model is adequate. I now turn to examining whether perceived risk and interpersonal/institutional trust are stratified by race/ethnicity, SES, and gender.

Results: Social Causes, Perceived Risk, and Interpersonal/Institutional Trust

The next part of the analysis explores how social causes shape perceived risk and interpersonal/institutional trust through a series of independent samples t-tests by gender and ANOVA by race/ethnicity and SES. The t-tests show whether there are significant differences in perceived risk and interpersonal/institutional trust between women and men; African Americans, "Other" race/ethnicity, and whites; and low, medium, and high SES. Following the premises of fundamental cause theory, as well as the arguments of Arneil (2006) and Wuthnow (2002), I predict that disadvantaged social conditions (women, non-whites, and low SES) will have higher risk perceptions and lower levels of trust than those of advantaged social conditions (men, whites, and high SES). In this part of the analysis, I test Hypotheses one through nine, as described in Chapter Two.

Social Causes and HPV Vaccine Uptake and Attitudes

As shown in Table 5, gender, but not race/ethnicity or SES, is significantly associated with HPV vaccine uptake, intentions, and acceptance. As predicted, women have higher rates of uptake than do men, as well as higher intent and willingness to get the HPV vaccine. There are no racial/ethnic or SES differences in the three outcomes. In fact, high SES has the lowest levels of HPV vaccine uptake, intentions, and acceptance. Of the 566 college students who did not complete the three-shot HPV vaccine series, African Americans report a greater willingness and intent to get the HPV vaccine than do whites, although these differences are not significantly significant.

Table 5. Independent Samples t-tests and ANOVA for HPV Vaccine Uptake, Intentions, and Acceptance by Gender, Race/Ethnicity, and SES (N=836)

	Women (N=589)	Men (N=247)	African Americans (N=81)	"Other" Race (N=65)	Whites (N=690)	Low SES (N=23)	Medium SES (N=174)	High SES (N=369)
Variable	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Uptake	1.47 (1.42)	.243 (.714)***	.975 (1.31)	1.23 (1.44)	1.12 (1.38)	1.24 (1.32)	1.17 (1.40)	1.08 (1.37)
Intentions[1]	2.19 (.901)	1.92 (.805)***	2.23 (.883)	2.15 (.864)	2.05 (.871)	2.13 (1.06)	2.09 (.859)	2.07 (.868)
Acceptance	2.05 (.729)	1.86 (.649) **	2.00 (.707)	2.00 (.641)	1.97 (.709)	2.26 (.864)	1.99 (.693)	1.94 (.695)

* p≤ .05 **p≤ .01***p≤ .000 [1]Only those who did not complete the 3-shot HPV vaccine series (n=566) answered the intentions and acceptance questions.

Social Causes and Perceived Risk

Table 6 reports the means and standard deviations of three types of perceived risk by gender, race/ethnicity, and SES. Across all groups, respondents perceive HPV to be a serious disease and the HPV vaccine to be effective in preventing HPV/HPV-related diseases more so than they perceive themselves to be at risk of acquiring HPV/HPV-related diseases in the future. Compared to men, women perceive themselves to be significantly more likely to get HPV/HPV-related diseases at some point in their lives. Women also perceive HPV to be a much more serious illness than do men. Contrary to predictions, there are no significant differences in perceived risk between high, medium, and low SES or between whites, African Americans, and "other" race/ethnicity.

The "Gap" in Interpersonal and Institutional Trust

As shown in Table 7., contrary to predictions, women, compared to men, have higher levels of interpersonal and institutional trust. In fact, women report higher levels of trust in four out of the six types of trust measured here. Men have slightly more trust in the health care system and the news media than do women. The only statistically significant gender difference in trust is with the federal government, in which women report that they trust the "government in Washington to do what is right" more often than men do. Thus, there is a gender "gap" in federal government trust.

Across, race/ethnicity, African Americans, compared to whites, report significantly lower levels of trust in the health care system, the federal government, and the news media. African Americans also report significantly lower levels of trust in the

Table 6. Independent Samples t-tests and ANOVA for Perceived Risk by Gender, Race/Ethnicity, and SES (N=836)

	Women (N=589)	Men (N=247)	African Americans (N=81)	"Other" Race (N=65)	Whites (N=690)	Low SES (N=23)	Medium SES (N=174)	High SES (N=369)
Variable	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Susceptibility[1]	1.45 (.447)	1.31 (.442)***	1.48 (.441)	1.47 (.439)	1.37 (.451)	1.38 (.442)	1.40 (.456)	1.38 (.449)
Efficacy	2.16 (.449)	2.12 (.407)	2.18 (.460)	2.15 (.429)	2.15 (.436)	2.08 (.409)	2.13 (.412)	2.16 (.450)
Severity	2.65 (.489)	2.41 (.525)***	2.60 (.540)	2.68 (.503)	2.56 (.508)	2.55 (.506)	2.57 (.511)	2.58 (.512)

***p≤ .000 [1] N=566 because those who had not completed the 3-shot HPV vaccine series were not asked the susceptibility questions.

Table 7. Independent Samples t-tests and ANOVA for Interpersonal/Institutional Trust by Gender, Race/Ethnicity, and SES (N=836)

	Women (N=589)	Men (N=247)	African Americans (N=81)	"Other" Race[a] (N=65)	Whites[a] (N=690)	Low SES (N=33)	Medium SES[b] (N=265)	High SES[b] (N=538)
Variable	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Health Care Provider	4.21 (.877)	4.14 (.924)	4.12 (1.04)	4.05 (.874)	4.21 (.874)	3.81 (1.21)	4.07 (.879)**	4.27 (.863) *
Health Care System	3.56 (.753)	3.60 (.784)	3.31 (.663)	3.42 (.803)	3.62 (.762) **	3.15 (.814)	3.45 (.720)**	3.66 (.763) ***
Pharmaceutical DTCA	2.93 (.897)	2.80 (.925)	2.90 (.850)	2.77 (.842)	2.90 (.919)	2.62 (.806)	.889 (.055)	2.97 (.895)
Federal Government	2.78 (.774)	2.60 (.829)**	2.46 (.822)	2.94 (.726)**	2.74 (.790) **	2.30 (.951)	2.69 (.781)*	2.77 (.783) **
Health Agencies	3.43 (.722)	3.38 (.760)	3.24 (.755)	3.42 (.671)	3.43 (.734)	3.20 (.968)	3.37 (.729)	3.45 (.716)
News Media	2.94 (.631)	2.99 (.675)	2.74 (.766)	3.04 (.624)	2.98 (.626) **	2.62 (.741)	2.92 (.643)*	3.00 (.633) **

* p≤ .05 **p≤ .01 ***p≤ .000. [a]compared to African Americans. [b]compared to low SES.

federal government compared to "other" race/ethnicity. Contrary to predictions, there is no racial "gap" in trust in one's health care provider, pharmaceutical DTCA, or health agencies.

College students who report that while growing up it was "somewhat difficult" (medium SES) or "very difficult" (low SES) for their families to meet basic expenses generally have lower levels of trust than those who report it was "not at all difficult" (high SES) for their families to meet basic expenses. Specifically, higher SES has higher health care provider, health care system, and federal government trust than does lower SES. Trust in the news media, pharmaceutical DTCA, and government health agencies are not stratified by gender, race/ethnicity, or SES. While there is a socioeconomic "gap" in health care provider, health care system, and federal government trust, there are not socioeconomic inequalities in news media, pharmaceutical DTCA, or health agencies trust.

Summary

The purpose of this chapter is to facilitate a better understanding of perceived risk and interpersonal/institutional trust as they relate to the HPV vaccine. I address two research questions: 1) *Are the measurement models of risk and trust valid and reliable?* and 2) *Are HPV vaccine uptake/attitudes, perceived risk, and interpersonal/institutional trust stratified by gender, race/ethnicity, and SES?* The CFA results indicate that the measurement models are valid and the results of the t-tests and ANOVA show that social causes—gender, race/ethnicity, and SES—shape HPV vaccine uptake/attitudes, perceived risk, and interpersonal/institutional trust.

There are only gender, but not race/ethnicity or SES, group differences in HPV vaccine uptake, intentions, and acceptance, with women reporting higher levels than men of all three outcomes. Similarly, perceived risk is shaped by gender, but not the other social causes, race/ethnicity and SES. The only significant difference in perceived risk I find is between women's and men's disparate beliefs about how serious of an illness HPV is (severity) and the likelihood that they will personally acquire HPV/HPV-related diseases (susceptibility). However, there are no racial/ethnic or SES differences in perceived risk. Across all groups, college students rate the likelihood that they will personally acquire HPV/HPV-related diseases to be lower than they estimate HPV's seriousness or the HPV vaccine's efficacy.

I find that there are several "gaps" in trust. Compared to whites, African Americans have less trust in three of the six health-related institutions examined here. SES also plays an important role in shaping interpersonal/institutional trust, with those of higher SES having more trust than those of lower SES in their health care provider and three out of the five institutions. Although women are the disadvantaged gender compared to men, women have significantly more trust in the federal government than do men. I conclude that, overall, the t-tests and ANOVA show a pattern indicating that, with the exception of women, those of disadvantaged social conditions have less trust than those of privileged social conditions.

In this chapter, I confirm that there are inequalities in HPV vaccine uptake/attitudes, perceived risk, and interpersonal/institutional trust or, in other words, that social causes affect the outcomes, as well as the intervening mechanisms, risk and

trust. Although different social groups have different levels of perceived risk and interpersonal/institutional trust, these differences may not affect the strength of the relationships between risk, trust, and HPV vaccine uptake/attitudes. This is the subject of the next chapter in which I examine the HPV vaccine decision-making process by identifying the various indirect and direct effects of social causes, interpersonal/institutional trust, and perceived risk on HPV vaccine uptake/attitudes.

CHAPTER FIVE

THE HPV VACCINE DECISION-MAKING PROCESS

Introduction

In the last chapter, I show that the measurement model of trust I use in these analyses is valid and reliable. I also find that perceived risk and interpersonal/institutional trust are stratified by race/ethnicity SES, and gender. In this chapter, I test Hypotheses 10-18 and analyze the mechanisms through which social causes, six types of trust, and three types of perceived risk operate to affect the HPV vaccine decision-making process. That is, I explore the indirect and direct effects of social causes, interpersonal/institutional trust, and perceived risk on HPV vaccine uptake and two types of attitudes that are assumed to lead to uptake: HPV vaccine intentions and acceptance.

I test the conceptual model depicted in Figure 1 and described in Hypotheses 10-18. I predict that the HPV vaccine decision-making process functions in the following ways: social causes are directly associated with HPV vaccine uptake/attitudes, as well as indirectly through both perceived risk and interpersonal/institutional trust. Interpersonal trust is indirectly associated with HPV vaccine uptake/attitudes through institutional trust and both interpersonal and institutional trust are indirectly related to HPV vaccine uptake/attitudes through their relationships with perceived risk. In turn, perceived risk is

directly related to HPV vaccine uptake/attitudes. To test whether the HPV vaccine decision-making process operates in the way described above, I estimate two structural equation models, the first with HPV uptake as the main dependent variable (0-3 doses) among the analytical sample of 836 college students. The second structural model I estimate is among the 480 respondents who did not initiate the 3-shot HPV vaccine series with HPV attitudes (acceptance: "not at all willing"=1 to "extremely willing"=3 and intentions: "definitely won't"= 1 to "definitely will"=4) as the main dependent variables. On the one hand, I conceptualize the HPV vaccine decision-making process similarly for HPV vaccine uptake and attitudes. On the other hand, I suspect there may be differences across these two models, as one predicts the actual behavior of getting the HPV vaccine while the other involves individuals' willingness and intent to get the vaccine among those who did not already receive the vaccine. However, I have no specific hypotheses related to differences between the uptake and attitudes models.

I model the error terms for all of the endogenous variables (interpersonal/institutional trust, perceived risk, and HPV vaccine uptake/attitudes) for both structural models. I also model the correlations between the six types of trust with each other because I suspect that trust functions as a system in which trust in one institution is dependent on trust in other institutions (Mechanic 2006). Thus, while the six types of trust are distinct concepts, they are also likely correlated with one another, which the CFA results in Chapter Four support. For similar reasons, I model the hypothesized correlation between the different types of perceived risk and also between African American race and SES. Lastly, I model the correlation between African

American race and "Other" race/ethnicity because they are a set of dummy variables. Because fundamental cause theory claims that social causes affect health in a multitude of ways, I use the t-tests and ANOVA results in Chapter Four as a guide to specify which social causes are associated with which types of trust, perceived risk, and HPV vaccine uptake/attitudes.

Results

Bivariate Correlations

Bivariate correlations provide preliminary support for the hypothesized relationships between interpersonal/institutional trust, perceived risk, and HPV vaccine uptake/attitudes. Although I predict that trust is indirectly related to HPV vaccine uptake/attitudes through its relationship with perceived risk, which the bivariate correlations support, the bivariate correlations also suggest that interpersonal/institutional trust may directly affect HPV vaccine attitudes. As shown in Tables 8 and 9, all the trust constructs are significantly correlated with one another and health care provider trust is correlated with HPV vaccine uptake, intentions, and acceptance.

