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Religiosity as a Predictor of HPV Awareness and Knowledge

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Walden University

College of Health Sciences

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Karen Adelheid Reiner

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Walden University
2017

Abstract

Religiosity as a Predictor of HPV Awareness and Knowledge

by

Karen Adelheid Reiner

MS, Andrews University, 1999

BS, Columbia Union College, 1994

Proposal Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Health

Walden University

July 2017

Abstract

The Human Papillomavirus (HPV) is a common sexually transmitted infection (STI) and etiological agent of cervical cancer. It has been suggested that religiosity may promote a generalized disassociation between all STIs/STDs, including HPV, and personal relevance thus contributing to lower levels of HPV awareness and knowledge among certain groups. This study sought to identify the role of religiosity as a predictor of HPV awareness and knowledge among women in a Christian university. Religiosity was defined and measured using the Duke University Religion Index (DUREL). The schemata and social identity theories provided the theoretical framework for this study. A total of 173 women completed the modified survey instrument to assess level of HPV awareness and knowledge, attitudes toward premarital sex, and level of religiosity. Multiple linear regression analysis was used to test the hypotheses. Religiosity, as defined by the intrinsic religiosity subscale of the DUREL significantly contributed to HPV awareness (p = .002) and HPV knowledge (p = .036). The positive social change implications of this study include a better understanding of the role of religiosity in HPV awareness and knowledge; consideration of religiosity in dissemination of health information by informing public health policies and programs to ensure adequate and culturally relevant education and awareness about HPV transmission, HPV-related cancers, and HPV vaccination.

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Dedication

I wish to dedicate this dissertation to my family. To my husband, Kevin Reiner, who spent many hours proofreading, who always had a word of encouragement and a vote of confidence, and was always willing to fill in the gaps at home. To my four children, Kyle, Kaleb, Kalyse, and Khenzie, who supported me by sacrificing many-a-story time and for their somewhat reluctant acquiescence to those long days at the office. To my parents, Dowell and Adelheid, for their incessant prayers and outmost confidence. Thank you for entertaining the children and feeding my family during those days of intense writing.

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Chapter 1: Introduction to the Study

The human papillomavirus (HPV) has been identified as the etiological agent for cervical cancer (International Agency for Research on Cancer [IARC], 1995). HPV infections are common among sexually active women; however, most infections are transient, asymptomatic, and go unnoticed (Stanley, 2010). Unawareness of HPV infection risk has been identified as a significant barrier to cervical cancer intervention programs (Schiffman et al., 2011).

Even though the HPV vaccine is now widely available and recommended for females ages 11 to 26 years (Markowitz et al., 2013), there remains a low HPV vaccine uptake among adolescents in the United States (Jemal et al., 2013). While public health efforts to increase HPV vaccination continue, there is particular concern for older women who are no longer eligible for HPV vaccination and thus not the typical target of vaccination campaigns (Blake et al., 2015*).* Compounding the issue may be the strong influences religion can exert on lifestyle and consequently attitudes toward HPV; a sexually transmitted virus. A lower HPV awareness and knowledge among these women may influence their commitment to routine cervical cancer screening and HPV testing as well as their support of HPV vaccination campaigns for their family.

The positive social change implications of this study include a better understanding of the role of religiosity in HPV awareness and knowledge; consideration of religiosity in dissemination of health information by informing public health policies and programs to ensure adequate and culturally relevant education and awareness about HPV transmission, HPV-related cancers, and HPV vaccination. Consequently, a better

understanding of the role of religiosity in HPV awareness and knowledge may serve to boost effectiveness of both primary and secondary HPV prevention by minimizing fear associated with certain HPV-related information and increasing women's ability and confidence to make appropriate HPV-related decisions.

Chapter 1 presents an overview of the purpose and significance of the study. It discusses the background and theoretical framework guiding the study, followed by the articulation of the research questions and hypotheses. This chapter also gives consideration to the nature of the study, types and sources of data, along with the limitations and delimitations of the study. The chapter concludes with a summary highlighting the main points.

Background

HPV is a commonly transmitted virus among sexually active individuals, with an HPV infection likely to occur at least once in their lifetime (Trottier & Franco, 2006). Typically, the immune system effectively controls HPV infections and symptoms never develop (Stanley, 2010). However, recurrent or persistent HPV infections may lead to tumorigenesis (Avanzi, Alvisi, & Ripalti, 2013). It is well understood that HPV, particularly high-risk HPV types such as HPV 16 and HPV 18, may lead to cervical cancer through the pathway of HPV infection, persistence of HPV infection, development of precancerous lesions, and cellular invasion (Saslow et al., 2012).

HPV contributes to approximately 90% of cervical cancers diagnosed in the United States (Insinga, Liaw, Johnson, & Madeleine, 2008). HPV 16 and HPV18 are the most common types detected in younger women with invasive cervical cancer (Saraiya et

al., 2015). Similar findings have been reported for other countries. A review of national population-based registries revealed that in excess of 50% of invasive and preinvasive cancers are attributed to HPV (Nygård et al. 2014). Such estimates point to the commonness of HPV, its prevalence among sexually active women, and its importance as the etiological agent in certain cancers.

Traditional screening methodologies for cervical cancer include a cytological test, the Papanicolaou (Pap) test, which screens for precancerous cells. In 2002, DNA testing for HPV was added to best practices for screening recommendations (Saslow et al., 2002). A noticeable decrease in cervical cancer incidence and mortality has been attributed to regular screening, mediated by the timely detection of localized lesions, when the 5-year disease survival rate is highest at approximately 92%, and improved treatment outcomes for precancerous lesions (Saslow et al., 2012).

The current standard of care for cervical cancer and HPV screening for both vaccinated and unvaccinated women are as follows: no screening for women younger than 21 years of age; cytology alone recommended for women ages 21-29; cytology and HPV cotesting recommended every 5 years –every 3 years is acceptable for women ages 30-65 screened with cytology testing alone; no recommended screening for women 65 years and older with a prior negative screen (Saslow et al., 2012).

Following the revised recommendations for cervical cancer screening introduced in 2012, the proportion of women, ages 22-30, that reported having had a Pap test within the preceding 12 months went from 78.1% to 67.0%, a decrease of 11% (Saraiya et al., 2013). These findings point to a concerning downward trend in screening among this age

group, particularly when considering that in the United States at least 10% of cervical cancers occur in women not screened in the past 5 years (Saslow et al., 2012).

The current prevalence of HPV testing in the United States is largely unknown. Current standards of care and recommendations suggest that HPV screening should be reserved for women 30 years of age or older (Saslow et al., 2012). This recommendation is based on the high prevalence of HPV in women younger than 30 year of age (Dunne et al., 2007; Saslow et al., 2012).

HPV vaccine prevalence in the United States is low and appears to continually decline. From 2003-2006, vaccine prevalence decreased from 11.5% (95% confidence interval [CI], 9.2–14.4) to 5.1% (95% CI, 3.8–6.6), a decline of 56% (95% CI, 38–69) (Markowitz et al., 2013).

Estimates suggest that approximately 60% of U.S. women ages 18 to 75 years are unaware of HPV or do not recognize the link between the virus and cervical cancer (Tiro, Meissner, Kobrin, & Chollette, 2007*).* While HPV awareness and knowledge continues to increase at the population level, the dissemination of HPV knowledge remains largely influenced by contextual factors (Blake et al., 2015). The focus of these studies has been on identifying barriers to HPV awareness that relate primarily to ethnicity and socioeconomic aspects. However, because HPV is primarily transmitted through sexual activity and thus considered a sexually transmitted infection, other factors such as religion and culture background should continue to be considered within the scope of identifying barriers to HPV awareness and knowledge. Religiosity, as a correlate of HPV awareness and knowledge, has not been directly assessed; therefore, this study is needed

because it could add to the body of knowledge by determining the role of religiosity as a construct in HPV awareness and knowledge.

Problem Statement

HPV is a common sexually transmitted infection (STI) (Satterwhite et al., 2013). STIs and sexually transmitted diseases (STDs) are associated with risky sexual behaviors such as unprotected sex, infidelity, promiscuity, multiple sexual partners, homosexuality, and drug/alcohol use (Hutton et al., 2013). A higher-level knowledge of HPV has been reported among women considered to be at higher risk such as women with multiple sexual partners, women that have been tested for HIV, and women who have been diagnosed with cervical abnormalities (Gerend & Shepherd, 2011). However, albeit a well-documented link between HPV and cervical cancer (Hopenhayn et al., 2014; IARC, 2012), deficits in HPV awareness and knowledge among various population groups remain (Dodd et al., 2014; Gerend & Shepherd, 2011; Glen at al., 2015; Sadry, De Souza, & Yudin, 2013).

Early on, researchers evaluated the social and psychological impact of HPV testing (Fernandez et al., 2009; Friedman & Shepeard, 2007). Most recently, researchers have linked the level of HPV awareness and knowledge with other correlates such as religiosity and opinions about premarital or extramarital sex. Barriers to HPV awareness and knowledge include misinformation, lack of intergenerational communication, religion-cultural norms (DiStefano et al., 2012), and a low perceived risk for cervical cancer as influenced by beliefs regarding extramarital sex (Marlow, Waller, & Wardle, 2015). Religiosity has been identified as a construct in HPV vaccine decision making

(Shelton, Snavely, De Jesus, Othus, & Allen, 2013). Vaccination acceptability and uptake have been linked to the level of HPV awareness and knowledge (Trim, Nagji, Elit, & Roy, 2012). In this context, religiosity, as a correlate of HPV awareness and knowledge, has been only assessed indirectly (Gonnerman, Lutz, Yehieli, & Meisinger, 2008; Shelton et al., 2013; Thomas, Strickland, DiClemente, Higgins, & Haber, 2012; Reynolds, 2014). Therefore, although previous studies have explored various constructs of HPV awareness and knowledge in subpopulations, this study is unique in that it focuses specifically on religiosity as a construct in HPV awareness and knowledge.

