I, Kimberly Price, hereby submit this original work as part of the requirements for the degree of Doctor of Philosophy in Health Education.

It is entitled:
A Preliminary Study of Mothers’ Social Support, Spirituality, Knowledge, and Acceptability of the HPV Vaccine for Daughters

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A Preliminary Study of Mothers’ Social Support, Spirituality, Knowledge, and Acceptability of the HPV Vaccine for Daughters

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ABSTRACT

AN ABSTRACT OF THE DISSERTATION FOR THE DOCTOR OF PHILOSOPHY DEGREE IN HEALTH PROMOTION AND EDUCATION, PRESENTED ON MARCH 11, 2013 AT THE UNIVERSITY OF CINCINNATI, CINCINNATI, OH

TITLE: A Preliminary Study of Mothers’ Social Support, Spirituality, Knowledge, and Acceptability of the HPV Vaccine for Daughters

DOCTORAL COMMITTEE MEMBERS: Dr. Keith King (chair), Dr. Liliana Rojas-Guyler, Dr. Rebecca Vidourek, and Dr. Laura Nabors

The Human Papillomavirus (HPV) vaccine has the potential to significantly reduce the disease burden of cervical cancer, which disproportionately affects vulnerable and underserved populations. Although social support and spirituality have been examined with how cancer patients cope with disease, little is known about how they influence preventive behaviors, such as HPV vaccine acceptability. The purpose of this study was to fill gaps in the research about the relationships between social support, spirituality (both behaviors and beliefs), and cervical cancer prevention through HPV vaccine acceptability.

Based on a review of the literature and theoretical models (Health Belief Model and Theory of Reasoned Action), a three-page, 64-item survey instrument was developed to measure a mother’s spiritual and social connections, and how they relate to her knowledge, attitudes, behaviors/experiences, and behavioral intentions toward the HPV vaccine for her daughter. Mothers with 9 to 18 year old daughters were recruited from the Greater Cincinnati area at community health clinics and neighborhood events. One hundred six women completed the written survey and responses were analyzed.

Overall, the mothers who participated in this study were knowledgeable regarding HPV and the HPV vaccine, had favorable attitudes toward the HPV vaccine and vaccines in general
and were inclined to talk with daughters about the HPV vaccine. Most aspects of spirituality and
social support were not found to be associated with mothers’ knowledge, attitudes, and
behaviors/behavioral intentions, however, results in this preliminary study showed that mothers
with stronger spiritual beliefs were more likely to have talked to their daughters about the HPV
vaccine.

Results in this study also showed that mothers with more knowledge of HPV and the
HPV vaccine had more favorable attitudes toward the HPV vaccine. Mothers with more
knowledge of HPV had a greater intention to talk to daughter about the HPV vaccine and to have
daughter vaccinated, and mothers with more knowledge about the HPV vaccine were more likely
to have already talked to their daughters about the HPV vaccine, had a greater intention to talk to
daughter about the vaccine, and had a greater intention to have daughter vaccinated. Mothers
had greater intentions to talk to daughters about the HPV vaccine if they had a more favorable
attitude toward the HPV vaccine, and mothers with lower annual household incomes showed a
more favorable attitude toward the HPV vaccine, specifically in agreeing that the HPV vaccine
should be a routine childhood immunization. Race, age of daughter, and doctor’s
recommendation were also associated with mothers’ behaviors or behavioral intentions.

The findings in this preliminary study supported the concept of the knowledge-attitudes-
behavior continuum, and indicated that further study on the impact of spiritual beliefs (apart
from practices/religiosity), social support networks’ and physicians’ influence, and race/ethnicity
on HPV vaccine acceptability is warranted. Understanding the variables that may influence HPV
vaccine acceptability is crucial to eliminating health disparities in women’s reproductive health.
ACKNOWLEDGEMENTS

“And let us not grow weary in well doing for in due season we shall reap, if we do not lose heart.” Galatians 6:9

I am so thankful to my family, friends, and colleagues who supported me and encouraged me to not lose heart throughout this journey. The path was neither straight nor easy, and I would not have made it all on my own. Proverbs 3:5 and 6 kept reminding me to “Trust in the Lord with all your heart, and lean not on your own understanding. In all your ways acknowledge Him, and He shall direct your paths.” I trusted, He directed, and many played important supportive roles all along my path.

I am especially grateful to Dr. Keith King and my dissertation committee, who have been very patient and very encouraging. I thank them for their guidance, their time, their experience, and their thoughtful comments.

I dedicate this work to my father, Floyd Jones, and to the memory of my mother, Marian Jones. Throughout my life, their unwavering love and hopeful optimism for my success propelled me to pursue my dreams. I also dedicate this work to my wonderful and loving husband, Kenneth, and to my amazing children, Karis, Kendall, and Kory. I could not have endured without them—they are my greatest cheerleaders! No journey can be completed without loving support, and I could not (would not) have journeyed without them.

“I have fought the good fight, I have finished the race, I have kept the faith.” 2 Timothy 4:7
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Chapter One

The Problem

Cervical cancer is one of the most common cancers in women worldwide, with approximately 500,000 new cases diagnosed each year and 274,000 deaths each year (Parkin, 2005; World Health Organization, 2008). In developing countries, it is second only to breast cancer as a cause of cancer-related mortality in women (Ferlay et al., 2008). The American Cancer Society (ACS) estimates that in 2013, about 12340 American women will be diagnosed with invasive cervical cancer and that about 4030 women will die from the disease (ACS, 2013).

A sizeable percentage of women may develop cervical cancer as a consequence of recurring sexually transmitted infections. The Human Papillomavirus (HPV) is present in nearly 100% of the cases of cervical cancer (Bosch, 2002). Genital infection with the HPV is the most common sexually transmitted infection (STI) in the United States today, with approximately 20 million people currently infected (Weinstock, Berman, & Cates, 2004). In the United States, it is estimated that more than 80% of men and women will be infected at some point in their lifetime (Koutsky, 1997). Nearly three out of four Americans between the ages of 15 and 49 would be infected with genital HPV over the course of their lifetime (Couto & Dailard, 1999). Nearly a quarter of 14 to 19 year olds in the U.S. are infected with HPV; more than one-third of women are infected by the time they are 24 years old (Dunne et al., 2007).

Because of the strong relationship between HPV and cervical cancer, the development of a prophylactic vaccine against high-risk HPV has the potential to significantly reduce the
incidence of HPV infections, HPV lesions, and cervical cancer. Universal HPV vaccination is widely accepted as a way to reduce the burden of cervical cancer and HPV-related diseases (Goldie et al., 2003). In June of 2006, Gardasil (Merck & Co.) was licensed by the Food and Drug Administration (FDA) as a prophylactic vaccine to protect females aged 9-26 years old against HPV infection. Another vaccine, Cervarix (GlaxoSmithKline), was approved by the FDA in October of 2009.

An important part of a women’s health program to prevent HPV and cervical cancer is by promoting the HPV vaccine. Some news accounts report how parents are refusing HPV vaccines for their adolescents, but there have been studies that show a large number of parents willing to vaccinate their child. Several studies looked at the influence of parental authority on the acceptability of the HPV vaccine (Serpell & Green, 2006; Rosenthal et al., 2008; Fazekas et al., 2008; Gerend et al., 2007; Sperber et al., 2008). Studies have supported the fact that parents are willing to vaccinate their children (Constantine & Jerman, 2007; Davis et al., 2004; Kahn et al., 2003; Mays et al., 2004; Slomovitz et al., 2006), while other studies showed that some parents decide against it or remain undecided (Barnack et al., 2010; Dempsey et al., 2006; Olshen et al., 2005). In order to reach the adolescent child, one must recognize that the parental/authority figure would play a major role in decision-making.

It is important to understand what influences HPV vaccine acceptability, and the perceptions associated with the vaccine. In order to understand what is influencing mothers’ decisions about whether their daughters should receive the vaccine or not, various factors should be explored. A review of studies examined how knowledge and attitudes influence HPV vaccine acceptability (Allen et al., 2010). Only a small minority of the 79 articles reviewed in the Allen study made use of a theoretical framework. Those that did (18%) reported using the Health
Belief Model, the Theory of Reasoned Action, or the social cognitive theory most commonly. The Theory of Reasoned Action uses behavioral intentions to predict behavior by measuring the attitude toward the behavior and the subjective norms associated with the behavior. The literature on HPV vaccine acceptability supports the measurement and correlations of these factors (knowledge, attitudes, and behaviors), but there are many individual and social factors that also may impact acceptability.

Knowledge, attitudes, beliefs, and health behaviors are influenced by one’s connections, either with one’s self or with others. Numerous studies address the influence of social relationships on health and have been reviewed (Berkman and Glass, 2000). Social relationships create cultures of information, beliefs, and behavioral norms, and within these social relationships is the dimension of social support. Social support is having people who one can go to for emotional support and advice, and should be incorporated into women’s health promotion efforts. A variety of approaches have been used to incorporate social support into health promotion efforts for women (Hurdle, 2001), and social support networks play a positive and major role in all ages (Voorhees et al., 2005; Ashida & Heaney, 2008; Cornwell et al., 2008; Small et al., 2011). A woman’s social support network has a strong effect on her health behaviors and the actions she takes to prevent disease.

Spiritual health is another dimension of overall health, but spirituality is difficult to measure. Spirituality is often defined as something inherent, a connection to self, or a belief in something greater than the self. Dimensions of spirituality may complicate the definition, and includes frequency of spiritual behaviors and strength of spiritual beliefs. Religiosity may measure spiritual behaviors and practices, and although related, it should be differentiated from spiritual beliefs. There has been extensive research on religious/church involvement and health
campaigns (Drake et al., 2010; Griffith et al., 2010; Yanek et al., 2001; Husaini et al., 2002), religious beliefs and cancer (Mitchell et al., 2002; Bourjolly, 1998; Gibson, 2003), and religiosity and the HPV vaccine (Ishibashi et al., 2008; Swain et al., 2006). No studies were found that examined the influence of inherent spiritual beliefs and acceptability of the HPV vaccine. Social and spiritual connections could make an impact on knowledge, attitudes, and behaviors toward the HPV vaccine. Understanding the variables that may predict HPV vaccine acceptability is crucial to eliminating health disparities in women’s reproductive health.

Statement of the Problem

A comprehensive review of the literature found no published study which examined mothers’ spirituality and social connections with associated HPV vaccine acceptability for their daughters. The purpose of this study was to fill such gaps in the research and examine mothers in Greater Cincinnati to understand their views on HPV vaccine acceptability for their daughters, social support and connections, and spiritual behaviors and beliefs.

Research Questions

This study had seven main research questions. These questions were:

1. How knowledgeable are mothers of daughters (ages 9 to 18 years old) regarding HPV and the HPV vaccine?
2. What attitudes do mothers of daughters (ages 9 to 18 years old) have toward the HPV vaccine and vaccines in general?
3. What experience do mothers of daughters (ages 9 to 18 years old) have in talking with their daughters about the HPV vaccine?
4. What is the likelihood that mothers of daughters (ages 9 to 18 years old) will talk with their daughters about the HPV vaccine?

5. How many mothers of daughters (ages 9 to 18 years old) have already had their daughters vaccinated?

6. What is the likelihood that mothers of daughters (ages 9 to 18 years old) will have their daughters vaccinated?

7. Do mothers’ knowledge, attitudes, experience talking to daughter, likelihood to talk to daughter, ever having daughter vaccinated, and likelihood to have daughter vaccinated differ based on mothers’ spirituality (behaviors and beliefs), social support, race/ethnicity, income level, and age of daughter?

**Hypotheses**

Twelve independent variables were examined to determine if they had significant association with seven dependent variables. The twelve independent variables were: 1) spiritual behaviors; 2) spiritual beliefs; 3) social support; 4) age of daughter; 5) race/ethnicity; 6) income level; 7) attitude toward vaccination; 8) attitude toward the HPV vaccine; 9) knowledge of HPV; 10) knowledge of the HPV vaccine; 11) doctor recommended HPV vaccine for daughter; and 12) mother talked to daughter about HPV vaccine. The seven dependent variables (outcomes) are: 1) knowledge of HPV; 2) knowledge of the HPV vaccine; 3) attitude toward the HPV vaccine; 4) having ever talked to daughter about the HPV vaccine; 5) likelihood to talk to daughter about the HPV vaccine; 6) having ever had daughter vaccinated; and 7) likelihood to have daughter vaccinated.

The following hypotheses were developed:
Hypothesis 1.0: Knowledge of HPV

Null Hypothesis 1.1: There will be no difference in knowledge of HPV between mothers with frequent spiritual behaviors and those with infrequent spiritual behaviors.

Null Hypothesis 1.2: There will be no difference in knowledge of HPV between mothers with strong spiritual beliefs and those without strong spiritual beliefs.

Null Hypothesis 1.3: There will be no difference in knowledge of HPV between mothers with good social support and those without good social support.

Hypothesis 2.0: Knowledge of the HPV vaccine

Null Hypothesis 2.1: There will be no difference in knowledge of the HPV vaccine between mothers with frequent spiritual behaviors and those with infrequent spiritual behaviors.

Null Hypothesis 2.2: There will be no difference in knowledge of the HPV vaccine between mothers with strong spiritual beliefs and those without strong spiritual beliefs.

Null Hypothesis 2.3: There will be no difference in knowledge of the HPV vaccine between mothers with good social support and those without good social support.

Hypothesis 3.0: Attitude toward the HPV vaccine

Null Hypothesis 3.1: There will be no difference in mothers’ attitude toward the HPV vaccine between mothers with frequent spiritual behaviors and those with infrequent spiritual behaviors.

Null Hypothesis 3.2: There will be no difference in mothers’ attitude toward the HPV vaccine between mothers with strong spiritual beliefs and those without strong spiritual beliefs.

Null Hypothesis 3.3: There will be no difference in mothers’ attitude toward the HPV vaccine between mothers with good social support and those without good social support.
Null Hypothesis 3.4: There will be no difference in mothers’ attitude toward the HPV vaccine between mothers with younger adolescent daughters and those with older adolescent daughters.

Null Hypothesis 3.5: There will be no difference in mothers’ attitude toward the HPV vaccine between mothers who are Black, mothers who are White, and mothers who are of another race/ethnicity.

Null Hypothesis 3.6: There will be no difference in mothers’ attitude toward the HPV vaccine between mothers with higher income level and those with lower income level.

Null Hypothesis 3.7: There will be no difference in mothers’ attitude toward the HPV vaccine between mothers with a favorable attitude toward vaccinations in general and those without a favorable attitude toward vaccinations in general.

Null Hypothesis 3.8: There will be no difference in mothers’ attitude toward the HPV vaccine between mothers with more knowledge of HPV and those with less knowledge of HPV.

Null Hypothesis 3.9: There will be no difference in mothers’ attitude toward the HPV vaccine between mothers with more knowledge of the HPV vaccine and those with less knowledge of the HPV vaccine.

Hypothesis 4.0: Having ever talked to daughter about the HPV vaccine

Null Hypothesis 4.1: There will be no difference in having ever talked to daughter about the HPV vaccine between mothers with frequent spiritual behaviors and those with infrequent spiritual behaviors.

Null Hypothesis 4.2: There will be no difference in having ever talked to daughter about the HPV vaccine between mothers with strong spiritual beliefs and those without strong spiritual beliefs.
Null Hypothesis 4.3: There will be no difference in having ever talked to daughter about the HPV vaccine between mothers with good social support and those without good social support.

Null Hypothesis 4.4: There will be no difference in having ever talked to daughter about the HPV vaccine between mothers with younger adolescent daughters and those with older adolescent daughters.

Null Hypothesis 4.5: There will be no difference in having ever talked to daughter about the HPV vaccine between mothers who are Black, mothers who are White, and mothers who are of another race/ethnicity.

Null Hypothesis 4.6: There will be no difference in having ever talked to daughter about the HPV vaccine between mothers with higher income level and those with lower income level.

Null Hypothesis 4.7: There will be no difference in having ever talked to daughter about the HPV vaccine between mothers with a favorable attitude toward vaccinations in general and those without a favorable attitude toward vaccinations in general.

Null Hypothesis 4.8: There will be no difference in having ever talked to daughter about the HPV vaccine between mothers with a favorable attitude toward the HPV vaccine and those without a favorable attitude toward the HPV vaccine.

Null Hypothesis 4.9: There will be no difference in having ever talked to daughter about the HPV vaccine between mothers with more knowledge of HPV and those with less knowledge of HPV.

Null Hypothesis 4.10: There will be no difference in having ever talked to daughter about the HPV vaccine between mothers with more knowledge of the HPV vaccine and those with less knowledge of the HPV vaccine.
Hypothesis 5.0: Likelihood to talk to daughter about HPV vaccine

Null Hypothesis 5.1: There will be no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with frequent spiritual behaviors and those with infrequent spiritual behaviors.

Null Hypothesis 5.2: There will be no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with strong spiritual beliefs and those without strong spiritual beliefs.

Null Hypothesis 5.3: There will be no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with good social support and those without good social support.

Null Hypothesis 5.4: There will be no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with younger adolescent daughters and those with older adolescent daughters.

Null Hypothesis 5.5: There will be no difference in the likelihood to talk to daughter about the HPV vaccine between mothers who are Black, mothers who are White, and mothers who are of another race/ethnicity.

Null Hypothesis 5.6: There will be no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with higher income level and those with lower income level.

Null Hypothesis 5.7: There will be no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with a favorable attitude toward vaccinations in general and those without a favorable attitude toward vaccinations in general.
Null Hypothesis 5.8: There will be no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with a favorable attitude toward the HPV vaccine and those without a favorable attitude toward the HPV vaccine.

Null Hypothesis 5.9: There will be no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with more knowledge of HPV and those with less knowledge of HPV.

Null Hypothesis 5.10: There will be no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with more knowledge of the HPV vaccine and those with less knowledge of the HPV vaccine.

Hypothesis 6.0: Having had daughter vaccinated

Null Hypothesis 6.1: There will be no difference in having had daughter vaccinated with the HPV vaccine between mothers with frequent spiritual behaviors and those with infrequent spiritual behaviors.

Null Hypothesis 6.2: There will be no difference in having had daughter vaccinated with the HPV vaccine between mothers with strong spiritual beliefs and those without strong spiritual beliefs.

Null Hypothesis 6.3: There will be no difference in having had daughter vaccinated with the HPV vaccine between mothers with good social support and those without good social support.

Null Hypothesis 6.4: There will be no difference in having had daughter vaccinated with the HPV vaccine between mothers with younger adolescent daughters and those with older adolescent daughters.
Null Hypothesis 6.5: There will be no difference in having had daughter vaccinated with the HPV vaccine between mothers who are Black, mothers who are White, and mothers who are of another race/ethnicity.

Null Hypothesis 6.6: There will be no difference in having had daughter vaccinated with the HPV vaccine between mothers with higher income level and those with lower income level.

Null Hypothesis 6.7: There will be no difference in having had daughter vaccinated with the HPV vaccine between mothers with a favorable attitude toward vaccinations in general and those without a favorable attitude toward vaccinations in general.

Null Hypothesis 6.8: There will be no difference in having had daughter vaccinated with the HPV vaccine between mothers with a favorable attitude toward the HPV vaccine and those without a favorable attitude toward the HPV vaccine.

Null Hypothesis 6.9: There will be no difference in having had daughter vaccinated with the HPV vaccine between mothers with more knowledge of HPV and those with less knowledge of HPV.

Null Hypothesis 6.10: There will be no difference in having had daughter vaccinated with the HPV vaccine between mothers with more knowledge of the HPV vaccine and those with less knowledge of the HPV vaccine.

Null Hypothesis 6.11: There will be no difference in having had daughter vaccinated with the HPV vaccine between those whose doctors recommended the HPV vaccine and those whose doctors did not recommend the HPV vaccine.

Hypothesis 7.0: Likelihood to have daughter vaccinated
Null Hypothesis 7.1: There will be no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with frequent spiritual behaviors and those with infrequent spiritual behaviors.

Null Hypothesis 7.2: There will be no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with strong spiritual beliefs and those without strong spiritual beliefs.

Null Hypothesis 7.3: There will be no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with good social support and those without good social support.

Null Hypothesis 7.4: There will be no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with younger daughters and those with older daughters.

Null Hypothesis 7.5: There will be no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers who are Black, mothers who are White, and mothers who are of another race/ethnicity.

Null Hypothesis 7.6: There will be no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with higher income level and those with lower income level.

Null Hypothesis 7.7: There will be no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with a favorable attitude toward vaccination and those without a favorable attitude toward vaccination.
Null Hypothesis 7.8: There will be no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with a favorable attitude toward the HPV vaccine and those without a favorable attitude toward the HPV vaccine.

Null Hypothesis 7.9: There will be no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with more knowledge of HPV and those with less knowledge of HPV.

Null Hypothesis 7.10: There will be no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with more knowledge of the HPV vaccine and those with less knowledge of the HPV vaccine.

Null Hypothesis 7.11: There will be no difference in the likelihood to have daughter vaccinated with the HPV vaccine between those whose doctors recommended the HPV vaccine and those whose doctors did not recommend the HPV vaccine.

Null Hypothesis 7.12: There will be no difference in the likelihood to have daughter vaccinated with the HPV vaccine between those mothers who talked to their daughters about the HPV vaccine and those who did not talk to their daughters about the HPV vaccine.

Interaction effects will be explored, but are not \textit{a priori} hypotheses.

Delimitations
1. This study will be delimited to mothers with daughters (ages 9 to 18 years old).
2. This study will be delimited to mothers who attend a community health clinic for their care, or who were in attendance at selected community activities.
3. This study will be delimited to mothers in the Greater Cincinnati area, and may not be generalized to the entire nation.
4. This study will be delimited to a non-randomized sample of mothers. A population-level survey would allow further analysis between groups.

Limitations

1. This study will be limited by the extent to which the mothers answered honestly and accurately.

2. This study will be limited by the data being self-reported, and that some items may be sensitive (personal) in nature. There is a threat to internal validity if respondents gave socially desirable responses.

3. This study will be limited based on it being a cross-sectional study; therefore no cause-and-effect can be determined.

4. This study will be limited by participant’s ability to clearly read, understand, and answer the survey in English.

5. This study will be limited by the sample size; small sample sizes will preclude more detailed analysis.

Operational Definitions

The following definitions are important to this study:

1. Human Papillomavirus (HPV)—any of a number of species of viruses that cause warts, particularly plantar and genital warts, on the skin and mucous membranes in humans; some are associated with malignancies of the genital tract

2. Social Support—the existence or availability of people on whom one can rely; people who let one know that he/she is cared about, valued, and loved

3. Spirituality—a basic or inherent quality in all humans that involves a belief in something greater than the self; it facilitates connectedness with self, others, and community
4. Spiritual behaviors—the practices, rituals, or religious behaviors that one engages, such as attendance at religious events/activities, prayer or meditation, and reading spiritual/sacred literature

5. Spiritual beliefs—one’s thoughts on the existence of a Higher Being, and the importance of spiritual connections and the role of faith and values; having these beliefs as guidance in one’s life

6. Likelihood of behaviors—one’s reported intention to do or perform a behavior; how likely or probable that one is to perform the behavior at some point in the future

Summary

The purpose of this study was to fill gaps in the research about the relationships between social support, spirituality (both behaviors and beliefs), and cervical cancer prevention through HPV vaccine acceptability. Identifying mechanisms by which social and spiritual connections impact HPV prevention may help researchers and policy makers in developing interventions and programs that promote and sustain reproductive health.
Chapter Two: Literature Review

Purpose Statement

A comprehensive review of the literature found no published study which examined mothers’ spirituality and social connections with associated HPV vaccine acceptability for their daughters. The purpose of this study was to fill such gaps in the research and examine mothers in Greater Cincinnati to understand their views on HPV vaccine acceptability for their daughters, social support and connections, and spiritual behaviors and beliefs.

Chapter One discussed the research questions, hypotheses, limitations, delimitations, and key terms used in this study. This chapter provides a comprehensive review of the literature.

Introduction

The literature offered a comprehensive review of social support and spirituality that proved helpful to the study. Social support/networking is a current and relevant topic that is of interest in health promotion. Spirituality is a dimension of overall health and wellness that could play a role in the outcomes of a health promotion program. Reproductive health programs help to create awareness and to prevent disease. The literature revealed that social and spiritual connections could play a role in reproductive health promotion.

Extent of the problem

Cervical cancer is one of the most common cancers in women worldwide, with approximately 500,000 new cases diagnosed each year and 274,000 deaths each year (Parkin, 2005; World Health Organization, 2008). Worldwide, it is the third most commonly diagnosed cancer and the fourth leading cause of cancer death in females; it is second only to breast cancer.
as a cause of cancer-related mortality in women in developing countries (Ferlay et al., 2010). The American Cancer Society (ACS) estimates that in 2013, about 12340 American women will be diagnosed with invasive cervical cancer and about 4030 women will die from the disease (ACS, 2013). Cervical cancer was once the leading cause of death from cancer for women in the United States, but over the past 50 years, incidence and mortality rates from cervical cancer have steadily decreased, largely due to the widespread use of the Papanicolaou test (Pap smear) which detects cervical cancer and pre-cancerous lesions (Freeman & Wingrove, 2005). It usually takes a long time for pre-cancerous lesions to progress to invasive cancers. Unlike some other cancers, cervical cancer can be prevented if detected early through Pap smear screenings and treatment of pre-cancerous lesions. Despite this knowledge of early detection, mortality rates due to cervical cancer have remained stable since 2003 (ACS, 2012).