Additionally, the bivariate correlations indicate that there are some differences in the bivariate correlations for HPV vaccine uptake among the whole sample of 836 respondents, as opposed to HPV vaccine attitudes among the 480 college students who did not initiate the 3-shot HPV vaccine series. Among the whole sample, perceived HPV vaccine efficacy is significantly and positively correlated with all six types of trust, while among the subsample, perceived HPV vaccine efficacy is not associated with

Table 8. Bivariate Correlations among Perceived Risk, Interpersonal/Institutional Trust, and HPV Vaccine Uptake (N=836)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Health Care Provider	1.00								
(2) Health Care System	.495***	1.00							
(3) Pharmaceutical DTCA	.203***	.422***	1.00						
(4) Federal Government	.171***	.230***	.285***	1.00					
(5) Health Agencies	.254***	.264***	.238***	.319***	1.00				
(6) News Media	.209***	.220***	.256***	.309***	.229***	1.00			
(7) Perceived Efficacy	.160***	.177***	.116**	.122***	.141***	.158***	1.00		
(8) Perceived Severity	.094**	.060	.077*	.050	.077*	.030	.091**	1.00	
(9) HPV Vaccine Uptake	.068*	-.013	.073*	.010	.065	.047	.199***	.117**	1.00

* p≤ .05 **p≤ .01 ***p≤ .000

Table 9. Bivariate Correlations among Perceived Risk, Interpersonal/Institutional Trust, and HPV Vaccine Attitudes (N=480)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Health Care Provider	1.00										
(2) Health Care System	.541***	1.00									
(3) Pharmaceutical DTCA	.323***	.417***	1.00								
(4) Federal Government	.174***	.207***	.257***	1.00							
(5) Health Agencies	.252***	.298***	.237***	.299***	1.00						
(6) News Media	.216***	.222***	.269***	.304***	.247***	1.00					
(7) Perceived Susceptibility	.019	.038	.085	.045	.038	-.042	1.00				
(8) Perceived Efficacy	.142**	.153**	.060	.086	.150**	.152**	.199***	1.00			
(9) Perceived Severity	.070	.061	.095*	.079	.107*	-.016	.043	.086	1.00		
(10) HPV Vaccine Acceptance	.114*	.128**	.032	.131**	.092*	-.017	.410***	.303***	.135**	1.00	
(11) HPV Vaccine Intentions	.110*	.115*	.105*	.135**	.129**	-.005	.452***	.196***	.119**	.712***	1.00

* * p≤ .05 **p≤ .01 ***p≤

pharmaceutical DTCA and federal government trust. The correlates of perceived HPV severity are also different between the whole sample and the subsample, with severity being significantly correlated with health care provider, pharmaceutical DTCA, and health agencies trust. Perceived HPV severity is not significantly correlated with health care provider trust among the 480 respondents who had not received the vaccine.

There are also differences between the whole sample and the sub-sample in the bivariate correlations between trust and the outcome variables. Only health care provider and pharmaceutical DTCA trust are significantly correlated with HPV vaccine uptake, while all trust variables are significantly correlated with HPV vaccine attitudes except news media trust and pharmaceutical DTCA trust (acceptance only). These differences suggest that the process of decision making regarding the HPV vaccine is likely different for attitudes that are theorized to lead up to getting the vaccine versus actually getting it, which is what I test using SEM below.

For both groups, all six types of trust are highly correlated ($p \leq .000$). Trust in pharmaceutical DTCA is significantly correlated with HPV vaccine uptake and HPV vaccine intentions, but not with HPV vaccine acceptance. Except for news media trust, the other five types of trust are significantly correlated with both intentions and acceptance. Among the whole sample, perceived HPV vaccine efficacy is significantly correlated with all six types of trust, but among the subsample perceived efficacy is only correlated with health care provider, health care system, health agencies, and news media trust. Perceived HPV vaccine efficacy is also significantly correlated with all three outcome variables. Among the whole sample, perceived HPV severity is significantly

correlated with health care provider, pharmaceutical DTCA, and health agencies trust, while among the subsample, perceived HPV severity is significantly correlated with pharmaceutical DTCA and health agencies trust only. I now turn to testing these relationships simultaneously (as opposed to bivariate correlations).

SEM Model One: HPV Vaccine Uptake

After running the initial model with HPV vaccine uptake as the main dependent variable, the model did not fit the data well, as indicated by the chi-square statistic (X^2=64.118, df=35, p=.002; TLI=.942; IFI=.975; CFI=.974; RMSEA=.032). I use the modification indices as a guide for which structural paths I should add. I follow the recommendation of the modification indices and add the path if adding the parameter significantly improves model fit as indicated by a chi-square difference test and if adding that path is theoretically justifiable (Kline 2005). I add two parameters that, African American → HPV vaccine uptake and federal government trust → HPV vaccine uptake. After adding these two paths, the model fit is much better (X^2=45.877, df=32, p=.053; TLI=.970; IFI=.988; CFI=.988; RMSEA=.023). The final model with standardized estimates is illustrated in Figure 4. The unstandardized estimates and standard errors are shown in Table 10 as well.

Direct Effects of Perceived Risk. I find partial support for my hypothesis that perceived risk (efficacy and severity) is associated with HPV vaccine uptake. The results show that the different types of risk are differentially related to HPV vaccine uptake. Perceived HPV vaccine efficacy is positively associated with uptake. College students'

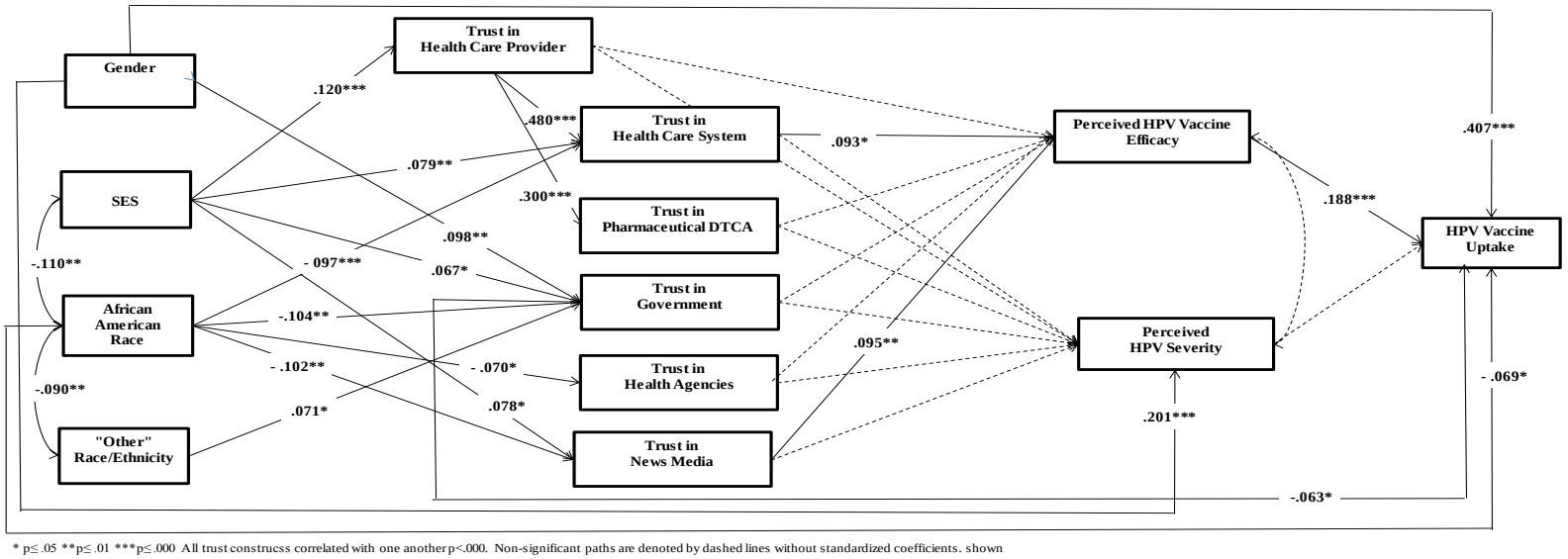

Figure 4. Final Model and Standardized Coefficients for HPV Vaccine Uptake (N=836)

Table 10. Unstandardized Parameter Estimates and Standard Errors for HPV Vaccine Uptake (N=836)

Path	b (SE)
Trust	
SES → Health Care Provider	.188 (.053)***
Health Care Provider → Health Care System	.411 (.026) ***
SES → Health Care System	.106 (.038)**
African American → Health Care System	-.248 (.073)***
Health Care Provider → Pharmaceutical DTCA	.306 (.034)***
Gender → Federal Government	.169 (054)**
SES → Federal Government	.094 (.045)*
African American → Federal Government	-.278 (.088)**
"Other" Race/Ethnicity → Federal Government	.211 (.092)*
African American → Health Agencies	-.191 (.082)*
SES → News Media	.089 (.038)*
African American → News Media	-.223 (.072)**
Perceived HPV Risk	
Gender → Severity	.224 (.038)***
Health Care Provider → Efficacy	.034 (.019)
Health Care System → Efficacy	.054 (.024)*
Pharmaceutical DTCA→ Efficacy	.002 (.019)
Federal Government→ Efficacy	.021 (.021)
Health Agencies→ Efficacy	.038 (.22)
News Media → Efficacy	.065 (.025)**
Health Care Provider → Severity	.065 (.023)
Health Care System → Severity	.007 (.028)
Pharmaceutical DTCA→ Severity	.018 (.022)
Federal Government → Severity	-.005 (.024)
Health Agencies → Severity	.032 (.026)
News Media → Severity	.004 (.029)
HPV Vaccine Uptake	
Gender → Uptake	1.23 (.096)***
Federal Government → Uptake	-.109 (.054)*
African American → Uptake	-.323 (.145)*
Efficacy → HPV Uptake	.592 (.098)***
Severity→ HPV Uptake	.054 (.085)

* p≤ .05 **p≤ .01 ***p≤ .000

belief about whether the vaccine works is associated with how many doses of the vaccine they received. In contrast, respondents' perceptions about how serious an illness HPV is do not affect HPV vaccine uptake.

The Relationship between Interpersonal and Institutional Trust. My findings in Model One support my hypothesis that interpersonal trust leads to institutional trust, as interpersonal trust in one's health care provider is significantly and positively associated with trust in the two institutions that are most directly associated with health care: the health care system and pharmaceutical DTCA. I find further support for the predicted relationship between interpersonal and institutional trust in that *all* of the covariances between the various types of trust are statistically significant ($p \leq .000$). Thus, those who have relatively low or high trust in their health care provider or one institution also have similar levels of trust in other institutions. See Table 11.

Indirect and Direct Effects of Interpersonal/Institutional Trust. I hypothesize that trusting in one's health care provider and five health-related institutions leads to getting the HPV vaccine through its effects on perceived risk. My findings in Model One support my claim that higher levels of trust lead to more perceived risk. None of the six types of trust affect college students' perceptions of how serious an illness HPV is (perceived HPV severity). Although I predict that all six types of trust are associated with both types of perceived risk, I find support for only a few of these hypotheses.

Two types of trust measured here are positively associated with risk perceptions. Health care system and news media trust are significantly related to perceived HPV

Table 11. Covariances for HPV Vaccine Uptake (N=836)

	b (SE)
Social Causes	
African American ↔ "Other" race/ethnicity	-.007 (.003)**
African American ↔ SES	-.018 (.006)**
Trust	
Health Care Provider ↔ Federal Government	.111 (.024)***
Health Care Provider ↔ Health Agencies	.160 (.023)***
Health Care Provider ↔ News Media	.111 (.020)***
Health Care System ↔ Pharmaceutical DTCA	.187 (.021)***
Health Care System ↔ Federal Government	.082 (.018)***
Health Care System ↔ Health Agencies	.072 (.016)***
Health Care System ↔ News Media	.049 (.014)***
Pharmaceutical DTCA↔ Federal Government	.165 (.024)***
Pharmaceutical DTCA↔ Health Agencies	.108 (.021)***
Pharmaceutical DTCA↔ News Media	.112 (.019)***
Federal Government ↔ Health Agencies	.176 (.021)***
Federal Government ↔ News Media	.148 (.018)***
Health Agencies ↔ News Media	.102 (.017)***
Perceived Risk	
Efficacy ↔ Severity	.013 (.007)

* p≤ .05 **p≤ .01 ***p≤ .000

vaccine efficacy. Those who trust the health care system and the news media are more likely to think that the HPV vaccine works in preventing HPV/HPV-related diseases. The more individuals trust their health care provider, the more they trust the health care system and so health care provider trust is associated with efficacy through health care system trust. In turn, perceived efficacy is positively associated with HPV vaccine uptake. Because of their relationships with perceived HPV vaccine efficacy, health care provider, health care system, and news media trust indirectly affect HPV vaccine uptake.

I conceptualize the HPV vaccine decision-making process with trust indirectly affecting uptake through risk and I find partial support for this conceptualization, as described above. I also find that institutional trust is directly associated with uptake in

that trust in the federal government is inversely related to HPV vaccine uptake. Those with higher levels of trust in the leaders in Washington to do the right thing are significantly less likely to have received the HPV vaccine. I did not predict that any of the types of trust would be directly related to uptake and the relationship is in a counterintuitive direction.

While trust in doctors and the health care system do affect HPV vaccine uptake, results of Model One show that trust in other institutions that are seemingly disconnected from the health care system (i.e., the media and the government), are also predictors of uptake. Model One also shows that while trust operates through risk perceptions as I predicted, it is directly associated with uptake as well. In other words, trust has an effect on decisions whether to get the HPV vaccine through mechanisms not included in this study.