The close association between HPV and STIs/STDs, perhaps magnified by religiosity, may present barriers in HPV screening interventions and impact women's understanding of the importance for HPV vaccination for their children. Two main tenets promote this rationale. First, previous observations point to religiosity as a potential protective factor against STIs/STDs by influencing abstinence, delay in coitarche, and minimizing the number of sexual partners (Gold et al., 2010). This suggests that religiosity may promote a generalized disassociation between all STIs/STDs, including HPV, and personal relevance. Secondly, the influence of religiosity appears to be gender-specific, exerting a greater influence on the sexual behavior of women as compared to men (Young, Denny, Penhollow, Palacios, & Morris, 2015). Therefore, women's perspectives about HPV screening and HPV vaccination for their children may be significantly impacted by religiosity. This research will contribute to the literature by identifying the role of religiosity as a construct in HPV awareness and knowledge.

Purpose

The purpose of this quantitative cross-sectional study was to determine the role of religiosity as a predictor of HPV awareness and knowledge among female faculty and staff in a Christian university. Religiosity was the predictor, or independent variable, and HPV awareness and knowledge were the outcome, or dependent variables. Religiosity has not been typically included in model constructs of HPV awareness and knowledge (Blake et al., 2015; Reimer, Schommer, Houlihan, & Gerrard, 2014). Chapter 2 discusses this premise in further detail. However, some have hinted at spirituality as a potential construct in HPV awareness and knowledge (Watkins, Reitzel, Wetter, & McNeill, 2015) and only a few have sought out to explore how religious beliefs affect HPV knowledge (Gerend & Shepherd, 2011).

Research Questions and Hypotheses

1. Is religiosity, as defined by the Duke University Religion Index (DUREL), a significant predictor of HPV awareness having age, educational level, ethnicity/race, marital status, and premarital sex values included in the research model?

   $H_0$1: Religiosity is not a significant predictor of HPV awareness having age, educational level, ethnicity/race, marital status, and premarital sex values included in the research model.

   H_a1: Religiosity is a significant predictor of HPV awareness having age, educational level, ethnicity/race, marital status, and premarital sex values included in the research model.

2. Is religiosity, as defined by the Duke University Religion Index (DUREL), a significant predictor of HPV knowledge having age, educational level, ethnicity/race, marital status, and premarital sex values included in this research model?

   $H_0$2: Religiosity is not a significant predictor of HPV knowledge having age, educational level, ethnicity/race, marital status, and premarital sex values included in the research model.

   H_a2: Religiosity is a significant predictor of HPV knowledge having age, educational level, ethnicity/race, marital status, and premarital sex values included in the research model.

Theoretical Framework

The schemata theory and social identity theory offer the theoretical framework for this study. The schemata theory describes how new knowledge is organized to facilitate its classification and organization based on prior knowledge (Mazzone, 2015).

The term *schema* was first coined by Piaget in 1923 (Piaget, 1923) and later introduced into the areas of psychology and education by Bartlett, a psychologist (Bartlett, 1932). An educational psychologist, Anderson (Anderson & Pearson, 1984), later developed the term into a theoretical model.

According to the schemata theory, organization of knowledge occurs in categories or schemas that are often defined by established frames of reference and relevance (DiMaggio, 1997). Once these categories, or schemas, have been created, the organization of knowledge occurs mostly without a conscious effort in determining the personal meaning or relevance of the new knowledge (DiMaggio, 1997). This theory may

help explain how *religious women*, who consider themselves at low risk for STIs/STDs due to their conservative lifestyle, may classify HPV information as irrelevant; thus, more likely to unconsciously disregard it or dismiss it as personally irrelevant.

Culture also heavily influences cognitive processes (Kuwabara & Smith, 2016). Cultural ideology has the potential to shape perception and subsequently influence action (Bandura, 2002). Given the interrelation of religion and culture among some groups one could proposed that religious beliefs could also define or at a minimum influence the relevance of knowledge. Therefore, the organization of knowledge, as rationalized by the schemata theory, presents a viable explanation for low uptake of new knowledge (Reyna, 2011). In this context, low HPV awareness and knowledge due to either social group definition or religiosity may then be considered as real barriers in HPV knowledge acquisition. For Somali immigrant women, with a culture heavily influenced by religious norms, the word cancer evokes secrecy and shame because it is often associated with stigmatized illnesses such as those caused by HIV (Raymond et al., 2014). This suggests that religious and culturally influenced misconceptions about HPV and cervical cancer could influence HPV awareness and knowledge in Christian women as well.

Hispanic women are likely to consider a positive HPV test result equivalent to a cancer diagnosis or may be afraid that their male partner would blame them for the positive HPV test result and possibly associate it with infidelity on their part (Fernandez et al., 2009). These attitudes of Hispanic women towards a positive HPV test are evidence that culturally influenced misconceptions about HPV and cervical cancer exist. Among other population groups, women may avoid cervical cancer screening because a

diagnosis of cervical cancer may be linked with culturally inappropriate sexual behaviors on their part and bring shame to the individual (Daley at al., 2010; Marlow et al., 2015).

The second construct guiding this study was the social identity theory, developed by social psychologists Tajfel and Turner in 1979 (Turner & Reynolds, 2010). According to the social identity theory, an individual's perceptions, attitudes, and behaviors are defined by their categorization of themselves and others (Turner & Tajfel, 2004). Associations with other individuals, social, cultural, or religious groups all contribute to the formation of social identities (Haslam, Jetten, Postmes, & Haslam, 2009). Therefore, public health interventions should take into consideration social identities. As it relates to this study, the social identity theory could help explain why some sexually active women may view themselves at a low or no risk for HPV infection (Wynne, 1992) and thus categorize HPV information as personally irrelevant.

Operational Definitions

Epithelium: "The cellular covering of internal and external surfaces of the body, including the lining of vessels and other small cavities. It consists of cells joined by small amounts of cementing substances. Epithelium is classified into types on the basis of the number of layers deep and the shape of the superficial cells." (Miller-Keane Encyclopedia and Dictionary of Medicine, Nursing, and Allied Health, 7th Edition, 2013).

Heuristic: Shortcuts in decision making that rely on either recall, previous experiences, or what others in similar situations may choose. (Blumenthal-Barby & Krieger, 2015). Examples include making a decision based on a rule of thumb, an educated guess, an intuitive judgment, or common sense.

Religiosity: The expression of religious values as demonstrated by attendance to religious services; attitudes toward religious behaviors, such as Bible reading and prayer; and involvement in religious activities (Koenig & Büssing, 2010).

Nature of the Study

This investigation of a property-disposition relationship was accomplished using a quantitative survey approach. Because a comprehensive survey tool that can assess all the constructs of the proposed model was not available at the time, a modified survey instrument, comprised of questions from previously validated instruments, was used to identify the role of religiosity as predictor of HPV awareness and knowledge among a group of Christian women. A correlational and quantitative cross-sectional approach allowed for factual determinations of preference, trends, potential differences between groups, and demographics. Quantitative methodology is essential for this study as it is based on objective measurements to explain the phenomenon in question and there is no intention to determine causation.

The target population for this study consisted of females, 27 years of age and older, at a Christian University in Southwestern Michigan. I recruited study participants from faculty and staff categories by e-mail and invited them to participate in a web-based survey. Faculty and staff participants from all university schools, departments, supporting offices (e.g. food services, campus safety, library, printing office, human resources, marketing, plant services, and custodial), as well as affiliated entities such as the elementary school and academy were invited to participate.

According to a manual count based on the 2016-2017 university information directory, the University employs approximately 338 female faculty and support staff and all were invited to participate in the study. The rationale for selecting this approach was derived from the main objective of the study: to explore the role of religiosity as predictor of HPV awareness and knowledge among female faculty and staff in a Christian university.

Women younger than 27 years of age were excluded from the study. The age exclusion was based on the established cut-off age for HPV vaccination (Markowitz et al., 2014), thus targeting women that were no longer eligible for the HPV vaccination due to age.

The study population consisted of approximately 338 female faculty and support staff employed at Andrews University, Berrien Spring, MI. This number was derived from a manual count of the female faculty and staff listed in the 2016-2017 university information directory. All eligible female faculty and support staff were invited to participate in the survey.

Demographic information (e.g. age, race/ethnicity, educational level, and marital status) was obtained through standard questions such as those used in the Health Information National Trends Survey 4 (HINTS 4) (NCI, 2014). Attitudes toward premarital sex was assessed using questions from a previous study on correlates of HPV Knowledge (Gerend & Shepherd, 2011). Religiosity, the predictor or independent variable of interest, were measured using the DUREL. The DUREL is a brief, five-item scale, measure of religiosity used in epidemiological surveys to explore relationships

between religion and health outcomes (Koenig & Büssing, 2010). It assesses three major dimensions of religious involvement—organizational religious activity (ORA), nonorganizational religious activity (NORA), and intrinsic religiosity (IR) (Koenig & Büssing, 2010).

The outcome or dependent variables were HPV awareness and knowledge. A *dichotomous variable for HPV awareness* was defined using the survey question from the Health Information National Trends Survey 4 (HINTS 4), "Before today, had you ever heard of HPV? HPV stands for Human Papillomavirus. It is not HIV, HSV, or herpes." (NCI, 2014, p. 13, question K1). HPV knowledge was gauged using the 16-item questionnaire for HPV knowledge validated by Waller, Ostini, Marlow, McCaffery, & Zimet (2013). Questions for HPV knowledge were formatted as 'true/false' with a 'don't know' option, which was coded as incorrect. The knowledge questions covered six themes—health consequences of HPV, HPV and cervical screening, symptoms, causes, risk factors and transmission, prevention and treatment, and prevalence—addressing general HPV knowledge (Waller et al., 2013). Knowledge questions were graded for correctness and a score was calculated to determine the relative knowledge of HPV among the study participants. It was anticipated that the scores would indicate an individual's relative standing as compared to other study participants in terms of HPV awareness and knowledge. Table 1 is a representation of the item distribution in the survey instrument by assessment area and sources. Chapter 2 and 3, respectively, offer further details regarding the rationale for instrument selection and item-specific content.