A sizeable percentage of women may develop cervical cancer as a consequence of recurring sexually transmitted infections. The Human Papillomavirus (HPV) is present in nearly 100% of the cases of cervical cancer (Bosch, 2002), and is associated with at least 80% of invasive cervical cancer cases. Genital infection with HPV is the most common sexually transmitted infection (STI) in the United States today, with approximately 20 million people currently infected (Weinstock, Berman, & Cates, 2004). In the United States, it is estimated that 80% of men and women will be infected with HPV at some point in their lifetime (Koutsky, 1997). Nearly three out of four Americans between the ages of 15 and 49 will be infected with genital HPV over the course of their lives (Couto & Dailard, 1999). Nearly a quarter of 14 to 19 year-olds in the U.S. are infected with HPV; more than one-third of women are infected by the time they are 24 years old (Dunne, 2007).
Sexually transmitted infections/diseases (STIs/STDs) are a very serious issue in the Greater Cincinnati metropolitan area. The Cincinnati area (Hamilton County, OH) was reported to have rates of sexually transmitted diseases higher than the national average (Hooker, 2011). HPV is a common viral infection, and, unlike syphilis and gonorrhea, it is not required to be reported to government agencies. Since the rates of STDs are high in this metropolitan area, it may be deduced that the rates of HPV infection are high as well. In fact, co-infection of other STIs with HPV infection is common. Because there may be no noticeable signs or symptoms of HPV, and because there is no requirement to report an HPV infection, even the reported cases may be underestimated and may under-represent the actual number of cases.

HPV can be spread through direct skin-to-skin contact, predominately through sexual contact involving vaginal, oral, or anal sex. A person can have HPV and not know it because it has no signs or symptoms until an abnormal Pap smear or genital warts are detected. Approximately 1% of sexually active adults in the US have visible genital warts, and at least 15% (as detected by HPV DNA assays) have a subclinical infection (Koutsky, 1997). Often, HPV is acquired within months after the first sexual encounter.

In one study of college women who recently had sexual intercourse for the first time, and who reported having had only one partner, almost 30% became HPV-positive within a year, and increased to almost 50% by three years (Winer, et al., 2008). The American Cancer Society (2012) reported that if condoms are used in every sexual encounter, they could decrease a woman’s risk of infection by 70%, and thus help to protect her from developing precancerous cervical changes. Because condoms do not cover the entire genital area, they are not 100% effective in preventing HPV infection. However, consistent condom use appears to reduce the
risk of cervical and vulvovaginal HPV infection (Winer, et al., 2006). Most cases of HPV infection are spread by partners who may not know that they have the infection.

The risk of cervical cancer is specifically related to persistent HPV infections, and these infections can possibly be recognized years before clinical symptoms. In most cases, infections with HPV are not serious and may resolve without treatment. Less than 10% of acute HPV infections eventually progress to high-grade lesions or invasive cancer (Wentzensen & Doeberitz, 2007). In some individuals, however, HPV infections may result in genital warts, abnormal Pap smear test results, or cervical cancer by causing cancerous changes in the cervix. Women with HPV may need to have Pap smears more frequently in order to monitor changes in the cervix.

The progression of HPV infection to cervical cancer corresponds with histologic changes of the epithelial tissue. Cervical intraepithelial neoplasia (CIN) is an abnormality of the cervical squamous epithelium associated with HPV infection. The life cycle of HPV occurs in keratinocytes, and the viral DNA gets integrated into the host genome as the cancer progresses. Carcinogenesis is associated with the expression of proteins E6 and E7, which turn off the tumor suppressors cells. See Figure 2-1, from Kahn (2009), p. 373.
Because of the strong relationship between HPV and cervical cancer, there is the potential to prevent cervical cancer by preventing the spread of HPV. The development of a prophylactic vaccine against high-risk HPV is expected to have a great influence on the incidence of HPV infections, HPV lesions, and cervical cancer. In June of 2006, Gardasil (Merck & Co.) was licensed by the Food and Drug Administration (FDA) as a prophylactic vaccine to protect females aged 9-26 years old against HPV infection. Gardasil was the first vaccine developed to prevent cervical cancer and genital warts caused by HPV. It works by protecting against the four types of HPV that most commonly cause these diseases; the vaccine is given in three doses. Another vaccine, Cervarix (GlaxoSmithKline), approved by the FDA in October of 2009, is designed to prevent infection from HPV types 16 and 18. The HPV vaccine protects against genital warts and most types of cervical cancer.
The FDA-approved HPV vaccine is recommended for adolescents, both males and females. It offers the greatest health benefits to those who receive all three doses before having any type of sexual activity. That is why the Centers for Disease Control and Prevention (CDC) recommends HPV vaccination for all boys and girls at age 11 or 12 years. It is also recommended for all teenage girls and women through age 26 who did not already receive the vaccine, as well as teenage boys and men through age 21 who did not already receive the vaccine (CDC, 2007).

Some vaccines offer long-term immunity, while others require booster doses. The HPV vaccine does not require booster shots; studies have found the HPV vaccine to be effective for over five years (Lehtinen et al., 2008; Villa et al., 2007; Harper et al., 2006). Once vaccinated with the HPV vaccine, women will still need to get their recommended Pap smears, in order to detect changes that may be attributed to another strain of the virus not covered by the vaccine. Pap screening is a secondary prevention measure, but the HPV vaccine is a primary prevention measure.

Both vaccines in the HPV vaccination program targets oncogenic high-risk types HPV16 and HPV18; these HPV types account for 62% to 77% of all cervical cancers, depending on the geographic region (Clifford et al., 2003). Universal HPV vaccination is widely accepted as a way to reduce the burden of cervical cancer and HPV-related diseases (Goldie et al., 2003). An individual’s decision to accept the vaccine is influenced by marketing and advertising by the pharmaceutical companies (Griffioen, 2012), perceived susceptibility of getting HPV, and availability/cost. Screening women for cervical cancer (Pap screening) and HPV vaccination are important, but are not in themselves totally effective strategies. Primary prevention of cervical cancer and HPV infection should include education and information regarding the transmission
of STIs and teaching safer sex negotiation skills, which are potentially highly effective and low cost (Shepherd, Peersman, Weston & Napuli, 2000). The main source of information for young people about STIs is in health education classes in high schools and middle schools, but information may not be communicated in a way that makes it acceptable (Baer et al., 2000). Prevention programs for HPV and cervical cancer, as well as sexual risk behavior reduction programs, should be part of a comprehensive women’s health campaign.

**HPV vaccine acceptability**

Promoting the HPV vaccine is an important part of a women’s health program for preventing HPV infection and cervical cancer. Generally, American adult women have high levels of HPV vaccine acceptability (Stupiansky et al., 2010), and since its approval by the FDA, parents have supported the use of the vaccine (Bernat et al., 2009). Some media accounts (Knox, 2011; Leung, 2012) report that parents are refusing HPV vaccines for their adolescents, but there have been many studies that show a large number of parents who are willing to consider vaccination (Kahn et al., 2003; Mays et al., 2004; Slomovitz et al., 2006). Research has been conducted to better understand the factors and perceptions involved with acceptability of the vaccine. Caskey and colleagues (2009) found that healthcare providers and even family members were influential regarding HPV vaccine knowledge and acceptance of the vaccine for young women. Several studies looked at the role of parental authority on the acceptability of the HPV vaccine. A mother’s decision to have her daughter vaccinated was found to be influenced by parenting style, sense of vulnerability, and attitude toward having the shots of the vaccine (Rosenthal et al., 2008). Higher intentions to vaccinate daughters were associated with knowing more about HPV, believing that there is a risk and negative consequences to HPV infection and
cervical cancer, and believing the vaccine to be effective against cervical cancer (Fazekas et al., 2008). Gerend and colleagues (2007) found that parents were willing to vaccinate their adolescent against HPV, and that personal acceptability and interest in having children vaccinated was high, while Sperber and colleagues (2008) found that women were more likely to intend to have their daughters vaccinated than themselves, depending on how message was framed.

Even though many parents are generally willing to vaccinate their children with the HPV vaccine, some of them decide against it or are undecided (Dempsey et al., 2006; Olshen et al., 2005). Reasons to not vaccinate include denial of its need (Constantine and Jerman, 2007) and unknown adverse effects due to the vaccine (Slomovitz et al., 2006). Increased education for parents regarding the vaccine could lead to higher acceptance rates (Davis et al., 2004). Parent/child relationships could influence prevention strategies for HPV and cervical cancer. In order to reach the adolescent, one must consider that the parental/authority figure would have a major influence on the decision.

*Connections*

Connectedness can be defined as a sense of belonging or a feeling that one “fits in.” The term is often used with adolescents and how school connectedness influences health behavior (McNeely & Falci, 2004). Among US youth, parent connectedness was found to be a leading protective factor against risky health behaviors (Resnick et al., 1997). Parent connectedness involves positive communication and comprises of a sense of caring and belonging between parent and child.
In the literature, there was a gap in the research regarding parental connections in any context besides parent/child. There lacked insight regarding the importance of parents having ties and receiving support from other parents or adults. One of the dimensions of connectedness is social support, and having significant ties to others that provide acceptance, nurturance, and coping relief. Without parents’ social connections with others, loneliness and isolation can have a negative effect on the decisions they make regarding rearing the child(ren). Exploring the dimension of social support for adults, especially for parents, could provide useful information regarding health behaviors and decision-making.

Another type of connection is spiritual connection. Spirituality connects a person to something greater than the self, and affirms one’s faith and beliefs. It is also used to help people cope with life’s challenges. A person’s spiritual connections could also impact behaviors and decision-making. Parental connections (socially and spiritually) can be examined in the context of how they may influence health behaviors.

*Social Connections*

Social relationships (in terms of the structure of social networks, the support we receive from others, and the quality and quantity of our social interactions and feelings of isolation and loneliness) play an essential role in our health and well-being (Cohen, 2004). Numerous studies address the influence of social relationships on health (Berkman and Glass, 2000). They can be summed up with the following statement: “Although the results of individual studies are usually open to alternative interpretations, the patterns of results across the full range of studies strongly suggests that what are variously termed social relationships, social networks, and social support
have important causal effects on health, exposure to stress, and the relationship between stress and health” (House, 1987, p. 136).

Social support within relationships connects people to one another. Social support is generally defined as “the existence or availability of people on whom one can rely; people who let one know that they are cared about, valued, and loved” (Sarason, 1983). It has also been defined as “the emotional support, advice, guidance, and appraisal, as well as the material aid and services, that people obtain from their social relationships” (Ell, 1984, p. 134). Social connections provide the structure for social interactions, including friendship groups and organizations. They create cultures of information, beliefs, and behavioral norms. The social connections one has could influence knowledge, attitudes, beliefs, and behaviors, which will affect decision-making for health behaviors.

Social support is thought to be particularly important for women. For females at every stage of development, the need for connection and relationships with others is a primary motivation that determines cognition, affect, and behavior (Hurdle, 2001). A variety of approaches have been used to incorporate social support into health promotion efforts for women, including developing buddy support, bringing efforts to community locations, using peer role models, and linking to natural supports (Hurdle, 2001). Researchers have found “protective” effects of behavior-specific social networks for girls (Voorhees et al., 2005) and that social connections also play a major role in support among older adults (Ashida & Heaney, 2008; Cornwell et al., 2008). Being a part of a social network that values a particular health behavior will influence individuals’ behavior. Interventions providing social support are helpful for women in being understood, not being judged, not feeling so alone, and feeling an increased sense of own self-worth (Small et al., 2011). One’s social environment is associated with long-
term quality of life (Petersen, 2008). Because of the importance of social networking/support for women and for health interventions, social support would be a major factor in a reproductive health program aimed at women. A woman’s social network, particularly her family and female friends, may have a strong effect on her preventive health behaviors.

**Spiritual Connections**

Spirituality can also give a person a sense of connectedness; it is commonly defined as a person’s connection to self, significant others, and the community. “Spirituality is often defined as a basic or inherent quality in all humans that involves a belief in something greater than the self and a faith that positively affirms life” (Miller, 1995). For the purposes of this research, spirituality will be examined as two dimensions—spiritual behaviors and spiritual beliefs.

Spiritual behaviors are the practices or religious behaviors that one engages, such as attendance at religious events, engaging in prayer or meditation, and reading spiritual/sacred literature. Spiritual beliefs are one’s beliefs in the existence of a Higher Being, and having this faith as guidance in one’s life and value system. Spirituality (behaviors and beliefs) may be related to religiosity, but many people make a distinction between the two. Religion has been characterized as “an organized system of beliefs, practices, rituals, and symbols,” while spirituality refers to “one’s transcendent relationship to some form of Higher Power” (Thoresen, 1998, p. 415). Religiosity has often been measured by frequency of attendance at church/synagogue/mosque (and may not include other spiritual behaviors). However, someone who is not affiliated with any religion may still think of themselves as “spiritual”. Spirituality involves a person’s search for meaning in life while religion usually involves rituals, practices, or behaviors (Tanyi, 2002). Recognizing that religious institutions promote connections with others
of similar values and beliefs, and serve as a spiritual resource, it is important to discern between religiosity and spirituality as related to health behavior and decision making.

There has been extensive research on religious involvement in diverse populations (Krause, 2003; Taylor et al., 1996), as well as health campaigns that have incorporated elements of religion and spirituality or initiated within the faith community (Bopp et al., 2011; Drake et al., 2010; Griffith et al., 2010; Falcone et al., 2006; Yanek et al., 2001; Resnikow et al., 2000). Health interventions that have a collaborative partnership with the faith community are effective (Campbell et al., 2007).

Many studies evaluate church-based programs that focus on cancer prevention. Corbie-Smith et al. (2003) found high levels of trust, benefit, and satisfaction, among members of African-American churches in a cancer prevention intervention that utilized a community-based participatory approach. Husaini et al. (2002) examined the effectiveness of a church-based breast cancer screening education program on mammography rates, and demonstrated the increased likelihood in getting screened because of their education intervention. Davis et al. (1994) examined the efficacy of a church-based model of social influence in reaching underserved populations for participation in a cervical cancer program. Utilizing urban churches, women parishioners were able to participate in a cervical cancer educational intervention and screening was offered to adult women who had not had a Pap test within the last two years. Because of the social influence of the ministers and the lay health workers, improved access to and high rates of participation were evidenced in minority (African American and Hispanic) women.

Religious beliefs have been addressed in several studies that examine women’s health and screening behaviors. Belief in God as the source of control over one’s health was associated
with being less likely to adhere to mammography recommendations in one small study (Kinney et al., 2002), but also positively associated with breast self-exam, demonstrating various motivations for prevention measures. Mitchell et al. (2002) also investigated the effect of religious beliefs on breast cancer screening, and noted that only a minority of women was found to believe that treatment for breast cancer was unnecessary because only God can cure cancer. Findings, however, supported the fact that women who believed that God worked through doctors to cure cancer were more likely to report getting mammography screenings. Bourjolly (1998) analyzed the differences in religious beliefs between Black and White women with breast cancer; African American women were more likely to use religion as a coping mechanism in dealing with cancer. Religious beliefs can influence the approach one takes for prevention, treatment, and coping with disease.

Other studies addressed spiritual beliefs/spirituality and women’s health behaviors for cancer prevention and treatment. Gibson (2003) compared inner resources among breast cancer survivors and results revealed that spiritual perspectives and hope, together, were predictors of psychological well-being. Although Lukwago et al. (2003) showed no significant correlations between breast cancer knowledge and spirituality, Holt et al. (2003) found that the dimension of spiritual beliefs played an important role in mammography knowledge and utilization. The spiritual needs of cancer patients (Moadel et al., 1999) and caregivers (Taylor, 2003) were also addressed in the literature as an important perspective in addressing the disease. Although studies have presented associations between spirituality in cancer patients, there is a gap in the research in addressing spirituality and HPV prevention through vaccination. Little evidence exists that uses spirituality measures to predict reproductive health behavioral intentions for primary prevention.
Religiosity has been found to be associated with HPV vaccine acceptability. Among parents (and even physicians), higher religiosity indicated a reluctance to vaccinate for HPV (Stupiansky et al., 2010; Ishibashi et al., 2008). Barnack and colleagues (2010) determined that those parents who attended religious services more than once a week were less likely to have their children vaccinated, compared with parents who never or rarely attended religious services. This study reiterated the findings of a previous study, which showed that less frequent religious involvement is associated with higher vaccination intentions (Swain et al., 2006). Since this vaccine is against a sexually transmitted infection, many religions or belief systems may refuse or frown upon it.

Although religiosity and HPV prevention have been examined in the literature, little is known regarding the impact of spirituality (beliefs, behaviors, and relationships) on HPV prevention measures. Questions as to how spiritual connections can impact the delivery of women’s health messages and affect the strength and quality of women’s social connections still exist. Faith-based programs and social support networks may be the conduit to allow women in hard-to-reach populations to receive education regarding the HPV vaccine.

*Health disparities in diverse populations*

It is well established that there are biological, behavioral, and social factors that interact through multiple feedback mechanisms to influence individual or population health over time (Cwickel, 2006). Social epidemiology seeks to describe or explain social differentials in health outcomes. It could also be used to predict how health promotion interventions might reduce health outcome disparities. Social differentials could be described in terms of social factors like socioeconomic status, race, ethnicity, gender, age/life, work, housing, support, or social capital.
It could be described in terms of health behaviors, psychosocial stressors, physical/environmental stressors, or health care access, utilization and quality. Health outcomes could be described in terms of morbidity, mortality, well-being, knowledge, attitudes, or behaviors.

Research on women’s health and on efforts to eliminate racial/ethnic disparities in health has recently stepped into the spotlight, impacting legislation and scientific endeavors. The federal government has prioritized the elimination of racial/ethnic health disparities in health to the top of the nation’s agenda (United States Department of Health and Human Services, Healthy People 2020). Cervical cancer health disparities exist for racial/ethnic minority women. Although cervical cancer as a cause of death has declined in most industrialized countries, morbidity has been disproportionately high, especially among older Black women of lower socioeconomic class (Mandelblatt et al., 1991). Even as the mortality rate from cervical cancer for African American women has declined more rapidly than for White women, mortality rates are still twice as high for Blacks than Whites (Freeman & Wingrove, 2005). Research shows that African American women are at a 40% higher risk for developing the invasive disease and have more than twice the risk of dying from cervical cancer than their Caucasian counterparts in the United States (Ries et al., 2002). Incidence rates of cervical cancer for Hispanic women are higher than that for non-Hispanic white women. Latinas are less likely to be screened and more likely to die of cervical cancer than non-Hispanic white women (Bernard et al., 2001; Barszagan et al., 2004). Other studies have indicated that minority women are at higher risk for HPV-related morbidity and mortality (McDougall et al., 2007; Watson et al., 2009).

Late-stage cervical cancer diagnoses has been found to be more likely in areas that are economically distressed (Barry & Breen, 2005; Freeman & Wingrove, 2005). Screening levels
for women are directly impacted by access to health care services (not having a routine place of care, a regular provider, transportation, health insurance, or health literacy). Lower HPV vaccine utilization (vaccine series completion) is also associated with public insurance and African American race (Dempsey et al., 2010). For many low-income minority parents, HPV vaccination is seen as a way to protect their daughters from cancer, and choose to vaccinate their daughters (Perkins, 2010). Barriers to preventive care and early treatment contribute to racial and ethnic disparities, and warrant cultural understanding for vulnerable populations to decrease barriers.

Social support and spiritual acknowledgement are imperative in the development of an intervention in vulnerable populations. Health promotion efforts utilizing social support are in line with culturally sensitive approaches to interventions (Hurdle, 2001). In health promotion and disease prevention efforts, interventions must respect cultural traditions of family relationships, incorporate cultural values, and be sensitive to the normative behaviors of different ethnic and racial communities. Erwin et al. (2007) examined how a cancer screening program for African American women that integrates social roles and relationships was successful and can be used as a model for an intervention in Latino communities. Minority women demonstrate shared attributes of spirituality and religiosity (Musgrave, Allen, & Allen, 2002). Dessio et al. (2004) showed that religion and spirituality are associated with health-seeking behaviors by African American women, especially for serious conditions like cancer. The use of spirituality for health reasons in ethnic minorities and vulnerable populations should be explored.

Church-based programs may have particular pertinence in African-American and Hispanic communities because the church has been seen as a stable, enduring institution that is central to family and community. It is a place that provides social capital and support for
members. The venue for church-based programs is a recognized location for religious, spiritual, and social events, and it provides a gathering place for people with similar beliefs.

The literature supports cultural considerations in an HPV vaccine acceptability program to address beliefs (Tissot et al., 2007; Sussman et al., 2007). Scarinci and colleagues (2007) found an increase in overall acceptability among women in focus groups after a brief intervention, but African Americans were more skeptical. Unique educational strategies need to be developed based on needs and perceptions of the targeted audience. One strategy for an audience of minority women may be to understand how connectedness may impact delivery of the health message, so that the message can be tailored and be sensitive to social and spiritual connections. Using this type of platform for promoting HPV prevention may prove effective. It would be important to examine predictors of acceptability among ethnic groups for the development of more culturally sensitive educational materials.

Theoretical framework

Several health promotion theories guide this research in understanding the influences on health decision-making. Adopting protective health behaviors is understood at various levels. Rogers’ diffusion of innovations model (2003) classifies members of the social system based on their innovativeness, or degree to which an individual is relatively earlier to adopt an innovative idea than other members. The classification includes, in order of adopting an innovation—innovators, early adopters, early majority, late majority, and laggards. The model considers effects at multiple levels—individual, interpersonal, and the community network level. Bandura (1986) calls for determining the interdependencies between personal and environmental influences on health behavior. His Social Cognitive Theory (SCT) constructs include reciprocal
determinism (person, behavior, environment), environments and situations (physical and perceptions of environments), observational learning, behavioral capability, outcome expectations and expectancies, and self-efficacy (one’s confidence in one’s ability to perform a specific behavior).

Both theories, the diffusion of innovations and the SCT, address the influence of behavior-adoption at multiple levels—individual and interpersonal. Rogers (2003) explained that both theories seek to explain how individuals change their behavior as a result of communication with other individuals. Both theories emphasize the exchange of information as integral to behavior change, and view social network links as the main explanation of how individuals change their behavior. These theories are important in the adoption of new recommendations, and may play a prominent role in influencing mothers to have their daughters receive the HPV vaccine.

The Health Belief Model (HBM) is one of the most widely used health behavior models. Originally developed by social psychologists Godfrey Hochbaum and Irwin Rosenstock in the 1950s, it is based on the concept that a person will take health-related action if he/she has a perception of susceptibility and severity to the health problem, and a perception of the benefits and barriers to the preventive behavior. It also states that the preventive behavior is a function of whether the person experiences a cue to action. The concept of self-efficacy was added later (utilizing Bandura’s work). In a comprehensive review of the HBM (Janz and Becker, 1984), perceived barriers were found to be the most powerful predictor across all the studies and behaviors, and perceived susceptibility was a strong predictor of a preventive health behavior (like a vaccine).
Other concepts to be included in this framework to understand behavior change is the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB). TRA was developed by Martin Fishbein and Icek Ajzen in 1975 to examine the relationship between attitudes and behavior, and uses behavioral intentions to predict behavior. To determine behavioral intentions, one can measure attitude toward the behavior and the subjective norm associated with the behavior (Fishbein & Ajzen, 1975). Intention to perform a behavior is a good predictor of actual behavior. Behavioral intention is driven by knowledge, attitudes, and beliefs about the need to perform the behavior. It is also driven by the behavior’s expected outcomes, perceptions of social norms of the behavior, and the person’s self-efficacy regarding the ability to perform the behavior. Behavioral intentions reflect how motivated a person is to perform the behavior.

TPB is an extension of TRA and accounts for the fact that behavior may not completely be under one’s own control. TPB includes the concept of perceived behavioral control, or a person’s ease or difficulty of performing a particular behavior (Ajzen, 1991). Without perceived behavioral control, one is assuming there are no or few external constraints, and that the person has the needed skills to perform that behavior. The concept of social influence is an important construct in both TRA and TPB, and is assessed by social norm and normative belief.

Behavioral intentions are important in predicting behavior (Conner & Sparks, 2005; Fishbein & Ajzen, 1975), and behavior change can include acceptance of a new behavior, such as receiving a vaccine recommendation. A previous study utilizing TPB (Askelson, 2010) indicated that attitudes were a strong predictor of mothers’ intentions to vaccinate, and that subjective norms also influence intention. Norms are highly associated with one’s intention to perform a health-related behavior (Rivis & Sheeran, 2003).
As previously mentioned, behavioral intentions are partially determined by attitude, therefore another influence on behavior is attitude toward the behavior. Fishbein and associates (1975) theorized that attitude toward a behavior is a better predictor of that behavior than attitude toward the target at which the behavior is directed. In other words, attitude toward HPV infection (target) is expected to be a poor predictor of HPV vaccination, whereas attitude toward the HPV vaccine (behavior) is expected to be a good predictor. Aspects of these theories with respect to HPV vaccine acceptability will be explored.

Summary

A review of the literature indicated gaps in knowledge about the relationship between social connections, spirituality, and reproductive health issues for women, specifically HPV and cervical cancer prevention through HPV vaccine acceptability. There is a need to explore these relationships in order to make appropriate recommendations and develop health promotion interventions in communities.
Chapter Three: Methods

Purpose Statement

A comprehensive review of the literature found no published study which examined mothers’ spirituality and social connections with associated HPV vaccine acceptability for their daughters. The purpose of this study was to fill such gaps in the research and examine mothers in Greater Cincinnati to understand their views on HPV vaccine acceptability for their daughters, social support and connections, and spiritual behaviors and beliefs.

Chapter One discussed the research questions, hypotheses, limitations, delimitations, and key terms used in this study. Chapter Two provided a comprehensive review of the literature. This chapter describes the methods used in this study.