Indirect and Direct Effects of Social Causes. Social causes affect HPV vaccine uptake through several pathways. First, gender and race are directly associated with uptake in that men and African Americans are significantly less likely to have received the HPV vaccine than are women and whites. Second, gender, race/ethnicity, and SES are indirectly related to uptake through their associations with federal government trust. All of the social causes (gender, race/ethnicity, and SES) are significantly related to federal government trust, which means that they are indirectly associated with uptake. Women, high SES, whites, and "other" race/ethnicity have higher levels of trust in the federal government than do men, low SES, African Americans, and Whites, respectively. In turn, federal government trust is inversely related to HPV vaccine uptake.

Social causes are also indirectly related to uptake through the four types of trust that are associated with efficacy, which in turn is associated with uptake. SES is indirectly associated with uptake through health care provider, health care system, and news media trust, with higher SES having more trust than lower SES. African Americans have significantly less trust in the health care system and the news media, which are indirectly associated with uptake.

There are several pathways through which college students received the HPV vaccine. I predicted that social causes directly and indirectly affect HPV vaccine uptake and that interpersonal/institutional trust is associated with perceived risk. I hypothesized that perceived risk would then lead to HPV vaccine uptake. I find that the HPV vaccine decision-making process does in fact function this way, but that there are other pathways from social causes to HPV vaccine uptake that do not operate through trust. Furthermore, the mechanism through which trust affects uptake is not always through perceived risk.

SEM Model Two: HPV Vaccine Attitudes

I follow the same procedure described above to estimate a SEM with HPV vaccine acceptance and intentions as the outcome variables. This analysis is only on the 480 individuals who did not initiate the 3-shot HPV vaccine series. The original model (see Figure 1) fits the data reasonably well, but the model fit is not ideal because the chi-square statistic is significant (X^2=66.461, df=47, p=.032; TLI=.960; IFI=.983; CFI=.982; RMSEA=.029). The modification indices suggest I add a parameter from African American race to HPV vaccine intentions, which I do because it significantly improves the model fit, as indicated by a Chi-square test, and because it seems reasonable that

intent to get the vaccine within the upcoming year varies by race. As a result of adding this parameter, the chi-square statistic and the fit indices improve (X^2=62.333, df=46, p=.055; TLI=.966; IFI=.986; CFI=.985; RMSEA=.027). The final model is depicted in Figure 5. The unstandardized coefficients and standard errors are shown in Table 12.

Direct Effects of Perceived Risk. As predicted, all three types of perceived risk are significantly and positively related to HPV vaccine acceptance. However, only perceived HPV/HPV related diseases susceptibility and perceived HPV vaccine efficacy, but not perceived HPV severity, are associated with HPV vaccine intentions. Thus, believing that one's self is going to get HPV/HPV-related diseases and that the vaccine works are more important for HPV vaccine attitudes than thinking that HPV is a serious disease.

The Relationship between Interpersonal and Institutional Trust. My findings support my hypothesis that interpersonal leads to institutional trust. Trust in one's health care provider is significantly and positively associated with health care system trust and pharmaceutical DTCA trust. All of the other types of institutional trust are also related to one another. The two main dependent variables, HPV vaccine acceptance and intentions, are highly correlated (r=.620), while the rest of the covariances are not large (r=.063 to r=.310). (Table 13)

Indirect and Direct Effects of Institutional Trust. One of the aims of this study is to identify what types of institutional trust affect individuals' risk perceptions regarding

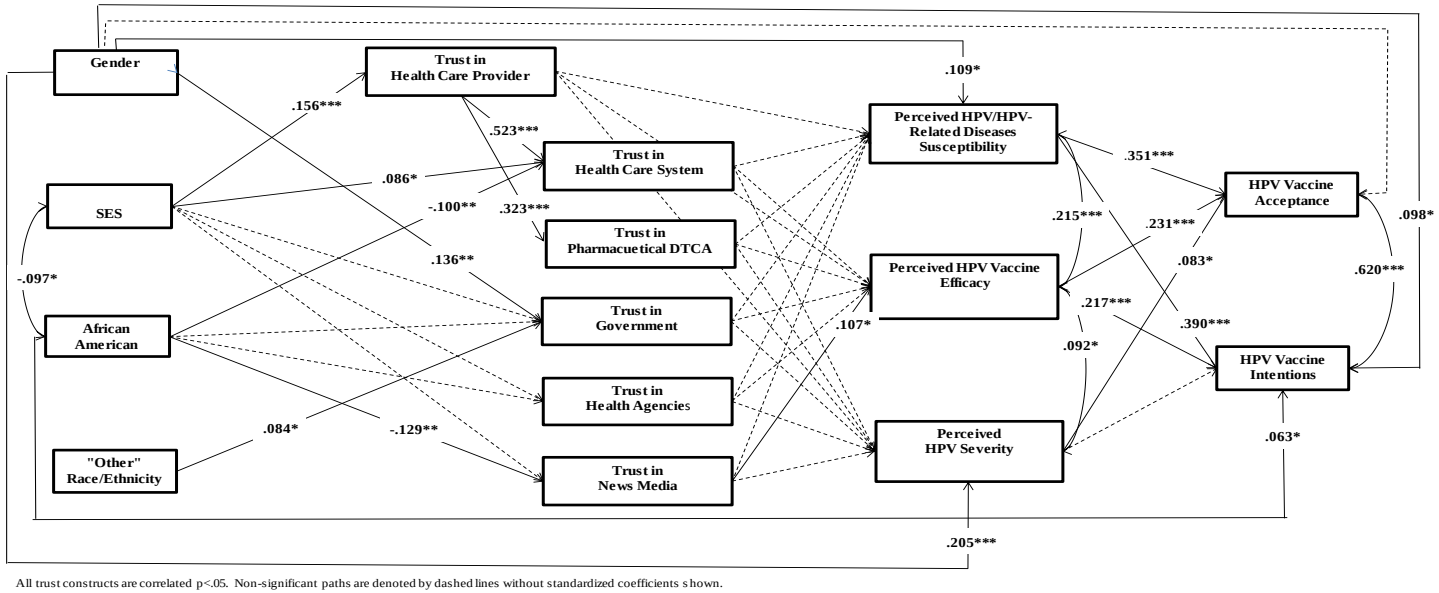

Figure 5. Final Model and Standardized Coefficients for HPV Vaccine

Table 12. Unstandardized Parameter Estimates and Standard Errors for Structural Model for HPV Vaccine Attitudes (N=480)

Parameter	b (SE)
Trust	
SES → Health Care Provider	.259 (.075)***
Health Care Provider → Health Care System	.423 (.031)***
SES → Health Care System	.116 (.049)*
African American Race → Health Care System	- .240 (.087)**
Health Care Provider → Pharmaceutical DTCA	.330 (.044)***
Gender → Federal Government	.214 (.066)**
African American → Federal Government	-.209 (.112)
"Other" Race/Ethnicity → Federal Government	.250 (.124)*
SES → Federal Government	.073 (.063)
African American → Health Agencies	-.198 (.106)
SES → Health Agencies	.110 (.062)
African American Race → News Media	-.277 (.093)**
SES → News Media	.072 (.053)
Perceived HPV Risk	
Gender → Susceptibility	.095(.039)*
Health Care Provider → Susceptibility	-.007 (.026)
Health Care System → Susceptibility	-.009 (.034)
Pharmaceutical DTCA → Susceptibility	.039 (.024)
Federal Government → Susceptibility	.012 (.028)
Health Agencies → Susceptibility	.013 (.029)
News Media→ Susceptibility	-.046 (.033)
Health Care Provider → Efficacy	.030 (.025)
Health Care System → Efficacy	.049 (.032)
Pharmaceutical DTCA → Efficacy	-.023 (.023)
Federal Government → Efficacy	.006 (.026)
Health Agencies → Efficacy	.051 (.027)
News Media → Efficacy	.068 (.031)*
Gender → Severity	.217 (.048)***
Health Care Provider → Severity	.017 (.031)
Health Care System → Severity	.001 (.040)
Pharmaceutical DTCA → Severity	.034 (.029)
Federal Government → Severity	.014 (.033)
Health Agencies → Severity	.058 (.034)
News Media → Severity	-.043 (.039)
HPV Vaccine Acceptance/Intentions	
Gender → Acceptance	.102 (.056)
Susceptibility → Acceptance	.544 (.064)***
Efficacy → Acceptance	.369 (.066)***
Severity → Acceptance	.106 (.052)*
Gender → Intentions	.151 (.063)*
African American Race→ Intentions	.159 (.078)*
Susceptibility → Intentions	.692 (.071)***
Efficacy → Intentions	.397 (.074)***
Severity→ Intentions	.088 (.059)

* p≤ .05 **p≤ .01 ***p≤ .000

Table 13. Covariances for HPV Vaccine Attitudes (N=480)

	b (SE)
Social Causes	
African American ↔ "Other" race/ethnicity	-.008 (.004)*
Trust	
Health Care Provider ↔ Federal Government	.115 (.032)***
Health Care Provider ↔ Health Agencies	.159 (.031)***
Health Care Provider ↔ News Media	.119 (.027)***
Health Care System ↔ Pharmaceutical DTCA	.166 (.026)***
Health Care System ↔ Federal Government	.062 (.021)**
Health Care System ↔ Health Agencies	.083 (.020)***
Health Care System ↔ News Media	.043 (.015)*
Pharmaceutical DTCA↔ Federal Government	.142 (.031)***
Pharmaceutical DTCA↔ Health Agencies	.109 (.029)***
Pharmaceutical DTCA↔ News Media	.123 (.026)***
Federal Government ↔ Health Agencies	.166 (.027)***
Federal Government ↔ News Media	.152 (.024)***
Health Agencies ↔ News Media	.113 (.023)***
Perceived Risk	
Susceptibility ↔ Efficacy	.038 (.008)***
Efficacy ↔ Severity	.019 (.009)*
HPV Vaccine Attitudes	
Intentions ↔ Acceptance	.239 (.021)***

* p≤ .05 **p≤ .01 ***p≤ .000

HPV and the HPV vaccine. I find that only one of the six types of trust is related to perceived risk, in that higher levels of trust in the news media is associated with thinking that the vaccine is effective in preventing HPV, HPV-related cancers, and genital warts. Neither trust in one's doctor nor the five health care-related institutions influence whether individuals think that they are going to get HPV, HPV-related diseases, or whether they think that HPV is a serious disease.

Indirect and Direct Effects of Social Causes. I find that social causes affect acceptance and intentions directly, as well as indirectly through news media trust and indirectly through perceived risk. Women and African Americans are more likely to intend to get the HPV vaccine in the upcoming year than are men and whites. In addition to the direct, inverse relationship between African American race and HPV vaccine intentions, African Americans also have an indirect relationship with HPV vaccine acceptance and intentions. Blacks, compared to whites, have significantly less news media trust, which in turn is associated with higher perceived HPV vaccine efficacy, which leads to higher levels of HPV vaccine intentions and acceptance.

The only factor associated with perceived risk other than news media trust is gender, with women more so than men thinking that HPV is a serious disease and that they are likely to contract HPV/HPV-related diseases at some point in their life. My findings show that women are more likely to think that they are going to contract HPV/HPV-related diseases than are men, which then leads to greater intentions and willingness to get the vaccine, but women are also more likely to intend to get the vaccine independent of their individual risk perceptions. Gender also has an indirect

relationship with HPV vaccine acceptance through severity, with women reporting higher levels of perceived severity, which is significantly and positively associated with acceptance. Therefore, there are multiple pathways through which women come to have greater intentions and/or willingness to get the HPV vaccine than men do: 1) independent from trust or risk; 2) through their higher trust in the news media; 3) through their higher perceived susceptibility to HPV/HPV-related diseases; and 4) through their perceptions of the seriousness of HPV.

Summary: HPV Vaccine Acceptance, Intentions, and Uptake

I find support for the HPV vaccine decision-making process operating as depicted in Figure 1 and described in Hypotheses 1-10, in which social causes affect HPV vaccine uptake and attitudes directly, as well as through several of the types of trust and risk. However, I find that interpersonal and institutional trust affect HPV vaccine uptake and attitudes (intentions and acceptance) not only through perceived risk, but also directly. As indicated by the squared multiple correlations, the conceptual model describes attitudes among those who did not receive the vaccine better than it describes the model with uptake among the whole sample.

My findings regarding the process of decision-making about the HPV vaccine indicate that the news media has the most consistent role in this process across the three outcomes. Contrary to the findings regarding the other health care-related institutions, news media trust is related to all three outcomes through its positive association with perceived HPV vaccine efficacy. The more individuals trust the news media, the more they think the HPV vaccine works, and, in turn, the more likely they are to have received

it; the more willing they are to receive it; and the more they intend to receive the vaccine within the upcoming year.

Perceived HPV vaccine efficacy is a more important determinant of all three outcomes than is perceived HPV severity. Thus, for HPV vaccine uptake, intentions, and acceptance, whether college students think the vaccine works affects their decision more so than whether they think HPV is a serious disease. Whether individuals think that HPV is a serious disease is associated with the outcome variable farthest removed from the behavior of getting the vaccine: one's willingness to receive the vaccine (acceptance). Susceptibility is a strong predictor of both intentions and acceptance, meaning that college students who believe they are going to get HPV/HPV-related diseases in the future are likely to report that they are willing to get the vaccine and intend to do so within the next year.

My findings point to the significance of gender in the HPV vaccine decision-making process, as gender has a variety of direct and indirect relationships with HPV vaccine uptake, intentions, and acceptance. Women are more likely than men to report that they received the HPV vaccine and that they intend to in the upcoming year. Women also perceive themselves to be susceptible to HPV/HPV-related diseases, which in turn is associated with willingness and intent to get the vaccine. Women, compared to men, have significantly more trust in the federal government, which is inversely associated with HPV vaccine uptake. Because gender seems to have a robust and strong relationship with HPV vaccine uptake/attitudes, a further investigation of the role of gender is warranted. In Chapter Six, I explore gender differences in the relationships

between social causes, interpersonal/institutional trust, perceived risk, and HPV vaccine uptake/attitudes.