Table 1.

Item Distribution in Survey Instrument

Assessment Area	Source of Question(s)	Number of Items
Demographic information (Age, ethnicity/race, Education, Marital status)	Health Information National Trends Survey 4 (HINTS 4) (NCI, 2014)	5
Attitudes toward premarital sex	Gerend & Shepherd, 2011	1
HPV Awareness (Outcome/Dependent variable)	Health Information National Trends Survey 4 (HINTS 4) (NCI, 2014)	2
HPV Knowledge (Outcome/Dependent variable)	Waller et al., 2013	16
Religiosity (Predictor/Independent Variable)	Duke University Religion Index (DUREL) (Koenig & Büssing, 2010)	5

The analytical strategies for this study included the Pearson Correlation Coefficient test and linear regression. The Pearson Correlation Coefficient was used to describe the relationship between the variables in the study and report mean and standard deviation, which aided in describing the central tendency and variability of each variable.

The strategy was to use a model (Figure 1) that included eight predictors or independent variables (age, race/ethnicity, educational level, marital status, attitudes toward premarital sex, and three dimensions of religiosity) for each corresponding outcome or dependent variables (HPV awareness and HPV knowledge).

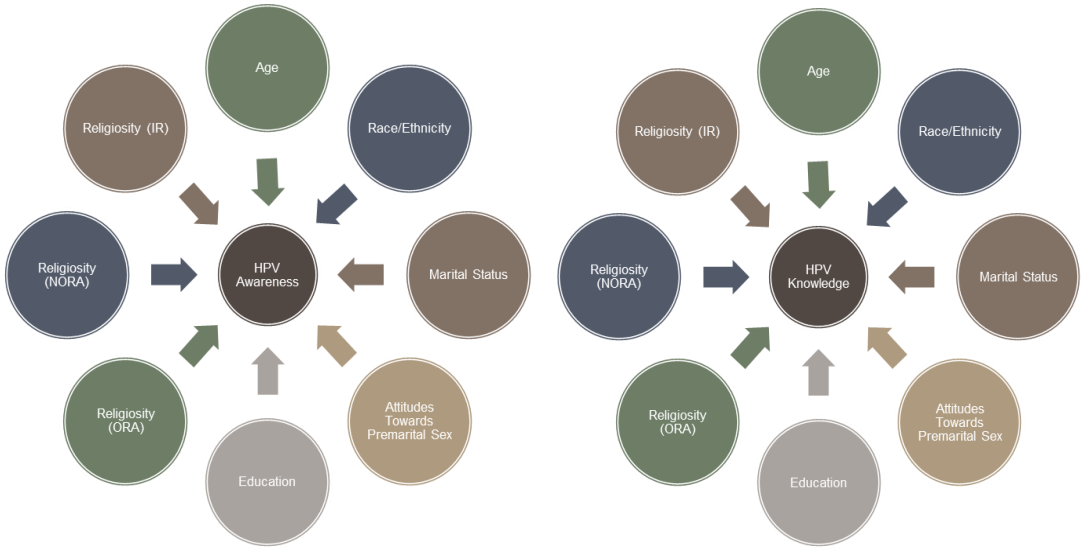


Figure 1. Analytical models

The analytical strategy was to (a) describe the participants/sample; (b) use descriptive statistics to describe each variable in the study; (c) use multiple linear regression analysis to test the hypotheses.

The linear regression analysis enabled an assessment of the association between age, race/ethnicity, educational level, personal income, marital status, attitudes toward premarital sex, and religiosity as predictors of HPV knowledge and awareness among study participants. Data was checked prior to analysis to assess whether it met the six assumption criteria required for this type of analysis. These assumptions included: (a) variables are measured using a continuous scale; (b) there is a linear relationship between the variables; (c) there are no significant outliers; (d) there is independence of observations; (e) data shows homoscedasticity; (f) residuals are normally distributed.

Alternative statistical test methods may be used to deal with failed assumptions. Specific actions to address failed assumptions are described in Chapter 3.

The correlation between each of the predictor or independent variables and outcome or dependent variables was assessed using a computed multiple correlation (R), squared multiple correlation (R^2), adjusted R square (R^2_{adj}), and the significance level (p). The goodness of fit between the regression equation and data was determined by a follow-up ANOVA. The outcome of the correlation guided the rejection or acceptance of the null hypothesis. Individual analysis of each predictor or independent variable was used to predict the percent variation in the mean as determined by the r^2, which refers to the effect size.

Regression values were reported using the R^2, F value (F), degrees of freedom, the significance level (p), and beta coefficient (β). The β value and the corresponding t-test were reported for each predictor or independent variable in the regression.

Limitations of the Study

The main limitation of this cross-sectional study was that it only assessed a section of the population at a given point in time; it was not longitudinal and did not allow determination of causation (Sedgwick, 2014). Cross-sectional studies are best at addressing the association between the variables (Sedgwick, 2014); therefore, data from this study allowed for describing a potential relationship or association between the predictor or independent variables and the two outcome or dependent variables. This study design also limits the determinations to levels of prevalence (Sedgwick, 2014).

Study participants were self-selected by recruiting from the entire target population using a single recruiting method (e.g. email invitation to the online survey) with follow-up reminder invitations. Possible response and exclusion biases were addressed through reliability studies as well as in the study recruitment protocol, both of which are described in Chapter 3. Instrument reliability may be determined by applying internal consistency reliability protocols. However, a revalidation of the instrument items was not performed for this study because the items in the questionnaire have been selected from previously validated instruments.

Assumptions, Scope, Limitations, and Delimitations

Assumptions

There were three assumptions underlying this study. The first assumption was that HPV is globally viewed in the same category as other STIs/STDs such as HIV and syphilis; therefore, HPV may be associated with promiscuous sexual behaviors and activities. The second assumption was that religiosity promotes a generalized disassociation between all STIs/STDs and personal relevance because it discourages and even disapproves of promiscuous sexual behavior. The third assumption was that participants would answer the survey questions truthfully in regards to both their religiosity and level of HPV awareness and knowledge.

Scope

This study proposed to identify the role of religiosity as a correlate of HPV awareness and knowledge because despite great public health efforts, HPV awareness and knowledge remain low among various population groups. Because the focus is on

religiosity as a correlate of HPV awareness and knowledge, the scope of study participants was limited to one Christian university. In addition, this study only targeted women 27 years of age and older because these women are no longer eligible for the HPV vaccination due to age and would greatly benefit from compliance to secondary prevention. Women younger than 27 years of age were excluded from the study because, presumably, they are still reachable by vaccination campaigns.

Limitations

A limitation in this study was that participants were recruited from only one Christian university; therefore, the sample may not be representative of the population of other Christian universities. In this context, the results may not be generalizable to other Christian universities or to the general population. However, it may be generalized to other Seventh-day Adventist Universities as rarely non-Adventist Christians are employed at these institutions. A limitation in the form of bias may be present due to the participants' subjectivity regarding of knowledge and religious attitudes. Only one method of surveying (e.g. online survey) was used and the questionnaire format was devoid of open-ended questions, which precluded the exploration of additional unidentified factors influencing HPV awareness and knowledge. Awareness or knowledge about HPV vaccination was beyond the scope of this study and was not explored.

Delimitations

The delimitation of this study was to determine the role of religiosity on HPV awareness and knowledge in a specific population. This information may prove

significant in better understanding the role of religiosity in HPV awareness and knowledge; considering the role of religious schema and religious social identity in assimilation of HPV-related information; informing public health policies and programs to ensure adequate and culturally relevant HPV education. Although it could be considered useful information, this study will not investigate risk factors for HPV in this population.

Summary

This study focused on assessing the role of religiosity as a construct in HPV awareness and knowledge through a proposed model that included an assessment of religiosity in addition to the traditionally investigated constructs of HPV awareness and knowledge. Chapter 1 provided an overview of the study. It included a basic introduction of the study and explained the motivation for the study. This chapter also presented the theoretical framework for the study and delineated the goals, objectives, research questions, and study design.

Chapter 2 provides a more in-depth review for this research by examining relevant literature related to the proposed model, which adds religiosity to previously studied constructs of HPV awareness and knowledge (e.g. age, educational level, ethnicity/race, marital status, and premarital sex values).

Chapter 2: Literature Review

Introduction

Researchers have focused on identifying barriers to HPV awareness and knowledge. A few have investigated correlates of HPV awareness and knowledge and collectively determined that the level of HPV awareness and knowledge appears to be heavily influenced by sociocultural and demographic factors (Dodd, McCaffery, Marlow, Ostini, Zimet, & Waller, 2014; Gerend, & Shepherd, 2011; Reimer, Schommer, Houlihan, & Gerrard, 2014; Sadry, De Souza, & Yudin, 2013). Religion is a social factor; however, it has been seldom the direct or primary focus of studies investigating constructs in HPV awareness and knowledge. Furthermore, even when included as part of an investigation, the typical study target has been younger female populations eligible for vaccination interventions; thus largely ignoring older women who are no longer eligible, according to U.S. standards, for HPV vaccination.

It has been determined that religion exerts a strong influence on lifestyle and health (Yeary, Ounpraseuth, Moore, Bursac, & Greene, 2012). Religious factors have been found to influence HPV vaccine decision making (Shelton, Snavely, De Jesus, Othus, & Allen, 2013) and vaccination acceptability. Vaccination uptake has been linked to the level of HPV awareness and knowledge (Trim, Nagji, Elit, & Roy, 2011).

Most studies addressing correlates of HPV awareness and knowledge have had some underlying HPV vaccination element. However, while HPV vaccination continues to be an important factor in HPV intervention campaigns, assessing factors that affect HPV awareness and knowledge among older women is still important. Only one study

has been found that has directly investigated the relationship between religious belief and HPV knowledge (Gerend & Shepherd, 2011). However, the study population comprised of college age females and HPV awareness was not explicitly explored.