Participants

The participants of this study were mothers in the Greater Cincinnati area who have daughters ages 9 through 18. Respondents were recruited from urban, outpatient clinics associated with a public health department and a faith-based community health center. These clinics provide primary care services to children, adolescents, and families, and serve a clientele of low to middle income families. Respondents were also recruited from neighborhood events in selected suburban communities (selected to represent diversity—both racially and economically). Inclusion criteria for this study were being an adult mother over the age of 18 and having a daughter aged 9 to 18 years old, and the ability of completing the survey instrument in English. Participants received a written survey with an oral explanation of the study. A sample of 200 participants was sought. As of the 2010 census, the Cincinnati/Northern Kentucky metropolitan area had a population of 2,130,151.
**Instrument Development**

No previously tested instrument was identified, therefore an original women’s reproductive health, spirituality, and social support questionnaire was developed based on review of the literature and an assessment of items from other surveys. A comprehensive review of the literature was conducted to examine HPV vaccine and HPV vaccine acceptability, social support, and spirituality and health. Databases utilized during this literature review included the following: Academic Search Premiere, CINHAL, Medline, PsychINFO and ERIC. Search terms included: human papillomavirus, HPV, HPV vaccine, HPV vaccine acceptability, social support, spirituality and health, and faith-based programs. Based on this review of the professional literature, previous survey instruments, discussions with other researchers, and theoretical models (Health Belief Model and Theory of Reasoned Action), a 3-page, 64-item survey (Appendix A) was developed. Items assessed knowledge, attitudes, health beliefs and behaviors, behavioral intentions toward the HPV vaccine, informational sources regarding the HPV vaccine, social support, spiritual behaviors, spiritual beliefs, and demographics. Items were adapted from the ENRICHED Social Support Instrument (ESSI) and various spirituality scales; HPV vaccine questions were based on the Health Belief Model (perceived benefits, barriers, susceptibility) and the Theory of Reasoned Action (behavioral intentions, subjective norms) and adapted with input from health care professionals.

To assess the mothers’ social support, the ESSI was used. The ESSI is a seven-item measure that assesses the four defining attributes of social support: emotional, instrumental, informational, and appraisalal. This instrument was previously developed for a cardiac clinical trial, derived from questions on the Medical Outcomes Study (MOS) and the awareness of the importance of social support on cardiovascular outcomes (Vaglio et al., 2004). For this current
survey, six of the seven items were grouped together in one section; the seventh item (which asks “are you currently married or living with a partner?”) was asked elsewhere on this survey (with demographical information). Just as with the original ESSI, individual items were then summed for a total score, with higher scores indicating greater social support. The ESSI has demonstrated acceptable internal consistency, is a valid and reliable measure of social support, and has shown to correlate positively with other social support instruments (Vaglio et al., 2004; Lindsey & Yates, 2004). Questions regarding spirituality, behaviors, and the HPV vaccine were adapted from other studies (Kahn et al., 2008; King et al., 2006; Lukwago et al., 2003). This current survey was used to examine all of the research questions and hypotheses.

Twelve independent variables were examined to determine if they had significant effects on seven dependent variables. The 12 independent variables are: 1) spiritual behaviors; 2) spiritual beliefs; 3) social support; 4) age of daughter; 5) race/ethnicity; 6) health insurance status/SES proxy; 7) attitude toward vaccination; 8) attitude toward the HPV vaccine; 9) knowledge of HPV; 10) knowledge of the HPV vaccine; 11) doctor recommended HPV vaccine for daughter; and 12) mother talked to daughter about HPV vaccine. The seven dependent variables (outcomes) are: 1) knowledge of HPV; 2) knowledge of the HPV vaccine; 3) attitude toward the HPV vaccine; 4) having ever talked to daughter about the HPV vaccine; 5) likelihood to talk to daughter about the HPV vaccine; 6) having ever had daughter vaccinated; and 7) likelihood to have daughter vaccinated. Analyses were performed to determine whether dependent variables differed based on independent variables. An expert in health education survey research reviewed the instrument for content validity.

Overall, the survey comprised of eight sections. Section one consisted of twelve items to assess knowledge of HPV and the HPV vaccine. Participants’ knowledge of HPV and the HPV
vaccine was assessed by their overall score on the true/false statements. Seven of the twelve items related to HPV knowledge, and five items related to knowledge of the HPV vaccine.

Section two consisted of fourteen items to assess attitudes towards vaccination, the HPV vaccine, and HPV prevention. A Likert five-point scale measured the responses for statements regarding barriers, benefits, beliefs, susceptibility, and subjective norms. The Likert five-point scale measured negative to positive responses (1 = negative or not favorable attitude to 5 = positive or favorable attitude).

Section three assessed behaviors, and consisted of four items. Self-report of behavior included yes/no responses to questions like “Have you talked to your daughter?” and “Has your daughter received the vaccine?” Section four assessed behavioral intention (following the Theory of Reasoned Action model) toward HPV prevention, and consisted of five questions on a four-point scale (1 = not likely at all likely to 4 = extremely likely). One additional question regarding where the mothers received their information on the HPV vaccine was also posed.

Section five consisted of six items to determine mother’s social support, as adapted from the ESSI. A social support score was determined from the responses to the six questions in the section regarding family and friends (1 = none of the time to 5 = all of the time on a five-point scale). Since the original ESSI consisted of seven questions, to make this score compatible to previous ESSI scores, the question concerning marital status (asked in the demographics section) is also used in the total social support score.

Sections six and seven of this survey assessed spirituality as a two-dimensional model. Section six consisted of five questions regarding frequency of spiritual behaviors (how often do you . . . ?). Section seven consisted of nine items regarding spiritual beliefs, with a Likert five-point scale measuring negative to positive responses (1 = strongly disagree to 5 = strongly
agree). The two-dimensional model of spiritual beliefs and behaviors is supported in the literature (Holt et al., 2003). Section eight included questions pertaining to demographic information, such as age of daughter, race/ethnicity, insurance status, income, educational level, and zip code.

*Readability of the Questionnaire*

The instrument readability was assessed with Microsoft Word 2007. The evaluation revealed that the Flesch-Kincaid score (literacy difficulty level of the questionnaire) was 6.1, indicating that respondents would need a sixth grade reading level to understand the survey. The Flesch Reading Ease score for the questionnaire was 70.0 (minimum score = 0, maximum obtainable score = 100, higher scores indicate the text is easier to read).

*Instrument Testing*

Validity and reliability of this survey were determined using a variety of methods. Face and content validity were based on a comprehensive review of the literature and input from experts in the field of survey development. Revisions were discussed and suggestions deemed appropriate were included into the final instrument. Stability reliability of the survey was established using test-retest procedures. The survey was administered to a convenience sample of 20 mothers on two separate occasions, one week apart. Pearson correlation coefficients were computed for parametric items (knowledge, attitudes, behavioral intentions, social support, spiritual behaviors, and spiritual beliefs). Pearson correlation coefficients yielded strong correlations (p < .001) for each of the subscales. For Knowledge, \( r = .773 \); Attitudes, \( r = .839 \); Behavioral intention, \( r = .796 \); Social support, \( r = .804 \); Spiritual behaviors, \( r = .856 \); and
Spiritual beliefs, $r = .674$. The Kendall’s tau-$b$ correlation coefficient was calculated for the nonparametric section of the survey (information source), resulting in 0.671 (correlation significant at the 0.01 level (2-tailed)). Internal consistency reliability was established on the convenience sample on the 20 mothers by computing Cronbach alphas for the parametric subscales (attitude, behavioral intention, social support, spiritual behaviors, and spiritual beliefs) and acceptably high values were found (attitude = .846; behavioral intentions = .822; social support = .918; spiritual behaviors = .822; spiritual beliefs = .846).

The testing was confirmed with the final sample of mothers (N=106) repeated for the entire population. The internal consistency reliability was again computed from the data collected from all participants. Cronbach alpha values were found as follows: overall attitudes = .776; attitude toward the HPV vaccine = .746; spiritual behaviors = .865; spiritual beliefs = .885; and social support = .848.

**Procedures**

Consent for implementing the study was obtained from the Institutional Review Board (IRB) of the university, the health center, and the health department. After consent was granted, surveys were distributed in person (face-to-face) to prospective respondents. Participants were recruited from primary care clinics and community events.

Over the course of six months after survey development and IRB approval, six primary care clinics were approached to gain entrance to the clinical population. Of the six, one was a private pediatric practice, two were affiliated with public health departments, and three were affiliated with other non-profit institutions. The study was accepted at two of the six clinical practices. Reasons for not being able to utilize the other facilities included: concern with the
amount of time that will be asked of the patient, and how that would interrupt patient flow; concern over the spirituality questions being asked in a government-funded clinic; concern that participants would have questions about the content of the survey and would want the physicians to take additional time to answer; and concern that their clinical population is already being used in several other studies with higher priorities and/or similar topic.

IRB approval was granted at two primary care clinics so that during specified clinic hours, a CITI (Collaborative Institutional Training Initiative) trained health educator could approach prospective women waiting for an appointment at one of the clinic sites. CITI training provides courses in the responsible conduct of research, and is a requirement of all researchers at CCHMC and the University of Cincinnati.

The health educator first met with personnel at the clinic sites to establish a rapport and introduce the project. She explained who is being recruited for the study, and distributed flyers about the study. Some of the flyers were also posted in the clinic, and included contact information. In the waiting area of the clinics, adult women were approached and asked the screening question, “Do you have a daughter between the ages of 9 and 18?” If they responded affirmatively, a brief introduction to the study (information sheet) was given and then they were asked if they had 10 minutes to complete the survey. If verbal consent was obtained, they were given the written survey with a pencil and assured that their responses would be kept private. The health educator would then step away (but nearby in case there were any questions) so that the participant could complete the survey. If there were questions, the health educator would address them, maintaining the integrity of the survey by not interpreting the items, but reading them and encouraging the respondent to do the best that they can to answer. When completed, the health educator thanked the participant for their time.
Parents at selected community events (such as PTA meeting, after school activity, health fair, etc.) were also invited to respond to the survey. Information regarding the study (including an overview of the study and the eligibility criteria) was given at the event, and those women who were interested volunteered to participate. If the respondent answered the screening question (“Do you have a daughter between the ages of 9 and 18?”) affirmatively, they were given the written survey with a pencil so that they could complete the survey and return it to the health educator.

Confidentiality and anonymity of all responses was ensured. No names, medical record numbers, or contact information was obtained from the participants to guarantee anonymity. The health educator did not look over the participants’ responses. Upon completion of the survey, she placed the survey in an envelope, sealed it, labeled it with the clinic location or community only, and filed it in a portable file folder. Once the health educator returned to her office, the file folder and all surveys were filed in a locked cabinet.

Data Analysis

The data was entered into the SPSS/PASW software system. The data were analyzed using univariate analyses (i.e., frequencies, means, percentages) to describe the demographic variables and responses. The data were analyzed using bivariate analyses (i.e., chi-squares, independent samples t-tests, and correlations) to examine associations between the scores on the knowledge, attitudes, behavior, behavioral intention, social support, and spirituality (behaviors and beliefs) with the demographic questions. Potential interaction effects were tested using analyses of variance (ANOVAs) and multivariate analysis of variance (MANOVAs) to examine
the relationships among the various sub-groups. The level of significance was set *a priori* at 0.05.
Chapter Four: Results

Purpose Statement

A comprehensive review of the literature found no published study which examined mothers’ spirituality and social connections with associated HPV vaccine acceptability for their daughters. The purpose of this study was to fill such gaps in the research and examine mothers in Greater Cincinnati to understand their views on HPV vaccine acceptability for their daughters, social support and connections, and spiritual behaviors and beliefs.

Chapter One discussed the research questions, hypotheses, limitations, delimitations, and key terms used in this study. Chapter Two presented a comprehensive review of the literature. Chapter Three described the methodology used in this study. This chapter gives the results of this study.

Response Rate

Over the course of six months, a total of 110 mothers from two different types of settings (clinical and community) were invited to participate in the survey. At selected urban community health clinics in Greater Cincinnati, 56 mothers/women were found to be eligible according to the screening procedure (must be an adult woman who is the mother of a daughter ages 9 and 18; must understand English). Fifty-two of these women agreed/consented to participate as a respondent in the study and completed the survey, resulting in a response rate of 93% in the clinical setting. Women at selected community events in the suburban community population of Greater Cincinnati were invited to respond to the survey. Of these five events, two were neighborhood/community events, one was school-related, and two were extra-curricular activities. Information regarding the study (including an overview of the study and the eligibility
criteria) was given at the event, and those women who were interested volunteered to participate. All 54 mothers/women who were eligible according to the screening procedure agreed/consented to participate, resulting in a 100% response rate for the community population. In total, 106 mothers completed the survey, which is an overall response rate of 96%. All completed surveys were used in the final data analysis.

_Description of Sample—Demographics_

The demographics of the participants are displayed in Table 4-1. Of the women/mothers who responded and completed the surveys, 46.7% were married, 38.1% were single, 6.7% were living with partner, 7.6% were divorced/separated, and 1% were widowed. Regarding race, 27.4% described themselves as White/Caucasian, 60.4% described themselves as Black/African American, and 12.3% classified themselves in another group (Native American, Asian, Multi-Racial, or other). For ethnicity, nearly all (97.2%) described themselves as not Hispanic/Latino. Regarding health insurance, 56.7% had private insurance, 39.4% had Medicaid, and 3.8% had no insurance. Reported household income was as follows: $19,999 or less (35.7%); $20,000 to $39,999 (17.3%); $40,000 to $59,999 (12.2%); $60,000 to $79,999 (11.2%); $80,000 to $99,999 (4.1%); $100,000 or more (19.4%). Most of the participants had more than a high school level of education. The distribution was as follows: less than high school diploma (8.7%); high school diploma or GED certificate (19.2%); some college, associate’s degree, trade school or military (30.8%); college degree (21.2%); graduate school (20.2%). The mean age for the daughter was 12.25 years (SD 2.632), with a range of 9 to 18 years old.
Table 4-1. Demographic Characteristics of Participants

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>49</td>
<td>46.7</td>
</tr>
<tr>
<td>Living together</td>
<td>7</td>
<td>6.7</td>
</tr>
<tr>
<td>Single</td>
<td>40</td>
<td>38.1</td>
</tr>
<tr>
<td>Separated or divorced</td>
<td>8</td>
<td>7.6</td>
</tr>
<tr>
<td>Widowed</td>
<td>1</td>
<td>1.0</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black/African-American</td>
<td>64</td>
<td>60.4</td>
</tr>
<tr>
<td>White/Caucasian</td>
<td>29</td>
<td>27.4</td>
</tr>
<tr>
<td>All other (incl Asian, Native American, multi-racial, and other)</td>
<td>13</td>
<td>12.3</td>
</tr>
<tr>
<td>Household income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$19,999 and below</td>
<td>35</td>
<td>35.7</td>
</tr>
<tr>
<td>$20,000 to $39,999</td>
<td>17</td>
<td>17.3</td>
</tr>
<tr>
<td>$40,000 to $59,999</td>
<td>12</td>
<td>12.2</td>
</tr>
<tr>
<td>$60,000 to $99,999</td>
<td>15</td>
<td>15.3</td>
</tr>
<tr>
<td>$100,000 and higher</td>
<td>19</td>
<td>19.4</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HS diploma or less</td>
<td>29</td>
<td>27.9</td>
</tr>
<tr>
<td>Some college</td>
<td>32</td>
<td>30.8</td>
</tr>
<tr>
<td>College graduate or more</td>
<td>43</td>
<td>41.4</td>
</tr>
<tr>
<td>Age of daughter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 to 10 years old</td>
<td>34</td>
<td>32.1</td>
</tr>
<tr>
<td>11 to 12 years old</td>
<td>34</td>
<td>32.1</td>
</tr>
<tr>
<td>13 to 15 years old</td>
<td>20</td>
<td>18.9</td>
</tr>
<tr>
<td>16 to 18 years old</td>
<td>18</td>
<td>17.0</td>
</tr>
</tbody>
</table>

N = 106; Missing values excluded
**Knowledge of HPV and the HPV vaccine**

Mothers were asked twelve knowledge items, and responded with True or False to the statements, and participants received one point for every correct response. Seven of the twelve items related to HPV knowledge, and five items related to knowledge about the HPV vaccine. The statements the participants were most likely to get correct included: “A person can have HPV without knowing it” (87.7% responded True correctly); “The HPV vaccine has been recommended for teenagers” (85.8% responded True correctly); and “Once vaccinated with the HPV vaccine, women no longer need Pap smears” (85.8% responded False correctly). Only 25.5% responded correctly (False) to the statement “The HPV vaccine lasts for about 3 to 4 years.” The obtained range of overall knowledge score was 0 to 12, with a median score of 8, and a mean score of 7.86 ($SD = 2.93$). Regarding the subscale for HPV knowledge: obtained range 0 to 7, with a median score of 5, and a mean score of 4.62 ($SD = 1.95$). Regarding the subscale for HPV vaccine knowledge: obtained range 0 to 5, with a median score of 3, and a mean score of 3.24 ($SD = 1.26$). These results are shown in Tables 4-2 and 4-3. For analysis purposes, the knowledge scores were dichotomized as high vs. low based on the median split.
Table 4-2. Ranges, Medians, Means, and Standard Deviations of Subscale Scores

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Number of Items</th>
<th>Potential Range</th>
<th>Actual Range</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of HPV</td>
<td>7</td>
<td>0 - 7</td>
<td>0 - 7</td>
<td>4.6226 (1.95401)</td>
</tr>
<tr>
<td>Knowledge of HPV vaccine</td>
<td>5</td>
<td>0 - 5</td>
<td>0 - 5</td>
<td>3.2358 (1.26153)</td>
</tr>
<tr>
<td>Overall knowledge</td>
<td>12</td>
<td>0 - 12</td>
<td>0 - 12</td>
<td>7.8585 (2.93238)</td>
</tr>
<tr>
<td>Attitude toward vaccinations</td>
<td>3</td>
<td>3 - 15</td>
<td>5 - 15</td>
<td>11.4245 (2.04217)</td>
</tr>
<tr>
<td>Attitude toward HPV vaccine</td>
<td>7</td>
<td>7 - 35</td>
<td>15 - 35</td>
<td>24.4764 (4.31850)</td>
</tr>
<tr>
<td>Attitude toward HPV prevention</td>
<td>4</td>
<td>4 - 20</td>
<td>4 - 20</td>
<td>13.9057 (2.87693)</td>
</tr>
<tr>
<td>Overall attitude</td>
<td>14</td>
<td>14 - 70</td>
<td>29 - 68</td>
<td>49.8066 (7.13962)</td>
</tr>
<tr>
<td>Social support</td>
<td>7</td>
<td>8 - 34</td>
<td>14 - 34</td>
<td>28.5524 (4.83573)</td>
</tr>
<tr>
<td>Spiritual behaviors/practices</td>
<td>5</td>
<td>0 - 30</td>
<td>0 - 29</td>
<td>18.3883 (7.60448)</td>
</tr>
<tr>
<td>Spiritual beliefs</td>
<td>9</td>
<td>9 - 45</td>
<td>20 - 45</td>
<td>39.5243 (5.95052)</td>
</tr>
<tr>
<td>Overall spirituality</td>
<td>14</td>
<td>9 - 75</td>
<td>21 - 74</td>
<td>58.000 (12.76323)</td>
</tr>
</tbody>
</table>

N=106
Missing values excluded.
Table 4-3. Mothers’ Knowledge of HPV and the HPV Vaccine

<table>
<thead>
<tr>
<th>Item</th>
<th>Correct Answer</th>
<th>n (%)^a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 10% of women in the US have the human papilloma virus (HPV).</td>
<td>False</td>
<td>51 (48.1)</td>
</tr>
<tr>
<td>A person can have HPV without knowing it.</td>
<td>True</td>
<td>93 (87.7)</td>
</tr>
<tr>
<td>An abnormal Pap smear may indicate HPV infection.</td>
<td>True</td>
<td>83 (78.3)</td>
</tr>
<tr>
<td>HPV may be cured with antibiotics.</td>
<td>False</td>
<td>54 (50.9)</td>
</tr>
<tr>
<td>Certain types of HPV are associated with cancer.</td>
<td>True</td>
<td>83 (78.3)</td>
</tr>
<tr>
<td>Condoms do not help protect against HPV.</td>
<td>False</td>
<td>51 (48.1)</td>
</tr>
<tr>
<td>Women with HPV may need Pap smears more frequently.</td>
<td>True</td>
<td>75 (70.8)</td>
</tr>
<tr>
<td>The HPV vaccine has been approved by the FDA.</td>
<td>True</td>
<td>80 (75.5)</td>
</tr>
<tr>
<td>The HPV vaccine protects against genital warts and most cervical cancer.</td>
<td>True</td>
<td>54 (50.9)</td>
</tr>
<tr>
<td>The HPV vaccine lasts for about 3 to 4 years.</td>
<td>False</td>
<td>27 (25.5)</td>
</tr>
<tr>
<td>The HPV vaccine has been recommended for teenagers.</td>
<td>True</td>
<td>91 (85.8)</td>
</tr>
<tr>
<td>Once vaccinated with the HPV vaccine, women no longer need Pap smears.</td>
<td>False</td>
<td>91 (85.8)</td>
</tr>
</tbody>
</table>

N=106

Percents based on valid percents. Missing values excluded.

^aFrequencies and percentages refer to individuals who correctly answered the item.
Knowledge regarding HPV or the HPV vaccine may come from a variety of sources. Regarding the mothers’ source of information about the HPV vaccine, only 9.9% (n=10) reported that they had not heard of it before. Many of the mothers (38.6%; n=39) had received information about the HPV vaccine from more than just one source. Of the information sources listed, the most likely sources were from a doctor or a television commercial. See Figure 4-1.

Figure 4-1. HPV Vaccine Information Sources
Attitudes toward vaccines, the HPV vaccine, and HPV prevention

Mothers were asked to rate how strongly they agreed or disagreed with fourteen items assessing their attitudes towards vaccinations in general, the HPV vaccine, and HPV prevention. A Likert five-point scale measured the responses for statements regarding barriers, benefits, beliefs, susceptibility, and subjective norms. The Likert five-point scale measured negative to positive responses (1 = negative or not favorable attitude to 5 = positive or favorable attitude). Of the fourteen items, based on means, it was found that mothers generally had favorable attitudes toward vaccinations in general, toward the HPV vaccine, and toward HPV prevention. Most significantly, mothers reported favorable attitudes by their agreement that “vaccines in general are an effective way to protect children’s health” ($M = 4.10; SD = .993$); “preventing HPV is an important health issue” ($M = 4.09; SD = .834$); and “teenagers and children should learn about HPV prevention from their parents” ($M = 3.91; SD = .857$). Mothers reported the least favorable attitudes (lower average scores) by their agreement to “the HPV vaccine should be a routine childhood immunization” ($M = 3.08; SD = 1.114$) and by their perception to the subjective norm, that “most of the people I know are having their daughters vaccinated with the HPV vaccine” ($M = 2.85; SD = 1.040$). Only 26.4% agreed/strongly agreed that “most of the people I know are having their daughters vaccinated with the HPV vaccine.” Attitude scores are described in Table 4-4.

The obtained range of overall attitude score was 29 to 68, with a median score of 49.25, and a mean score of 49.81 ($SD = 7.14$). The subscale for attitude toward vaccines in general: range 5-15, median = 11.5, mean = 11.42 ($SD = 2.04$). The subscale for attitude toward the HPV vaccine: range 15-35, median = 25, mean = 24.48 ($SD = 4.32$). The subscale for attitude toward HPV prevention: range 4-20, median = 14, mean = 13.91 ($SD = 2.88$). These scores are
described in Table 4-2. For analysis purposes, the attitude scores were dichotomized as positive/favorable attitude vs. negative/not favorable attitude based on the median split.
Table 4-4. Mothers’ Attitudes toward Vaccines, HPV Vaccine, and HPV Prevention

<table>
<thead>
<tr>
<th>Item</th>
<th>$M$</th>
<th>$SD$</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel that Doctors give out too many vaccines. (1)</td>
<td>3.75</td>
<td>.993</td>
</tr>
<tr>
<td>I feel that vaccines in general are an effective way to protect children’s health. (2)</td>
<td>4.10</td>
<td>.945</td>
</tr>
<tr>
<td>I feel that vaccines increase the chance that you could get sick. (1)</td>
<td>3.57</td>
<td>1.113</td>
</tr>
<tr>
<td>I feel that the HPV vaccine is safe. (2)</td>
<td>3.36</td>
<td>.896</td>
</tr>
<tr>
<td>I feel that preventing HPV is an important health issue. (2)</td>
<td>4.09</td>
<td>.834</td>
</tr>
<tr>
<td>I feel that if children or teens get the HPV vaccine it will promote early sexual activity. (1)</td>
<td>3.75</td>
<td>.944</td>
</tr>
<tr>
<td>Most of the people I know are having their daughters vaccinated with the HPV vaccine. (2)</td>
<td>2.85</td>
<td>1.040</td>
</tr>
<tr>
<td>I feel that the HPV vaccine should be a routine childhood immunization (like that for measles and mumps). (2)</td>
<td>3.08</td>
<td>1.114</td>
</tr>
<tr>
<td>I feel that the HPV vaccine is an effective way to protect my daughter’s reproductive health. (2)</td>
<td>3.58</td>
<td>.965</td>
</tr>
<tr>
<td>I feel that the chance of getting HPV is so low that it is not worth getting the HPV vaccine. (1)</td>
<td>3.75</td>
<td>1.043</td>
</tr>
<tr>
<td>I believe I could provide appropriate information on HPV to my daughter. (2)</td>
<td>3.36</td>
<td>1.106</td>
</tr>
<tr>
<td>Teenagers and children should learn about HPV prevention from their parents. (2)</td>
<td>3.91</td>
<td>.857</td>
</tr>
<tr>
<td>Teenagers and children should learn about HPV prevention from their teachers and schools. (2)</td>
<td>3.37</td>
<td>1.124</td>
</tr>
<tr>
<td>I think faith-based settings should address the issue of HPV prevention. (2)</td>
<td>3.27</td>
<td>1.083</td>
</tr>
</tbody>
</table>

N=106
Missing values excluded.
1 = agreement with statement means less favorable attitude; 2 = agreement with statement means more favorable attitude
Experiences and Likelihood of Behaviors

Participants were asked about their behaviors and their behavioral intentions towards HPV prevention. Of the items that assessed behaviors, 47.2% \((n=50)\) responded affirmatively that their daughter’s doctor recommended getting the vaccine; 41.9% \((n=44)\) reported having talked with their daughter about the vaccine; and 28.3% \((n=30)\) reported that their daughter had already received the vaccine. Participants were also asked about their behavioral intentions. It was reported that 80.2% \((n=85)\) were moderately to extremely likely to talk to their daughter about the HPV vaccine, and 61% \((n=61)\) were moderately to extremely likely to have their daughter receive the vaccine. Table 4-5 describes the results of mothers’ behaviors and behavioral intentions for their daughters.