CHAPTER SIX

GENDER AND THE HPV VACCINE

Introduction

Gender is a significant factor is shaping individuals' attitudes toward the HPV vaccine. Since the HPV vaccine was only recently recommended by the CDC to be administered to men in October 2011 (Brady et al. 2012), some researchers have questioned whether there are different predictors of HPV vaccine uptake/attitudes for men and women (Brewer, Ng, McRee, and Reiter 2010; McRee, Reiter, Chantala, and Brewer 2010; Gerend and Barley 2009; Zimet and Rosenthal 2010). In regards to gender, public health officials have two goals: to encourage/convince men to receive the HPV vaccine and to increase HPV vaccination rates among women. Not only might women and men have different levels of interpersonal and institutional trust as indicated by the results of the analyses described in Chapter Five, but the relationships between trust, risk, and HPV vaccine attitudes may vary as a function of gender. For those who want to encourage HPV vaccination for *all* individuals who are eligible (women and men ages 9-26), or to increase vaccination rates among boys specifically, it is important to establish whether targeted programs/interventions are necessary. The goal of this chapter is to better understand variation in the process through which individuals form attitudes about the HPV vaccine and, specifically, the role of gender in this process.

Plan of Analysis

To explore gender differences in attitudes about the HPV vaccine, I test the null hypothesis that there are no group (women and men) differences in the HPV vaccine decision-making process. Although it would be interesting to also test race/ethnicity and SES group differences, the estimates would likely be biased because the number of individuals in each group is not equivalent. For similar reasons, it is not possible to estimate a gender multi-group SEM model for HPV uptake, with only 31 out of 216 men in this sample having initiated the vaccine series, eleven of which who completed the 3-shot series. There are also theoretical justifications for why I choose to focus on gender, as I discussed above.

I test the same conceptual model as in previous models with HPV vaccine attitudes (see Figure 1). If a chi-square difference test indicates that the unconstrained model fits the data better than the model in which all of the parameters are constrained to be equal, then I can reject the null hypothesis. The multi-group analysis is completed in three steps. First, I test whether the conceptual model tested in Chapter Five, but with the variable gender removed, fits the data equally well for women and men. The Chi-Square statistic and the fit indices suggest that the unconstrained model fits the data well (X^2=94.865, df=76, p=.070; TLI=.957; IFI=.984; CFI=.982; RMSEA=.023), suggesting that there may be significant gender differences in the relationships between social causes, trust, risk, and HPV vaccine attitudes. Second, I constrain all of the paths to be equal and determine whether the unconstrained and constrained models fit the data equally well by examining the chi-square statistic and the other fit indices. Compared to

the unconstrained model, the constrained model fits the data better (X^2=131.103, df=112, p=.105; TLI=.957; IFI=.984; CFI=.982; RMSEA=.019). Therefore, I do not reject the null hypothesis that there are no gender differences.

Even though the process of developing attitudes toward the HPV vaccine is generally the same for women and men, as the model fit the data equally well for women and men, I nonetheless continue the multi-group analysis to identify more specifically what relationships on which women and men may differ. The modification indices suggest that I add several parameters, but only one significantly improves model fit, according to a chi-square test. After adding a path from pharmaceutical DTCA trust to HPV vaccine intentions, the unconstrained model (X^2=83.269, df=74, p=.216; TLI=.978; IFI=.992; CFI=.991; RMSEA=.016) fits the data better than the constrained model (X^2=125.101, df=111, p=.170; TLI=.978; IFI=.987; CFI=.986; RMSEA=.016), but this difference is not statistically significant.

Next, I examine the structural coefficients to determine whether constraining certain parameters significantly improves model fit. I begin constraining each parameter one at a time, conducting a chi-square difference test, and keeping it constrained unless constraining it significantly improves model fit. When parameters are unconstrained, they are free to be estimated differently for women and men. If a chi-square difference test indicates that having a certain parameter released significantly improves model fit, then this relationship differs significantly between women and men.

Results

Descriptive statistics for the key analytic variables among this subsample of the 480 respondents, 264 women and 216 men, who have not initiated the 3-shot HPV vaccine series are shown in Table 14. This sub-sample is about 65 percent white, while about 83 percent of the whole sample of 836 college students is white. This reflects the greater proportion of racial/ethnic minorities who have not initiated the HPV vaccine series. Among the six trust constructs, the only one in which there is a significant gender difference is that women have significantly higher levels of trust in the federal government. Among the perceived risk variables, women perceive themselves to be significantly more susceptible to contracting HPV/HPV-related diseases. Women also believe that HPV is a serious disease more so than men do. Women and men have similar perceptions about whether the vaccine is effective in preventing HPV, genital warts, and HPV-related cancers. Women are also more likely than men to report that they are willing to receive the vaccine and that they intend to do so in the next year. These results for HPV vaccine acceptance and intentions are the same as those reported in Chapter Four for the whole sample of 836 respondents.

Bivariate Correlations

Since I have no specific hypotheses regarding gender differences in the structural relationships, this portion of the analysis is mainly exploratory. Thus, I am testing the null hypothesis that there are no significant differences between women and men in the relationships between social causes, trust, perceived risk, and HPV vaccine acceptance/intentions. Although I do not have specific hypotheses, the bivariate

Table 14. Descriptive Statistics by Gender (N=480)

	Women (N=264)		Men (N=216)		
Construct	Mean (SD) or N (%)	Alpha	Mean (SD) or N (%)	Alpha	Range
Social Causes					
African American Race[1]	N=36 (13.4%)		N=15 (6.95)		1= African American
"Other" Race/Ethnicity	N=20 (7.5%)		N=16 (7.4%)		1= "Other" Race/Ethnicity
SES	2.61 (.539)		2.64 (.552)		1= low SES to 3= high SES
Trust[2]					
Health Care Provider	4.17 (.877)	*a*=.916	4.01 (.940)	*a*=.931	1=strongly disagree to 6=strongly agree
Health Care System	3.59 (.688)	*a*=.807	3.58 (.789)	*a*=.832	1=strongly disagree to 6=strongly agree
Pharmaceutical DTCA	2.92 (.922)	*a*=.925	2.77 (.948)	*a*= 9.23	1=strongly disagree to 6=strongly agree
Federal Government	3.42 (.725)	-	3.34 (.774)**	-	1=never to 5=always
Health Agencies	3.41 (.727)	*r*=7.86	3.34 (.774)	*r*= .749	1=never to 5=always
News Media	2.91 (.640)	*a*=.758	2.98 (.671)	*a*=.742	1=never to 5=always
Perceived Risk					
Susceptibility	1.39 (.429)	*a*= .745	1.29 (434)*	*a*= .861	1=not at all to 3=extremely
Efficacy	2.05 (.445)	*a*= .732	2.12 (.386)	*a*=.640	1=not at all to 3=extremely
Severity	2.63 (2.41)	-	.241 (.529)***	-	1=not at all to 3=extremely
HPV Vaccine Attitudes					
Intentions	2.01 (7.93)		1.81 (.721)**		1= definitely won't to 4=definitely will
Acceptance	1.94 (.693)		1.80 (.629)*		1=not at all to 3=extremely

* p≤ .05 **p≤ .01 ***p≤ .000 [1]Whites are the excluded group [2]For all types of trust, higher values indicate more trust.

correlations as shown in Tables 15 and 16, suggest that the direct and indirect relationships with the main dependent variables (acceptance and intentions) are different for women than they are for men. Specifically, health care provider and health care system trust are significantly correlated with HPV vaccine acceptance among women, but none of the types of trust are significantly correlated with HPV vaccine acceptance among men. Additionally, health care provider trust is the only type of trust that is significantly correlated with HPV vaccine intentions among women, but health care provider and news media trust are the only two types of trust that are not correlated with HPV vaccine intentions among men.

Gender Differences in the HPV Vaccine Decision-Making Process

There are only two relationships that significantly differ between women and men, as shown in bolded font in Table 17. Unstandardized estimates, standard errors, and standardized estimates for significant relationships ($p \leq .05$) are also shown in Table 17. As in the previous model for attitudes in Chapter Five, and here for both women and men, the only type of trust that is related to any of the three types of perceived risk is trust in the news media, which is positively associated with perceived HPV vaccine efficacy. Thus, whether individuals believe they are likely to acquire the diseases that the vaccine is supposed to prevent significantly shapes whether they are willing and intend to get the vaccine.

There are two relationships in which women and men significantly differ (shown in bold font in Table 17). The first is that, among women, the positive relationship between perceived HPV vaccine efficacy and HPV vaccine acceptance is much stronger

Table 15. Bivariate Correlations among Women between Perceived Risk, Interpersonal/Institutional Trust, and HPV Vaccine Attitudes (N=480)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Health Care Provider	1.00										
(2) Health Care System	.536***	1.00									
(3) Pharmaceutical DTCA	.325***	357***	1.00								
(4) Federal Government	.237**	.162**	232***	1.00							
(5) Health Agencies	.264**	225***	.203**	.291***	1.00						
(6) News Media	.282***	222***	.297	.309***	.227***	1.00					
(7) Susceptibility	.096	.009	.029	.069	.029	.018	1.00				
(8) Efficacy	.122*	.128*	.037	.111	.150*	.125*	.253***	1.00			
(9) Severity	.078	.078	.074	.069	.109	.002	-.041	.184**	1.00		
(10) Acceptance	.186**	.128*	-.012	.115	.058	.017	.405***	.430***	.085	1.00	
(11) Intentions	.151*	.071	-.006	.078	.089	.022	.421***	.363***	097	.697***	1.00

*p≤ .05 **p≤ .01 ***p≤

Table 16. Bivariate Correlations among Men between Perceived Risk, Interpersonal/Institutional Trust, and HPV Vaccine Attitudes (N=480)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Health Care Provider	1.00										
(2) Health Care System	.547***	1.00									
(3) Pharmaceutical DTCA	.317***	.481***	1.00								
(4) Federal Government	.103	.252***	.270***	1.00							
(5) Health Agencies	.236***	.373***	.269***	.301***	1.00						
(6) News Media	.150*	.223**	.247***	.324***	.277***	1.00					
(7) Susceptibility	-.075	.068	.135*	-.010	.038	-.098	1.00				
(8) Efficacy	.179**	.188**	.105	.086	.164*	.181**	.151*	1.00			
(9) Severity	.047	.044	.091	.032	.088	-.009	.092	.003	1.00		
(10) Acceptance	.016	.130	.073	.120	.123	-.046	.401***	.136*	.153*	1.00	
(11) Intentions	.049	.169*	.230**	.166*	.168*	-.020	.475***	.231**	.087	.722***	1.00

*p≤ .05 **p≤ .01 ***p≤ .000

Table 17. Gender Multi-Group Model for HPV Vaccine Attitudes: Unstandardized Estimates, Standard Errors, and Standardized Estimates (N=480)

	Women (N=264)		Men (N=216)	
Parameter	b (SE)	r	b (SE)	r
Trust				
SES → Health Care Provider	.255 (.075)***	.156	.255 (.075)***	.151
Health Care Provider → Health Care System	.422 (.031)***	.536	.422 (.031)***	.510
SES → Health Care System	.115 (.049)*	.089	.115 (.049)*	.082
African American → Health Care System	-.228 (.086)**	-.111	-.228 (.086)**	-.075
Health Care Provider → Pharmaceutical DTCA	.327 (.044)***	.318	.327 (.044)***	.321
African American → Federal Government	-2.16 (.109)*	-.100	-2.16 (.109)*	-.066
"Other" Race/Ethnicity → Federal Government	.262 (.123)*	.095	.262 (.123)*	.082
African American → News Media	-.261 (.092)**	-.137	-.261 (.092)**	-.100
Perceived Risk				
News Media → Efficacy	.063 (.031)*	.091	.063 (.031)*	.108
HPV Vaccine Attitudes				
Susceptibility → Acceptance	.540 (.063)***	.336	.540 (.063)***	.370
Efficacy → Acceptance	**.481 (.078)*** **	**.309**	**.192 (.088)***	**.118**
Pharmaceutical DTCA → Intentions	**-.004 (.038)**	**-.005**	**.111 (.033)*** **	**.145**
Susceptibility → Intentions	.689 (.071)***	.378	.689 (.071)***	.409
Efficacy → Intentions	.387 (.074)***	.219	.387 (.074)***	.206

* p≤ .05 **p≤ .01 ***p≤ .000 **Bolded** coefficients denote that there is not an equality constraint placed on that path.

among women (β=.309, p≤.000) than it is among men (β=.118, p≤.05) and this difference is statistically significant (p≤.000). Therefore, among those who have not received the HPV vaccine, if women believe that the vaccine is effective in preventing HPV and HPV-related diseases, they are much more willing to get the vaccine. Men's perceptions about the efficacy of the vaccine do not matter as much in regards to their willingness to get the vaccine. However, for both women and men, perceived HPV vaccine efficacy is significantly associated with HPV vaccine intentions and the effect-size is relatively large for both genders (β=.21, β=.206). In other words, perceived HPV vaccine efficacy is an important factor in whether one intends on getting the vaccine, but is a stronger influence on women's willingness to receive the vaccine. For both women and men, whether individuals think that HPV is a serious disease affects neither their willingness to receive the vaccine nor the likelihood that they will receive it.