The purpose of this study was to identify the role of religiosity as a predictor of HPV awareness and knowledge among female faculty and staff at a Christian university. The importance of this study was underscored by several factors. First, this study constitutes the first study primarily focused on assessing the role of religiosity in both HPV awareness and knowledge. Second, the study purposed to assess the role of religiosity in HPV awareness and knowledge among an older female population, currently not targeted in HPV vaccination campaigns. Third, the study provided a venue for assessing the need to account for religious factors when developing and implementing HPV-related interventions.

This chapter, containing a review of the literature, is organized into various relevant themes. It begins with a general overview of HPV and moves systematically through the various components relevant to the study.

Literature Search Strategy

The literature review was conducted by searching the Walden University Library as well as a variety of databases, including, Medline, PubMed, and Google Scholar. Key terms used to search for relevant articles included *HPV Awareness and Knowledge; Constructs of HPV Awareness and Knowledge; Religiosity and HPV Awareness and Knowledge.* Additional articles were located by searching the reference list of relevant studies. Preference was given to articles published within the last 5 years. Very few

current articles that addressed religiosity as a construct of HPV awareness and knowledge (Table 2); therefore, the search had to be expanded to include as many relevant studies as practical. All articles used were peer reviewed and published in reputable journals. Only full text articles were included in the study.

Theoretical Framework

The two constructs guiding the present study are the schemata theory and social identity theory. Chapter 1 provided an in-depth discussion of the most important aspects of these two constructs. The use of a theoretical framework constitutes a point of distinction for the present study as none of the studies relevant to this review (Table 1) discussed a theoretical framework. It must be noted that while no specific theory was discussed, Gerend and Shepherd (2011) attempted to explain lower HPV knowledge among women that are against premarital sex by suggesting that certain social conditions, such as having friends with similar views and a perceived lack of personal relevance, may have prevented assimilation of HPV knowledge. The social identity theory supports the notion that social groups (e.g. having friends with similar views about premarital sex) influence an individual's perception of personal relevance and consequently influence assimilation of knowledge.

The schemata theory also provides a suitable background for understanding how a perceived lack of personal relevance influences low HPV knowledge. As pointed by Bandura (2002), cultural ideology has the potential to shape perception and subsequently influence action (e.g. acceptance/assimilation of HPV knowledge).

General Information about the Human Papillomavirus

HPV Etiology

HPV is a small, circular, double-stranded circular, nonenveloped DNA virus containing approximately 8,000 base pairs (Doorbar, 2006) and 55nm in size (Coggin & zur Hausen, 1979). HPV is an epitheliotropic virus belonging to the papovaviruses family of viruses. Epitheliotropic viruses preferentially infect cutaneous or mucocutaneous epithelium and promote unnatural cell proliferation (Chaitanya et al., 2016). The integration of HPV DNA into the host's genome is likely the most important risk factor for developing cervical carcinoma (Doorbar, Egawa, Griffin, Kranjec, & Murakami, 2015; Mighty, & Laimins, 2014; Shukla et al., 2014). Hundreds of putative HPV types have been identified. While the characterization of new HPV types is ongoing, presently, 170 HPV types have been accepted (de Villiers, 2013; Santos-López, Márquez-Domínguez, Reyes-Leyva, & Vallejo-Ruiz, 2015), 13 of which are considered high-risk types (Schottenfeld, & Beebe-Dimmer, 2015). For practical clinical understanding, HPVs are categorized as either high-risk or low-risk types. Comparatively, high-risk HPV types constitute a small portion of identified HPVs.

The Alpha papillomaviruses group consists of 14 HPV-types capable of infecting humans (de Villiers, 2013). This makes it the largest of the HPV groups. Alpha papillomaviruses contain both cutaneous and genital HPV types (de Villiers, 2013; Bzhalava, Guan, Franceschi, Dillner, & Clifford, 2013). Cutaneous HPV types such as HPV-2 and HPV-4, which are the etiological agent of common warts, are not typically associated with cancer (Bzhalava et al., 2013). However, the Alpha group contains

several high-risk HPVs. These include HPV-16, HPV-18, HPV-26, HPV-34, and HPV-53. Much detailed genetic information is available for HPV-16 and HPV-18 as they have been well studied.

HPV-16 is the most common type associated with the majority of invasive cervical cancer (ICC) cases (Ghittoni, Accardi, Chiocca, & Tommasino, 2015; Hopenhayn et al., 2014) with HPV-18 ranking in second place (Monsonego et al., 2015; Schottenfeld, & Beebe-Dimmer, 2015; Serrano et al., 2015). HPV-16 is also responsible for the majority of anal cancers (Benevolo, Dona, Ravenda, & Chiocca, 2016; Steinau et al., 2013) and some oropharyngeal cancers (Jayaprakash, et al., 2011). In combination, HPV-16 and HPV-18 account for approximately 70% of all cases of invasive cervical adenocarcinoma (Doorbar, 2016; Pimenta, Galindo, Jenkins, & Taylor, 2013). HPV-45 is also associated with ICC, but its prevalence is lower than that of HPV16/18 (Bzhalavaa, et al., 2013).

HPV-types in the Beta group are primarily associated with human cutaneous infections and primarily affect individuals with the inherited autosomal recessive skin disorder epidermodysplasia verruciformis (EV) (Cubie, 2013). In these individuals, HPV can lead to nonmelanoma skin cancer (McLaughlin-Drubin, 2015).

Approximately 5% of all human cancers, roughly one-third of all virus-induced tumors, are associated with *high-risk* HPV types (Ghittoni et al., 2015). While HPV variants can differ in pathogenicity, all HPV types can contribute to human disease, with cervical cancer being one of the most common gynecologic malignancy and one of the leading causes of cancer mortality in women worldwide (Jemal et al., 2013).

Prevalence of HPV Genotypes

The prevalence of high-risk HPV infections varies by age and geographical location (Clifford et al., 2005; Guan et al., 2012; Li, Franceschi, Howell-Jones, Snijders, & Clifford, 2011). HPV prevalence is higher in women younger than 30 year of age (Dunne et al., 2007; Saslow et al., 2012). Infections with high-risk HPV types are more likely to occur in younger women (Yang, Cuzick, Hunt, & Wheeler, 2014). HPV-16 and HPV-18, both high-risk HPV types, are the most common types detected in younger women with invasive cervical cancer (Saraiya et al., 2015).

HPV-16 is the most prevalent of the high-risk HPV types worldwide (Cornet et al., 2012; Guan, et al., 2012) found in approximately 63% of squamous carcinomas of the cervix (SCC) (Clifford, Smith, Plummer, Muñoz, & Franceschi, 2003; Serrano et al., 2015) and approximately 26% of low-grade squamous intraepithelial neoplasia lesions (Clifford, et al., 2005). HPV-18 is the second most common HPV type associated with SCC, isolated by polymerase chain reaction (PCR) in more than 13% of SCC cases (Clifford, et al., 2003). HPV-18 is the most common HPV type associated with cervical adenocarcinoma (ADC), isolated by PCR in almost 40% of all cases (Clifford, et al., 2003).

Prevalence of HPV Infections

Currently, approximately 79 million Americans are infected with HPV, with an estimated 16 million new infections each year (Centers for Disease Control and Prevention [CDC], 2016). Infections with HPV are so common that the majority of sexually active women will be infected at some point in their lives (CDC, 2016). The

prevalence of HPV infection ranges greatly (2-44%) among asymptomatic women in the general population (Trottier & Franco, 2006). This wide range in estimates are likely due to variations in population age, samples studied, surveillance methodologies, and differences in the sensitivity of the various HPV DNA assays used to detect the virus (Formana et al., 2012; Trottier & Franco, 2006).

While there remain considerable variations by region, the adjusted global prevalence of HPV among cancer-free women is at least 10.41% (95% confidence interval, CI: 10.2–10.7%) (Burchell, Winer, de Sanjosé, & Franco, 2006). Informed estimations suggest that 1 in 10 women worldwide carries an HPV infection at any point in time (Burchell et al., 2006). Variations in screening practices have made worldwide HPV prevalence estimates difficult to ascertain. However, best estimated suggest that at least 3 million women are carriers of HPV-DNA, 1 million of will likely suffer from a high risk HPV infection such a HPV-16 or HPV-18 at some point in their lives (Burchell et al., 2006). Recent studies of HPV prevalence in other countries have revealed higher prevalence numbers than previously estimated (Bhar et al., 2015; Tunc et al., 2016). It is likely that these estimates more closely approach the actual worldwide prevalence of the virus.

While most HPV infections are self-limiting and will spontaneously resolve in a matter of months (Nielsen & Hayney, 2014; Wilson & Waghel, 2015), reinfection with new HPV types, persistent infections with high-risk HPV types, or reactivation of a previous infection increase the risk of developing cervical cancer. Persistent infections are typically associated with HPV-16 (Guan et al., 2012; Richardson et al., 2003) and as

part of a multiple type infection in 1.2% of women (Dickson, Isaksson Vogel, Bliss, & Downs, 2013). However, in such infections, a single variant usually shows predominance and significant longevity over other variants (Xi & Koutsky, 1997).

HPV Transmission

Transmission of HPV occurs sexually and through skin contact (Satterwhite et al., 2013). Typically, a healthy immune system fights the infection and symptoms never develop (Stanley, 2010). However, the risk of developing cancer increases with recurrent or persistent HPV infections, particularly with the high-risk HPV types such as HPV-16 and HPV-18 (Saslow et al., 2012). Persistent infections affect 10-20% of women (Stanley, 2010). Due to the ubiquitousness of HPV, exposure to the virus is likely for sexually active women, regardless of the relational context of their sexual interactions.