For mothers who were likely to have their daughters receive the HPV vaccine, the most frequently reported age that daughter will be when she receives the vaccine was 13 years old. See Table 4-6 for description of reported results.
### Table 4-5. Experiences and Likelihood of Behaviors

<table>
<thead>
<tr>
<th>Item</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctor has recommended that daughter get HPV vaccine.</td>
<td>50 (47.2)</td>
</tr>
<tr>
<td>I’ve talked with my daughter about the HPV vaccine.</td>
<td>44 (41.9)</td>
</tr>
<tr>
<td>My daughter has already received the HPV vaccine.</td>
<td>30 (28.3)</td>
</tr>
<tr>
<td><strong>Likelihood of talking to daughter about HPV vaccine</strong></td>
<td></td>
</tr>
<tr>
<td>Not likely at all</td>
<td>10 (9.4)</td>
</tr>
<tr>
<td>Slightly likely</td>
<td>11 (10.4)</td>
</tr>
<tr>
<td>Moderately likely</td>
<td>29 (27.4)</td>
</tr>
<tr>
<td>Extremely likely</td>
<td>56 (52.8)</td>
</tr>
<tr>
<td><strong>Likelihood of giving daughter something to read about the HPV vaccine</strong></td>
<td></td>
</tr>
<tr>
<td>Not likely at all</td>
<td>14 (13.2)</td>
</tr>
<tr>
<td>Slightly likely</td>
<td>12 (11.3)</td>
</tr>
<tr>
<td>Moderately likely</td>
<td>32 (30.2)</td>
</tr>
<tr>
<td>Extremely likely</td>
<td>48 (45.3)</td>
</tr>
<tr>
<td><strong>Likelihood of attending a health program to learn how to talk to daughter about HPV prevention</strong></td>
<td></td>
</tr>
<tr>
<td>Not likely at all</td>
<td>20 (18.9)</td>
</tr>
<tr>
<td>Slightly likely</td>
<td>23 (21.7)</td>
</tr>
<tr>
<td>Moderately likely</td>
<td>30 (28.3)</td>
</tr>
<tr>
<td>Extremely likely</td>
<td>33 (31.1)</td>
</tr>
<tr>
<td><strong>Likelihood to have daughter receive HPV vaccine</strong></td>
<td></td>
</tr>
<tr>
<td>Not likely at all</td>
<td>19 (19.0)</td>
</tr>
<tr>
<td>Slightly likely</td>
<td>20 (20.0)</td>
</tr>
<tr>
<td>Moderately likely</td>
<td>26 (26.0)</td>
</tr>
<tr>
<td>Extremely likely</td>
<td>35 (35.0)</td>
</tr>
</tbody>
</table>

N=106

Percents based on valid percents. Missing values excluded.

*Frequencies and percentages refer to individuals who answered “yes” on the item.
Table 4-6. Likely Age of Daughter When She Receives Vaccine

<table>
<thead>
<tr>
<th>Age of daughter</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 years old and below</td>
<td>1 (1.7)</td>
</tr>
<tr>
<td>11 to 12 years old</td>
<td>14 (23.7)</td>
</tr>
<tr>
<td>13 to 15 years old</td>
<td>32 (54.2)</td>
</tr>
<tr>
<td>16 years old and above</td>
<td>12 (20.3)</td>
</tr>
</tbody>
</table>

N=59
Perceptions of mothers’ social support

Participants were asked about their social support using the ESSI (ENRICHD Social Support Instrument), a valid and reliable seven-item measure of social support. Mothers were requested to report how often they felt supported based on a five-point scale (1 = none of the time, 2 = a little of the time, 3 = some of the time, 4 = most of the time, 5 = all of the time). Individual items in this subscale were summed for a total score, with higher scores indicating greater social support. Overall means and ranges indicated that most women had some degree of social support. The social support score ranged from 14 to 34, with the mean being 28.55 (SD = 4.84) and the median being 31; see Table 4-2. Of the six items rated (not including marital status), mothers most frequently reported that they had “someone available” to them who showed them “love and affection” (\(M = 4.46, SD = .899\)). Social support scores are described in Table 4-7. For analysis purposes, the social support scores were dichotomized as high vs. low based on the median split.
Table 4-7. Mothers’ Perception of Social Support

<table>
<thead>
<tr>
<th>Item</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there someone available to whom you can count on to listen to you when you need to talk?</td>
<td>4.31</td>
<td>.870</td>
</tr>
<tr>
<td>Is there someone available to you to give you good advice about a problem?</td>
<td>4.32</td>
<td>.814</td>
</tr>
<tr>
<td>Is there someone available to you who shows you love and affection?</td>
<td>4.46</td>
<td>.899</td>
</tr>
<tr>
<td>Is there someone available to help with daily chores?</td>
<td>3.90</td>
<td>1.151</td>
</tr>
<tr>
<td>Can you count on anyone to provide you with emotional support (talking over problems or helping you make a difficult decision)?</td>
<td>4.36</td>
<td>.867</td>
</tr>
<tr>
<td>Do you have as much contact as you would like with someone you feel close to, someone in whom you can trust and confide in?</td>
<td>4.19</td>
<td>1.039</td>
</tr>
</tbody>
</table>

N=106
Missing values excluded.

*a Excludes marital status item*
Mothers’ spiritual behaviors and beliefs

Participants were asked questions regarding their spiritual behaviors and spiritual beliefs. Recognizing that many people make a distinction between their spiritual behaviors or practices and their spiritual beliefs, this survey assessed spirituality as a two-dimensional model. There were five questions regarding frequency of spiritual behaviors (how often do you . . . ?), and was measured on a six-point scale (from 0 = never to 6 = every day). There were nine items regarding spiritual beliefs, with a Likert five-point scale measuring negative to positive responses (1 = strongly disagree with specified spiritual belief to 5 = strongly agree with spiritual belief). Individual items in these subscales were summed for a total score, with higher scores indicating greater spirituality.

The spiritual behaviors/practices score ranged from 0 to 29, with the mean being 18.39 (SD = 7.60) and the median being 20. The spiritual beliefs scores ranged from 20 to 45, with the mean being 39.52 (SD = 5.95) and the median being 42. Results are shown in Table 4-2. Of the five questions on spiritual behaviors, mothers’ most frequent behavior was praying or meditating (M = 4.96, SD = 1.68) and least frequent was attendance at religious service (M = 2.92, SD = 1.65). Of the nine items regarding spiritual beliefs, all of the means from each of the items were greater than 3.99 except for “I have a religious leader that I can talk to” (M = 3.65, SD = 1.40). This indicates a strong sense of spiritual beliefs, with mothers most strongly agreeing with “I believe in a Higher Being” (M = 4.80, SD = .466). Results from the spirituality scales can be found in Tables 4-8 and 4-9. Both the spiritual behaviors/practices and the spiritual beliefs scores were dichotomized as more vs. less based on the median score. A Pearson correlation coefficient was calculated for the relationship between participants’ spiritual behaviors and spiritual beliefs. A positive correlation was found [r (99) = .740, p < .001].
Table 4-8. Mothers’ Spiritual Behaviors and Practices

<table>
<thead>
<tr>
<th>Item (How often do you...)</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attend a church/mosque/temple or other religious activity/event?</td>
<td>2.92</td>
<td>1.651</td>
</tr>
<tr>
<td>Listen to religious/spiritual music?</td>
<td>3.65</td>
<td>1.937</td>
</tr>
<tr>
<td>Read the Bible or other sacred/spiritual/inspirational books?</td>
<td>3.50</td>
<td>1.981</td>
</tr>
<tr>
<td>Engage in personal prayer or meditation?</td>
<td>4.96</td>
<td>1.679</td>
</tr>
<tr>
<td>Speak to others about your faith?</td>
<td>3.36</td>
<td>2.113</td>
</tr>
</tbody>
</table>

N=106
Missing values excluded.
Table 4-9. Mothers’ Spiritual Beliefs

<table>
<thead>
<tr>
<th>Item</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>I believe in a Higher Being.</td>
<td>4.80</td>
<td>.466</td>
</tr>
<tr>
<td>I think that spirituality is important.</td>
<td>4.62</td>
<td>.728</td>
</tr>
<tr>
<td>I believe that everything happens for a reason.</td>
<td>4.47</td>
<td>.833</td>
</tr>
<tr>
<td>I use prayer of some kind to get through tough times.</td>
<td>4.65</td>
<td>.718</td>
</tr>
<tr>
<td>I use my spiritual beliefs to guide my life decisions.</td>
<td>4.42</td>
<td>.959</td>
</tr>
<tr>
<td>My spiritual growth is an important life-long process.</td>
<td>4.48</td>
<td>.819</td>
</tr>
<tr>
<td>My spiritual beliefs help me to cope with illness.</td>
<td>4.38</td>
<td>.955</td>
</tr>
<tr>
<td>Most of my friends have similar spiritual beliefs as I do.</td>
<td>3.99</td>
<td>1.100</td>
</tr>
<tr>
<td>I have a minister/religious leader that I can talk to.</td>
<td>3.65</td>
<td>1.399</td>
</tr>
</tbody>
</table>

N=106
Missing values excluded.
Analyses

The purpose of these analyses was to determine if mothers’ knowledge, attitudes, experience talking to daughter, likelihood to talk to daughter, ever having daughter vaccinated, and likelihood to have daughter vaccinated differ based on mothers’ spirituality (behaviors and beliefs), social support, race/ethnicity, income, educational level, and age of daughter. Demographic interactions were explored.

Demographic interactions

The study examined four main demographic variables: race, income, education, and age of daughter. Analyses were conducted to determine if there were interaction effects between the demographic variables (chi-square analyses performed for nonparametric demographic variables; correlations performed for parametric demographic variables).

Age of daughter did not have a significant relationship to race, income, or educational level of mother. Pearson’s correlation coefficient revealed that there was no significant relationship found ($r = .083, N = 106; p = .400$) between race and age of daughter. Pearson’s correlation coefficient revealed that there was no significant relationship found ($r = -.056, N = 98, p = .586$) between income and age of daughter, and no significant relationship found ($r = -.007, N = 103, p = .946$) between education and age of daughter.

There were significant relationships between race, income, and educational level of mother. A chi-square test of independence was calculated comparing race with education level. A significant relationship was found ($X^2 (2) = 6.755, N=103, p = .034$); African-American race was associated with lower educational level. A chi-square test of independence was calculated comparing race and income. A significant interaction was found ($X^2 (2) = 9.814, N= 98, p = \ldots$)
African-American race is associated with lower income level. A chi-square test of independence was calculated comparing income and education. A significant relationship was found ($\chi^2 (1) = 25.406, N = 95, p < .001$); low income is associated with lower educational level. Significant demographic interactions are summarized in Table 4-10.

Analyses for determining associations between scores on the knowledge, attitudes, behaviors, behavioral intentions, social support, and spirituality (behaviors and beliefs) scales with the demographic questions were examined by using bivariate analyses (chi-square and independent t-tests).

Chi-square tests of independence were calculated to examine the relationship between race and other variables, and several significant interactions were found. A significant interaction was found between race and knowledge of HPV ($\chi^2 (2) = 7.286, N = 106, p = .026$); African-American mothers were less likely to be knowledgeable about HPV. A significant interaction was found between race and knowledge about the HPV vaccine ($\chi^2 (2) = 13.361, N = 106, p = .001$); African-American mothers were less likely to be knowledgeable about the HPV vaccine. A significant interaction was found between race and attitudes toward vaccinations in general ($\chi^2 (2) = 5.865, N = 106, p = .053$); African-American mothers were somewhat less likely to have a favorable attitude toward vaccinations in general. A significant interaction was found between race and attitudes toward the HPV vaccine ($\chi^2 (2) = 8.546, p = .014$); African-American mothers were less likely to have a favorable attitude toward the HPV vaccine. A significant interaction was found between race and spiritual beliefs ($\chi^2 (2) = 5.864, N = 103, p = .053$); African-American mothers were somewhat more likely to have stronger spiritual beliefs.

Chi-square tests of independence were calculated to examine the relationship with other demographic variables as well. Most of these were not found to be significant. No significant
interaction was found between age of daughter and mother’s knowledge of HPV ($\chi^2 (3) = 4.228, N = 106, p = .238$), between age of daughter and mother’s knowledge of HPV vaccine ($\chi^2 (3) = 2.929, N = 106, p = .403$), between age of daughter and mother’s attitude toward vaccinations in general ($\chi^2 (3) = 4.741, N = 106, p = .192$), nor between age of daughter and mother’s attitude toward the HPV vaccine ($\chi^2 (3) = 2.066, N = 106, p = .559$). No significant interaction was found between a mother’s social support and the age of her daughter ($\chi^2 (3) = .228, N = 105, p = .973$) nor between a mother’s spiritual behaviors and her daughter’s age ($\chi^2 (3) = 1.144, N = 103, p = .767$). No significant interaction was found between daughter’s age and the mother’s likelihood to talk about the HPV vaccine ($\chi^2 (3) = 4.119, N = 106, p = .249$) nor between daughter’s age and the mother’s likelihood to have her vaccinated with the HPV vaccine ($\chi^2 (3) = 5.764, N = 100, p = .124$).

No significant interaction was found between race and having ever talked to daughter ($\chi^2 (2) = 2.350, N = 105, p = .309$) nor between race and mother’s social support ($\chi^2 (2) = 3.186, N = 105, p = .203$). No significant interaction was found between a mother’s spiritual behaviors and her race ($\chi^2 (2) = 2.780, N = 103, p = .249$). No significant interaction was found between race and doctor recommending that daughter receive the vaccine ($\chi^2 (2) = 2.859, N = 106, p = .239$). No significant interaction was found between race and daughter having received the HPV vaccine ($\chi^2 (2) = 5.590, N = 106, p = .061$).

However, other significant interactions were found. A significant interaction was found between talking with daughter about the HPV vaccine and daughter’s age ($\chi^2 (3) = 31.453, N = 105, p < .001$); mothers were less likely to talk with their younger daughters than with their older daughters about the HPV vaccine. A significant interaction was found between daughter having received the HPV vaccine and the daughter’s age ($\chi^2 (3) = 31.633; N = 106, p < .001$); older
daughters were more likely to have already received the HPV vaccine. A significant interaction was found between mothers’ spiritual beliefs and age of daughter ($\chi^2 (3) = 9.379, N = 103, p = .025$); mothers with younger daughters were less likely to have stronger spiritual beliefs.

Independent samples $t$ tests were conducted to compare the means of the higher vs. lower educational levels for knowledge, attitudes, behaviors/behavioral intentions, social support, and spirituality. Independent-samples $t$-test found a significant difference in mother’s knowledge of HPV ($t(101) = -4.982, p < .001$), knowledge of the HPV vaccine ($t(101) = -4.697, p < .001$), and mother’s likelihood to talk to daughter about the HPV vaccine ($t(101) = -3.514, p = .001$) for the higher vs. lower educational levels. For knowledge of HPV, the mean score of the less educated group was significantly lower ($M = 1.03, SD = .186$) than for the group with more education ($M = 1.51, SD = .503$). For knowledge of the HPV vaccine, the means score of the less educated group was significantly lower ($M = 1.14, SD = .351$) than for the group with more education ($M = 1.61, SD = .492$). For likelihood to talk to daughter, the means score of the less educated group was significantly lower ($M = 2.76, SD = 1.123$) than for the group with more education ($M = 3.46, SD = .814$). No other significant differences were found; for attitudes, behaviors, likelihood to receive HPV vaccine, social support, and spirituality, the means for those with less education were not significantly different from the group with more education.

Independent samples $t$ tests were conducted to compare the means of the higher vs. lower income levels for knowledge, attitudes, behaviors/behavioral intentions, social support, and spirituality. Independent-samples $t$-test found a significant difference in mother’s knowledge of HPV ($t(96) = -2.396, p = .018$) and mother’s knowledge of the HPV vaccine ($t(96) = -2.226, p = .028$) for those in the higher vs. lower income levels. For knowledge of HPV, the mean score of the lower income group was significantly less ($M = 1.27, SD = .448$) than for the group with
more income ($M = 1.50$, $SD = .506$). For knowledge of the HPV vaccine, the means score of the lower income group was significantly less ($M = 1.37$, $SD = .486$) than for the group with more income ($M = 1.59$, $SD = .498$). No other significant differences were found--for attitudes, behaviors, behavioral intentions, social support, and spirituality--the means for those with lower incomes were not significantly different from the group with higher incomes.

These relationships are summarized in Table 4-10.
Table 4-10 Demographic Interactions with Significance

<table>
<thead>
<tr>
<th>Variables</th>
<th>Statistical Test</th>
<th>Test Value</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race</td>
<td>Chi-square</td>
<td>6.755</td>
<td>.034</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td>Chi-square</td>
<td>9.814</td>
<td>.007</td>
</tr>
<tr>
<td>Income</td>
<td>Chi-square</td>
<td>25.406</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td>Chi-square</td>
<td>7.286</td>
<td>.026</td>
</tr>
<tr>
<td>HPV knowledge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td>Chi-square</td>
<td>13.361</td>
<td>.001</td>
</tr>
<tr>
<td>HPV vaccine knowledge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td>Chi-square</td>
<td>5.865</td>
<td>.053</td>
</tr>
<tr>
<td>Attitude to vaccines in general</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td>Chi-square</td>
<td>8.546</td>
<td>.014</td>
</tr>
<tr>
<td>Attitude to HPV vaccine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td>Chi-square</td>
<td>5.864</td>
<td>.053</td>
</tr>
<tr>
<td>Spiritual beliefs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of daughter</td>
<td>Chi-square</td>
<td>31.453</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Ever talked to daughter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of daughter</td>
<td>Chi-square</td>
<td>31.633</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Daughter received HPV vaccine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of daughter</td>
<td>Chi-square</td>
<td>9.379</td>
<td>.025</td>
</tr>
<tr>
<td>Spiritual beliefs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>Independent-samples ( t ) test</td>
<td>-4.982</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>HPV knowledge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>Independent-samples ( t ) test</td>
<td>-4.697</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>HPV vaccine knowledge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>Independent-samples ( t ) test</td>
<td>-3.514</td>
<td>.001</td>
</tr>
<tr>
<td>Likelihood to talk to daughter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td>Independent-samples ( t ) test</td>
<td>-2.396</td>
<td>.018</td>
</tr>
<tr>
<td>HPV knowledge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td>Independent-samples ( t ) test</td>
<td>-2.226</td>
<td>.028</td>
</tr>
</tbody>
</table>

N = 106; missing values were excluded from analyses.
Knowledge interactions

For analysis purposes, the knowledge scores were dichotomized as high vs. low based on the median split (for HPV knowledge score, median = 5; for HPV vaccine knowledge score, median = 3). Inferential statistics were used to compare knowledge scores with social support and spirituality (behaviors and beliefs). The social support and spirituality scores were also dichotomized for analysis purposes. Knowledge scores were previously evaluated to determine if there was an association with the demographic variables (see Table 4-10).

HPV knowledge scores were not significantly different in mothers with more or less social support, and more or less reported spirituality. An independent-samples t test comparing the mean scores for mothers’ knowledge of HPV for the group with less frequent spiritual behaviors/practices vs. the group with more frequent spiritual behaviors/practices revealed no significant difference ($t(101) = -.909, p = .366$). HPV knowledge was not significantly different for those with more or less frequent spiritual behaviors and practices. An independent-samples t test comparing the mean scores for knowledge of HPV for the group with less spiritual beliefs vs. the group with stronger spiritual beliefs revealed no significant difference ($t(101) = .461, p = .646$). HPV knowledge was not significantly different for those with more or less spiritual beliefs. An independent-samples t test comparing the mean scores for knowledge of HPV for the group with less social support vs. the group with more social support revealed no significant difference ($t(103) = -.308, p = .759$). The mean score for HPV knowledge of mothers with more social support was not significantly different from the mean score of mothers with less social support.

HPV vaccine knowledge scores were not significantly different in mothers with more or less social support, and more or less reported spirituality. An independent-samples t test
comparing the mean scores for knowledge of the HPV vaccine for the group with less frequent spiritual behaviors vs. the group with more frequent spiritual behaviors/practices revealed no significant difference ($t(101) = -.781, p = .437$). An independent-samples $t$ test comparing the mean scores for knowledge of the HPV vaccine for the group with less/weaker spiritual beliefs vs. the group with more/stronger spiritual beliefs revealed no significant difference ($t(101) = -.622, p = .535$). An independent-samples $t$ test comparing the mean scores for knowledge of the HPV vaccine for the group with less social support vs. the group with more social support revealed no significant difference ($t(103) = -.611, p = .543$). HPV vaccine knowledge scores were not significantly different between mothers with more or less frequent spiritual behaviors and practices, with more or less spiritual beliefs, or more or less social support.

Results from independent-samples $t$ tests comparing the mean scores for knowledge of HPV and knowledge of the HPV vaccine with spiritual behaviors/practices, spiritual beliefs, and social support are summarized in Table 4-11.
Table 4-11. Mothers’ Knowledge Based on Spiritual Behaviors, Spiritual Beliefs, and Social Support

<table>
<thead>
<tr>
<th>Outcome Item</th>
<th>Variable Item</th>
<th>Mean (SD)</th>
<th>Signif.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of HPV</td>
<td>Less frequent spiritual behaviors</td>
<td>4.43 (1.92)</td>
<td>N.S.</td>
</tr>
<tr>
<td></td>
<td>More frequent spiritual behaviors</td>
<td>4.78 (1.98)</td>
<td></td>
</tr>
<tr>
<td>Knowledge of HPV</td>
<td>Less spiritual beliefs</td>
<td>4.70 (1.95)</td>
<td>N.S.</td>
</tr>
<tr>
<td></td>
<td>More spiritual beliefs</td>
<td>4.52 (1.98)</td>
<td></td>
</tr>
<tr>
<td>Knowledge of HPV</td>
<td>Less social support</td>
<td>4.55 (2.08)</td>
<td>N.S.</td>
</tr>
<tr>
<td></td>
<td>More social support</td>
<td>4.67 (1.75)</td>
<td></td>
</tr>
<tr>
<td>Knowledge of HPV vaccine</td>
<td>Less frequent spiritual behaviors</td>
<td>3.11 (1.33)</td>
<td>N.S.</td>
</tr>
<tr>
<td></td>
<td>More frequent spiritual behaviors</td>
<td>3.31 (1.19)</td>
<td></td>
</tr>
<tr>
<td>Knowledge of HPV vaccine</td>
<td>Less spiritual beliefs</td>
<td>3.19 (1.27)</td>
<td>N.S.</td>
</tr>
<tr>
<td></td>
<td>More spiritual beliefs</td>
<td>3.35 (1.23)</td>
<td></td>
</tr>
<tr>
<td>Knowledge of HPV vaccine</td>
<td>Less social support</td>
<td>3.17 (1.31)</td>
<td>N.S.</td>
</tr>
<tr>
<td></td>
<td>More social support</td>
<td>3.33 (1.21)</td>
<td></td>
</tr>
</tbody>
</table>

N=106; missing values excluded
N.S.= not significant
**Attitude interactions**

A series of multivariate analysis of variance (MANOVAs) were conducted to determine if mothers’ attitudes toward the HPV vaccine (as a dependent variable) differed significantly based on spiritual behaviors/practices, spiritual beliefs, social support, attitude toward vaccination in general, knowledge of HPV, knowledge of the HPV vaccine, and demographics. These independent variables were dichotomized into low and high groups based on the median split, with race being divided into three groups (Black, White, and other). If significance was found, each of the seven subscale items in the “attitudes toward the HPV vaccine” scale was used in subsequent univariate $F$-tests.

MANOVAs were calculated examining the effect of spirituality and social support on attitudes toward the HPV vaccine. Pillai’s trace is considered the most reliable of the multivariate measures and offers the greatest protection against Type I errors with small sample sizes. Mothers’ attitudes to the HPV vaccine were not significantly associated with spiritual behaviors (using Pillai’s trace, V = .057, $F(7, 95) = .819, p = .574$), spiritual beliefs (using Pillai’s trace, V = .034, $F(7, 95) = .472, p = .852$), nor social support (using Pillai’s trace, V = .103, $F(7, 97) = 1.588, p = .148$). There was no significant difference in mothers’ attitudes toward the HPV vaccine between those mothers with frequent spiritual behaviors/practices and those with less frequent spiritual behaviors/practices. There was no significant difference in mothers’ attitudes toward the HPV vaccine between those mothers with greater/stronger spiritual beliefs and those with less spiritual beliefs. There was no significant difference in mothers’ attitudes toward the HPV vaccine between those mothers with greater social support and those with less social support.
A MANOVA was performed to examine whether mothers’ attitudes differed significantly based on income levels. Results revealed a significant difference between those with lower incomes and those with higher incomes regarding mothers’ attitudes (using Pillai’s trace, $V = .251, F(7, 90) = 4.311, p < .001$). Subsequent univariate $F$-tests were conducted to determine the specific subscale items that significantly differed based on income level. Women with lower annual household incomes (less than $40,000) showed a more favorable attitude toward the HPV vaccine in agreeing that the HPV vaccine should be a routine childhood immunization (see Table 4-12).

A MANOVA was also performed to examine whether mothers’ attitudes toward the HPV vaccine differed significantly based on educational levels. Results from the MANOVA indicated a significant difference between those with a lower educational levels (high school graduate or less) and those with higher educational levels (some college or more) regarding mothers’ attitudes (using Pillai’s trace, $V = .239, F(7, 95) = 4.256, p < .001$). Subsequent univariate $F$-tests were conducted to determine the specific subscale items that differed significantly based on educational level. It was found that mothers with less education showed a more favorable attitude for having the HPV vaccine as a routine childhood immunization (see Table 4-13).

MANOVA results found that mothers’ attitudes were not significantly associated with race (using Pillai’s trace, $V = .173, F(14, 196) = 1.325, p = .195$). There was no significant difference in mothers’ attitudes toward the HPV vaccine between those mothers who were Black/African-American, White/Caucasian, or another racial/ethnic category.