The second relationship that significantly differs between women and men is between trust in pharmaceutical DTCA and HPV vaccine intentions. Among men (β=.145, p<.000), but not women, those with higher levels of trust in drug advertisements are significantly more likely to report that they intend to receive the vaccine within the upcoming year. Women's trust in pharmaceutical DTCA does not matter for whether they intend to receive the vaccine (β=.-.005).

Summary

Most of the relationships I find in Model Two in Chapter Five between social causes, risk, trust, and HPV vaccine attitudes I also find here in Chapter Six in the multi-

group model by gender. However, there are two exceptions. First, women's perceptions about whether the vaccine works matters much more for their willingness to get the vaccine than it does for men. Second, whether men trust advertisements about prescription drugs significantly affects their intent to receive the vaccine in the next 12 months, while this type of trust does not affect women's intent to get the vaccine. Since trust in one's health care provider is significantly associated with trust in pharmaceutical DTCA (for both women and men), health care provider trust has an indirect relationship with HPV vaccine intentions among men. Overall, I do not find that there a lot of gender differences in how women and men perceive the risks and benefits of the HPV vaccine and how these perceptions affect their willingness/intent to receive the vaccine.

CHAPTER SEVEN

DISCUSSION AND CONCLUSIONS

Given the low, declining, and unequal distribution of HPV vaccination, this study asks: *what are the factors that affect HPV vaccine uptake and attitudes*? To explain variation in HPV vaccine uptake/attitudes, I draw from three theoretical perspectives. First, I use the Health Belief Model (HBM) to identify health beliefs that may provide college students with motivation to get the HPV vaccine and/or increase their willingness and intent to get the vaccine. Second, because the HBM does not account for the structural inequalities that shape health beliefs, I borrow from fundamental cause theory to highlight the multiple ways that social causes affect HPV vaccine uptake/attitudes through perceived risk and trust. Finally, because there is a great deal of uncertainty (and controversy) about the HPV vaccine, I rely on the sociological literature on trust, which suggests that an important mechanism through which social causes affect HPV vaccine uptake/attitudes is through individuals' perceptions of the trustworthiness of the people and institutions who made risk claims about HPV and the HPV vaccine. Based on the HBM, fundamental cause theory, and the sociology of trust, I developed and tested a conceptual model for how the HPV vaccine decision-making process operates. This study highlights the necessity for all of the various pathways from social causes, trust, and risk to HPV vaccine uptake/attitudes to be tested simultaneously—ideally over

time—and, in so doing, recognizing that the HPV decision-making process is indeed a *process*.

Theoretical Contributions

The Health Belief Model

While I use the HBM as a basis on which to build, this study is not a direct test of the full model. Rather, the purpose of this study is to contribute to the HBM by including the social context in which individuals develop risk perceptions and make decisions about the HPV vaccine. Specifically, I contribute to the HBM by incorporating fundamental cause theory and the sociology of trust and thus consider how social causes and interpersonal/institutional trust structure health beliefs. These are considerations that are neglected in most studies employing the HBM (Taylor et al. 2006).

Findings in Chapter Five support the main tenet of the HBM that individual-level risk perceptions are significant predictors of preventative health care utilization and findings also suggest that individuals are more likely to get the HPV vaccine if they consider HPV to be a serious disease in which the HPV vaccine is effective in preventing. However, it is more important for predicting HPV vaccine uptake/attitudes for people to think they are personally at risk of contracting the disease. This is consistent with other studies that show that perceived vulnerability to HPV/HPV-related diseases and perceived benefits of the HPV vaccine increase the likelihood that people get the HPV vaccine or are willing to get it (Boehner, Howe, Bernstein, and Rosenthal 2003; Brabin et al. 2006; Brewer and Fazekas 2007; Davis, Dickman, Ferris, and Dias 2004; Dempsey,

Zimet, Davis, and Koutsky 2006; Ferris, Cromwell, Waller, and Horn 2010; Friedman and Shepeard 2007; Olshen et al., 2005; Patel, Zochowski, Peterman, Dempsey, Ernst, and Dalton 2012; Reiter, Brewer, Gottlieb, McRee, and Smith 2009; Zimet et al. 2000). This study also supports prior research on the HBM showing that, compared to perceived susceptibility and efficacy, severity does not have a strong effect on the adoption of a preventative health measure (Boehner et al. 2003; Dempsey et al. 2006; Kahn et al., 2005; Nan et al. 2014; Patel et al. 2012). Since the development of the HBM, other studies have produced similar results concerning the influence of the different types of health beliefs on health behavior (Carpenter 2010; Rosenstock et al. 1994), including studies on the HPV vaccine (See Brewer and Fazekas 2007).

I find support from the HBM's claim that individuals' risk perceptions motivate them to engage in a preventative health behavior. I also expand upon the HBM to incorporate the social context in which those health beliefs develop by examining the factors— social causes and trust—that affect health beliefs. Rather than just focusing on health beliefs, in alignment with fundamental cause theory, I argue that a more critical point of emphasis is how gender, race/ethnicity, and SES shape perceived risk.

Social Causes of Perceived Risk. The context surrounding the development, approval, marketing, and distribution of the HPV vaccine likely accounts for my results, which show gender, but not racial/ethnic or SES, differences in perceived HPV severity and HPV/HPV-diseases susceptibility. Both genders may think that only females can get HPV and that the main consequence is cervical cancer since *Gardasil* was first developed, approved, marketed, and administered for girls only (Markowitz et al. 2007).

The gender-specific content of the advertising campaigns and the public discourse surrounding *Gardasil* probably accounts for the gender differences in perceived risk I find here. Furthermore, the media constructed HPV as a women's problem (Mamo et al. 2010). Specifically, the public service announcements (PSAs), direct-to-consumer advertisements, FDA/CDC approval for girls only, and the controversy around HPV vaccination mandates all contributed to an understanding that HPV is a severe disease for women, but not necessarily for men. The sexual transmission of HPV was downplayed; the focus remained on cervical cancer to the exclusion of genital warts and other cancers; and HPV risk was implied to apply to all women regardless of race/ethnicity or class (Mamo et al. 2010; Rothman and Rothman 2009). This context ensured that the HPV vaccine would remain a women's health issue even after it was approved for males.

Perceived Risk and Interpersonal/Institutional Trust. In addition to exploring how social causes structure perceived risk, I also contribute to the HBM by examining how perceptions of trustworthiness of people and institutions who made risk claims about the HPV vaccine may have shaped individuals' health beliefs. This study supports the theory that risk is a central feature of trust because trust allows people to accept risk when uncertainty is high (Giddens 1990). As society becomes more advanced, people must rely on trust in "faceless" or "abstract" systems (Giddens 1991), rather than individuals, to assess the risks and benefits of the HPV vaccine. As this study shows, people must rely on expert systems that are not directly involved in the delivery of health care. Specifically, health care system trust (in the HPV vaccine uptake model) and news media trust (in both models) are the two types of trust that are significantly associated with

perceived risk; people who have more trust in the health care system and the news media believe that the HPV vaccine is effective in preventing HPV/HPV-related diseases. Thus, I conclude that there is utility in measuring institutional trust in organizations that are not closely related to health care.

It is not clear why the other four types of trust do not also affect risk perceptions. This study suggests that individuals develop beliefs about their susceptibility to HPV/HPV-related diseases and the severity of HPV independent of their trust in the institutional actors who make claims about the severity of HPV and women's high probability of acquiring the disease. Therefore, it is important to determine what *does* influences people's belief that they are susceptible to HPV/HPV-related diseases and that HPV is a serious illness. Since my results show that perceived susceptibility is a much stronger predictor of HPV vaccine attitudes than is perceived severity, which is in alignment with prior research using the HBM (Boehner et al. 2003; Dempsey et al. 2006; Kahn et al., 2005; Nan et al. 2014; Patel et al. 2012), researchers should determine the mechanisms through which people come to believe that they are likely to acquire a given illness.

The Sociology of Trust

Measuring Trust. Despite the disagreement among scholars about how to best conceptualize and measure trust, a majority of trust research defines trust as including individuals' perceptions of another party's trustworthiness and the consequent willingness to be vulnerable based on those perceptions (Lewicki and Brimsfield 2012).

In this study, I build on that definition of trust by recognizing that trust is a multidimensional process in which trust in one person or institution is based on whether one trusts other people or institutions, creating a system of trust (or distrust). Taken together, my findings support the conceptualization of trust as a multidimensional process that functions as a system of trust (or distrust) and expands upon the definition of trust as a psychological state to reflect that trust is a complex system by including several related but distinct types of trust. More specifically, this study expands on the use of trust in medical sociology. Whereas most studies of trust in medical sociology (and public health) only use trust in one's doctor and trust in the health care system as predictors of preventative health care utilization, this study acknowledges that within the U.S., health care delivery is not limited to physicians and the places in which they work. Messages about health reach the public through a multitude of sources (Meyer et al. 2008). Thus, it is important to consider the effect of health messages provided by those outside of what is traditionally considered to be the "health care system"; it is necessary to do so in order to advance the conceptualization of trust in medical sociology.

The Gap in Trust. In alignment with fundamental cause theory and Arneil's (2006) argument that marginalized groups are unlikely to trust the system in which they are marginalized, I find that those disadvantaged by race and SES may have less trust than whites and individuals of higher SES. While some scholars see trust as an inherent public good that facilitates cooperation (Coleman 1988; Putnam 2000), my results in Chapter Four do not support the utility of conceptualizing trust this way. The "gap in trust" indicates that "the central question is not so much how we increase connectedness

in order to build trust, but, rather, how we overcome a sense of betrayal and create trust in order to build healthy and connected societies" (Arneil 2006:128). Therefore, to the extent that trust is a public good, the unequal distribution of trust cannot be considered functional for society.

I predicted that because women are disadvantaged compared to men, they would also be less likely to trust the system in which they are disadvantaged, but I find that women actually have more trust in the federal government than do men. This finding is not consistent with prior research that shows a small, but consistent, pattern of more trust among men (Arneil 2006). However, most of the studies that show men have more trust than women refer to social trust, or the trust people have in other people in general. Other studies define trust as civic engagement, in which traditional gender roles dictate that women are less involved in the public sphere than are men (Putnam 2000). My findings may differ from prior research because I examine institutional trust, as opposed to social trust or civic engagement.

While research on the gender gap in trust produces mixed results concerning the existence and size of the gender gap, studies show that the race gap in trust is large and persistent over time (Arneil 2006). Given that this sample is about 83 percent white, I cannot draw any strong conclusions about race. However, I do find that African Americans in this sample have less trust than do whites in the health care system, the federal government, and the news media. This finding is consistent with the many other studies that show African Americans have low levels of social trust (Patterson 1999; Wuthnow 2002); trust in their physician (Boulware, Cooper, Ratner, LaVeist, and Power

2003; Carpenter et al. 2009); in the health care system (Freimuth, Crouse Quinn, Thomas, Cole, Zook, and Duncan 2001); the government (Hero and Tolbert 2004; Mangum 2011), and in the media (Brodie et al. 1999). Given the collective experience of African Americans that can be characterized by institutional discrimination, it is surprising that I do not find that African Americans have significantly less trust in their health care provider, health agencies, and pharmaceutical DTCA than their white counterparts do. These findings should be considered tentative until they are replicated in more racially representative samples.

My results on the socioeconomic stratification of trust further support the utility of focusing on the gap in trust. Compared to gender and race/ethnicity, I find that individuals' economic hardship while growing up is particularly influential in determining how much interpersonal and institutional trust they have as young adults. These findings are consistent with other studies that show lower trust among those who are economically disadvantaged (Uslaner 2002; Wuthnow 2002). Although race has independent effects on trust, one reason that trust is unequally distributed by race is likely due to economic inequality. In other words, my findings support Wuthnow's (2002) assertion that income inequality is the driving force behind the unequal distribution of trust.

In Chapter Four I show that interpersonal/institutional trust is stratified by gender, race/ethnicity, and SES. Taken together, these results suggest that those of marginalized statuses do not trust the system in which they are marginalized; that sociologists should focus on the gap in trust between the marginalized and privileged rather than the overall

decline; and that the unequal distribution of trust reflects larger social inequalities. Furthermore, to the extent that risk and trust predict HPV vaccine uptake and attitudes, the unequal distribution of trust has the potential to exacerbate HPV-related health disparities.

Trust as a Flexible Resource. I conceptualize trust as a flexible resource that shapes people's health beliefs, which in turn affects HPV vaccine uptake/attitudes. While I expected institutional trust to only have indirect relationships with HPV vaccine uptake through perceived risk, I find that there are multiple pathways through which trust affects HPV vaccine uptake/attitudes. Thus, trust is a flexible resource that can be used to benefit health (increase HPV vaccination) in ways that are not related to perceived risk. Although trust operates through perceived risk as well, I conclude that trust—independent from perceived susceptibility, severity, and efficacy—is an important addition to the HBM.

Specifically, I find that federal government trust is directly and inversely associated with HPV vaccine uptake and pharmaceutical DTCA trust is directly and positively associated with HPV vaccine intentions among men. The inverse relationship between federal government trust and HPV vaccine intentions is counterintuitive because trust theoretically increases social solidarity and cooperation (Luhmann 1979). This finding is also inconsistent with prior research that shows a positive association between government trust and willingness to get vaccines (Brownlie and Howson 2006; Marlow et al. 2007).