Current HPV Screening Protocols and HPV Testing Prevalence

Traditional screening methodologies for cervical cancer include a cytological test, the Pap test, which screens for precancerous cells (Sawaya & Huchko, 2017). DNA testing for HPV was added in 2002 to the cervical cancer screening recommendations (Saslow et al., 2002). The current standard of care for cervical cancer and HPV screening, for both vaccinated and unvaccinated women, are as follows: no screening for women younger than 21 years of age; cytology alone recommended for women ages 21-29; cytology and HPV cotesting recommended every 5 years –every 3 years is acceptable for women ages 30-65 screened with cytology testing alone; no recommended screening for women 65 years and older with a prior negative screen (Saslow et al., 2012).

Following the revised recommendations for cervical cancer screening introduced in 2012, the proportion of women, ages 22-30, that reported having had a Pap test within the preceding 12 months went from 78.1% to 67.0%, a decrease of 11% (Saraiya et al., 2013). These findings point to a concerning downward trend in screening among this age group, particularly when considering that in the United States at least 10% of cervical cancers occur in women not screened in the past 5 years (Saslow et al., 2012).

The current prevalence of HPV testing in the United States is largely unknown. Current standards of care and recommendations suggest that HPV screening should be reserved for women 30 years of age or older (Saslow et al., 2012). This recommendation is based on the high prevalence of HPV in women younger than 30 year of age (Dunne et al., 2007; Saslow et al., 2012).

HPV and Cervical Cancer

Both epidemiological and laboratory-based research has identified high-risk HPV types as a necessary element in cervical cancer. Epidemiological studies have identified HPV DNA in over 90% of cervical cancer cases (Hopenhayn et al., 2014; Muñoz et al., 2003). Laboratory testing has confirmed the presence of HPV DNA in almost all cervical cancers (CDC, 2012; Walboomers et al., 1999), making the integration of high-risk HPV DNA a necessary event in carcinogenesis (Shukla at al., 2014). Cervical cancer is one of the four cancers attributable to infectious agents (Schottenfeld, & Beebe-Dimmer, 2015) and the causation link between HPV and cervical cancer is well recognized. This data supports the continuation of further research aimed at increasing HPV awareness and knowledge.

Cervical cancer is the second most commonly diagnosed cancer and the third leading cause of cancer-related death in less developed countries (Torre et al., 2015). It accounts for 9% of the total new cancer cases and 8% of total cancer deaths (Jemal et al., 2011). Estimates for 2016 indicate that 12,990 women will be diagnosed with cervical cancer in the United States and approximately 4,120 women will die from cervical cancer (Siegel, Miller, & Jemal, 2016). Figure 2 shows cervical cancer incident rates by state as of 2010 and Figure 3 shows cervical cancer mortality rates by state.

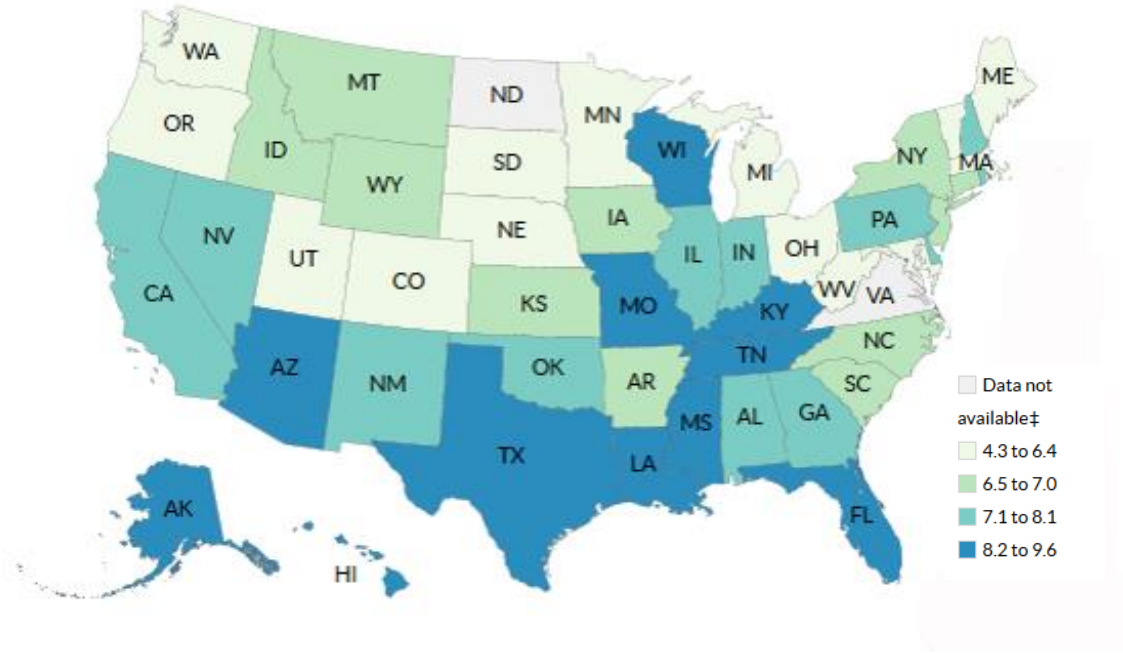


Figure 2. Cervical cancer incidence rates* by state, 1999-2012.

Note. Adapted from "United States Cancer Statistics: 1999–2012 Incidence and Mortality Web-based Report," by U.S. Cancer Statistics Working Group, 2012.

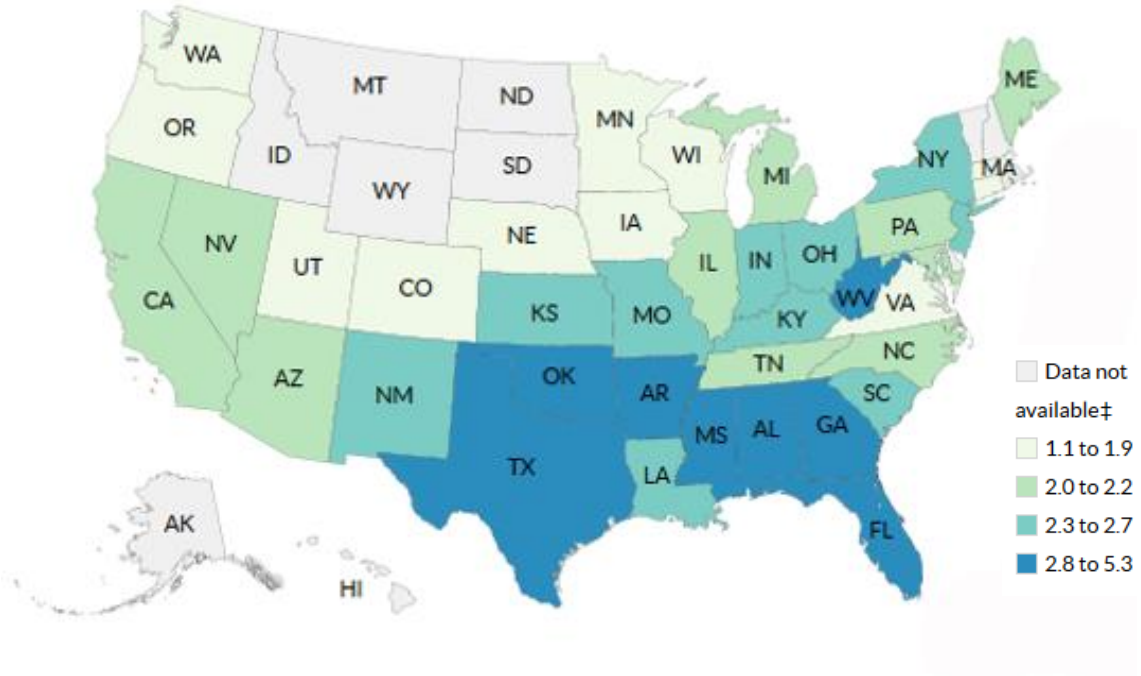


Figure 3. Cervical cancer death rates* by state, 2012

Note. Adapted *from "United States Cancer Statistics: 1999–2012 Incidence and Mortality Web-based Report,"* by U.S. Cancer Statistics Working Group, 2012.

HPV Awareness and Knowledge

The most recent estimate of HPV awareness and knowledge suggests that more than half of U.S. women 18 to 75 years remain unaware of HPV, or did not recognize the link between the virus and cervical cancer (Tiro, Meissner, Kobrin, & Chollette, 2007). There are indications that HPV awareness and knowledge is increasing at the population level; however, dissemination of HPV knowledge remains largely influenced by contextual factors such as sex, age, education, and other sociodemographic factors (Blake et al., 2015). Women are more likely than men to have head of HPV and women in younger age categories are more likely than women ages 65 or older to have heard of

HPV and its association with cervical cancer (Blake et al., 2015). Women classified at higher risk such as women with multiple sexual partners, women that have been tested for HIV, and women who have been diagnosed with cervical abnormalities report superior HPV knowledge (Gerend & Shepherd, 2011). However, deficits in HPV knowledge and awareness remain among various population groups (Dodd, McCaffery, Marlow, Ostini, Zimet, & Waller, 2014; Gerend, & Shepherd, 2011; Sadry, De Souza, & Yudin, 2013). Approximately 32% of Americans remain ignorant about HPV and almost 40% do not know of its association with cervical cancer (Blake et al., 2015).

Much of the literature has focused on identifying barriers to HPV awareness that relate primarily to ethnicity and socioeconomic aspects. However, because HPV transmission is primarily through sexual activity and thus considered a sexually transmitted infection (STI), other factors that shape perceptions towards STIs, such as cultural background and religion, should be given further consideration when identifying barriers to HPV awareness and knowledge.