A Pearson correlation coefficient was calculated for the relationship between age of daughter and mother’s attitude toward the HPV vaccine. A weak correlation that was not
significant was found ($r = .093, N = 106, p = .345$). Age of daughter is not related to mother’s attitude toward the HPV vaccine.

A MANOVA was performed to examine whether a mother’s attitude to the HPV vaccine differed significantly based on her attitude toward vaccines in general. Results revealed that attitude toward the HPV vaccine was significantly better for those who had a favorable attitude toward vaccines in general, than those who did not have a favorable attitude to general vaccinations (using Pillai’s trace, $V = .196, F(7, 98) = 3.413, p = .003$). Specifically, the following attitudinal subscale items were significant: HPV vaccine is safe, preventing HPV is an important health issue, HPV vaccine does not promote early sex, HPV vaccine should be routine, and HPV vaccine is effective for reproductive health. See Table 4-14.

One-way MANOVAs were also calculated examining the effect of knowledge on attitudes toward the HPV vaccine. Mothers’ attitudes were significantly associated with knowledge of HPV (using Pillai’s trace, $V = .129, F(7, 98) = 2.067, p = .054$) and by their knowledge of the HPV vaccine (using Pillai’s trace, $V = .192, F(7, 98) = 3.336, p = .003$). Results from the MANOVAs indicated that mothers with more knowledge had more favorable attitudes. Univariate analyses of variance were subsequently performed and showed that the following attitudinal items differed based on HPV knowledge: HPV vaccine is safe, preventing HPV is an important health issue, and the chance of getting HPV is high (so the vaccine is worth it). Univariate analysis also revealed that these specific attitudinal items were significant for mothers based on HPV vaccine knowledge: HPV vaccine is safe, preventing HPV is an important health issue, HPV vaccine does not promote early sex, most people are vaccinating their daughters, HPV vaccine is effective for reproductive health, and the chance of getting HPV is high (so the vaccine is worth it). See Tables 4-15 and 4-16.
<table>
<thead>
<tr>
<th>Item</th>
<th>Lower Income M (SD)</th>
<th>Higher Income M (SD)</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel that the HPV vaccine is safe.</td>
<td>3.37 (.971)</td>
<td>3.40 (.800)</td>
<td>.041</td>
<td>.839</td>
</tr>
<tr>
<td>I feel that preventing HPV is an important health issue.</td>
<td>4.02 (1.019)</td>
<td>4.22 (.593)</td>
<td>1.337</td>
<td>.250</td>
</tr>
<tr>
<td>I feel that if children or teens get the HPV vaccine it will promote early sexual activity.</td>
<td>3.71 (1.035)</td>
<td>3.87 (.778)</td>
<td>.715</td>
<td>.400</td>
</tr>
<tr>
<td>Most of the people I know are having their daughters vaccinated with the HPV vaccine.</td>
<td>2.92 (1.064)</td>
<td>2.78 (1.052)</td>
<td>.430</td>
<td>.514</td>
</tr>
<tr>
<td>I feel that the HPV vaccine should be a routine childhood immunization (like that for measles and mumps).</td>
<td>3.52 (1.019)</td>
<td>2.70 (1.030)</td>
<td>15.780</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>I feel that the HPV vaccine is an effective way to protect my daughter’s reproductive health.</td>
<td>3.67 (1.024)</td>
<td>3.52 (.937)</td>
<td>.578</td>
<td>.449</td>
</tr>
<tr>
<td>I feel that the chance of getting HPV is so low that it is not worth getting the HPV vaccine.</td>
<td>3.85 (1.073)</td>
<td>3.63 (1.019)</td>
<td>1.034</td>
<td>.312</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Less Education M (SD)</th>
<th>More Education M (SD)</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel that the HPV vaccine is safe.</td>
<td>3.38 (1.049)</td>
<td>3.44 (.740)</td>
<td>.107</td>
<td>.745</td>
</tr>
<tr>
<td>I feel that preventing HPV is an important health issue.</td>
<td>3.93 (1.033)</td>
<td>4.20 (.641)</td>
<td>2.596</td>
<td>.110</td>
</tr>
<tr>
<td>I feel that if children or teens get the HPV vaccine it will promote early sexual activity.</td>
<td>3.55 (1.121)</td>
<td>3.84 (.794)</td>
<td>2.121</td>
<td>.148</td>
</tr>
<tr>
<td>Most of the people I know are having their daughters vaccinated with the HPV vaccine.</td>
<td>2.76 (.872)</td>
<td>2.93 (1.077)</td>
<td>.600</td>
<td>.440</td>
</tr>
<tr>
<td>I feel that the HPV vaccine should be a routine childhood immunization (like that for measles and mumps).</td>
<td>3.62 (1.083)</td>
<td>2.85 (1.069)</td>
<td>10.719</td>
<td>.001</td>
</tr>
<tr>
<td>I feel that the HPV vaccine is an effective way to protect my daughter’s reproductive health.</td>
<td>3.62 (1.083)</td>
<td>3.64 (.869)</td>
<td>.005</td>
<td>.944</td>
</tr>
<tr>
<td>I feel that the chance of getting HPV is so low that it is not worth getting the HPV vaccine.</td>
<td>3.90 (.860)</td>
<td>3.76 (1.057)</td>
<td>.402</td>
<td>.528</td>
</tr>
</tbody>
</table>
Table 4-14  Mothers’ Attitudes toward the HPV Vaccine Based on Mothers’ Attitudes Toward Vaccines in General

<table>
<thead>
<tr>
<th>Item</th>
<th>Negative Attitude $M$ (SD)</th>
<th>Positive Attitude $M$ (SD)</th>
<th>$F$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel that the HPV vaccine is safe.</td>
<td>3.14 (.787)</td>
<td>3.58 (.949)</td>
<td>6.854</td>
<td>.010</td>
</tr>
<tr>
<td>I feel that preventing HPV is an important health issue.</td>
<td>3.83 (.975)</td>
<td>4.36 (.558)</td>
<td>11.715</td>
<td>.001</td>
</tr>
<tr>
<td>I feel that if children or teens get the HPV vaccine it will promote early sexual activity.</td>
<td>3.55 (.992)</td>
<td>3.96 (.854)</td>
<td>5.332</td>
<td>.023</td>
</tr>
<tr>
<td>Most of the people I know are having their daughters vaccinated with the HPV vaccine.</td>
<td>2.70 (.932)</td>
<td>3.00 (1.127)</td>
<td>2.259</td>
<td>.136</td>
</tr>
<tr>
<td>I feel that the HPV vaccine should be a routine childhood immunization (like that for measles and mumps).</td>
<td>2.81 (1.001)</td>
<td>3.36 (1.162)</td>
<td>6.747</td>
<td>.011</td>
</tr>
<tr>
<td>I feel that the HPV vaccine is an effective way to protect my daughter’s reproductive health.</td>
<td>3.32 (.827)</td>
<td>3.85 (1.026)</td>
<td>8.515</td>
<td>.004</td>
</tr>
<tr>
<td>I feel that the chance of getting HPV is so low that it is not worth getting the HPV vaccine.</td>
<td>3.58 (1.046)</td>
<td>3.91 (1.024)</td>
<td>2.545</td>
<td>.114</td>
</tr>
</tbody>
</table>

Table 4-15. Mothers’ Attitudes toward the HPV Vaccine Based on Knowledge of HPV

<table>
<thead>
<tr>
<th>Item</th>
<th>Low Knowledge $M$ (SD)</th>
<th>High Knowledge $M$ (SD)</th>
<th>$F$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel that the HPV vaccine is safe.</td>
<td>3.22 (1.012)</td>
<td>3.60 (.587)</td>
<td>4.554</td>
<td>.035</td>
</tr>
<tr>
<td>I feel that preventing HPV is an important health issue.</td>
<td>3.96 (.944)</td>
<td>4.33 (.530)</td>
<td>5.271</td>
<td>.024</td>
</tr>
<tr>
<td>I feel that if children or teens get the HPV vaccine it will promote early sexual activity.</td>
<td>3.63 (1.013)</td>
<td>3.97 (.778)</td>
<td>3.415</td>
<td>.067</td>
</tr>
<tr>
<td>Most of the people I know are having their daughters vaccinated with the HPV vaccine.</td>
<td>2.73 (1.067)</td>
<td>3.05 (.972)</td>
<td>2.363</td>
<td>.127</td>
</tr>
<tr>
<td>I feel that the HPV vaccine should be a routine childhood immunization (like that for measles and mumps).</td>
<td>3.07 (1.172)</td>
<td>3.10 (1.021)</td>
<td>.015</td>
<td>.902</td>
</tr>
<tr>
<td>I feel that the HPV vaccine is an effective way to protect my daughter’s reproductive health.</td>
<td>3.48 (1.064)</td>
<td>3.77 (.742)</td>
<td>2.280</td>
<td>.134</td>
</tr>
<tr>
<td>I feel that the chance of getting HPV is so low that it is not worth getting the HPV vaccine.</td>
<td>3.55 (.989)</td>
<td>4.08 (1.061)</td>
<td>6.575</td>
<td>.012</td>
</tr>
</tbody>
</table>
Table 4-16. Mothers’ Attitudes toward the HPV Vaccine Based on Knowledge of the HPV Vaccine

<table>
<thead>
<tr>
<th>Item</th>
<th>Low Knowledge $M$ (SD)</th>
<th>High Knowledge $M$ (SD)</th>
<th>$F$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel that the HPV vaccine is safe.</td>
<td>3.13 (.992)</td>
<td>3.63 (.691)</td>
<td>9.036</td>
<td>.003</td>
</tr>
<tr>
<td>I feel that preventing HPV is an important health issue.</td>
<td>3.95 (.903)</td>
<td>4.26 (.723)</td>
<td>3.834</td>
<td>.053</td>
</tr>
<tr>
<td>I feel that if children or teens get the HPV vaccine it will promote early sexual activity.</td>
<td>3.54 (1.061)</td>
<td>4.00 (.728)</td>
<td>6.735</td>
<td>.011</td>
</tr>
<tr>
<td>Most of the people I know are having their daughters vaccinated with the HPV vaccine.</td>
<td>2.52 (.934)</td>
<td>3.22 (1.036)</td>
<td>13.468</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>I feel that the HPV vaccine should be a routine childhood immunization (like that for measles and mumps).</td>
<td>2.95 (1.166)</td>
<td>3.24 (1.041)</td>
<td>1.850</td>
<td>.177</td>
</tr>
<tr>
<td>I feel that the HPV vaccine is an effective way to protect my daughter’s reproductive health.</td>
<td>3.36 (1.086)</td>
<td>3.84 (.738)</td>
<td>6.994</td>
<td>.009</td>
</tr>
<tr>
<td>I feel that the chance of getting HPV is so low that it is not worth getting the HPV vaccine.</td>
<td>3.46 (1.061)</td>
<td>4.06 (.935)</td>
<td>9.307</td>
<td>.003</td>
</tr>
</tbody>
</table>
Experiences and behavioral intentions for talking about or receiving the HPV vaccine

Other main analyses for this study include examining which variables may be related to experiences (talking with daughter about the HPV vaccine or having daughter vaccinated with the HPV vaccine) and behavioral intentions (likelihood to talk with daughter about the HPV vaccine or likelihood to have daughter vaccinated with the HPV vaccine). Analyses for determining associations between scores on the knowledge, attitudes, behaviors, behavioral intentions, spirituality (behaviors and beliefs), and social support (all as independent variables) with the experiences/behavioral intention items (as dependent variables) were examined by using bivariate analyses (chi-square and independent t-tests) and analysis of variance (ANOVA), as well as correlations.

Experience of talking with daughter

Chi-square analysis was conducted to determine the effects of social support, spiritual behaviors, spiritual beliefs, attitudes, and knowledge (as independent variables) on having ever talked to daughter about the HPV vaccine (as the dependent variable). The independent variables were dichotomized into low and high groups, with race being divided into three groups (Black, White, and other).

A significant interaction was found between mothers having talked to daughter about the HPV vaccine and mothers’ spiritual beliefs ($\chi^2 (1) = 5.063, N = 102, p = .024$) and between having talked to daughter and mothers’ knowledge of the HPV vaccine ($\chi^2 (1) = 4.697, N = 105, p = .030$). Mothers with stronger spiritual beliefs were more likely to have talked to their daughters about the HPV vaccine. Mothers with more knowledge about the HPV vaccine were more likely to have talked to their daughters about the HPV vaccine. No significant relationship
was found between having talked to daughter and any of the following variables: spiritual
behaviors ($X^2(1) = .503, N = 102, p = .478$); social support ($X^2(1) = .193, N = 104, p = .660$);
race ($X^2(2) = 2.350, N = 105, p = .309$); education ($X^2(1) = .176, N = 102, p = .675$); income ($X^2
(1) = 1.649, N = 97, p = .199$); attitude towards vaccines in general ($X^2(1) = 2.773, N = 105, p = .096$);
advice towards the HPV vaccine ($X^2(1) = 1.055, N = 105, p = .304$); and knowledge of
HPV ($X^2(1) = .302, N = 105, p = .583$).

An independent samples $t$ test was conducted to compare the mean age of the daughter
between the groups that had and had not talked to their daughter about the HPV vaccine, and a
significant difference was found ($t(103) = -6.825, p < .001$). The daughter’s average age for
those mothers who said no (they did not talk to daughter) was significantly lower ($M = 10.98, SD
= 1.971$) than for those who said yes (they talked to daughter) ($M = 13.95, SD = 2.487$).

Significant results of what factors are associated with mothers talking with their daughters about
the HPV vaccine are summarized in Table 4-17.

*Intentions of talking with daughter*

Independent-samples $t$ testing was conducted to determine the effects of social support,
spiritual behaviors, spiritual beliefs, attitudes, and knowledge on the likelihood of talking with
daughter about the HPV vaccine. The independent variables were dichotomized into low and
high groups. A significant difference in the likelihood to talk to daughter was found for attitude
to vaccines in general ($t(104) = -3.430, p = .001$). The mean score for likelihood for a mother to
talk to daughter about the HPV vaccine was greater ($M = 3.55, SD = .889$) for those with a more
favorable attitude toward vaccines in general, than for those with a less favorable attitude toward
vaccines in general ($M = 2.92, SD = .978$). A significant difference in the likelihood to talk to
daughter was found for attitude toward the HPV vaccine ($t(104) = -3.215, p = .002$). The mean score for likelihood for a mother to talk to daughter about the HPV vaccine was greater for those with a more favorable attitude toward the HPV vaccine ($M = 3.58, SD = 2.98$) than for those with a less favorable attitude toward the HPV vaccine ($M = 2.98, SD = 1.008$). There was also significant difference for knowledge of HPV ($t(104) = -3.166, p = .002$), with the mean score for likelihood for a mother to talk to daughter being significantly greater ($M = 3.62, SD = .673$) for those mothers with more knowledge about HPV than less knowledge ($M = 3.01, SD = 1.066$). There was also a significant difference for knowledge of the HPV vaccine ($t(104) = -3.601, p < .001$), with the mean score for likelihood for a mother to talk to daughter being significantly greater for those with more knowledge about the HPV vaccine ($M = 3.58, SD = .702$) than those with less knowledge ($M = 2.93, SD = 1.093$).

No significant difference in the likelihood for a mother to talk to her daughter about the HPV vaccine was found based on mother’s spiritual behaviors ($t(101) = -1.327, p = .187$), social support ($t(103) = -.174, p = .862$), or income ($t(96) = -.472, p = .638$). No significant difference in the likelihood for a mother to talk to her daughter about the HPV vaccine was found based on mother’s spiritual beliefs ($t(101) = -1.736, p = .086$).

For analysis purposes, the independent variables were dichotomized into low and high groups, with race being divided into three groups (Black, White, and other) and age divided into four groups. With race and age having more than two groups each, conducting multiple $t$ tests would inflate the Type I error rate and increase the chance of drawing an inappropriate conclusion. Therefore, Pearson correlation and an analysis of variance were conducted.

A Pearson correlation coefficient was calculated for the relationship between age of daughter and likelihood to talk about the HPV vaccine. A weak correlation that was not
significant was found ($r(104) = .151, p = .123$). Age of daughter was not related to the likelihood to talk about the vaccine.

A one-way analysis of variance (ANOVA) is a procedure that determines the proportion of variability attributed to each of several components. It compares the means of two or more groups of subjects that vary on a single independent variable. With likelihood of talking to daughter about the HPV vaccine being the dependent (outcome) variable, and race being the independent variable (with three groups), we found a significant difference among the three racial categories ($F(2, 103) = 4.058, p = .020$). Tukey’s $B$ was used to determine the nature of the differences between the races. This analysis revealed that White mothers were more likely to talk to daughter ($M = 3.66, SD = .614$) than Black mothers ($M = 3.05, SD = 1.105$) and other non-White mothers ($M = 3.23, SD = .725$). Significant results of what factors are associated with mothers’ likelihood to talk with their daughters about the HPV vaccine are summarized in Table 4-17.

**Experience of receiving the HPV vaccine**

Chi-square analyses were conducted to determine the effects of social support, spiritual behaviors, spiritual beliefs, attitudes, and knowledge (as independent variables) on having received the HPV vaccination for daughter (as the dependent variable). The independent variables were dichotomized into low and high groups, with race being divided into three groups (Black, White, and other).

There were no significant interactions found for the following independent variables: spiritual behaviors ($X^2(1) = .008, N = 103, p = .929$); spiritual beliefs ($X^2(1) = .069, p = .793$); social support ($X^2(1) = .065, N = 105, p = .799$); educational level ($X^2(1) = 1.516, N = 103, p = .020$).
.218); income ($X^2 (1) = 2.770, N = 98, p = .096$); attitude towards vaccines in general ($X^2 (1) = .186, p = .666$); knowledge of HPV ($X^2 (1) = .215, N = 106, p = .643$); and knowledge of the HPV vaccine ($X^2 (1) = .638, N = 106, p = .424$). Each of these variables was independent of daughters receiving the HPV vaccine. No significant interactions were found for race ($X^2 (2) = 5.590, N = 106, p = .061$) nor attitude towards the HPV vaccine ($X^2 (1) = 3.460, N = 106; p = .063$).

A chi square test of independence was calculated to examine the relationship between daughters receiving the HPV vaccine and doctor recommending the HPV vaccine. A significant interaction was found ($X^2 (1) = 35.782, N = 106, p < .001$). Daughters were more likely to receive the HPV vaccine if the doctor recommended that they do; 93.3% of those who received the vaccine had a doctor recommend it, compared to only 28.9% of those who did not have a doctor recommend it had been vaccinated.

An independent samples $t$ test was conducted to compare the mean age of the daughters between the groups that had and that had not received the HPV vaccine, and a significant difference was found ($t(104) = -6.419, p < .001$). The daughter’s average age for those mothers who said they had not received the vaccine was significantly lower ($M = 11.37, SD = 2.238$) than for those who had received the vaccine ($M = 14.47, SD = 2.240$). Significant results of what factors are associated with mothers’ decision to have their daughter receive the HPV vaccine are also summarized in Table 4-17.

**Intentions of receiving the HPV vaccine**

Independent-samples $t$ testing was conducted to determine the effects of social support, spiritual behaviors, spiritual beliefs, attitudes, and knowledge on the likelihood to have daughter
vaccinated with the HPV vaccine. The independent variables were dichotomized into low and high groups. A significant difference in the likelihood to have daughter vaccinated was found for attitude toward the HPV vaccine ($t(98) = -4.682, p < .001$). The mean score for likelihood for a mother to have her daughter vaccinated with the HPV vaccine was greater for those with a more favorable attitude toward the HPV vaccine ($M = 3.33, SD = .979$), than for those with a less favorable attitude toward the HPV vaccine ($M = 2.36, SD = 1.055$). A significant difference in the likelihood to have daughter vaccinated was found for knowledge of HPV ($t(98) = -2.384, p = .019$). The mean score for likelihood for a mother to have her daughter receive the vaccine was greater for those with more knowledge about HPV ($M = 3.11, SD = .924$), than for those with less knowledge ($M = 2.56, SD = 1.196$). A significant difference in the likelihood to have daughter vaccinated was found for knowledge of the HPV vaccine ($t(98) = -3.206, p = .002$). The mean score for likelihood for a mother to have her daughter receive the vaccine was greater for those with more HPV vaccine knowledge ($M = 3.12, SD = 1.013$), than those with less knowledge ($M = 2.43, SD = 1.136$). A significant difference in the likelihood to have daughter vaccinated was found between those who had a doctor recommend the vaccine or not ($t(98) = -2.676, p = .009$). The mean score for likelihood for mother to have her daughter receive the vaccine was greater for those who had a doctor recommend it ($M = 3.09, SD = 1.189$) than for those who did not have a doctor recommend it ($M = 2.50, SD = 1.005$). A significant difference in the likelihood to have daughter vaccinated was found between those who had ever talked to daughter about the HPV vaccine or not ($t(97) = -2.840, p = .006$). The mean score for likelihood for mother to have her daughter receive the vaccine was greater for mothers who had talked to daughter about the HPV vaccine ($M = 3.12, SD = 1.194$) than for those who had not talked to daughter ($M = 2.49, SD = 1.002$).
For many of the independent samples $t$ testing, there were no significant differences. No significance was found for likelihood of mothers to have their daughters receive the HPV vaccine based on spiritual behaviors ($t(96) = .441, p = .660$), spiritual beliefs ($t(96) = -.156, p = .876$), social support ($t(98) = -.216, p = .829$), and income ($t(90) = .425, p = .672$). No significant difference was found for likelihood of mothers to have their daughters receive the HPV vaccine based on mothers’ attitude to vaccines in general ($t(98) = -1.845, p = .068$).

Pearson correlation coefficient was calculated for the relationship between age of daughter and likelihood to receive the HPV vaccine. A weak correlation that was not significant was found ($r (98) = .146, p = .148$). Age of daughter was not related to the likelihood that daughter will receive the vaccine.

An ANOVA was conducted to examine whether likelihood to have daughter receive the vaccine differed significantly based on race. Results indicated that there was a significant difference among the three racial categories ($F (2, 97) = 48.536, p < .001$). Tukey’s $B$ was used to determine the nature of the differences between the races. This analysis revealed that White mothers were more likely to have daughter receive the HPV vaccine ($M = 3.38, SD = .862$) than Black mothers ($M = 2.41, SD = 1.109$) and other non-White mothers ($M = 3.00, SD = 1.155$). Significant results of what is associated with mothers’ likelihood to have their daughter receive the HPV vaccine are summarized in Table 4-17.
Table 4-17. Significant Findings on Experiences and Behavioral Intentions of Talking to Daughter and Receiving the HPV Vaccine

<table>
<thead>
<tr>
<th>Variables</th>
<th>Statistical Test</th>
<th>Test Value</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spiritual beliefs</td>
<td>Chi square</td>
<td>5.063</td>
<td>.024</td>
</tr>
<tr>
<td>Talk with daughter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge of HPV vaccine</td>
<td>Chi square</td>
<td>4.697</td>
<td>.030</td>
</tr>
<tr>
<td>Talk with daughter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of daughter</td>
<td>Independent samples t test</td>
<td>-6.825</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Talk with daughter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude toward vaccination</td>
<td>Independent samples t test</td>
<td>-3.430</td>
<td>.001</td>
</tr>
<tr>
<td>Likely to talk to daughter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>.002</td>
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<td>ANOVA</td>
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<td>Doctor recommendation</td>
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<tr>
<td>Age of daughter</td>
<td>Independent samples t test</td>
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<td>Receive vaccine</td>
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<td>Attitude toward HPV vaccine</td>
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<td>Knowledge of HPV</td>
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<td>Doctor recommendation</td>
<td>Independent samples t test</td>
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<td>Talk to daughter</td>
<td>Independent samples t test</td>
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<tr>
<td>Race</td>
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Hypothesis Testing

Null Hypothesis 1.1: There will be no difference in knowledge of HPV between mothers with frequent spiritual behaviors and those with infrequent spiritual behaviors.

An independent-samples $t$ test comparing the mean scores for mothers’ knowledge of HPV for the group with less frequent spiritual behaviors/practices vs. the group with more frequent spiritual behaviors/practices revealed no significant difference ($t(101) = -.909, p = .366$). Therefore, the null hypothesis failed to be rejected. It was concluded that frequency of spiritual behaviors had no effect on a mother’s knowledge of HPV.

Null Hypothesis 1.2: There will be no difference in knowledge of HPV between mothers with strong spiritual beliefs and those without strong spiritual beliefs.

An independent-samples $t$ test comparing the mean scores for knowledge of HPV for the group with less spiritual beliefs vs. the group with stronger spiritual beliefs revealed no significant difference ($t(101) = .461, p = .646$). Therefore, the null hypothesis failed to be rejected. It was concluded that spiritual beliefs had no effect on a mother’s knowledge of HPV.

Null Hypothesis 1.3: There will be no difference in knowledge of HPV between mothers with good social support and those without good social support.

An independent-samples $t$ test comparing the mean scores for knowledge of HPV for the group with less social support vs. the group with more social support revealed no significant difference ($t(103) = -.308, p = .759$). Therefore, the null hypothesis failed to be rejected. It was concluded that social support had no effect on a mother’s knowledge of HPV.

Null Hypothesis 2.1: There will be no difference in knowledge of the HPV vaccine between mothers with frequent spiritual behaviors and those with infrequent spiritual behaviors.
An independent-samples $t$ test comparing the mean scores for knowledge of the HPV vaccine for the group with less frequent spiritual behaviors vs. the group with more frequent spiritual behaviors/practices revealed no significant difference ($t(101) = - .781, p = .437$). Therefore, the null hypothesis failed to be rejected. It was concluded that frequency of spiritual behaviors had no effect on a mother’s knowledge of the HPV vaccine.

Null Hypothesis 2.2: There will be no difference in knowledge of the HPV vaccine between mothers with strong spiritual beliefs and those without strong spiritual beliefs.

An independent-samples $t$ test comparing the mean scores for knowledge of the HPV vaccine for the group with less/weaker spiritual beliefs vs. the group with more/stronger spiritual beliefs revealed no significant difference ($t(101) = - .622, p = .535$). Therefore, the null hypothesis failed to be rejected. It was concluded that spiritual beliefs had no effect on a mother’s knowledge of the HPV vaccine.