The only plausible explanation for this counterintuitive finding is the specific claims about the HPV vaccine that government officials made. For example, GOP presidential candidate Michelle Bachmann criticized Rick Perry's HPV vaccine mandate by stating publically that the vaccine caused "mental retardation" and is a very dangerous drug (Printz 2013). Individuals who identify as politically conservative are probably more likely to trust the claims made by Republican Michelle Bachmann who stated her "real" concern not as the safety of the HPV vaccine, but as Perry's bypassing of the state legislature to mandate HPV vaccination and how it took away parental autonomy. I predicted that higher levels of trust would facilitate cooperation for the sake of the public good (getting the HPV vaccine). However, given the specific content of government officials' claims regarding the HPV vaccine, it follows that individuals who trust Bachmann and equate "those in Washington" with her would be less— not more— likely to get the HPV vaccine.

Trust in the news media seems to play a particularly important role in the HPV vaccine decision-making process, as it is indirectly related to HPV vaccine uptake, intentions, and acceptance through perceived HPV vaccine efficacy. These results are consistent with several studies that show that the news media highlighted the HPV vaccine's efficacy to prevent cervical cancer, with some newspaper articles using phrases such as the "elimination" of cervical cancer or "100% effective" (Calloway et al. 2006; Habel et al. 2009; Quintero Johnson et al. 2011). If people believe these accounts, they will be more likely to believe that the HPV vaccine is effective (in preventing cervical cancer).

According to the findings of this study, the media has an effect on the HPV vaccine decision-making process in two ways. First, the media directly made claims about the HPV vaccine that positively influenced the public's perception of its efficacy. Second, the media reported on government representatives' claims that questioned the vaccine's safety (and morality). The latter may have had a negative effect on uptake, as indicated by the inverse relationship between federal government trust and HPV vaccine uptake. In contrast, the former may have had a positive effect on uptake, as indicated by the positive association with perceived HPV vaccine efficacy, which in turn is positively associated with HPV vaccine uptake, intentions, and acceptance. Both of these pathways suggest that the media plays an important role in disseminating health information and shaping people's perceptions of the risks of HPV, HPV-related diseases, and the HPV vaccine—even above other institutions that seemingly have a more direct role in health care delivery.

Social Causes and HPV Vaccine Uptake and Attitudes. One of the main goals of this study is to identify the multiple pathways through which social causes affect HPV vaccine uptake/attitudes directly and indirectly through perceived risk and trust. Social causes directly affect HPV vaccine uptake in that men and African Americans have significantly lower rates of HPV vaccination than do women and whites. Additionally, women and African Americans have significantly greater intentions to get the HPV vaccine within the upcoming year than do men and whites. Therefore, while African Americans may be less likely than whites to get the vaccine, they may intend to get it within the upcoming year more so than whites do. Although this finding may seem

counterintuitive, African Americans may genuinely intend to get the vaccine, but then face barriers to doing so (e.g., financial hardship, not receiving a doctor's recommendation). If African Americans have more barriers to getting the HPV vaccine than do other groups, as research indicates they do, for intentions to translate into uptake, those barriers will need to be addressed (Bednarczyk, Birkhead, Morse, Doleyres, and McNutt 2011).

Social causes also affect HPV vaccine uptake/attitudes through the mechanisms of interpersonal/institutional trust and perceived risk. Social causes—gender, race/ethnicity, and SES— have indirect relationships with uptake through their associations with health care provider, health care system, federal government, and news media trust. Social causes also indirectly affect HPV vaccine attitudes through health beliefs. As fundamental cause theory highlights and this study shows, there are multiple pathways through which social causes affect HPV vaccine uptake and attitudes. Thus, while some public health professionals advocate for targeted campaigns aimed at populations at increased risk for HPV/HPV-related diseases to attempt to alter their health beliefs (Sohl and Moyer 2007), my results suggest that the flexible resource, trust, would intervene and reproduce disparities even if interventions to modify risk perceptions were successful. For example, even if African Americans increasingly believed that they were personally at risk of contracting HPV and this belief led them to get the vaccine, their lower levels of trust in the news media could counteract this effect. To decrease disparities in HPV vaccination, decreasing the racial, SES, or gender gap in perceived risk would only be partially effective. The same gaps in trust would simultaneously have to be addressed, as

well as all of the other mechanisms structured by social causes that are not included in this study. It is important for future research to identify the mechanisms linking social causes to HPV vaccine uptake/attitudes.

Gender as a Fundamental Cause of HPV Vaccination. This study indicates that gender is a fundamental cause of HPV vaccination, as I find there are multiple pathways through which gender affects multiple outcomes: HPV vaccine uptake, intentions, and acceptance. Women have significantly higher rates of uptake than do men, as well as more intent and willingness to get the vaccine. Women's heightened perceived HPV/HPV-related susceptibility partially explains their greater intent to get the vaccine and their greater willingness to get the vaccine. Because of these multiple pathways (directly and indirectly through both trust and risk) through which women come to have higher uptake and intentions than men, in Chapter Six, I examine what particular pathways to HPV vaccine attitudes[6] vary by gender. In so doing, I fill a gap in the HPV vaccination literature that lacks studies using samples of both women and men who are actually faced with the decision of whether to get the vaccine.

The HPV vaccine decision-making process is different for women and men in two ways. First, the belief that the HPV vaccine is effective in preventing HPV and HPV-related diseases matters much more for women than for men in predicting whether they are willing to get the vaccine. This is likely because women are thinking of preventing cervical cancer when they consider the efficacy of the HPV vaccine. Believing that the

[6] I could not conduct a gender multi-group model for HPV vaccine *uptake* because the groups need to be relatively equal in size. In the whole sample of 836 individuals, 30 percent are male, with only 13 percent having received at least one dose of the 3-shot HPV vaccine.

vaccine can prevent this life-threatening disease would affect their willingness to get it. In contrast, men might also be thinking of the vaccine's efficacy in terms of cervical cancer, but this belief would not increase their willingness to get it because it does not apply to them personally. Even if men think that the HPV vaccine is effective in preventing genital warts, which they *can* acquire, this belief may not increase their willingness to get the vaccine because of their belief that genital warts is not serious enough to warrant an expensive, three-dose vaccine. Therefore, the gender difference in the relationship between perceived HPV vaccine efficacy could be due to either or both of the following two factors: 1) the cognitive reference to cervical cancer in estimating efficacy, which renders the vaccine irrelevant to men's personal health and/or 2) men's belief that genital warts is not a serious disease or one that they are going to acquire and thus their perceived efficacy of the vaccine does not affect their willingness to get the vaccine.

The second gender difference in the HPV vaccine decision-making process is that, among men but not women, trusting in pharmaceutical DTCA affects whether men intend to get the HPV vaccine in the upcoming year. My findings contradict those of the only other study that examines the effect of trust in the pharmaceutical industry on the HPV vaccine decision-making process. Allen and colleagues (2010b) found that trust in the pharmaceutical industry is an important predictor of HPV vaccine uptake and intentions among mothers of young daughters. There is evidence that a physician recommendation to get the vaccine is a very strong predictor of HPV vaccine receipt (Gerend, Cruz Lee and Shepherd 2007; Jones and Cook 2008; Liau et al. 2012; Rosenthal et al. 2011;

Ylitalo, Lee, and Mehta 2013), yet physicians do not recommend the HPV vaccine to their male patients as often as they do to their female patients (Kahn et al. 2005; Riedesel, Rosenthal, Zimet, Bernsetin, Huang, Lan et al. 2005; Reiter, McRee, Kadis, and Brewer 2011; Weiss, Zimet, Rosenthal, Brenneman, and Klein 2010). In the absence of a physician recommendation to get the vaccine, males may rely more on their assessments of advertisements in deciding their intentions to get the vaccine whereas women can rely on their trust in their doctor following a recommendation. Research also shows that men use health care services less often than do women, which further reduces the likelihood that men will receive a doctor recommendation to get the vaccine (Bertakis, Azari, Helms, Callahan, and Robbins 2000). Even if doctors begin to recommend the vaccine to males at the same rate as they do to their female patients, this may not decrease the gender disparity in HPV vaccination. In fact, one study finds that, following a doctor's recommendation, females are significantly more interested than males in getting the HPV vaccine (Reimer, Schommer, Houlihan, and Gerrard 2013). In other words, men may be more resistant to getting the HPV vaccine regardless of a recommendation by a physician.

An advertising campaign targeted at males that tries to re-frame the HPV vaccine as something more than the "cervical cancer vaccine" might be effective in convincing men that the HPV vaccine is effective in preventing diseases that they can acquire. Furthermore, such a campaign might alleviate the concerns of scholars and journalists who claim an undue burden has been placed on women by making it their sole responsibility to protect sexual health (Casper and Carpenter 2008; Mamo et al. 2010;

Thompson 2010). However, designing an effective advertising campaign might prove to be difficult given the controversies surrounding the HPV vaccine. Rather than waging a mass advertising campaign targeted toward males, perhaps it would behoove advocates of HPV vaccination to encourage (or regulate) responsible advertising or to increase doctor recommendations for the HPV vaccine to boys and their parents. Then, trusting in the pharmaceutical advertisements may become irrelevant for men, as this study suggests it is for women.

The gender differences I find in Chapter Six are further evidence that the context of health decisions are important to consider and that the HPV vaccine decision-making process does not work the same way for women and men. My findings regarding gender in all three models suggest that studies using the HBM should be placed in context by including how social causes shape trust, risk, and preventative health care utilization. Furthermore, future studies should consider how the whole process may differ across social groups based on gender, race/ethnicity, SES, and other systems of inequality.

HPV Vaccine Uptake versus Attitudes

While I find that social causes, trust, and risk are all important factors for HPV vaccine uptake and attitudes, these processes do not operate exactly as predicted and they are not the same for the three outcome measures. Specifically, institutional trust has indirect relationships with HPV vaccine uptake/attitudes as predicted, but it also has direct relationships with HPV vaccine uptake/attitudes. Put simply, the role of institutional trust seems to be more complicated than I hypothesized.

It is notable that this study is predicated on the assumption that HPV vaccine acceptance and intentions lead to uptake. The relationship between attitudes and behavior is empirically contentious (Weinstein 1993). There is some support that intent to receive the HPV vaccine is significantly correlated with getting the first shot within six months (Patel et al. 2012), but there is also evidence that intentions do not lead to uptake (Brewer et al. 2011; Perkins, Pierre-Joseph, Marquez, Iloka, and Clark 2010). My results should be viewed as falling on an attitudes-behavior continuum, from HPV vaccine acceptance being the farthest removed from getting the vaccine and intentions being the closest proxy to uptake.

My results show that the conceptual model I test explains the process of developing attitudes toward the HPV vaccine better than it explains whether people have received the vaccine. This is likely because of two related reasons. First, rates of HPV vaccine uptake in the U.S. were the highest in the few years following 2006 when *Gardasil* was formally recommended by the CDC for use in young girls (Liddon et al. 2012a). During this time period in which many young girls received the vaccine, most of the college students in this sample were between the ages of 10 to 14 and thus not autonomous decision-makers. Rather, their parents were responsible for making their health care decisions. In other words, for a portion of this sample, there is no decision-making process to explain.

Second, this survey was administered in 2012, only a year after *Gardasil* was formally recommended by the CDC for use in males and so boys have neither been faced with this decision for a long period of time nor have they had a long period of time to

actually execute their decisions (Brady et al. 2012). As opposed to uptake, forming attitudes toward the HPV vaccine is not limited by government regulations or parental authority, which in part explains why the conceptual model I test works better for explaining attitudes than it does for uptake.

The main finding that differs between the uptake and attitudes analyses is that the more people trust in the health care system, the more effective they think the HPV vaccine is, which in turn increases the likelihood that they received the HPV vaccine. This finding is consistent with other studies within medical sociology that show trusting in the health care system is associated with a variety of health outcomes (Ahnquist, Wamala, and Lindström 2010; Cunningham, Sohler, Gao, and Anastos 2007; Hall, Dugan, Zheng, and Mishra 2001; Mechanic and Schlesinger 1996; Mohseni and Lindstrom 2007; Mollborn et al. 2005; Musa, Schulz, Harris, Silverman, and Thomas 2009). Health Care system trust is not associated with perceived HPV vaccine efficacy in the model with attitudes. If the goal is to increase rates of HPV vaccination, one relatively direct way to do so is to foster increased trust in the health care system.

Because of its relationship with health care system trust, interpersonal trust in one's health care provider is indirectly associated with HPV vaccine uptake. On the one hand, it is important for medical sociologists to extend analyses from just measuring doctor and health care system trust to include multiple types of trust in expert systems that not necessarily related to health care, such as the news media. On the other hand, my results also suggest that trusting in one's health care provider is a significant type of trust to consider in studies of preventative health care utilization. My findings showing

significant relationships between interpersonal trust and institutional trust; significant correlations between health care provider trust and five institutional trust constructs; and indirect relationships between health care provider trust and uptake are all evidence that physician trust, as well as other types of trust, are important factors in the HPV vaccine decision-making process.

In summary, this study contributes to the HBM by incorporating elements of fundamental cause theory and shifting the focus from individual-level risk perceptions to a more sociological perspective of how social causes and trust affect health beliefs. Additionally, I contribute to the sociology of trust by recognizing that trust is multi-dimensional, as people have to rely on a variety of expert systems that are not directly related to the delivery of health care to assess risk. I also contribute to the trust literature by taking Arneil's (2006) suggestion to focus on the "gap in trust," as opposed to the decline, and I conclude that this gap is important in understanding variation in HPV vaccine uptake and attitudes.