HPV and its Association with STI and STD

HPV is a sexually transmitted virus (Satterwhite et al., 2013). Traditionally, sexually transmitted diseases (STDs) and STIs have been associated with risky sexual behaviors such as unprotected sex, infidelity, promiscuity, multiple sexual partners, homosexuality, and drug/alcohol use. Among certain groups, HPV is associated with a high level of stigma and shame due to its transmission route (León et al., 2015). These *feelings* have been identified as potential barriers for screening and treatment efforts (Morris et al. 2014). Furthermore, women opposed to premarital sex have reported lower

levels of HPV knowledge (Gerend & Shepherd, 2011), which strongly suggests that other cultural factors such as religion may influence HPV awareness and knowledge. Collectively, these findings suggest that women in certain groups, either because they do not subscribe to socially defined risky sexual behaviors or are afraid of the stigma and shame associated with HPV, legitimately disregard HPV-related information as personally irrelevant. This self-exclusion, due to a perceived lack of relevance as supported by the social identity theory (Wynne, 1992), may help explain low HPV awareness and knowledge among certain groups. Women in certain groups may disregard information about HPV if there is low personal involvement or a perceived lack of relevance (Chaiken, 1980; Petty & Cacioppo, 1984; Wynne, 1992). Therefore, there is merit in further exploring factors that may promote a sense of low personal involvement or lack of relevance as it relates to HPV awareness and knowledge.

Correlates of HPV Awareness and Knowledge

Some correlates of HPV knowledge and awareness have been identified and well studied. These include age, gender, educational level, ethnicity/race, marital status, personal income, and premarital sex values. Some researchers have also assessed the effects of political, social and religious beliefs on HPV knowledge (Gerend & Shepherd, 2011). However, these investigations often reflect on either HPV awareness or HPV knowledge and seldom on both. In addition, they represent a very small portion of the literature on correlates of HPV awareness and knowledge.

Age, a determinant of generational status, has been identified as a significant predictor of HPV awareness across various ethnic/racial groups (Garcini et al., 2015). For

Asian-Americans in particular, the generation status was also a significant predictor of HPV knowledge (Garcini et al., 2015). Individuals in younger age categories are more likely, than older individuals, to have heard of HPV (Blake et al., 2015). Previous studies have largely focused on younger populations (< 25 years of age). This study focused on women 26 years of age and older. While this population may not be eligible for the vaccine, according to US standards, they may be caretakers of girls or boys who are eligible for HPV vaccination.

Gender has also been identified as a correlate of HPV knowledge and awareness (Reimer, Schommer, Houlihan, & Gerrard, 2014). Women are more likely than men to know about HPV. Men remain largely uniformed about HPV and the HPV vaccine (Blake et al., 2015; Gerend & Magloire, 2008; Marlow, Zimet, McCaffery, Ostini, & Waller, 2013). This study proposes to assess HPV awareness and knowledge among women only, making it possible to identify other potentially significant correlates of HPV awareness and knowledge.

Educational level is another correlate of HPV awareness and knowledge. In general, a lower educational level has been associated with lower HPV awareness (Marlow et al., 2013) as compared to individuals with more years of education (Gerend & Shepherd, 2011). Foreign-born Korean women living in the US demonstrated a substantially lower level of HPV awareness (Glenn et al., 2015). Among African-American women of comparable age, lower educational attainment was a strong predictor for low HPV awareness (Watkins, Reitzel, Wetter, & McNeill, 2015). Educational level

is an important factor in HPV awareness and knowledge and appears to be particularly relevant for certain ethnic groups.

Ethnicity/race is another identified significant predictor of HPV awareness and knowledge. Whites are more likely than Hispanics to be aware of HPV (Reimer et al., 2014). Similar findings have been reported for Chinese students living and studying in the U.S. (Gao, Okoror, & Hyner, 2015) and Latina women (Gerend & Shepherd, 2011). Therefore, identifying ethnicity/race when investigating correlates of HPV awareness and knowledge remains relevant.

Additionally, identified constructs of HPV awareness and knowledge include relationship status, premarital sex values, and religious believes. Relationships status was associated with HPV awareness in US men (Marlow et al., 2013). This construct, relationship status, affects women in a similar manner. HPV knowledge was higher in women involved in a romantic relationship and for women who reported a higher number of lifetime sexual partners (Gerend & Shepherd, 2011). This appears to be the only construct with a similar effect on both genders.

In contrast, HPV knowledge was low in women opposed to premarital sex (Gerend & Shepherd, 2011). The undelaying reasons for this phenomenon are not well known; however, some have hinted to a connection between cultural factors, such as religiosity, and lower HPV awareness and knowledge (Francis et al., 2011; Gerend & Shepherd, 2011).

Religiosity and Health Promotion

Religiosity is a multidimensional construct at the core of an individual's existence, which integrates mind, body, and spirit (Saroglou, 2011). In general, religiosity has been defined by assessing the practice or levels of participation (degree of religious commitment, or 'religiosity') in the rituals and activities of an organized religion (Kaye & Raghavan, 2002). Common dimensions of religiosity include religion or denomination, service attendance, involvement or participation in religious activities, and religious beliefs (Kaye and Raghavan, 2002). Prior research has shown that higher levels of religiosity are associated with improved mental (Bonelli & Koenig, 2013) and physical health outcomes (Powell, Shahabi, & Thoresen, 2003). Religiosity has also been identified as a protective factor against risky health behaviors such as alcohol use (Anye, Gallien, Bian, & Moulton, 2013) and higher levels of health-promoting behaviors such as diet and exercise (Hassan, 2015; Hill, Ellison, Burdette, & Musick, 2007; Homan, & Boyatzis, 2010; Kim, & Sobal, 2004). However, religious content and saliency vary across cultural and religious groups resulting in a gradient, which is further colored by an individual's cognition, attitudes, emotions, behavior and values (Saroglou, 2011).

Religiosity and HPV

It has been determined that religious practices may be a factor in the tolerance and acceptability of certain health behaviors (Benjamins & Brown, 2004), acceptability and utilization of preventative health services (Benjamins, Ellison, Krause, & Marcum, 2011; Reynolds, 2014). Abstinence from sex until after marriage and sexual faithfulness after marriage, as promoted by some denominations, are prominent examples. Because HPV is

a sexually transmitted infection, individuals subscribing to a religion-influenced code of conduct, may demonstrate a lack of personal involvement and disregard HPV information as personally relevant. Some have suggested this phenomenon as a plausible explanation for lower HPV awareness and knowledge among certain groups (Francis et al., 2011; Gerend & Shepherd, 2011). As previously discussed, both the schemata and social identity theory support this rationale. Low HPV awareness and knowledge promoted by either social group definition or religiosity may then be considered real barriers in HPV knowledge acquisition.

A significant number of studies have demonstrated that personal religiosity has an inverse association with pre-marital sex (Adamczyk, 2012; Adamczyk & Felson, 2006; Barkan, 2006). However, what typically is viewed as a protective health factor may be potentially impeding adequate HPV awareness and knowledge among certain groups by fostering self-exclusion due to a perceived lack of relevance. Women may disregard information about HPV if there is low personal involvement or a perceived lack of relevance (Chaiken, 1980; Petty & Cacioppo, 1984; Wynne, 1992). Women who either because they do not subscribe to socially defined risky sexual behaviors or are afraid of the stigma and shame associated with STDs/STIs because of their religiosity may legitimately disregard HPV-related information as personally irrelevant, thus contributing to the perpetuation of low HPV awareness, knowledge, or both.

This self-exclusion, due to a perceived lack of relevance as supported by the social identity theory (Wynne, 1992), may help explain low HPV awareness and knowledge among certain groups. Religiosity, specifically, being the reason why women

may choose to disregard HPV information as personally irrelevant (Gerend & Shepherd, 2011). The heuristic approach to decision making could also explain this cognitive bias (Blumenthal-Barby & Krieger, 2015).

The multi-dimensional constructs underlying cultural values and religious preferences are significant. While investigations regarding the role of religion in the acceptance of HPV vaccine are common (Constantine & Jerman, 2007; Shelton et al., 2013), very few studies have directly investigated religiosity as a correlate of HPV awareness and knowledge and most of these studies have focused on younger women. Therefore, an exploration of the role of religiosity in HPV awareness and knowledge, as presented in this study, continues to be relevant even after the introduction of the HPV vaccine.

Literature Addressing Religiosity and HPV

Table 1 compares the very few studies that have addressed aspects of religiosity or spirituality as constructs of HPV awareness and/ or knowledge. Three of the studies were conducted within the last five years. It is important to note that there have been many studies that have investigated aspects of spirituality and acceptance of HPV vaccine. However, it is evident that little has been done in the area of religiosity and HPV awareness and knowledge, and what has been done has focused mostly on younger women. None of the studies included a theoretical framework. Therefore, further assessments of religiosity as a construct of HPV awareness and knowledge is necessary for gaining a more complete view of the factors that influence the public's understanding of HPV.

Table 2

Studies on Religiosity and HPV Awareness and Knowledge

Author/Date	Theoretical/ Conceptual Framework	Research Question(s)/ Hypotheses	Methodology	Analysis & Results	Conclusions	Implications for future research	Implications for practice
DiStefano et al., 2012.	None reported.	Identify and contextualize factors that shape HIV and HPV risk and prevention among young adults in Chamorro and Tongan communities.	Inductive community participatory to conceptualize factors that shape HIV and HPV risk.	Identification of nine themes, one of which was religio-cultural norms.	A perception that maintenance of religio-cultural norms regarding sexual abstinence until marriage was protective against HIV and HPV.	Investigate specific religion-cultural traditions/norms that contribute to the perception of protection against HIV/HPV.	Enhance health education on HIV and HPV with considerations of the influence of religio-cultural norms.
Gerend & Shepherd, 2011.	None reported.	To identify correlates of HPV knowledge post quadrivalent HPV vaccine: 1. Relationship between HPV knowledge and provider recommendation for HPV Vaccination. 2. Assessment of the extent to which an individual's social and political context might relate to her knowledge about HPV.	Quantitative computer-administered questionnaire to survey of 739 women ages 18-26 enrolled at Florida State University and not previously vaccinated for HPV.	Correlations used to determine relationships between knowledge summary score and all variables Significant correlations with HPV knowledge included: age, currently in a romantic relationship. Lower knowledge scores were correlated with Hispanic/Latina women, more politically conservative participants, and participants who identified themselves as born-again or evangelical Christian. In addition, less knowledge about HPV infection was identified among participants who were more opposed to premarital sex.	Being Hispanic/Latina and premarital sex values were identified as new correlates of HPV knowledge. Awareness was great among study participants and correlates with the noted increase in HPV awareness reported by similar research. However, HPV knowledge was only moderate.	Identification of HPV awareness and knowledge correlates remains an important research topic. Future HPV awareness and knowledge research must further explore cultural and religious factors.	Consideration of cultural and religious factors as well as understanding of perceived personal relevance may be necessary for HPV knowledge adherence.