Null Hypothesis 2.3: There will be no difference in knowledge of the HPV vaccine between mothers with good social support and those without good social support.

An independent-samples $t$ test comparing the mean scores for knowledge of the HPV vaccine for the group with less social support vs. the group with more social support revealed no significant difference ($t(103) = - .611, p = .543$). Therefore, the null hypothesis failed to be rejected. It was concluded that social support had no effect on a mother’s knowledge of the HPV vaccine.

Null Hypothesis 3.1: There will be no difference in mothers’ attitude toward the HPV vaccine between mothers with frequent spiritual behaviors and those with infrequent spiritual behaviors.
A MANOVA was conducted to examine the differences in a mother’s attitude toward the HPV vaccine based on frequency of spiritual behaviors. Results showed that there was no significant difference between those with frequent spiritual behaviors and those with infrequent spiritual behaviors, using Pillai’s trace, $V = .057$, $F(7, 95) = .819$, $p = .574$. Therefore, the null hypothesis failed to be rejected. It was concluded that spiritual behaviors had no effect on a mother’s attitude toward the HPV vaccine.

Null Hypothesis 3.2: There will be no difference in mothers’ attitude toward the HPV vaccine between mothers with strong spiritual beliefs and those without strong spiritual beliefs.

A MANOVA was conducted to examine the differences in a mother’s attitude toward the HPV vaccine based on her spiritual beliefs. Results showed that there was no significant difference, using Pillai’s trace, $V = .034$, $F(7, 95) = .472$, $p = .852$. Therefore, the null hypothesis failed to be rejected. It was concluded that mothers’ attitudes to the HPV vaccine were not significantly related to spiritual beliefs.

Null Hypothesis 3.3: There will be no difference in mothers’ attitude toward the HPV vaccine between mothers with good social support and those without good social support.

A MANOVA was conducted to examine the differences in a mother’s attitude toward the HPV vaccine based on her social support. Results showed that there was no significant difference based on social support, using Pillai’s trace, $V = .103$, $F(7, 97) = .1.588$, $p = .148$. Therefore, the null hypothesis failed to be rejected. It was concluded that mothers’ attitudes to the HPV vaccine were not significantly related to social support.

Null Hypothesis 3.4: There will be no difference in mothers’ attitude toward the HPV vaccine between mothers with younger adolescent daughters and those with older adolescent daughters.
A Pearson correlation coefficient was calculated to examine the relationship between age of daughter and mother’s attitude toward the HPV vaccine. A weak correlation that was not significant was found ($r = .093, N = 106, p = .345$). Therefore, the null hypothesis failed to be rejected. It was concluded that mothers’ attitudes to the HPV vaccine were not significantly associated with whether the daughter was a younger adolescent or an older adolescent. Age of daughter is not related to mother’s attitude toward the HPV vaccine.

Null Hypothesis 3.5: There will be no difference in mothers’ attitude toward the HPV vaccine between mothers who are Black, mothers who are White, and mothers who are of another race/ethnicity.

A MANOVA was conducted to examine the differences in a mother’s attitude toward the HPV vaccine based on race. Results showed that mothers’ attitudes were not significantly related to race, using Pillai’s trace, $V = .173, F(14, 196) = 1.325, p = .195$. Therefore, the null hypothesis failed to be rejected. It was concluded that mothers’ attitudes to the HPV vaccine were not significantly related to race.

Null Hypothesis 3.6: There will be no difference in mothers’ attitude toward the HPV vaccine between mothers with higher income level and those with lower income level.

A MANOVA was performed to examine the differences in a mother’s attitude toward the HPV vaccine based on income levels. Results revealed that mothers’ attitudes were significantly different between those with lower incomes and those with higher incomes (using Pillai’s trace, $V = .251, F(7, 90) = 4.311, p < .001$). Specifically, women with lower annual household incomes (less than $40,000) showed a more favorable attitude toward the HPV vaccine in agreeing that the HPV vaccine should be a routine childhood immunization. Therefore, the null
hypothesis was rejected. It was concluded that there is a difference in attitude based on income level.

**Null Hypothesis 3.7:** There will be no difference in mothers’ attitude toward the HPV vaccine between mothers with a favorable attitude toward vaccinations in general and those without a favorable attitude toward vaccinations in general.

A MANOVA was performed to examine the differences in a mother’s attitude to the HPV vaccine based on her attitude toward vaccines in general. Results revealed that attitude toward the HPV vaccine was significantly more favorable for those who had a favorable attitude toward vaccines in general, than those who did not have a favorable attitude to vaccines in general (using Pillai’s trace, $V = .196, F(7, 98) = 3.413, p = .003$). Specifically, those who had a more favorable attitude toward vaccinations in general were more favorable in believing that the HPV vaccine is safe, preventing HPV is an important health issue, HPV vaccine does not promote early sex, HPV vaccine should be routine, and HPV vaccine is effective for reproductive health. Therefore, the null hypothesis was rejected. It was concluded that there is a difference in attitude toward the HPV vaccine based on attitude toward vaccines in general.

**Null Hypothesis 3.8:** There will be no difference in mothers’ attitude toward the HPV vaccine between mothers with more knowledge of HPV and those with less knowledge of HPV.

A MANOVA was calculated to examine the differences in a mother’s attitude to the HPV vaccine based on her knowledge of HPV. Results revealed that mothers’ attitudes were significantly associated with her knowledge of HPV (using Pillai’s trace, $V = .129, F(7, 98) = 2.067, p = .054$). Specifically, mothers with more knowledge of HPV were more favorable in believing that the HPV vaccine is safe, preventing HPV is an important health issue, and the chance of getting HPV is high (so the vaccine is worth it). Therefore, the null hypothesis was
rejected. It was concluded that there is a difference in mothers’ attitudes based on her knowledge of HPV.

Null Hypothesis 3.9: There will be no difference in mothers’ attitude toward the HPV vaccine between mothers with more knowledge of the HPV vaccine and those with less knowledge of the HPV vaccine.

A MANOVA was calculated to examine the differences in a mother’s attitude to the HPV vaccine based on her knowledge of the HPV vaccine. Results revealed that mothers’ attitudes were significantly related to her knowledge of the HPV vaccine (using Pillai’s trace, $V = .192$, $F(7, 98) = 3.336, p = .003$). Specifically, mothers with more knowledge of the HPV vaccine were more favorable in believing that the HPV vaccine is safe, preventing HPV is an important health issue, HPV vaccine does not promote early sex, most people are vaccinating their daughters, HPV vaccine is effective for reproductive health, and the chance of getting HPV is high (so the vaccine is worth it). Therefore, the null hypothesis was rejected. It was concluded that there is a difference in mothers’ attitudes based on her knowledge of the HPV vaccine.

Null Hypothesis 4.1: There will be no difference in having ever talked to daughter about the HPV vaccine between mothers with frequent spiritual behaviors and those with infrequent spiritual behaviors.

Chi-square analysis was conducted to determine the effects of spiritual behaviors on having ever talked to daughter about the HPV vaccine. No significant relationship was found between having talked to daughter and spiritual behaviors ($X^2 (1) = .503, N = 102, p = .478$). Therefore, the null hypothesis failed to be rejected. It was concluded that having ever talked to daughter about the HPV vaccine was not significantly associated with a mother’s frequency of spiritual behaviors.
Null Hypothesis 4.2: There will be no difference in having ever talked to daughter about the HPV vaccine between mothers with strong spiritual beliefs and those without strong spiritual beliefs.

Chi-square analysis was conducted to determine the effects of spiritual beliefs on having ever talked to daughter about the HPV vaccine. A significant interaction was found between mothers having talked to daughter about the HPV vaccine and mothers’ spiritual beliefs ($\chi^2 (1) = 5.063, N = 102, p = .024$). Therefore, the null hypothesis was rejected. It was concluded that mothers with stronger spiritual beliefs were more likely to have talked to their daughters about the HPV vaccine.

Null Hypothesis 4.3: There will be no difference in having ever talked to daughter about the HPV vaccine between mothers with good social support and those without good social support.

Chi-square analysis was conducted and no significant relationship was found between having talked to daughter and social support ($\chi^2 (1) = .193, N = 104, p = .660$). Therefore, the null hypothesis failed to be rejected. It was concluded that having ever talked to daughter about the HPV vaccine was not significantly associated with a mother’s social support.

Null Hypothesis 4.4: There will be no difference in having ever talked to daughter about the HPV vaccine between mothers with younger adolescent daughters and those with older adolescent daughters.

An independent samples $t$ test was conducted to compare the mean age of the daughter between the groups that had and had not talked to their daughter about the HPV vaccine, and a significant difference was found ($t(103) = -6.825, p < .001$). The daughter’s average age for those mothers who said no (they did not talk to daughter) was significantly lower ($M = 10.98, SD$
Therefore the null hypothesis was rejected. It was concluded that having ever talked to daughter about the HPV vaccine was associated with the age of the daughter; if the daughter was an older adolescent, mothers were more likely to have already talked about the HPV vaccine.

Null Hypothesis 4.5: There will be no difference in having ever talked to daughter about the HPV vaccine between mothers who are Black, mothers who are White, and mothers who are of another race/ethnicity.

Chi-square analysis was conducted and no significant relationship was found between having talked to daughter and race ($X^2 (2) = 2.350, N = 105, p = .309$). Therefore, the null hypothesis failed to be rejected. It was concluded that having ever talked to daughter about the HPV vaccine was not significantly related to race.

Null Hypothesis 4.6: There will be no difference in having ever talked to daughter about the HPV vaccine between mothers with higher income level and those with lower income level.

Chi-square analysis was conducted and no significant relationship was found between having talked to daughter and income ($X^2 (1) = 1.649, N = 97, p = .199$). Therefore, the null hypothesis failed to be rejected. It was concluded that having ever talked to daughter about the HPV vaccine was not significantly associated with income level.

Null Hypothesis 4.7: There will be no difference in having ever talked to daughter about the HPV vaccine between mothers with a favorable attitude toward vaccinations in general and those without a favorable attitude toward vaccinations in general.

Chi-square analysis was conducted and no significant relationship was found between having talked to daughter and attitude towards vaccines in general ($X^2 (1) = 2.773, N = 105, p = .096$). Therefore, the null hypothesis failed to be rejected. It was concluded that having ever
talked to daughter about the HPV vaccine was not significantly associated with a mother’s attitude toward vaccinations in general.

Null Hypothesis 4.8: There will be no difference in having ever talked to daughter about the HPV vaccine between mothers with a favorable attitude toward the HPV vaccine and those without a favorable attitude toward the HPV vaccine.

Chi-square analysis was conducted and no significant relationship was found between having talked to daughter and attitude towards the HPV vaccine ($X^2 (1) = 1.055, N = 105, p = .304$). Therefore, the null hypothesis failed to be rejected. It was concluded that having ever talked to daughter about the HPV vaccine was not significantly associated with a mother’s attitude toward the HPV vaccine.

Null Hypothesis 4.9: There will be no difference in having ever talked to daughter about the HPV vaccine between mothers with more knowledge of HPV and those with less knowledge of HPV.

Chi-square analysis was conducted and no significant relationship was found between having talked to daughter and knowledge of HPV ($X^2 (1) = .302, N = 105, p = .583$). Therefore, the null hypothesis failed to be rejected. It was concluded that having ever talked to daughter about the HPV vaccine was not significantly associated with a mother’s knowledge of HPV.

Null Hypothesis 4.10: There will be no difference in having ever talked to daughter about the HPV vaccine between mothers with more knowledge of the HPV vaccine and those with less knowledge of the HPV vaccine.

Chi-square analysis was conducted to determine the effects of knowledge of the HPV vaccine on having ever talked to daughter about the HPV vaccine. A significant interaction was found, $X^2 (1) = 4.697, N = 105, p = .030$. Therefore, the null hypothesis was rejected. It was
concluded that mothers with more knowledge about the HPV vaccine were more likely to have talked to their daughters about the HPV vaccine.

Null Hypothesis 5.1: There will be no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with frequent spiritual behaviors and those with infrequent spiritual behaviors.

Independent-samples $t$ testing was conducted and no significant difference in the likelihood for a mother to talk to her daughter about the HPV vaccine was found based on mother’s spiritual behaviors ($t(101) = -1.327, p = .187$). Therefore, the null hypothesis failed to be rejected. It was concluded that frequency of a mother’s spiritual behaviors is not related to her reported intention to talk to daughter about the HPV vaccine.

Null Hypothesis 5.2: There will be no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with strong spiritual beliefs and those without strong spiritual beliefs.

Independent-samples $t$ testing was conducted and no significant difference in the likelihood for a mother to talk to her daughter about the HPV vaccine was found based on mother’s spiritual beliefs ($t(101) = -1.736, p = .086$). Therefore, the null hypothesis failed to be rejected. It was concluded that a mother’s spiritual beliefs is not related to her intention to talk to daughter about the HPV vaccine.

Null Hypothesis 5.3: There will be no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with good social support and those without good social support.

Independent-samples $t$ testing was conducted and no significant difference in the likelihood for a mother to talk to her daughter about the HPV vaccine was found based on
mother’s social support ($t(103) = -0.174, p = .862$). Therefore, the null hypothesis failed to be rejected. It was concluded that a mother’s social support is not related to her intention to talk to daughter about the HPV vaccine.

**Null Hypothesis 5.4:** There will be no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with younger adolescent daughters and those with older adolescent daughters.

A Pearson correlation coefficient was calculated for the relationship between age of daughter and likelihood to talk about the HPV vaccine. A weak correlation that was not significant was found ($r (104) = 0.151, p = .123$); therefore, the null hypothesis failed to be rejected. Age of daughter was not related to the likelihood to talk about the vaccine.

**Null Hypothesis 5.5:** There will be no difference in the likelihood to talk to daughter about the HPV vaccine between mothers who are Black, mothers who are White, and mothers who are of another race/ethnicity.

A one-way analysis of variance (ANOVA) found a significant difference among the three racial categories ($F (2, 103) = 4.058, p = .020$). Tukey’s $B$ was used to determine the nature of the differences between the races. This analysis revealed that White mothers were more likely to talk to daughter ($M = 3.66, SD = .614$) than Black mothers ($M = 3.05, SD = 1.105$) and other non-White mothers ($M = 3.23, SD = .725$). Therefore, the null hypothesis was rejected. It was concluded that White mothers had a greater likelihood/intention to talk to their daughters about the HPV vaccine than other mothers.

**Null Hypothesis 5.6:** There will be no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with higher income level and those with lower income level.
Independent-samples $t$ testing was conducted and no significant difference in the likelihood for a mother to talk to her daughter about the HPV vaccine was found based on income level ($t(96) = -.472, p = .638$). Therefore, the null hypothesis failed to be rejected. It was concluded that income is not related to a mother’s intention to talk to daughter about the HPV vaccine.

Null Hypothesis 5.7: There will be no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with a favorable attitude toward vaccinations in general and those without a favorable attitude toward vaccinations in general.

Independent-samples $t$ testing was conducted to determine the effects attitudes toward vaccinations in general on the likelihood of talking with daughter about the HPV vaccine. A significant difference was found ($t(104) = -3.430, p = .001$). The mean score for likelihood for a mother to talk to daughter about the HPV vaccine was greater ($M = 3.55, SD = .889$) for those with a more favorable attitude toward vaccines in general, than for those with a less favorable attitude toward vaccines in general ($M = 2.92, SD = .978$). Therefore, the null hypothesis was rejected. It was concluded that the intention to talk to daughter about the HPV vaccine was associated with a mother’s attitude toward vaccinations in general. She had less intention to talk to daughter about the HPV vaccine if she had a less favorable attitude toward vaccinations in general.

Null Hypothesis 5.8: There will be no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with a favorable attitude toward the HPV vaccine and those without a favorable attitude toward the HPV vaccine.

Independent-samples $t$ testing was conducted to determine the effects attitudes toward the HPV vaccine on the likelihood of talking with daughter about the HPV vaccine. A significant
difference was found ($t(104) = -3.215, p = .002$). The mean score for likelihood for a mother to talk to daughter about the HPV vaccine was greater for those with a more favorable attitude toward the HPV vaccine ($M = 3.58, SD = 2.98$) than for those with a less favorable attitude toward the HPV vaccine ($M = 2.98, SD = 1.008$). Therefore, the null hypothesis was rejected. It was concluded that the intention to talk to daughter about the HPV vaccine was associated with a mother’s attitude toward the HPV vaccine. She had more intentions to talk to daughter about the HPV vaccine if she had a more favorable attitude toward the HPV vaccine.

Null Hypothesis 5.9: There will be no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with more knowledge of HPV and those with less knowledge of HPV.

Independent-samples $t$ testing was conducted to determine the effects of knowledge of HPV on the likelihood of talking with daughter about the HPV vaccine. There was significant difference for knowledge of HPV ($t(104) = -3.166, p = .002$), with the mean score for likelihood for a mother to talk to daughter being significantly greater ($M = 3.62, SD = .673$) for those mothers with more knowledge about HPV than less knowledge ($M = 3.01, SD = 1.066$). Therefore, the null hypothesis was rejected. It was concluded that the intention to talk to daughter about the HPV vaccine was related to a mother’s knowledge about HPV. The more knowledgeable the mother was about HPV, the greater intention she had to talk to daughter about the HPV vaccine

Null Hypothesis 5.10: There will be no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with more knowledge of the HPV vaccine and those with less knowledge of the HPV vaccine.

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Independent-samples $t$ testing was conducted to determine the effects of knowledge of the HPV vaccine on the likelihood of talking with daughter about the HPV vaccine. There was a significant difference for knowledge of the HPV vaccine ($t(104) = -3.601, p < .001$), with the mean score for likelihood for a mother to talk to daughter being significantly greater for those with more knowledge about the HPV vaccine ($M = 3.58, SD = .702$) than those with less knowledge ($M = 2.93, SD = 1.093$). Therefore, the null hypothesis was rejected. It was concluded that the intention to talk to daughter about the HPV vaccine was associated with a mother’s knowledge about the HPV vaccine. The more knowledgeable the mother was about the HPV vaccine, the greater intention she had to talk to daughter about the HPV vaccine.

Null Hypothesis 6.1: There will be no difference in having had daughter vaccinated with the HPV vaccine between mothers with frequent spiritual behaviors and those with infrequent spiritual behaviors.

Chi-square analyses were conducted to determine the effects of spiritual behaviors on having received the HPV vaccination for daughter. There was no significant interaction found ($X^2 (1) = .008$, $N = 103$, $p = .929$), therefore the null hypothesis failed to be rejected. It was concluded that receiving the HPV vaccine for one’s daughter was not related to one’s spiritual behaviors.

Null Hypothesis 6.2: There will be no difference in having had daughter vaccinated with the HPV vaccine between mothers with strong spiritual beliefs and those without strong spiritual beliefs.

Chi-square analyses were conducted to determine the effects of spiritual beliefs on having received the HPV vaccination for daughter. There was no significant interaction found ($X^2 (1) = \ldots$
.069, \( p = .793 \)), therefore the null hypothesis failed to be rejected. It was concluded that receiving the HPV vaccine for one’s daughter was not related to one’s spiritual beliefs.

Null Hypothesis 6.3: There will be no difference in having had daughter vaccinated with the HPV vaccine between mothers with good social support and those without good social support.

Chi-square analyses were conducted to determine the effects of social support on having received the HPV vaccination for daughter (as the dependent variable). There was no significant interaction found \((X^2 (1) = .065, N = 105, p = .799)\), therefore the null hypothesis failed to be rejected. It was concluded that receiving the HPV vaccine for one’s daughter was not related to one’s social support.

Null Hypothesis 6.4: There will be no difference in having had daughter vaccinated with the HPV vaccine between mothers with younger adolescent daughters and those with older adolescent daughters.

An independent samples \( t \) test was conducted to compare the mean age of the daughters between the groups that had and that had not received the HPV vaccine, and a significant difference was found \((t(104) = -6.419, p < .001)\). The daughter’s average age for those mothers who said they had not received the vaccine was significantly lower \((M = 11.37, SD = 2.238)\) than for those who had received the vaccine \((M = 14.47, SD = 2.240)\). Therefore, the null hypothesis was rejected. It was concluded that age was associated with a mother’s decision to have her daughter vaccinated; the older the daughter, the more likely it was that she had received the HPV vaccine.
Null Hypothesis 6.5: There will be no difference in having had daughter vaccinated with the HPV vaccine between mothers who are Black, mothers who are White, and mothers who are of another race/ethnicity.

Chi-square analyses were conducted to determine the effects of race on having received the HPV vaccination for daughter. There was no significant interaction found ($\chi^2 (2) = 5.590, N = 106, p = .061$), therefore the null hypothesis failed to be rejected. It was concluded that receiving the HPV vaccine for one’s daughter was not significantly associated with race.

Null Hypothesis 6.6: There will be no difference in having had daughter vaccinated with the HPV vaccine between mothers with higher income level and those with lower income level.

Chi-square analyses were conducted to determine the effects of income level on having received the HPV vaccination for daughter. There were no significant interactions found ($\chi^2 (1) = 2.770, N = 98, p = .096$), therefore the null hypothesis failed to be rejected. It was concluded that receiving the HPV vaccine for one’s daughter was not significantly related to income.

Null Hypothesis 6.7: There will be no difference in having had daughter vaccinated with the HPV vaccine between mothers with a favorable attitude toward vaccinations in general and those without a favorable attitude toward vaccinations in general.

Chi-square analyses were conducted to determine the effects of attitudes on having received the HPV vaccination for daughter. There were no significant interactions found for attitudes toward vaccines in general ($\chi^2 (1) = .186, p = .666$), therefore the null hypothesis failed to be rejected. It was concluded that receiving the HPV vaccine for one’s daughter was not significantly related to attitudes toward vaccinations.
Null Hypothesis 6.8: There will be no difference in having had daughter vaccinated with the HPV vaccine between mothers with a favorable attitude toward the HPV vaccine and those without a favorable attitude toward the HPV vaccine.

Chi-square analyses were conducted to determine the effects of attitudes on having received the HPV vaccination for daughter. There was no significant interaction found ($X^2 (1) = 3.460, N = 106; p = .063$), therefore the null hypothesis failed to be rejected. It was concluded that receiving the HPV vaccine for one’s daughter was not significantly related to attitudes toward the HPV vaccine.

Null Hypothesis 6.9: There will be no difference in having had daughter vaccinated with the HPV vaccine between mothers with more knowledge of HPV and those with less knowledge of HPV.

Chi-square analyses were conducted to determine the effects knowledge on having received the HPV vaccination for daughter. There were no significant interactions found for knowledge of HPV ($X^2 (1) = .215, N = 106, p = .643$), therefore the null hypothesis failed to be rejected. It was concluded that receiving the HPV vaccine for one’s daughter was not significantly related to knowledge of HPV.

Null Hypothesis 6.10: There will be no difference in having had daughter vaccinated with the HPV vaccine between mothers with more knowledge of the HPV vaccine and those with less knowledge of the HPV vaccine.

Chi-square analyses were conducted to determine the effects of knowledge on having received the HPV vaccination for daughter. There were no significant interactions found for knowledge of the HPV vaccine ($X^2 (1) = .638, N = 106, p = .424$). Therefore, the null hypothesis
failed to be rejected. It was concluded that receiving the HPV vaccine for one’s daughter was not significantly related to knowledge of the HPV vaccine.

Null Hypothesis 6.11: There will be no difference in having had daughter vaccinated with the HPV vaccine between those whose doctors recommended the HPV vaccine and those whose doctors did not recommend the HPV vaccine.

A chi square test of independence was calculated to examine the relationship between daughters receiving the HPV vaccine and doctor recommending the HPV vaccine. A significant interaction was found ($X^2 (1) = 35.782, N = 106, p < .001$). Daughters were more likely to receive the HPV vaccine if the doctor recommended that they do; 93.3% of those who received the vaccine had a doctor recommend it, compared to those who did not have a doctor recommend it—only 28.9% had been vaccinated.

Null Hypothesis 7.1: There will be no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with frequent spiritual behaviors and those with infrequent spiritual behaviors.

Independent-samples $t$ testing was conducted; no significance was found for likelihood of mothers to have their daughters receive the HPV vaccine based on spiritual behaviors ($t(96) = .441, p = .660$), therefore the null hypothesis failed to be rejected. It was concluded that a mother’s spiritual behaviors is not related to her intention to have daughter vaccinated with the HPV vaccine.

Null Hypothesis 7.2: There will be no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with strong spiritual beliefs and those without strong spiritual beliefs.
Independent-samples $t$ testing was conducted and no significance was found for likelihood of mothers to have their daughters receive the HPV vaccine based on spiritual beliefs ($t(96) = -.156, p = .876$). Therefore the null hypothesis failed to be rejected. It was concluded that a mother’s spiritual beliefs is not related to her intention to have daughter vaccinated with the HPV vaccine.

Null Hypothesis 7.3: There will be no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with good social support and those without good social support.

Independent-samples $t$ testing was conducted and no significance was found for likelihood of mothers to have their daughters receive the HPV vaccine based on social support ($t(98) = -.216, p = .829$). Therefore the null hypothesis failed to be rejected. It was concluded that a mother’s social support is not related to her intention to have daughter vaccinated with the HPV vaccine.

Null Hypothesis 7.4: There will be no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with younger daughters and those with older daughters.

Pearson correlation coefficient was calculated for the relationship between age of daughter and likelihood to receive the HPV vaccine. A weak correlation that was not significant was found ($r (98) = .146, p = .148$). Therefore the null hypothesis failed to be rejected. It was concluded that age of daughter was not related to the likelihood that daughter will receive the vaccine.
Null Hypothesis 7.5: There will be no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers who are Black, mothers who are White, and mothers who are of another race/ethnicity.

An ANOVA was conducted to examine whether likelihood to have daughter receive the vaccine differed significantly based on race. Results indicated that there was a significant difference among the three racial categories (\(F(2, 97) = 48.536, p < .001\)). Tukey’s B was used to determine the nature of the differences between the races. This analysis revealed that White mothers were more likely to have daughter receive the HPV vaccine (\(M = 3.38, SD = .862\)) than Black mothers (\(M = 2.41, SD = 1.109\)) and other non-White mothers (\(M = 3.00, SD = 1.155\)). Therefore the null hypothesis was rejected. It was concluded that White mothers had greater intention to have daughters vaccinated with the HPV vaccine.