This study also makes three contributions to research on HPV vaccination. First, the role of social inequalities in the HPV vaccine decision-making process is vast, as there are multiple pathways through which social causes affect HPV vaccine uptake and attitudes. Second, while perceived risk is important in understanding why people choose to get the HPV vaccine, more research is needed on the factors that shape these health beliefs, in particular how social causes—gender, race/ethnicity, and SES— structure these health beliefs. Third, institutional trust shapes perceived risk, but it also functions as a resource that directly affects HPV vaccine uptake/attitudes independent of perceived

risk. This study highlights that social causes, perceived risk, and interpersonal/institutional trust are all important factors in the HPV vaccine decision-making process and should be considered in order to effectively address the related problems of low and unequal HPV vaccination.

Limitations

The use of a college sample has both advantages and disadvantages. Despite that this study does not utilize a random nationally representative sample, this college sample is ideal for these analyses. The typical age of college students is within the CDC-recommended range of ages to receive the HPV vaccine and so whether to receive the vaccine is (or was) an actual option for this group. While many previous studies have focused on parents' decisions to get the vaccine for their daughters or on just young women (Dempsey et al. 2006; Ferris et al. 2010; Marlow et al. 2007), this study examines the HPV vaccine decision-making process among a group of autonomous women *and* men who are currently faced with this decision.

However, regarding receipt of the vaccine (as opposed to willingness or intent to get it), one might argue that it is parents who likely made the decision for their children to get the vaccine, and thus parents' trust rather than college students' trust should be examined. Since trust and risk are stratified by race/ethnicity, SES, and gender and thus a reflection of the social structure, children's perceptions of trust and risk are likely similar to that of their parents'. Despite this potential limitation, I find that college students' current levels of trust are associated with prior HPV vaccine uptake and so I conclude that there is utility in examining their current levels of trust even to predict past behavior.

My results regarding race/ethnicity and SES must be interpreted with caution for two reasons. First, college samples are not representative of the overall population. For example, racial/ethnic minorities and those of lower SES are less likely to be in college and thus not included in this sample (Walpole 2003). Second, I do not have enough racial or socioeconomic variation to make conclusive statements about the role of race/ethnicity and SES in the HPV vaccine decision-making process. This is especially the case with race/ethnicity because over 80 percent of the sample is white.

Future Directions: The Importance of Longitudinal Studies

Because my findings indicate that there are both indirect and direct effects of interpersonal/institutional trust on HPV vaccine uptake/attitudes, I conclude that the HPV vaccine decision-making process, as I conceptualized it, is too simplistic. Based on these findings, I revised the model and argue that it could serve as a guide for future research on the HPV vaccine decision-making process. In testing this revised conceptual model as shown in Figure 6, several other empirical and theoretical issues will be addressed.

The revised model is similar to the original conceptual model in that it expands on the HBM by including various mechanisms through which social causes affect the HPV vaccine decision-making process. However, the revised model differs from the original model in that it accounts for the direct effects of interpersonal and institutional trust on HPV vaccine uptake/attitudes, as well as the indirect effects of interpersonal/institutional trust through perceived risk. Ideally, future research will approach the HPV vaccine decision-making process through a fundamental cause perspective in which social causes, trust, and risk— and the relationships between them— change over time.

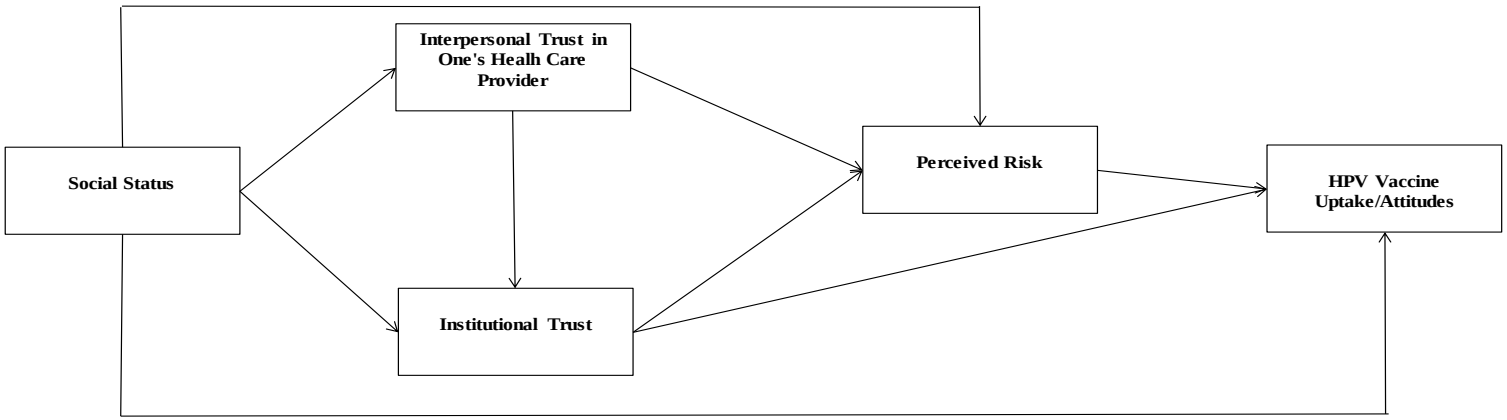

Figure 6. Revised Conceptual Model for HPV Vaccine Decision-Making Process

The utility of this proposed model is predicated on testing it over time. Longitudinal studies will overcome some of the limitations of this study and contribute to a better understanding of the roles of social causes, interpersonal/institutional trust, and perceived risk in the HPV vaccine decision-making process. Studying this model over time is the only way to empirically establish the theorized link between attitudes and behavior rather than assume a willingness or intent to get the HPV vaccine will lead to actually getting it. If acceptance or intentions do not lead to uptake, then, at least for those who seek to increase HPV vaccination rates, attitudes do not matter, rendering research that studies attitudes futile. If future research finds that acceptance and intentions do in fact lead to getting the HPV vaccine, it is nonetheless important to determine whether intent to get the vaccine within a specified time is a closer proxy to getting the vaccine than is a general willingness to get the vaccine. Specifying the most useful predictors of HPV vaccine uptake would provide a clearer focus for both future research and public health interventions.

In addition to contributions to the public health literature on HPV vaccination, testing this model longitudinally would also contribute to some of the debates within the sociology of trust literature. While my findings *support* the notion that interpersonal trust leads to institutional trust, I cannot actually claim that causal order in the absence of longitudinal data. Similarly, my findings suggest, but do not prove, that trust functions as a system in which trusting in one person or institution is dependent on trusting in other people and institutions. Testing this model over time could determine if changes in trust

in one area affect changes in trust in the other areas. Establishing the relationship between different types of trust will contribute to a better understanding of what trust is, what causes trust, and the effects of trust.

Examining the proposed model through a fundamental cause perspective, but also including perceived risk and trust, will contribute to the sociology of trust by establishing the degree to which institutional trust is stable over time. While research shows a decline in social trust, it is less clear whether institutional trust is equally amenable to change and how such changes occur. This issue is particularly important given that trust is stratified by race/ethnicity, SES, and gender. If institutional actors make efforts to make institutional practices more trustworthy, it is useful to know whether the public will accordingly trust those institutions more. However, if perceptions of trustworthiness are based on larger social inequalities, as this study suggests, the particular practices of various institutions may be irrelevant in affecting public trust. Longitudinal studies using my proposed model could contribute to the literature on the nature of trust by tracking whether and how institutional trust changes over time.

Using my proposed model would also add insight to the relationship between risk and trust. Some theorists focus on how trust is only necessary in the presence of risk and trust functions as a way to manage this risk (Luhmann 1979). Other theorists focus on how, in modernity, we live in a "risk society" in which social life is characterized by constant threats and people who perceive a high level of risk are less likely to be trusting (Beck 1992). While these conceptualizations of the relationship between risk and trust are not necessarily incompatible, they imply a different causal order. To the degree that

risk and trust predict preventative health care utilization, it is important to establish this causal order.

In addition to testing the proposed model over time, I suggest that this model be tested on populations other than college students. Since the HPV vaccine is recommended for children ages 11 and 12 (Brady 2012), it follows that parents' health care decisions for their children are relevant. Future research should establish whether this proposed model functions similarly for parents. Additionally, this model could be used to test the HPV vaccine-decision making process on other populations, such as non-college students or those in particular geographic regions, such as the Appalachian region where cervical cancer rates are particularly high (Hopenhayn, Christian, Christian, and Schoenberg 2007).

Future research might use my proposed model to explore different health outcomes other than HPV vaccination. Doing so would require adapting the model and, specifically, the types of trust employed. I chose the six types of trust according to what groups made claims about the HPV vaccine and what discourses were prominent in the media, but these types of trust would probably not be salient for other outcomes. For instance, this model could be utilized to examine what factors influence whether cigarette smokers are willing to quit, intend to quit, and actually quit. Such a study would probably have to consider the role of trust in tobacco companies. Whatever the particular health outcome, each study requires an assessment of the different types of trust that are relevant in that particular context.

Regardless of the particular outcome being studied, I purport that the focus needs to remain on how each step in the process (risk, trust, and the outcome) is structured by broader social inequalities. To reduce HPV-related health disparities, it is necessary to identify all of the factors that are independently stratified by race/ethnicity, SES, and gender. For example, research has established that there are racial disparities in HPV vaccination coverage (Chao et al. 2010; Demspey et al. 2011; Liddon et al. 2012b), but not many studies have identified the mechanisms through which race affects HPV vaccine uptake (for an exception, see Polonijo and Carpiano 2013). If studied across time, research could test the effect of a given intervention on HPV vaccine uptake and identify the specific effects on HPV-related health disparities.

In this study, I use fundamental cause theory and the sociology of trust to shift the focus from proximate, individual-level risk perceptions to the social causes of HPV vaccination. However, as new knowledge and medical innovations develop, future research should investigate how flexible resources affect the relationship between social causes and HPV-related health disparities. This study suggests that trust is an important resource that may intervene in the reproduction of HPV-related health disparities, both positively and negatively. Therefore, I suggest that future research should continue to explore the role of trust in the HPV vaccine decision-making process, meaning all of the direct and indirect ways through which trust affects HPV vaccination. Such research efforts could benefit from my proposed conceptual model that incorporates the HBM, fundamental cause theory, and the sociology of trust, to identify all of the mechanisms that may be causing low and unequal HPV vaccination rates.

Implications: Building Trust in the Doctor-Patient Relationship

Based on the findings of this study, I agree with Arneil (2006) that researchers should focus on the gap in trust as opposed to the overall decline. While Arneil (2006) and others (Luhmann 1979; Putnam 2000) discuss the functions of social trust as promoting social solidarity and having a plethora of related positive effects, this study focuses on the ability of trust to promote cooperation for the sake of the public health. Building trust will require paying particular attention to the gaps in trust based on race/ethnicity, SES, and gender, as inequality fosters distrust (Arneil 2006; Wuthnow 2002).

My findings suggest that trusting in particular institutions affects the HPV vaccine decision-making process: the health care system, the federal government, the news media, and, among men, pharmaceutical DTCA. Building trust in these institutions may prove to be difficult because it might require their practices to be trustworthy and applied equally to everyone. This is unlikely to occur in America's democratic, capitalistic society in which individual rights are emphasized and there is limited regulation on the pursuit of profit. Consequently, marginalized populations are often disadvantaged more by the practices of these institutions, undermining trust in the process.

Given my speculation that building institutional trust would require a complete restructuring of society, I instead propose that improving the doctor-patient relationship is the best way to build trust in the institutions that make risk claims about the HPV vaccine. This study supports this proposition for three reasons. First, my findings suggest that trust is a multi-dimensional system in which trusting in one institution is

dependent on trusting in other institutions. Second, my findings show that interpersonal trust in one's health care provider is significantly associated with the two types of institutional trust that are most directly related to health care delivery: the health care system and pharmaceutical DTCA. Third, I find that trust in one's health care provider is indirectly related to HPV vaccine uptake through its association with health care system trust. Because of the nature of interpersonal trust that is based on familiarity and interactions over time (Luhmann 1979), building trust between doctor and patient will be easier than attempting to build trust in "faceless" systems (Giddens 1994).

To facilitate trust within the doctor-patient relationship, especially among particular social groups, it is necessary to ensure equal access to health care and continuity of care (Mechanic 2006). The Patient Protection and Affordable Care Act of 2010 (ACA) includes many provisions that might increase continuity of care between a doctor and patient (Koh and Sebelius 2010). Perhaps the portion of the law that will have the biggest effect on continuity of care is the individual mandate that requires all Americans have health insurance. By increasing access to preventative health care, people will be able to have a primary care doctor that they are able to visit regularly in non-emergency situations and, in the process, build trust. Furthermore, equalizing access to health care across race and SES could have the added benefit of decreasing the SES gap in health care provider trust and the race gap in health care system trust. Differential rates of HPV vaccination by race and SES could decrease and, consequently, HPV-related health disparities.

While the ACA holds promise for a better structure of health care that is amenable to building trust, it is too early to determine the effects of the law. The full effects of the ACA are not predictable because its implementation is occurring over several years (Koh and Sebelius 2010). Furthermore, there has been much political opposition to the ACA, which could also hinder its implementation as it was originally intended. It is impossible to predict the intended and unintended consequences of the ACA on continuity of care or access to health care. The full implementation of the ACA will likely improve equal access to health care, continuity of care, and preventative care (Koh and Sebelius 2010), which could decrease the racial and SES gaps in trust that lead to disparities in HPV vaccination.