Author/Date	Theoretical/ Conceptual Framework	Research Question(s)/ Hypotheses	Methodology	Analysis & Results	Conclusions	Implications for future research	Implications for practice
Gonnerman, Lutz, Yehieli, & Meisinger, 2008.	None reported.	Examination of the relationship between religious behaviors and health promoting behaviors among a community sample of mostly lower-income, African American, Protestant Christians in a small city in a rural state in the Midwest.	Quantitative structured face-to-face interviews of 105 non-random adult African American, Protestant Christians in a small city in a rural state in the Midwest.	Descriptive statistics to identify relationships among measures of interest. Logistic regression to assess the capacity of gender, age, and health promotion and explain the variance in the 8 health related problems of interest.	Highlights the complexity of the role religious beliefs and practices in people's physical and emotional health.	Encourages the future explorations of the role of religion and health.	Religion does not necessarily trump the influence of standard Western medicine for advice and treatment of physical and emotional health problems.
Watkins et al., 2015.	None reported.	Assess correlates (age, educational attainment, parental status, family history of cancer, and spirituality) of human papillomavirus (HPV) awareness, knowledge, and attitudes among older, church-going African-American women.	First year data from a longitudinal cohort study on African-American older women from a Methodist church in Houston collected using a computer-administered questionnaire.	Descriptive statistics and chi-square associations between each participants' characteristics and each HPV item (awareness, knowledge, and attitude). Spirituality was analyzed using logistic regression. More than half of the participants (66.7%) were aware of HPV and of these, 73.5% knew of its association with cervical cancer. Age, education, cancer history, and spirituality were significantly associated with HPV awareness.	Lower education, no history of cancer, and stronger spirituality were predictors of lower HPV awareness.	Points to a gap in HPV awareness among older African-American women, particularly among those with less education and/or higher spirituality.	Inform educational strategies for increasing HPV awareness, knowledge, and HPV vaccine acceptance among older African-American women who may play important roles in family decision making regarding vaccinations.

Methodologies Used

Quantitative non-experimental methods was the typical research design used in all the studies reviewed in Table 1. When variable manipulation is not appropriate or feasible, non-experimental research designs offer a method for making observations or describing the status of a condition or situation (Berg & Latin, 2008). This is an appropriate approach for social science studies in which variable manipulation is not possible (Frankfort-Nachmias, Nachmias, & DeWaard, 2012). Gerend & Shepherd (2011) used this approach to survey 739 women ages 18-26 enrolled at Florida State University and not previously vaccinated for HPV. Watkins et al., (2015) also use this research method to assess correlates of human papillomavirus (HPV) awareness, knowledge, and attitudes among older, church-going African-American women. For both studies utilized a computer-administered questionnaire to gather the data.

This study proposed to investigate a property-disposition relationship where the property or some characteristic or quality of a person (property) corresponds with a particular attitude or inclination (disposition) towards HPV. In line with commonly used methodology for collecting data on property-disposition relationships, the data for this study was collected using a computer-administered questionnaire.

Instrument for Measuring HPV Awareness and Knowledge

The instrument for measuring HPV awareness and knowledge was a questionnaire. The questionnaire contained closed questions. Research indicated that this approach is likely to yield better estimates of knowledge than open-ended questions (Klug, Hukelmann, & Blettner, 2008; Marlow et al., 2013; Waller & McCaffery, 2004).

HPV awareness was determined using questions selected from HINTS 4 (National Cancer Institute [NCI], 2014). Questions to assess relative HPV knowledge were taken from questionnaires used in and validated by previous studies (Gerend & Magloire, 2008; Gerend & Shepherd, 2011; Waller et al., 2013; Marlow et al., 2013). Attitudes toward premarital sex was assessed using questions from a previous study on correlates of HPV knowledge (Gerend & Shepherd, 2011; Rosenthal et al., 2008).

Religiosity was measured by the Duke University Religion Index (DUREL); a five-item measure of religious involvement (Koenig & Büssing, 2010). This instrument assesses the three major dimensions of religiosity: organizational, non-organizational, and intrinsic or subjective religiosity (Koenig & Büssing, 2010). The DUREL has been found to be reliable measure of these three dimensions of religiosity (Storch et al., 2004; Storch, Strawser, & Storch, 2004). Therefore, this study did not repeat a reliability assessment of the tool.

Summary

This chapter articulated the review of relevant literature that investigated correlates of HPV awareness and knowledge, specifically religiosity. While previous research has indicated that the level of HPV awareness and knowledge is steadily increasing, there is evidence of HPV knowledge gaps and disparities among certain groups. The specific factors responsible for this HPV knowledge deficit are largely unknown; however, the level of HPV awareness and knowledge appears to be heavily influenced by socio cultural factors. Religiosity has been shown to be a salient social factor and known to influence health behaviors. Typically, religiosity has been associated

with positive health outcomes; however, some have suggested that certain overreaching influences of religiosity may result in barriers to HPV awareness and knowledge. From this review, it is evident that this study is both timely and relevant. Timely, because it is in line with current research exploring correlates of HPV awareness and knowledge. Relevant, because it further explores sociodemographic factors that influence gaps in HPV knowledge and adds to the very small body of knowledge that currently exists on the role of religiosity on HPV awareness and knowledge. To the author's knowledge, this is the first study that investigated religiosity as a correlated of HPV awareness and knowledge among older Christian women of various ethnic/racial backgrounds.

Chapter 3 provides a discussion of the study's methodology and the tools for data collection.

Chapter 3: Research Method

Introduction

The purpose of this study was to identify the role of religiosity as a predictor of HPV knowledge and awareness among female faculty and staff in a Christian university. Chapter 2 highlighted enduring disparities in HPV awareness and knowledge among certain groups and presented evidence that sociocultural factors contribute to these inequalities. These two factors are the primary motivation for this study and informed the research questions guiding this study.

This chapter contains a discussion of the study design, sample population and sample size, data collection procedures, survey instrument and materials, as well as ethical considerations for the study.

Research Design and Rationale

A quantitative cross-sectional survey was be used to investigate the property-disposition relationship of religiosity and HPV awareness and knowledge. This approach was justifiable for two reasons: First, the main purpose of the study was to identify the role of religiosity, the predictor variable, and there was no intention to determine causation. Second, cross-sectional surveying is adequate when the purpose of the study is to determine prevalence of an outcome of interest (e.g. HPV awareness and knowledge) within the population and subgroups (cross-section) at a given point in time (Levin, 2006; Sedgwick, 2014) and the aim is describe relationship patterns between variables (Seguin, Aggarwal, Vermeylen, & Drewnowski, 2016).

Using a survey, research facilitated my gathering of numeric data on religiosity and HPV awareness and knowledge. Survey research also offered a rapid approach to data collection. Religiosity was the predictor or independent variable and HPV awareness and knowledge were the outcome or dependent variables.

Methodology

Population

The target population for this study was adult females, 27 years of age and older at a Christian University in Southwestern Michigan. Recruiting of study participants occurred by e-mail containing an invitation to participate in a web-based survey.

Sampling and Sampling Procedures

The study population consisted of approximately 338 female faculty and support staff employed at the main campus of Andrews University, Berrien Spring, MI. Eligible participants were women 27 years of age and older. Women younger than 27 years of age were excluded from the study. All 27 years of age or older female faculty and staff were invited to participate in the survey.

Sample Size

Assuming that all of the estimated 338 female faculty and support staff employed at Andrews University were eligible to participate in the survey, approximately 180 women would have been needed as participants to adequately calculate and analyze the measures in this study. This estimated total sample would permit verification of results at 95% confidence interval with a 5% acceptable margin of error, and detection of a large

effect size (0.50). This sample size was calculated using Epi-Info StatCalc for population survey anticipating an expected frequency of 50%.

Procedures for Recruitment, Participation and Data Collection

Upon receipt of the Walden University Institutional Review Board (approval number 09-01-16-0081795) and Andrews University Institutional Review Board (study protocol number 16-101), the e-mail invitation to the survey was sent to all female faculty and staff. Appendix A contains the documentation demonstrating Andrews University's intent to support data collection for this study. Appendix B includes the survey invitation used. The data collection tool was an anonymous self-administered computer survey. No names or other identifying information was collected. Informed consent was obtained and documented prior to participation.

Great effort was exerted to make clear that this study was not being conducted by or for Andrews University, nor did Andrews University have any interest in the outcome of the survey. Any questions regarding the survey were directed to either to me or to Walden University's IRB. All this information was included with the survey invitation and survey link.

Instrumentation and Operationalization of Constructs

The survey tool used to answer the research questions for this study consisted of a modified survey instrument, comprised of questions from previously validated instruments, each independently assessing religiosity, HPV awareness, and HPV knowledge. Table 3 contains a summary of the name of each variable, the variable type,

how each variable was assessed, which item(s) in the survey were used to address each variable, the source of each survey item, and the reliability/validity values.

The questionnaire consisted of 28 items (Appendix C). Demographic data included age, ethnicity/race, level of education, and marital status. HPV awareness was assessed using the HPV awareness question from HINTS 4 (National Cancer Institute [NCI], 2014): *Before today, had you ever heard of HPV? HPV stands for Human Papillomavirus. It is not HIV, HSV, or herpes.* If participants answer *yes*, they were asked to indicate the source(s) of their information and were then directed to the HPV knowledge section of the questionnaire. If participants answer *no,* they were directed to the religiosity portion of the survey.