Null Hypothesis 7.6: There will be no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with higher income level and those with lower income level.

Independent-samples \(t\) testing was conducted and no significance was found for likelihood of mothers to have their daughters receive the HPV vaccine based on income (\(t(90) = .425, p = .672\)). Therefore the null hypothesis failed to be rejected. It was concluded that income is not associated with a mother’s intention to have daughter vaccinated with the HPV vaccine.

Null Hypothesis 7.7: There will be no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with a favorable attitude toward vaccination and those without a favorable attitude toward vaccination.
Independent-samples \( t \) testing was conducted and no significant difference was found for likelihood of mothers to have their daughters receive the HPV vaccine based on mothers’ attitude to vaccines in general \((t(98) = -1.845, p = .068)\). Therefore the null hypothesis failed to be rejected. It was concluded that a mother’s attitude toward vaccines in general is not associated with her intention to have daughter vaccinated with the HPV vaccine.

Null Hypothesis 7.8: There will be no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with a favorable attitude toward the HPV vaccine and those without a favorable attitude toward the HPV vaccine.

Independent-samples \( t \) testing was conducted; a significant difference in the likelihood to have daughter vaccinated was found for attitude toward the HPV vaccine \((t(98) = -4.682, p < .001)\). The mean score for likelihood for a mother to have her daughter vaccinated with the HPV vaccine was greater for those with a more favorable attitude toward the HPV vaccine \((M = 3.33, SD = .979)\), than for those with a less favorable attitude toward the HPV vaccine \((M = 2.36, SD = 1.055)\). Therefore the null hypothesis was rejected. It was concluded that the intention to have daughter vaccinated with the HPV vaccine was associated with a mother’s attitude toward the HPV vaccine. She had more intentions to have daughter vaccinated if she had a more favorable attitude toward the HPV vaccine.

Null Hypothesis 7.9: There will be no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with more knowledge of HPV and those with less knowledge of HPV.

Independent-samples \( t \) testing was conducted; a significant difference in the likelihood to have daughter vaccinated was found for knowledge of HPV \((t(98) = -2.384, p = .019)\). The mean score for likelihood for a mother to have her daughter receive the vaccine was greater for those
with more knowledge about HPV \((M = 3.11, SD = .924)\), than for those with less knowledge \((M = 2.56, SD = 1.196)\). Therefore the null hypothesis was rejected. It was concluded that the intention to have daughter vaccinated with the HPV vaccine was associated with a mother’s knowledge of HPV. She had greater intention to have daughter vaccinated if she was more knowledgeable about HPV.

Null Hypothesis 7.10: There will be no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with more knowledge of the HPV vaccine and those with less knowledge of the HPV vaccine.

Independent-samples t testing was conducted; a significant difference in the likelihood to have daughter vaccinated was found for knowledge of the HPV vaccine \((t(98) = -3.206, p = .002)\). The mean score for likelihood for a mother to have her daughter receive the vaccine was greater for those with more HPV vaccine knowledge \((M = 3.12, SD = 1.013)\), than those with less knowledge \((M = 2.43, SD = 1.136)\). Therefore the null hypothesis was rejected. It was concluded that the intention to have daughter vaccinated with the HPV vaccine was associated with a mother’s knowledge of the HPV vaccine. She had greater intention to have daughter vaccinated if she was more knowledgeable about the HPV vaccine.

Null Hypothesis 7.11: There will be no difference in the likelihood to have daughter vaccinated with the HPV vaccine between those whose doctors recommended the HPV vaccine and those whose doctors did not recommend the HPV vaccine.

Independent-samples t testing was conducted; a significant difference in the likelihood to have daughter vaccinated was found between those who had a doctor recommend the vaccine or not \((t(98) = -2.676, p = .009)\). The mean score for likelihood for mother to have her daughter receive the vaccine was greater for those who had a doctor recommend it \((M = 3.09, SD = 1.189)\)
than for those who did not have a doctor recommend it ($M = 2.50, SD = 1.005$). Therefore the null hypothesis was rejected. It was concluded that the intention to have daughter vaccinated with the HPV vaccine was associated with having a doctor recommend it. A mother was more likely to have her daughter receive the HPV vaccine if the doctor recommended it.

Null Hypothesis 7.12: There will be no difference in the likelihood to have daughter vaccinated with the HPV vaccine between those mothers who talked to their daughters about the HPV vaccine and those who did not talk to their daughters about the HPV vaccine.

Independent-samples t testing was conducted; a significant difference in the likelihood to have daughter vaccinated was found between those who had ever talked to daughter about the HPV vaccine and those who had not ($t(97) = -2.840, p = .006$). The mean score for likelihood for mother to have her daughter receive the vaccine was greater for mothers who had talked to daughter about the HPV vaccine ($M = 3.12, SD = 1.194$) than for those who had not talked to daughter ($M = 2.49, SD = 1.002$). Therefore the null hypothesis was rejected. It was concluded that a mother was more likely to have her daughter receive the HPV vaccine if she had already talked to her daughter about it.

Summary

Overall, the mothers who participated in this study were knowledgeable regarding HPV and the HPV vaccine, had favorable attitudes toward the HPV vaccine and vaccines in general, and were inclined to talk with daughters about the HPV vaccine. Even though many had not already had their daughters vaccinated, many did have intentions to have their daughter vaccinated with the HPV vaccine.
For the mothers who participated in this study, most aspects of spirituality, social support, and certain demographic variables were not found to be associated with their knowledge, attitudes, and behaviors/behavioral intentions. However, there were significant findings for several variables. Attitude toward the HPV vaccine differed based on income level, attitude toward vaccinations in general, and knowledge of HPV and of the HPV vaccine. Talking to daughter about the HPV vaccine differed based on age of daughter, mothers’ spiritual beliefs and mothers’ knowledge of the HPV vaccine. Mothers’ intentions to talk to daughter differed based on race, attitudes (toward vaccines in general and toward the HPV vaccine), and knowledge (of HPV and of the HPV vaccine). Having daughter vaccinated differed based on daughter’s age and if doctor recommended it. Mothers’ intentions to have daughter vaccinated differed based on race, attitude toward the HPV vaccine, knowledge (of HPV and of the HPV vaccine), doctor recommendation, and having already talked to daughter about it.
Chapter Five: Discussion

Purpose Statement

A comprehensive review of the literature found no published study which examined mothers’ spirituality and social connections with associated HPV vaccine acceptability for their daughters. The purpose of this study was to fill such gaps in the research and examine mothers in the healthcare system in Greater Cincinnati to understand their views on HPV vaccine acceptability for their daughters, social support and connections, and spiritual behaviors and beliefs.

Chapter One discussed the research questions, hypotheses, limitations, delimitations, and key terms used in this study. Chapter Two presented a comprehensive review of the literature. Chapter Three described the methodology used in this study. Chapter Four gave the results of this study. This chapter discusses the findings of the study, including implications and recommendations.

Summary

The mothers who participated in this study were knowledgeable regarding HPV and the HPV vaccine, had favorable attitudes toward the HPV vaccine and vaccines in general, and was inclined to talk with daughters about the HPV vaccine. Even though several mothers had not already had their daughters vaccinated, many have intentions to have their daughter vaccinated with the HPV vaccine.

There were several significant findings in this study. Attitude toward the HPV vaccine differed based on income level, attitude toward vaccinations in general, and knowledge of HPV and of the HPV vaccine. Talking to daughter about the HPV vaccine differed based on age of
daughter, mothers’ spiritual beliefs and mothers’ knowledge of the HPV vaccine. Mothers’ intentions to talk to daughter differed based on race, attitudes (toward vaccines in general and toward the HPV vaccine), and knowledge (of HPV and of the HPV vaccine). Having daughter vaccinated differed based on daughter’s age and if doctor recommended it. Mothers’ intentions to have daughter vaccinated differed based on race, attitude toward the HPV vaccine, knowledge (of HPV and of the HPV vaccine), doctor recommendation, and having already talked to daughter about it.

Rejected Null Hypotheses

For the mothers who participated in this study, several variables were significantly associated with attitude toward the HPV vaccine, talking to daughter about the HPV vaccine, having daughter vaccinated, and mothers’ intentions to talk to daughter about the HPV vaccine or intentions to have daughter vaccinated.

Based on the results of this study, the following null hypotheses were rejected, meaning there was a significant relationship between variables found.

Null Hypothesis 3.6: There was no difference in mothers’ attitude toward the HPV vaccine between mothers with higher income level and those with lower income level.

Null Hypothesis 3.7: There was no difference in mothers’ attitude toward the HPV vaccine between mothers with a favorable attitude toward vaccinations in general and those without a favorable attitude toward vaccinations in general.

Null Hypothesis 3.8: There was no difference in mothers’ attitude toward the HPV vaccine between mothers with more knowledge of HPV and those with less knowledge of HPV.
Null Hypothesis 3.9: There was no difference in mothers’ attitude toward the HPV vaccine between mothers with more knowledge of the HPV vaccine and those with less knowledge of the HPV vaccine.

Null Hypothesis 4.2: There was no difference in having ever talked to daughter about the HPV vaccine between mothers with strong spiritual beliefs and those without strong spiritual beliefs.

Null Hypothesis 4.4: There was no difference in having ever talked to daughter about the HPV vaccine between mothers with younger adolescent daughters and those with older adolescent daughters.

Null Hypothesis 4.10: There was no difference in having ever talked to daughter about the HPV vaccine between mothers with more knowledge of the HPV vaccine and those with less knowledge of the HPV vaccine.

Null Hypothesis 5.5: There was no difference in the likelihood to talk to daughter about the HPV vaccine between mothers who are Black, mothers who are White, and mothers who are of another race/ethnicity.

Null Hypothesis 5.7: There was no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with a favorable attitude toward vaccinations in general and those without a favorable attitude toward vaccinations in general.

Null Hypothesis 5.8: There was no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with a favorable attitude toward the HPV vaccine and those without a favorable attitude toward the HPV vaccine.
Null Hypothesis 5.9: There was no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with more knowledge of HPV and those with less knowledge of HPV.

Null Hypothesis 5.10: There was no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with more knowledge of the HPV vaccine and those with less knowledge of the HPV vaccine.

Null Hypothesis 6.4: There was no difference in having had daughter vaccinated with the HPV vaccine between mothers with younger adolescent daughters and those with older adolescent daughters.

Null Hypothesis 6.11: There was no difference in having had daughter vaccinated with the HPV vaccine between those whose doctors recommended the HPV vaccine and those whose doctors did not recommend the HPV vaccine.

Null Hypothesis 7.5: There was no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers who are Black, mothers who are White, and mothers who are of another race/ethnicity.

Null Hypothesis 7.8: There was no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with a favorable attitude toward the HPV vaccine and those without a favorable attitude toward the HPV vaccine.

Null Hypothesis 7.9: There was no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with more knowledge of HPV and those with less knowledge of HPV.
Null Hypothesis 7.10: There was no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with more knowledge of the HPV vaccine and those with less knowledge of the HPV vaccine.

Null Hypothesis 7.11: There was no difference in the likelihood to have daughter vaccinated with the HPV vaccine between those whose doctors recommended the HPV vaccine and those whose doctors did not recommend the HPV vaccine.

Null Hypothesis 7.12: There was no difference in the likelihood to have daughter vaccinated with the HPV vaccine between those mothers who talked to their daughters about the HPV vaccine and those who did not talk to their daughters about the HPV vaccine.

Accepted null hypotheses

For the mothers who participated in this study, most aspects of spirituality, social support, and certain demographic variables were not related to their knowledge, attitudes, and behaviors/behavioral intentions.

Based on the results of this study, the following null hypotheses were accepted, meaning there was no relationship between variables.

Null Hypothesis 1.1: There was no difference in knowledge of HPV between mothers with frequent spiritual behaviors and those with infrequent spiritual behaviors.

Null Hypothesis 1.2: There was no difference in knowledge of HPV between mothers with strong spiritual beliefs and those without strong spiritual beliefs.

Null Hypothesis 1.3: There was no difference in knowledge of HPV between mothers with good social support and those without good social support.
Null Hypothesis 2.1: There was no difference in knowledge of the HPV vaccine between mothers with frequent spiritual behaviors and those with infrequent spiritual behaviors.

Null Hypothesis 2.2: There was no difference in knowledge of the HPV vaccine between mothers with strong spiritual beliefs and those without strong spiritual beliefs.

Null Hypothesis 2.3: There was no difference in knowledge of the HPV vaccine between mothers with good social support and those without good social support.

Null Hypothesis 3.1: There was no difference in mothers’ attitude toward the HPV vaccine between mothers with frequent spiritual behaviors and those with infrequent spiritual behaviors.

Null Hypothesis 3.2: There was no difference in mothers’ attitude toward the HPV vaccine between mothers with strong spiritual beliefs and those without strong spiritual beliefs.

Null Hypothesis 3.3: There was no difference in mothers’ attitude toward the HPV vaccine between mothers with good social support and those without good social support.

Null Hypothesis 3.4: There was no difference in mothers’ attitude toward the HPV vaccine between mothers with younger adolescent daughters and those with older adolescent daughters.

Null Hypothesis 3.5: There was no difference in mothers’ attitude toward the HPV vaccine between mothers who are Black, mothers who are White, and mothers who are of another race/ethnicity.

Null Hypothesis 4.1: There was no difference in having ever talked to daughter about the HPV vaccine between mothers with frequent spiritual behaviors and those with infrequent spiritual behaviors.
Null Hypothesis 4.3: There was no difference in having ever talked to daughter about the HPV vaccine between mothers with good social support and those without good social support.

Null Hypothesis 4.5: There was no difference in having ever talked to daughter about the HPV vaccine between mothers who are Black, mothers who are White, and mothers who are of another race/ethnicity.

Null Hypothesis 4.6: There was no difference in having ever talked to daughter about the HPV vaccine between mothers with higher income level and those with lower income level.

Null Hypothesis 4.7: There was no difference in having ever talked to daughter about the HPV vaccine between mothers with a favorable attitude toward vaccinations in general and those without a favorable attitude toward vaccinations in general.

Null Hypothesis 4.8: There was no difference in having ever talked to daughter about the HPV vaccine between mothers with a favorable attitude toward the HPV vaccine and those without a favorable attitude toward the HPV vaccine.

Null Hypothesis 4.9: There was no difference in having ever talked to daughter about the HPV vaccine between mothers with more knowledge of HPV and those with less knowledge of HPV.

Null Hypothesis 5.1: There was no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with frequent spiritual behaviors and those with infrequent spiritual behaviors.

Null Hypothesis 5.2: There was no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with strong spiritual beliefs and those without strong spiritual beliefs.
Null Hypothesis 5.3: There was no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with good social support and those without good social support.

Null Hypothesis 5.4: There was no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with younger adolescent daughters and those with older adolescent daughters.

Null Hypothesis 5.6: There was no difference in the likelihood to talk to daughter about the HPV vaccine between mothers with higher income level and those with lower income level.

Null Hypothesis 6.1: There was no difference in having had daughter vaccinated with the HPV vaccine between mothers with frequent spiritual behaviors and those with infrequent spiritual behaviors.

Null Hypothesis 6.2: There was no difference in having had daughter vaccinated with the HPV vaccine between mothers with strong spiritual beliefs and those without strong spiritual beliefs.

Null Hypothesis 6.3: There was no difference in having had daughter vaccinated with the HPV vaccine between mothers with good social support and those without good social support.

Null Hypothesis 6.5: There was no difference in having had daughter vaccinated with the HPV vaccine between mothers who are Black, mothers who are White, and mothers who are of another race/ethnicity.

Null Hypothesis 6.6: There was no difference in having had daughter vaccinated with the HPV vaccine between mothers with higher income level and those with lower income level.
Null Hypothesis 6.7: There was no difference in having had daughter vaccinated with the HPV vaccine between mothers with a favorable attitude toward vaccinations in general and those without a favorable attitude toward vaccinations in general.

Null Hypothesis 6.8: There was no difference in having had daughter vaccinated with the HPV vaccine between mothers with a favorable attitude toward the HPV vaccine and those without a favorable attitude toward the HPV vaccine.

Null Hypothesis 6.9: There was no difference in having had daughter vaccinated with the HPV vaccine between mothers with more knowledge of HPV and those with less knowledge HPV.

Null Hypothesis 6.10: There was no difference in having had daughter vaccinated with the HPV vaccine between mothers with more knowledge of the HPV vaccine and those with less knowledge of the HPV vaccine.

Null Hypothesis 7.1: There was no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with frequent spiritual behaviors and those with infrequent spiritual behaviors.

Null Hypothesis 7.2: There was no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with strong spiritual beliefs and those without strong spiritual beliefs.

Null Hypothesis 7.3: There was no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with good social support and those without good social support.
Null Hypothesis 7.4: There was no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with younger daughters and those with older daughters.

Null Hypothesis 7.6: There was no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with higher income level and those with lower income level.

Null Hypothesis 7.7: There was no difference in the likelihood to have daughter vaccinated with the HPV vaccine between mothers with a favorable attitude toward vaccination and those without a favorable attitude toward vaccination.

Discussion

Overview of knowledge, attitudes, and behaviors

The mothers who participated in this research study were knowledgeable regarding HPV and the HPV vaccine. They had accurate knowledge regarding knowing that a person can have HPV without knowing it, that the HPV vaccine had been recommended for teenagers, and that women would still need Pap smears even after being vaccinated with the HPV vaccine. Overall knowledge mean score was 7.86 (range 0 to 12). The mean score for the subscale for knowledge of HPV was 4.62 (range 0 to 7) and for the subscale for knowledge of the HPV vaccine was 3.24 (range 0 to 5). In this preliminary study, many mothers had knowledge of HPV and the HPV vaccine, whereas level of knowledge was found to be low in other previous studies (Friedman, 2007; Caskey, 2009; Tiro, 2007).

The mothers who participated in this research study had favorable attitudes toward the HPV vaccine and to vaccines in general. Most significantly, mothers reported favorable attitudes
by their agreement that “vaccines in general are an effective way to protect children’s health,” “preventing HPV is an important health issue,” and “teenagers and children should learn about HPV prevention from their parents.” Lower attitudinal scores were reported in agreeing “the HPV vaccine should be a routine childhood immunization” and by their perception to the subjective norm that “most of the people I know are having their daughters vaccinated with the HPV vaccine.” Only 26.4% agreed/strongly agree with the latter statement. Other studies also found favorable attitudes toward the vaccine (Short, 2010; Chan, 2012).

Many of the mothers in this study had experience talking with their daughters about the HPV vaccine; 41.9% reported having talked with their daughter about the vaccine and 80.2% were moderately to extremely likely to talk to their daughter about the HPV vaccine. Only 28.3% reported that their daughter had already received the vaccine. However, 61% of mothers in this study were moderately to extremely likely to have their daughter receive the vaccine. Mothers’ approval and mother-daughter communication are important in predicting who will accept the HPV vaccine (Roberts, 2010).

**Spirituality**

Previous studies examined spirituality and cancer prevention (Gibson, 2003; Moadel et al., 1999; Lukwago et al., 2003), but there was a gap in the literature in addressing spirituality and HPV vaccination for the prevention of cancer. In this preliminary study, results indicated that spirituality had some relationship with HPV vaccine-related behaviors, but not with mother’s knowledge or attitudes. Understanding the dimensions of spirituality (not just religiosity) had not been previously explored in research regarding HPV acceptability. The differences between spiritual behaviors (the practices or religious behaviors that one engages)
and spiritual beliefs (faith, values, and belief in a Higher Being) were explored. In this sample, mothers with stronger spiritual beliefs were more likely to have talked to their daughters about the HPV vaccine, even though spiritual beliefs were not associated with the mothers’ knowledge and attitudes. Spiritual behaviors did not seem to play a role in knowledge or attitudes, nor any behaviors or behavioral intentions regarding the HPV vaccine. This finding was in contrast with previously reported findings regarding religiosity—mostly measured by religious attendance (Swain et al., 2006; Stupiansky et al., 2010; Ishibashi et al., 2008; Barnack et al., 2010) which noted that more frequent religious involvement was associated with less likeliness to vaccinate. This current research indicated that by discerning between spiritual practices and spiritual beliefs, there may be no difference in mothers’ knowledge or attitudes toward HPV vaccine acceptability based on her spiritual behaviors and beliefs. Furthermore, stronger spiritual beliefs might positively affect communication with daughters. Talking to daughters about the HPV vaccine may be prompted by mothers’ spiritual beliefs and connections. This finding supports the idea that having a spiritual connection could lead someone to accept disease-preventing measures, which starts with the behavior of open communication.

**Social support**

Although there have been studies conducted that looked at the role of social connections and spiritual connections on a person’s overall well-being and health (Cohen, 2004; Berkman and Glass, 2000; Gibson, 2003; Bourjolly, 1998; Holt, 2003), no previous study was found that examined the role of these connections on a mother’s acceptability of the HPV vaccine for her daughter. Some studies looked at how social support was important in health promotion programs for women (Hurdle, 2001; Voorhees et al., 2005), but did not address its role in
influencing prevention through vaccination. In this study, the amount of social support perceived by mothers was not found to be associated with her knowledge, attitudes, or behaviors and behavioral intentions. This study used the ESSI, a recognized social support instrument, found to be valid and reliable, but had not previously been applied in understanding vaccination behaviors. Most of the participants in this study indicated some degree of social support, with an average score of 28.55 (range of 14 to 34 out of possible 34). Other items relating to participants’ social network indicated that 73.6% of participants did not agree that most of the people they know are having their daughters vaccinated with the HPV vaccine (measuring subjective norms), and that 72.7% of participants agreed that most of their friends have similar spiritual beliefs as they do. Regarding attending a health program (as in a social setting) to learn how to talk to daughter about HPV prevention, 59.4% of mothers indicated that they would be likely to attend. The mothers in this sample perceived support from their social network, but this support may not be associated with their knowledge, attitudes, behaviors, or intentions regarding HPV vaccinations.

One limitation in this study was that behavioral intention to talk to daughter and intention to have daughter receive the HPV vaccine were each measured as a single-item. This may not have been a strong enough measure (Peter, 1979) to elucidate the impact of a woman’s social support on her decision to vaccinate her daughter. Also, questions regarding what mothers’ social support systems would think of her decision to vaccinate daughter (or not) was not specifically posed. Having a multiple-item question and asking about the subjective norms in relation to mothers’ support system may have revealed greater insight.
**Knowledge and attitudes**

Several studies have been published that examined the role of parental authority on the acceptability of the HPV vaccine (Bernat et al., 2009; Serpell & Green, 2006; Rosenthal et al., 2008, Fazekas et al., 2008; Gerend et al., 2007; Sperber et al., 2008; Roberts, 2010). Most of these studies revealed that knowledge and attitude of the mother were related to her decision to have her daughter vaccinated.

In this present study, results indicated that knowledge may be associated with attitudes and behaviors. The mothers who participated in this research study were somewhat knowledgeable regarding HPV and the HPV vaccine, with most (11/12) knowledge statements marked correctly by most of the respondents (51% to 93%). The major information sources for these mothers were a doctor or television commercial. Neither mothers’ spirituality (either beliefs or behaviors), nor her social support, were found to significantly impact her knowledge of HPV or the HPV vaccine. This present study did not find mothers’ knowledge to be associated with how spiritual they were, nor how much social support they perceived.

Results in this study showed that mothers with more knowledge of HPV and the HPV vaccine seemed to have more favorable attitudes toward the HPV vaccine. Those with more knowledge about HPV were more favorable in believing that the HPV vaccine is safe, preventing HPV is an important health issue, and the chance of getting HPV is high (so the vaccine is worth it). Those with more knowledge about the HPV vaccine were more favorable in believing that the HPV vaccine is safe, preventing HPV is an important health issue, HPV vaccine does not promote early sex, most people are vaccinating their daughters, HPV vaccine is effective for reproductive health, and the chance of getting HPV is high (so the vaccine is worth getting). There were differences in mothers’ attitudes based on her knowledge.
Knowledge was also related to behaviors and behavioral intentions for the mothers in this preliminary study. In this study, the more knowledgeable the mother was about HPV, the greater intention she had to talk to daughter about the HPV vaccine and the greater intention she had to have daughter vaccinated. Knowledge about the HPV vaccine was also associated with behavior. Mothers with more knowledge about the HPV vaccine were more likely to have talked to their daughters about the HPV vaccine. Mothers with more knowledge about the HPV vaccine also had greater intention to talk to their daughters and greater intention to have daughters vaccinated. The results from this study indicated that some behaviors and intentions varied by mothers’ knowledge of HPV and the HPV vaccine.

Attitude was also related to behaviors and behavioral intentions. The mothers who participated in this research study had generally favorable attitudes toward the HPV vaccine and toward vaccines in general. Attitude toward the HPV vaccine differed based on income level, attitude toward vaccinations, and knowledge of HPV and the HPV vaccine. This study supported the concept of the knowledge-attitudes-behavior continuum, and its importance in understanding health behaviors.