Before trusting in a health care provider becomes relevant for getting the HPV vaccine, doctors must recommend the vaccine to their patients. Therefore, to reduce HPV-related health disparities, physicians must recommend the HPV vaccine at equal rates to non-whites, males, and those with less economic resources. Public health officials could attend professional medical associations' (PMAs) meetings, such as the American College Health Association Annual Meeting and The American Academy of Pediatrics National Conference and Exhibition. Many PMAs have expositions at their annual meetings and public health officials could collaborate with physicians in providing educational materials about the importance of recommending the HPV vaccine to males and racially and socioeconomically disadvantaged groups. Once doctors recommend the HPV vaccine to *all* of their patients who are eligible to get it, interpersonal and institutional trust becomes salient for whether individuals then accept

that recommendation. Thus, encouraging doctors to recommend the vaccine and building trust in the doctor-patient relationship are equally important to increase HPV vaccination rates, especially among men, non-whites, and the socioeconomically disadvantaged.

Conclusion: Public Health or "One Less"?

I have argued that individuals manage uncertainty by relying on their trust in their doctors and the institutions that make risk claims about HPV, HPV-related diseases, and the HPV vaccine. Trust functions as a resource that counters the "free-rider dilemma," in which individuals do not get the HPV vaccine because of the uncertainty and risk involved and instead rely on herd immunity to protect them (Misztal 1996). Appealing to individuals' sense of personal risk to make the "right" choice will probably not produce high HPV vaccination rates or reduce HPV-related health disparities, considering that such approaches have not done so to date. Additionally, focusing on people's calculations of the risks and benefits of the vaccine for the sake of self-interest neglects the important role of trust in facilitating cooperative action (Misztal 1996).

The structure of American society and specifically public health campaigns, encourage this view of public health as an individual decision in which each person should rationally decide what course of action is best for him/herself (Wailoo et al. 2010). When public health is viewed this way, the strategy that follows is to address the free-rider dilemma by convincing individuals that taking a particular action will benefit their own health— and severely hurt it if they do not. However, it will be impossible to produce collective action and cooperation and thus solve the free-rider problem without building interpersonal and institutional trust.

In the absence of compulsory vaccination, the decision to get the HPV vaccine is left to individuals. Thus, public health campaigns tailor HPV vaccination campaigns around notions of individualized risk and choice (Aronowitz 2010). Since only about a third of American girls and less than two percent of boys are currently vaccinated against HPV (Jemal et al. 2013), convincing people on an individual basis that they are at high risk has arguably been ineffective. In this study, I argue that it is important to shift the focus from individual risk perceptions to the fundamental, social causes of HPV vaccination. By identifying the fundamental causes of getting the HPV vaccine, public health campaigns could better design population-level interventions for HPV vaccination rather than the arguably ineffective strategy of the HPV vaccine, "by means other than herd immunity or other contextual means, being promoted as a one-person-at-a-time ("One Less") population-level intervention" (Aronowitz 2010:33). As long as public health campaigns focus on individual-level risk factors for HPV vaccination, the groups who are already at a heightened risk for HPV-related diseases will also be less likely to get the HPV vaccine because of scarce flexible resources. Furthermore, while the risk and protective factors may change for HPV vaccination, the relationship between social conditions and HPV-related diseases will not (Link and Phelan 1995). Since compulsory HPV vaccination does not seem to be a political reality in the current socio-political context, there needs to be a different way to reduce the salience of flexible resources in which privileged groups are able to gain a health advantage and reproduce health disparities.

Given the potential for HPV vaccination to reduce cervical cancer, genital warts, and other HPV-related cancers, one might question whether low HPV vaccination overall or the unequal distribution of the HPV vaccine deserves the majority of attention and resources. I agree with Phelan and colleagues (2010) who suggest that public health policy makers do not need to choose; *every* policy needs to be considered health policy, such as:

> minimum wage, housing for homeless and low-income people, capital-gains and estate taxes, parenting leave, social security, head-start programs and college admission policies, regulation of lending practices, or other initiatives of this type (Phelan, Link, and Tehranifar 2010:S37).

Reducing broader social inequalities could increase HPV vaccination rates and thus improve population health. Furthermore, a more equal distribution of resources would reduce the ability of flexible resources to reproduce HPV-related health disparities by simultaneously decreasing inequalities in all of the mechanisms through which social conditions affect HPV vaccination, including trust and perceived risk. Consequently, HPV vaccination would not function as a "latent mechanism" in which inequalities in HPV vaccination manifest as HPV-related health disparities in the future (Polonijo and Carpiano 2013).

APPENDIX

SURVEY

Thank you for participating in this study about culture and health in the United States. DO **NOT** PUT YOUR NAME OR OTHER IDENTIFYING INFORMATION ON THIS SURVEY.

First, I'd like to ask you about your opinions about several aspects of life in the United States. Please circle the degree to which you agree with the following statements.

Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree

1. Most people can be trusted.
2. You can't be too careful in your dealings with people.
3. Most people are inclined to help others.
4. Most people are inclined to look out for themselves.
5. If you don't watch yourself, people will take advantage of you.

Now I'd like to ask you about your opinions about your health care provider, for example, a physician, nurse, or physicians' assistant. If you do not have a regular primary care doctor, please think about the health care provider that you saw the last time you visited a health care facility.

6. Your health care provider will do whatever it takes to get you all the care you need.
7. Sometimes your health care provider cares more about what is convenient for him or her than about your medical needs.
8. Your health care provider's medical skills are not as good as they should be.
9. Your health care provider is extremely thorough and careful.
10. You completely trust your health care provider's decisions about which medical treatments are best for you.
11. Your health care provider is totally honest in telling you about all of the different treatment options available for your condition.
12. Your health care provider only thinks about what is best for you.
13. Sometimes your health care provider does not pay full attention to what you are trying to tell him or her.
14. You have no worries about putting your concerns in your health care provider's hands.
15. All in all, you have complete trust in your health care provider.

Next, I'd like to ask you your opinions about the American health care system.

16. The health care system does its best to make patients' health better.

17. The health care system covers up its mistakes.
18. Patients receive high quality medical care from the health care system.
19. The health care system makes too many mistakes.
20. The health care system puts making money above patients' needs.
21. The health care system gives excellent medical care.
22. Patients get the same medical treatment from the health care system, no matter what the patient's race or ethnicity.
23. The health care system lies to make money.
24. The health care system experiments on patients without them knowing.

Now I'd like to ask you about your opinions on the federal U.S. government.

Never Rarely Sometimes Frequently Always

25. How much of the time do you think you can trust the government in Washington to do what is right?

The Centers for Disease Control and Prevention (CDC) and the Food and Drug Administration (FDA) are United States federal agencies that work to protect public health.

Not at All Somewhat Extremely

26. Before today, how familiar were you with the CDC?
27. Before today, how familiar were you with the FDA?

Never Rarely Sometimes Frequently Always

28. How much of the time do you think you can trust the CDC to do what is right?
29. How much of the time do you think you can trust the FDA to do what is right?

Next I'd like to ask you about your attitudes toward pharmaceutical companies' advertisements for prescription drugs.

Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree

30. Prescription drug advertising is truth well told.
31. Prescription drug ads generally present a true product picture.
32. We can depend on getting the truth in most prescription drug advertising.
33. I am accurately informed by most prescription drug ads.
34. Prescription drug advertising is a reliable source of information.
35. Prescription drug advertising's aim is to inform the consumer.
36. Most prescription drug advertising provides consumers with essential information.
37. Prescription drug advertising is informative.

The next questions are about the media, including the news media, the Internet, and social media.

Never Rarely Sometimes Frequently Always

38. How much of the time can you trust newspapers to report the news accurately and fairly?
38. How much of the time can you trust newspapers to report the news accurately and fairly?
39. How much of the time can you trust television news broadcasts to report the news accurately and fairly?
40. How much of the time can you trust news on the Internet to report the news accurately and fairly?
41. How much of the time can you trust videos on YouTube to provide accurate and balanced information?
42. Approximately how many hours per day do you spend:
reading newspapers and/or magazines? _____ listening to the radio? ____
watching television? _____ using the Internet? ____

The following questions ask you your opinions about scientists and the studies they do.

Strongly Disagree	Somewhat Disagree	Disagree	Somewhat Agree	Agree	Strongly Agree

43. It is important to have some scientists who are not linked to business interests.
43. It is important to have some scientists who are not linked to business interests.
44. When scientists say they can't really be clear about the actual threat posed by something risky, they are telling the truth.
45. Scientists should have to explain and justify their research to the general public.
46. It is not possible for scientists to be certain about any single cause for some health problems such as cancer.
47. If two scientists interpret the same results in different ways, one of them must be wrong.

The next questions are about the Human Papillomavirus, also known as HPV. A vaccine is now available that protects against HPV; sometimes it is called the cervical cancer vaccine, HPV shot, or Gardasil. I will call it the HPV vaccine.

48. Have you heard of HPV before today?
Yes
No

*Please read each statement below and circle whether it is true or false. This is **not** a quiz. I just want to know your opinions.*

49. A person usually has symptoms when infected with HPV.	True	False
50. A person's chances of getting HPV increases with the number of sexual partners they have.	True	False
51. Most types of HPV cannot clear up on their own.	True	False
52. Certain types of HPV can lead to cervical cancer.	True	False
53. HPV can cause genital warts.	True	False
54. An abnormal Pap test result may indicate an HPV infection.	True	False

55. Have you ever seen, read, or heard advertisements for the HPV vaccine (Gardasil or Cervarix) on:

Television?	Yes	No
Radio?	Yes	No
Newspapers?	Yes	No
Magazines?	Yes	No
The Internet?	Yes	No
Flyers/brochures?	Yes	No

Not at all Serious Somewhat Serious Extremely Serious

56. How serious an illness do you think HPV is?
57. How serious an illness do you think genital warts is?
58. How serious an illness do you think cancer caused by HPV is?

Not at all Serious Somewhat Serious Extremely Serious

56. How serious an illness do you think HPV is?
57. How serious an illness do you think genital warts is?
58. How serious an illness do you think cancer caused by HPV is?

Not at all Effective Somewhat Effective Extremely Effective

59. How effective do you think the HPV vaccine is in preventing HPV?
60. How effective do you think the HPV vaccine is in preventing cancer caused by HPV?
61. How effective do you think the HPV vaccine is in preventing genital warts?

62. Has a doctor ever recommended that you receive the HPV vaccine?
Yes
No

63. Have your parents ever recommended that you receive the HPV vaccine?
Yes
No

Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree

64. I think my parents did or would approve of me getting the HPV vaccine.

65. Have you received any shots of the HPV vaccine?
Yes
No → *Go to Question #67*
Not Sure

66. How many doses of the HPV vaccine have you received?
One
Two
Three→ *Go to Question #89*
Not Sure

Please go to Question #89 if you have completed the 3-shot HPV vaccine series.

Not at All Likely Somewhat Likely Extremely Likely

67. If you do not get the vaccine, how likely do you think it is that you will get HPV in the future?
68. If you do not get the vaccine, how likely do you think it is that you will get genital warts in the future?
69. If you do not get the vaccine, how likely do you think it is that you will get cancer from HPV in the future?

Not at All Willing Somewhat Willing Extremely Willing

70. How willing are you to get the HPV vaccine?

Definitely Won't Probably Won't Probably Will Definitely Will

71. How likely are you to get the HPV vaccine in the next year?
Would you say you:

How much did each of the following affect your decision not to receive the HPV vaccine?

Not at All Somewhat Very Much

72. Concern about side effects/vaccine is too new and not tested enough
73. My doctor didn't recommend that I get vaccine
74. Don't have sex, don't need vaccine
75. Parents wouldn't let me get vaccine
76. Doctor didn't offer vaccine
77. Worried about effectiveness
78. Already in a monogamous relationship
79. Apathy/didn't want to get vaccine
80. Too expensive/insurance issues
81. Don't like shots/needles
82. Already diagnosed with HPV
83. Don't trust vaccines
84. Outside recommended age range
85. Don't have access to doctor that offers vaccine
86. Too inconvenient to get vaccine series
87. Don't know what the vaccine is
88. Other, please specify_____

Now I'd like to ask you a few questions about your background.

89. Do you identify as:

Female
Male
Transgendered

90. What is your race/ethnicity?

Hispanic/Latino
Asian
Black or African American
American Indian or Alaska Native
Native Hawaiian or Pacific Islander
White or Caucasian
Other, please specify_____

91. In what year were you born? 19 _____ _____

92. Do you think of yourself as

Heterosexual
Homosexual
Bisexual
Something else

93. Thinking back to your years up to age 18, how difficult was it for your family to meet expenses for basic needs like food, clothing and housing? Would you say it was:

Not at all difficult
Somewhat difficult
Very difficult
Don't Know

94. What is the highest grade or year of school your father completed?

Less than high school
High school graduate
Some college
Bachelor's degree
Graduate degree
Don't Know

95. What is the highest grade or year of school your mother completed?

Less than high school
High school graduate

Some college
Bachelor's degree
Graduate degree
Don't Know

96. Do you currently have any form of health insurance, including Medicaid?
Yes
No
Not Sure

97. In general, would you say your views in most political matters are:

Very conservative
Somewhat conservative
Moderate
Somewhat liberal
Very liberal
Don't know

98. What is your religious affiliation?

Christian
Catholic
Jewish
Evangelical/ "Born Again Christian"
No religion
Don't know
Other, please specify_____

99. Are you an international student?
Yes
No

100. What year are you in college?
1st year
2nd year
3rd year
4th year or more

101. What is your major in college? _____

Thank you for participating in this study!

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