The intention to talk to daughter about the HPV vaccine was related to a mother’s attitude toward the HPV vaccine and toward vaccines in general. A mother had less intention to talk to daughter about the HPV vaccine if she had a less favorable attitude toward vaccinations in general; similarly, she had greater intentions to talk to daughter about the HPV vaccine if she had a more favorable attitude toward the HPV vaccine. The intention to have daughter vaccinated with the HPV vaccine was associated with a mother’s attitude toward the HPV vaccine. She had greater intentions to have daughter vaccinated if she has a more favorable attitude toward the HPV vaccine.
There was a relationship between attitude toward the HPV vaccine and attitude toward vaccines in general. No previous studies were found to examine this dynamic, although fear-mongering for vaccines has been in the media recently (Bean, 2011). Reports indicated a fear that vaccinations caused illnesses and adverse effects, therefore some people were suspicious of receiving them. Was there a connection between low acceptance rates of the HPV vaccine and rejection of other vaccines due to fear? There were no published studies that found that attitude toward general vaccinations influenced attitude toward the HPV vaccine. Results from this present study indicated that those who had a more favorable attitude toward vaccinations in general had a favorable attitude toward the HPV vaccine in believing that the HPV vaccine is safe, preventing HPV is an important health issue, HPV vaccine does not promote early sex, HPV vaccine should be routine, and HPV vaccine is effective for reproductive health. The finding that mothers believe that the HPV vaccine does not promote early sex was confirmed in other recent studies as well (Bednarczyk, 2012; Liddon, 2012). For the majority of people in the US who accept vaccinations for their children, and with the evidence that the HPV vaccine will not promote promiscuity, it is predicted that more people will accept the recommendation of getting the HPV vaccine for their daughters. Knowledge and positive attitudes regarding the HPV vaccine are increasing, therefore the likelihood to talk to daughters is increasing, and the likelihood of having daughter vaccinated should subsequently increase.

**Demographics**

Some demographic variables were associated with knowledge, attitudes and behaviors. In this present study, income level was associated with attitudes, but not with knowledge or behaviors. In this sample, there was a difference in attitude based on income level; specifically,
mothers with lower annual household incomes (less than $40,000) showed a more favorable attitude toward the HPV vaccine in agreeing that the HPV vaccine should be a routine childhood immunization. This finding indicated that lower income families would be more likely to approve of and would benefit from a universal vaccine for HPV. Universal HPV vaccination is widely accepted as a way to reduce the burden of cervical cancer and HPV-related diseases (Goldie et al., 2003) and could help alleviate disparities between income levels.

In this diverse (racially and financially) sample, there were significant relationships between race, income, and educational level of mother. Lower income level was associated with lower educational level and with African-American race. Several studies have found that minority women and communities that are economically distressed are at higher risk for HPV-related morbidity and mortality (McDougall et al., 2007; Watson et al., 2009; Barry & Breen, 2005; Freeman & Wingrove, 2005; Dempsey et al., 2010; Mandelblatt et al., 1991). In this study, it was also found that those with lower educational attainment and lower income were less knowledgeable about HPV and the HPV vaccine; those with less education were also less likely to talk to daughter about the HPV vaccine. These mothers may feel they do not have the tools (information) or the resources to speak with authority on the subject. This study reiterated what other studies have found before: women (due to poverty, limited access to care and educational resources, often of a minority ethnic/racial group) are at risk, and are less likely to intend to receive the HPV vaccine (Allen et al., 2010). In light of the finding that lower income women, and less educated women had more favorable attitudes to having the HPV vaccine as a routine childhood immunization, the HPV vaccine may have the potential to reduce disparities in HPV associated diseases if provided to all routinely. Socioeconomic level seemed to play a role in the acceptance of the HPV vaccine.
The results in this study indicated that race had a relationship with behavioral intentions. White mothers had a greater likelihood/intention to talk to their daughters about the HPV vaccine than other mothers; African-American mothers were least likely to intend to talk to their daughters. White mothers also had greater intention to have daughters vaccinated with the HPV vaccine than African-America mothers. Due to the under representation of Hispanic mothers, differences in ethnicity could not be further delineated.

In this sample, although race was associated with behavioral intentions, it was not associated with attitude toward the HPV vaccine, nor with behaviors (of having already talked to daughter or already having daughter vaccinated). This finding was interesting because race is often used as a proxy for socioeconomic level (since race, income, and educational level are often correlated). This study found that lower income level, though associated with African-American race, was not associated with behavioral intentions. In other words, race and income were related, race and behavioral intentions were related, but income and behavioral intentions were not related. There are a few theories behind this finding. African-American mothers, especially those with less education, may not feel empowered or knowledgeable enough to talk to their daughters about the HPV vaccine. If there is a lack of self-efficacy for talking about HPV vaccination, then the reported likelihood/intention to talk to daughter about it is going to be low. In this study, African-American mothers also reported less intention to have daughter vaccinated; this may be related to the fact that it is not a requirement or a routine vaccination for school enrollment. These “likelihood” scenarios are prospective, and indicate a future event. African-American mothers may not be as forthcoming with what they may or may not do at a later time, which may be due to a lack of confidence about what they can control, a lack of trust with the medical establishment, or perhaps due to cultural differences in attending to what is
current rather than the likelihood of future events. Race appeared to be a factor in mothers’ intent to perform a behavior.

Age of daughter did not have a significant relationship to race, income, or educational level of mother, although daughter’s age was associated with mothers’ behaviors. In this study, the mean age for the daughter was 12.25 years (SD 2.632), with a range of 9 to 18 years old. For mothers who were likely to (or intend to) have their daughters receive the HPV vaccine, the most frequently reported age that daughter will be when she receives the vaccine is 13 years old. Having ever talked to daughter about the HPV vaccine was related to the age of the daughter; if the daughter was an older adolescent, mothers were more likely to have already talked about the HPV vaccine. Daughter’s age was associated with whether a mother had her daughter vaccinated; the older the daughter, the more likely it was that she had received the HPV vaccine.

This study found that there was a relationship between age of daughter and a mother’s behavior of talking about the HPV vaccine and of accepting it for her daughter. Although related to behaviors, daughter’s age was not related to a mother’s attitude toward the HPV vaccine. Other studies conducted found that age of daughter had nothing to do with parental attitude (Rosenthal et al., 2008), but that vaccine acceptance was higher for mothers with older daughters (Marlow et al., 2007). Demographic variables and age of daughter showed significant association with mother’s vaccine acceptability for daughter.

Other Associations

This study found that doctor’s recommendation was associated with behaviors. Daughters were more likely to receive the HPV vaccine if the doctor had recommended that they did; 93.3% of those who received the vaccine had a doctor recommend it, compared to only
28.9% of those who did not have a doctor recommend it had been vaccinated. Also, the intention to have daughter vaccinated with the HPV vaccine was associated with having a doctor recommend it. Mothers reported greater intentions to have her daughter receive the HPV vaccine if the doctor recommended it. Caskey and colleagues (2009) had also found that healthcare providers are influential regarding HPV vaccine knowledge and acceptance of the vaccine.

Lastly, in this sample, mothers were more likely to have their daughters receive the HPV vaccine if they had already talked to their daughters about it. Parenting style influences a mother’s decision to have her daughter vaccinated (Rosenthal et al., 2008), and having a relationship with one’s child that fosters communication could promote greater HPV vaccine acceptance. Rogers (2003) explained that the diffusion of innovations theory and the Social Cognitive Theory both seek to explain how individuals change their behavior as a result of communication with other individuals, and this preliminary study found that mother/daughter communication affected health care decision-making. According to the Theory of Reasoned Action (Fishbein & Ajzen, 1975), intention to perform a behavior is a good predictor of actual behavior. In this study, mothers were more likely (stronger intention) to receive HPV vaccine for daughters based on communication, which may therefore drive performing the actual preventive behavior. Behavioral intention is driven by knowledge, attitudes, and beliefs about the need to perform the behavior. Influences of parental authority, communication, and behavioral intention may all be important predictors of whether daughters receive the HPV vaccine.
Implications

The results from this study lend themselves to some significant implications (keeping in mind the limitation of generalizability of these results due to small sample size and that future research is still needed). First of all, mothers were knowledgeable about HPV and the HPV vaccine, but the message of its role in prevention still needs to be spread. Almost 40% of mothers surveyed had heard of the HPV vaccine from more than one information source, and only 10% of mothers surveyed revealed that they had not heard of the HPV vaccine previously. However, only about 50% of mothers knew that the HPV vaccine offered protection against genital warts and cervical cancer. Further findings from this study provided insight that knowledge about the vaccine was being shared with people of various backgrounds, and that it was not dependent on mothers’ spirituality and social support. Although Pap screening as a secondary prevention strategy for cervical cancer had shown to be successful, the knowledge and use of the HPV vaccine as a primary prevention strategy against genital warts and cervical cancer needs to be continued to reach more people. Health educators could play a leading role at the individual and population level in planning, implementing, and communicating efforts toward cervical cancer prevention. Further educational efforts could increase mothers’ knowledge about HPV and the HPV vaccine and its direct correlation to cervical cancer.

While mothers in this study generally had favorable attitudes toward vaccinations and the HPV vaccine, only about 36% agreed that the HPV vaccine should be a routine childhood immunization. This is in contrast to the 58% who felt that the HPV vaccine was an effective way to protect their daughter’s reproductive health and the 83% who agreed that vaccines were an effective way to protect children’s health. This implied that although mothers’ attitudes were favorable to vaccines, most were not interested in having the HPV vaccine become a routine,
perhaps mandatory, vaccine for their daughters. With significant exception were mothers with lower annual household incomes, who showed a more favorable attitude toward the HPV vaccine being a routine childhood immunization. With attitudes toward the HPV vaccine differing based on income level and knowledge of HPV, health educators have the opportunity to make an impact by conducting health promotion efforts to increase knowledge and advocate for healthcare that will decrease HPV-related morbidity and mortality in low income areas. This directly relates to how understanding the social determinants of health could lead to effective framing and acceptance of messages, and to reducing disparities in reproductive health for women.

Health educators understand the importance of advocacy and communicating for health. As myths are debunked (i.e. the HPV vaccine leads to promiscuity) and recommendations to vaccinate are routinely given by physicians (not just commercial companies with financial interests in its perpetuation), awareness and acceptance will generally increase. Exposure to media and marketing about HPV vaccines plays a key role in mothers’ decisions to vaccinate (Griffioen et al, 2012) by raising their awareness of HPV vaccines, providing them with facts and benefits, triggering discussions with their daughters and prompting them to seek out more information. Subjective norms are shifted as more conversations and media attention surrounding the HPV vaccine are propagated. Citing statistics in the media about what other parents are doing exposes the readers to “normative beliefs” (Forster et al., 2010). If news stories report that most parents are not concerned with their daughters’ sexual behavior following vaccination, more of the readers will likely have less concerns. This could lead to increased rates of vaccination.
Another implication in this study was that mother/daughter communication is a stronger predictor of HPV acceptability than mother’s spirituality or her social support. Many of the mothers in this study had experience talking with their daughters about the HPV vaccine; 41.9% report having talked with their daughter about the vaccine and 80.2% were moderately to extremely likely to talk to their daughter about the HPV vaccine. Only 28.3% reported that their daughter had already received the vaccine. However, 61% of mothers in this study were moderately to extremely likely to have their daughter receive the vaccine. As previously mentioned, talking to daughter about the HPV vaccine differed based on age of daughter, mothers’ spiritual beliefs and mothers’ knowledge of the HPV vaccine. Mothers’ intentions to talk to daughter differed based on race, attitudes (toward vaccines in general and toward the HPV vaccine), and knowledge (of HPV and of HPV vaccine). Having daughter vaccinated differed based on daughter’s age and if doctor recommended it. Mothers’ intentions to have daughter vaccinated differed based on race, attitude toward the HPV vaccine, knowledge (of HPV and of HPV vaccine), doctor recommendation, and having already talked to daughter about it. This implied that if health educators understand the factors associated with a mother’s behaviors and behavioral intentions for her daughter receiving the HPV vaccine, they can design effective programs that promote mother/daughter communication and increase knowledge of HPV prevention.

Evidence in this study suggested that certain aspects of spirituality do not play a major role in a mother’s decision of having her daughter vaccinated with the HPV vaccine. However, strong spiritual beliefs do lend to talking with one’s daughter about the HPV vaccine. These talks could be in favor of accepting the HPV vaccine, or perhaps in disapproval. Either way, the conversation is sparked. In this study, over 46% of the mothers agreed that faith-based settings
should address the issue of HPV prevention, and 59% would attend a health program to learn how to talk to their daughter about HPV prevention. This is significant because it encourages health educators to reach out to mothers in faith groups to open the discussion of reproductive health for their daughters, especially in light of the vaccine not promoting promiscuity (dispelling much of the controversy).

Another implication in this study was that utilizing a social setting with peers to promote an HPV health education program needs further exploration. Opportunities for mothers to learn and discuss HPV prevention was warranted, but this learning does not need to come from one’s social support system. Evidence in this study suggested that social support does not play a role in a mother’s decision of having her daughter vaccinated with the HPV vaccine. It is not reported from the items in this survey if mothers discussed HPV vaccination with family members or with those that offer them social support. Respondents may have responded differently to the subjective norms item if it had been a multiple question item and if the “someone I know” was specific to those who had greater social capital or stronger ties in their social support network. In this study, the more significant relationship in communicating about the HPV vaccine is with a doctor and as mother/daughter, not with those who offer social support. However, mothers implied that they were open to discussing this topic in a social setting. In future studies, social network analysis should be conducted to understand who and how others in a mother’s social circle may play a role in the influence of knowledge, attitudes, and behaviors.
Recommendations

Through evaluation of various factors that may be associated with mothers’ decision-making for accepting the HPV vaccine for daughters, this study reiterates that knowledge and attitude are related to behaviors and behavioral intentions. This study also examines how mothers perceive their social support, how frequently they engage in spiritual behaviors, and the strength of their spiritual beliefs. There is a plethora of research on the evidence of HPV prevention and the prevention of cervical cancer, but further research is needed on best approaches for increasing HPV vaccine acceptability. Here are some recommendations for future research:

1. Study and understand the impact of spiritual beliefs on disease preventing behaviors, apart from religiosity and spiritual practices. If spiritual beliefs are related to the likelihood to talk to daughter about the HPV vaccine, further research is needed to understand what is being communicated. Are there differences in what is said? How does it impact accepting the vaccine? Can a faith-based health program address or foster greater communication about reproductive health issues?

2. Analyze the impact of social support networks and social capital on HPV information. Will social capital contribute to a shift in subjective norms and a change in behaviors?

3. Examine predictors of acceptability among ethnic groups for the development of more culturally sensitive educational materials, especially for Hispanic mothers. Why do behaviors differ by race? Are there confidence or trust issues? Are there differences in perception of susceptibility? How do different race/ethnic groups
attend to current vs. future concerns? If Hispanic mothers are underrepresented in HPV vaccine research, what can be done to change that?

4. Conduct research with a larger sample size. More robust findings would be revealed.

Conclusions

The HPV vaccine was developed as a prophylactic vaccine to reduce the incidence of HPV infections, HPV lesions, and cervical cancer. Universal HPV vaccination is widely accepted in the public health community as a way to reduce the disease burden of cervical cancer, and has been marketed in commercial advertisements and recommended by physicians. In this present study, providing the HPV vaccine as a routine childhood immunization is supported by lower income families, and would contribute to eliminating disparities in HPV infections and cervical cancer.

This study attempts to fill gaps in knowledge about the relationship between social connections, spirituality, and cervical cancer prevention through HPV vaccine acceptability, and support the concept of the knowledge-attitudes-behavior continuum, and its importance in predicting health behaviors. Mothers’ knowledge and attitudes are related to her decision to have her daughter vaccinated and in how she communicates to her daughter about reproductive health issues. This study shows that talking to daughter about the HPV vaccine differs based on spiritual beliefs, age of daughter, and knowledge of the HPV vaccine. Having daughter vaccinated differs based on age and if doctor recommended it. Mothers’ intentions to talk to daughter differs based on race, attitudes, and knowledge, and her intentions to have daughter vaccinated differs based on race, attitude toward the HPV vaccine, knowledge, doctor recommendation, and having already talked to daughter about it. This study examines some
relationships that had not been previously explored, but further research is needed. An understanding of these potentially influential factors will affect how health educators and others frame and promote prevention messages in communities.


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vaccination among 11- to 12-year-old girls and their mothers. *Clinical Pediatrics, 51*(6), 560-568.


APPENDIX A

Three-page, 64 Item, Survey Instrument
### MOTHER/DAUGHTER HEALTH SURVEY

**DIRECTIONS:** This survey is voluntary and all of your responses will be kept private. Do not write your name. Please answer each question honestly. By completing this survey, you grant your consent to participate in this study. If you have more than one daughter, please answer in reference to your oldest daughter that is 18 years old or younger.

<table>
<thead>
<tr>
<th>Please check TRUE or FALSE for each of the following items:</th>
<th>TRUE</th>
<th>FALSE</th>
<th>DON'T KNOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 10% of women in the US have the human papilloma virus (HPV).</td>
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<tr>
<td>A person can have HPV without knowing it.</td>
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<tr>
<td>An abnormal Pap smear may indicate HPV infection.</td>
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<tr>
<td>HPV may be cured with antibiotics.</td>
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<tr>
<td>Certain types of HPV are associated with cancer.</td>
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<tr>
<td>Condoms do not help protect against HPV.</td>
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<tr>
<td>Women with HPV may need Pap smears more frequently.</td>
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<tr>
<td>The HPV vaccine has been approved by the FDA.</td>
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<tr>
<td>The HPV vaccine protects against genital warts and most cervical cancer.</td>
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<tr>
<td>The HPV vaccine lasts for about 3 to 4 years.</td>
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<td>The HPV vaccine has been recommended for teenagers.</td>
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<tr>
<td>Once vaccinated with the HPV vaccine, women no longer need Pap smears.</td>
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</table>

**Please check how strongly you agree or disagree with the following statements:**

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel that Doctors give out too many vaccines.</td>
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<tr>
<td>I feel that vaccines in general are an effective way to protect children’s health.</td>
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<tr>
<td>I feel that vaccines increase the chance that you could get sick.</td>
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<tr>
<td>I feel that the HPV vaccine is safe.</td>
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<tr>
<td>I feel that preventing HPV is an important health issue.</td>
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<tr>
<td>I feel that if children or teens get the HPV vaccine it will promote early sexual activity.</td>
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<tr>
<td>Most of the people I know are having their daughters vaccinated with the HPV vaccine.</td>
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<tr>
<td>I feel that the HPV vaccine should be a routine childhood immunization (like that for measles and mumps).</td>
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<tr>
<td>I feel that the HPV vaccine is an effective way to protect my daughter’s reproductive health.</td>
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<tr>
<td>I feel that the chance of getting HPV is so low that it is not worth getting the HPV vaccine.</td>
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<tr>
<td>I believe I could provide appropriate information on HPV to my daughter.</td>
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<tr>
<td>Teenagers and children should learn about HPV prevention from their parents.</td>
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<tr>
<td>Teenagers and children should learn about HPV prevention from their teachers and schools.</td>
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<tr>
<td>I think faith-based settings should address the issue of HPV prevention.</td>
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</table>
Please check **YES or NO** for each of the following items:

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
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</thead>
<tbody>
<tr>
<td>My daughter’s doctor has recommended to me to have my daughter get the HPV vaccine.</td>
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<tr>
<td>I have talked with my daughter about the HPV vaccine.</td>
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<tr>
<td>My daughter has already received the HPV vaccine.</td>
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<tr>
<td>I would only allow my daughter to get the HPV vaccine if it were mandatory.</td>
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**Please check how likely you are to. . .**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Not Likely at all</th>
<th>Slightly Likely</th>
<th>Moderately Likely</th>
<th>Extremely Likely</th>
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</thead>
<tbody>
<tr>
<td>Talk to your daughter about the HPV vaccine?</td>
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<tr>
<td>Give a brochure (or something to read) to your daughter about the HPV vaccine?</td>
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<tr>
<td>Attend a health program to learn how to talk to your daughter about HPV prevention?</td>
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<tr>
<td>How likely are you to have your daughter receive the HPV vaccine?</td>
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</table>

*If you are likely*, at what age will she be when she receives the vaccine? _________________

Where have you received information about the HPV vaccine?

- o I have not heard about this.
- o Doctor
- o Family member
- o Friend
- o Newspaper
- o Television program
- o Magazine
- o Television commercial
- o Other, specify: ___________

**Please check “How often. . .” for the following questions:**

<table>
<thead>
<tr>
<th>Question</th>
<th>None of the time</th>
<th>A little of the time</th>
<th>Some of the time</th>
<th>Most of the time</th>
<th>All of the time</th>
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</thead>
<tbody>
<tr>
<td>Is there someone available to whom you can count on to listen to you when you need to talk?</td>
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<td>Is there someone available to you to give you good advice about a problem?</td>
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<td>Is there someone available to you who shows you love and affection?</td>
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<td>Is there someone available to help with daily chores?</td>
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<td>Can you count on anyone to provide you with emotional support (talking over problems or helping you make a difficult decision)?</td>
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<td>Do you have as much contact as you would like with someone you feel close to, someone in whom you can trust and confide in?</td>
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How often do you …

<table>
<thead>
<tr>
<th>Activity</th>
<th>Never</th>
<th>At least once a year</th>
<th>Once a month</th>
<th>More than once a month</th>
<th>Once a week</th>
<th>More than once a week</th>
<th>Every day</th>
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<tbody>
<tr>
<td>Attend a church/mosque/temple or other religious activity/event?</td>
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<td>Listen to religious/spiritual music?</td>
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<td>Read the Bible or other sacred/spiritual/inspirational books?</td>
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<td>Engage in personal prayer or meditation?</td>
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<td>Speak to others about your faith?</td>
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<td>Please check how strongly you agree or disagree with each statement.</td>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Neutral</td>
<td>Agree</td>
<td>Strongly Agree</td>
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<td>I believe in a Higher Being.</td>
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<td>I think that spirituality is important.</td>
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<td>I believe that everything happens for a reason.</td>
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<td>I use prayer of some kind to get through tough times.</td>
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<td>I use my spiritual beliefs to guide my life decisions.</td>
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<td>My spiritual growth is an important life-long process.</td>
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<td>My spiritual beliefs help me to cope with illness.</td>
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<td>Most of my friends have similar spiritual beliefs as I do.</td>
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<td>I have a minister/religious leader that I can talk to.</td>
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</table>

ABOUT YOU

Please circle, check, or write in the requested information.

What is the age (or ages) of your daughter(s)?   ___________________

On a scale from 1 to 10 (10 being very close, 1 being very distant), how would you rate your relationship with your daughter? Please circle your answer.  1          2          3          4          5          6          7          8          9         10

What is your marital status?  
___ Single       ___ Living with partner       ___ Married       ___ Divorced       ___ Widowed

Which best describes you?  
___ Native American     ___ African American     ___ Asian     ___ Hawaiian/Pacific Islander     ___ White     ___ Multi-Racial     ___ Other (specify) ____________________________

Are you Hispanic/Latino?  
___ Yes     ___ No

What type of health insurance do you have?  
___ Private insurance     ___ Medicaid     ___ No health insurance

What is your annual household income?  
___ $19,999 or less     ___ $20,000 to $39,999     ___ $40,000 to $59,999     ___ $60,000 to $79,999     ___ $80,000 to $99,999     ___ $100,000 or more

What is the highest level of education that you completed?  
___ Less than high school diploma     ___ High school diploma or GED certificate     ___ Some college, associate’s degree, trade school or military     ___ College degree (BA, BS)     ___ Graduate school (MA, MS, PhD)

What is your zip code?   _____________________

Thank you very much for completing this survey.  
We appreciate your participation!
APPENDIX B

Research Information Sheet
Title of Study: Influence of Mothers’ Social Support and Spirituality on HPV Vaccine Acceptability for Daughters

Introduction:
You are being asked to take part in a research study. Please read this paper carefully and ask questions about anything that you do not understand.

Who is doing this research study?
The person in charge of this research study is Kimberley Price of the University of Cincinnati (UC) Department of Health Promotion and Education. She is being guided in this research by Keith King, PhD.

What is the purpose of this research study?
The purpose of this research study is to examine the relationships between social support, spirituality (behaviors and beliefs), and HPV vaccine acceptability.

Who will be in this research study?
About 200 people will take part in this study. You may be in this study if you are an adult female, and you have at least one daughter that is 9 to 18 years old.

What will you be asked to do in this research study, and how long will it take?
You will be asked to complete a 3-page survey. It will take about 10 to 15 minutes. The research survey will take place here during your visit today. The questions on the survey will cover questions about you, your beliefs, and what you know about women’s and girls’ health.

Are there any risks to being in this research study?
As an anonymous survey, this study is no more than minimal risk. If there are some questions that make you feel uncomfortable, you may refuse to answer any questions that you don’t want to answer.

Are there any benefits from being in this research study?
You will probably not get any benefit from taking part in this study. But, being in this study may help researchers understand what influences a mother’s decisions when making health decisions for her daughter.

What will you get because of being in this research study?
You will not be paid to take part in this study.

Do you have choices about taking part in this research study?
If you do not want to take part in this research study you may simply not participate. You will not be treated any differently.
How will your research information be kept confidential?
Information about you will be kept private by not having you put your name on the survey. There will be no way to link survey to you because this is an anonymous survey. No identifying information will be used. All the surveys collected will be stored in a locked file in my work office. Your information will be kept in a password protected computer for two years. The data from this research may be published, but you will not be identified by name.

Agents of the University of Cincinnati may inspect study records for audit or quality assurance purposes.

What are your legal rights in this research study?
Nothing in this consent form waives any legal rights you may have. This consent form also does not release the investigator, the institution, or its agents from liability for negligence.

What if you have questions about this research study?
If you have any questions or concerns about this research study, you should contact Kimberly Price at 513-636-0576. Or, you may contact Dr. Keith King at 513-556-3859.

The UC Institutional Review Board reviews all research projects that involve human participants to be sure the rights and welfare of participants are protected.

If you have questions about your rights as a participant or complaints about the study, you may contact the UC IRB at (513) 558-5259. Or, you may call the UC Research Compliance Hotline at (800) 889-1547, or write to the IRB, 300 University Hall, ML 0567, 51 Goodman Drive, Cincinnati, OH 45221-0567, or email the IRB office at irb@ucmail.uc.edu.

Do you HAVE to take part in this research study?
No one has to be in this research study. Refusing to take part will NOT cause any penalty or loss of benefits that you would otherwise have.
You may skip any questions that you don’t want to answer.
You may start and then change your mind and stop at any time. To stop being in the study, you should tell Kimberly Price.

BY TURNING IN YOUR COMPLETED SURVEY, YOU INDICATE YOUR CONSENT FOR YOUR ANSWERS TO BE USED IN THIS RESEARCH STUDY.

PLEASE KEEP THIS INFORMATION SHEET FOR YOUR REFERENCE.