The HPV knowledge section consisted of a 16-item questionnaire (Table 4), compiled and previously validated for use by female subjects between the ages of 18 and 70 in three different countries, including the United States. The internal consistency and test-retest reliability for the 16 items was very good. The Cronbach's alpha for the 16 items was 0.849 (n = 1,473) and the test-retest score, which excluded one item (*HPV can cause HIV/AIDS*) was 0.68 (n = 307) (Waller et al., 2013).

Knowledge questions covered six themes—health consequences of HPV, HPV and cervical screening, symptoms, causes, risk factors and transmission, prevention and treatment, and prevalence—addressing general HPV knowledge. HPV knowledge questions were *true/false* questions with a *don't know* option. Knowledge questions were graded for correctness and a HPV knowledge score was calculated by assigning one point

for correct responses and zero points for incorrect and *don't know* responses. The sum of points constituted the HPV knowledge score for each participant.

Premarital sex values (Appendix B, Item #5) was assessed using the same question used by Gerend & Shepherd (2011) to determine women's attitudes toward premarital sex, *Which of the following best describes your view on when it is appropriate for a woman to have sexual intercourse?* This question has been used in a previous study on correlates of HPV knowledge (Gerend & Shepherd, 2011). Participants were able to choose from four options to answer the following question: "Which of the following best describes your view on when it is appropriate for a woman to have sexual intercourse?" (Gerend & Shepherd, 2011; Rosenthal et al., 2008). The four options ranged from a conservative view: ''A woman should not have sexual intercourse until she is married'' to a more liberal view: ''A woman should explore her sexuality when she is ready as long as she takes care of herself'' = 4 (Gerend & Shepherd, 2011; Rosenthal et al., 2008). All HPV knowledge questions and question about attitudes toward premarital sex were used with permission (Appendix D).

Religiosity, the predictor or independent variable of interest, was assessed in three distinct dimensions using the DUREL five-item scale (Koenig & Büssing, 2010). The five questions from the DUREL scale were items number 23-28 in the survey questionnaire (See Appendix C). As mentioned in Chapter 2, the DUREL measures three major areas of religiosity using three separate subscales. The first question, Subscale 1, measures frequency of attendance at religious services (Organizational Religious Activity [ORA]). Question 2 or Subscale 2 measures the frequency of private religious activities

(Nonorganizational religious activity [NORA]). Subscale 3 consists of three questions assessing IR. Best utilization practices for this tool indicate that each subscale score be examined independently (Koenig & Büssing, 2010). The overall DUREL scale has an intraclass correlation of 0.91, indicating a high test-retest reliability (Koenig & Büssing, 2010). The reported Cronbach's alpha is 0.78-0.91 indicates high internal consistency (Koenig & Büssing, 2010).

Table 3

Summary of Variables

Category	Variable Name	Variable Type	Measure	Item Number	Item Source	Reliability/ Validity Method(s)	Reliability/ Validity Values
Demographic data	Age	Predictor	Continuous	1	Standard	NA	NA
	Race/Ethnicity	Predictor	Categorical	2			
	Educational level	Predictor	Categorical	3			
	Marital Status	Predictor	Categorical/ Dichotomous	4			
Attitudes toward premarital sex	Attitudes	Predictor	Categorical	5	Gerend & Shepherd, 2011	None reported	None reported
Religiosity	Religiosity	Predictor	Categorical/ Ordinal	24 - 28	Duke University Religion Index (DUREL) (Koenig & Büssing, 2010)	Cronbach's alpha & test-retest	Alpha = 0.78-0.91 Test-retest = 0.91 (intra-class correlation)
	Organizational Religious Activity (ORA)			24			
	Non-organizational religious activity (NORA)			25			
	Intrinsic religiosity (IR)			26 - 28			
HPV awareness	Awareness	Outcome	Categorical/ Dichotomous	6, 7	HINTS 4 (NCI, 2014)	None reported	None reported
HPV knowledge	Knowledge	Outcome	Continuous	8 - 23	Waller et al., 2013	Cronbach's alpha & test-retest	Alpha = 0.849 (n = 1473) Test-retest = 0.68 (n = 307)

Note: Item Number corresponds to Table 1; Standard = refers to standard questions for collecting demographic data; NA = Not applicable

Table 4

HPV Knowledge Questions

Question	Correct Response
HPV is very rare.	False
HPV always has visible signs or symptoms.	False
HPV can cause cervical cancer.	True
HPV can be passed on by genital skin-to-skin contact.	True
There are many types of HPV.	Ture
HPV can cause HIV/AIDS.	False
HPV can be passed on during sexual intercourse.	True
HPV can cause genital warts.	True
Men cannot get HPV.	False
Using condoms reduces the risk of getting HPV.	True
HPV can be cured with antibiotics.	False
Having many sexual partners increases the risk of getting HPV.	True
HPV usually doesn't need any treatment.	True
Most sexually active people will get HPV at some point in their lives.	True
A person could have HPV for many years without knowing it.	True
Having sex at an early age increases the risk of getting HPV.	True

Note. Adapted from "Validation of a Measure of Knowledge about Human Papillomavirus (HPV) Using Item Response Theory and Classical Test Theory," by J. Waller, R. Ostini, L. A. Marlow, K. McCaffery, and G. Zimet, 2013, Preventive Medicine, 56, p. 35-40. Copyright 2012 by Elsevier Inc.

Data Analysis

In general, the analytical strategy to address the research questions was (a) to describe the participants, (b) use descriptive statistics to describe each variable in the study, and (c) use multiple linear regression analysis to test the hypotheses.

The demographic data on the survey was analyzed descriptively including the number (*N*), mean, median, and standard deviation for continuous variables such as age.

Frequency distributions, graphs, and /or tables were used to describe categorical or nominal variables such as ethnicity/race, marital status, and premarital sex values.

The data, including demographic data, was imported into a statistical database through the Statistical Package for Social Sciences (SPSS). Prior to analysis, data was cleaned by running frequencies to identify missing values and recoding any variables with reverse coding. Data was also be checked prior to analysis to assess whether it met the six assumption criteria required for this type of analysis: variables are measured using a continuous scale; there is a linear relationship between the variables; there are no significant outliers; there is independence of observations; data shows homoscedasticity; residuals are normally distributed. Categorical variables such as ethnicity/race, marital status, and attitudes towards premarital sex were converted to dummy or binary variables so they could be properly handled in analysis. Assumptions for linearity, outliers, independence of observations, homoscedasticity, and residuals were checked by visually inspecting residual plots, scatter plots, and boxplots. This was necessary as non-linearity can be detected by in-depth examination of residual plots and scatter plots (Osborne & Waters, 2002). A curve component (variable^2) would have been added if a curvilinear relation was suspected (Keith, 2014).

Detection of outliers and independence of observations were accomplished by generating boxplots. Examining the variability of the boxplots facilitated the identification of violations to independence of errors (Keith, 2014).

Homoscedasticity in data was assessed by visually examining the scatterplot of residuals generated by statistical software (Keith, 2014). Non-parametric statistical

techniques such as Cochran's Q, Cohen's kappa, Kendall's tau, Mann–Whitney U, Wilcoxon rank sum test, or McNemar's test offered alternative methods for dealing with failed assumptions.

The demographic data on the survey was analyzed descriptively including the number (*N*), mean, median, and standard deviation for continuous variables such as age. Frequency distributions, graphs, and /or tables were used to describe categorical or nominal variables such as ethnicity/race, marital status, and premarital sex values.

The research questions for this study were:

1. Is religiosity, as defined by the Duke University Religion Index (DUREL), a significant predictor of HPV awareness having age, educational level, ethnicity/race, marital status, and premarital sex values included in the research model?

   $H_0$1: Religiosity is not a significant predictor of HPV awareness having age, educational level, ethnicity/race, marital status, and premarital sex values included in the research model.

   H_a1: Religiosity is a significant predictor of HPV awareness having age, educational level, ethnicity/race, marital status, and premarital sex values included in the research model.

2. Is religiosity, as defined by the Duke University Religion Index (DUREL), a significant predictor of HPV knowledge having age, educational level, ethnicity/race, marital status, and premarital sex values included in this research model?

$H_0$2: Religiosity is not a significant predictor of HPV knowledge having age, educational level, ethnicity/race, marital status, and premarital sex values included in the research model.

H_a2: Religiosity is a significant predictor of HPV knowledge having age, educational level, ethnicity/race, marital status, and premarital sex values included in the research model.

To test $H_0$1, religiosity is not a significant predictor of HPV awareness having age, educational level, ethnicity/race, marital status, and premarital sex values included in the same model, Chi Square was used to assess the difference in knowledge of and attitude toward HPV by gender and ethnicity. Group differences were further analyzed using analysis of variance (ANOVA). A linear regression analysis facilitated an assessment of the association between the three subscales of religiosity, educational level, age, ethnicity, and marital status as predictors of HPV knowledge and awareness among study participants. Pearson Correlation Coefficient was used to describe the relationship between the variables in the study.

As discussed in Chapter 1, the correlation between each of the predictor or independent variables and outcome or dependent variables was assessed using a computed multiple correlation (R), squared multiple correlation (R^2), adjusted R square (R^2_{adj}), and the significance level (p). The goodness of fit between the regression equation and data was determined by a follow-up ANOVA. The outcome of the correlation guided rejection or acceptance of the null hypothesis. Individual analysis of each predictor or independent variable was used to predict the percent variation in the mean as determined

by the r^2, which refers to the effect size. Regression values were reported using the R^2, F value (F), degrees of freedom, the significance level (p), and beta coefficient (β). The β value and the corresponding t-test was also reported for each predictor or independent variable in the regression.

The same analytical approach was used to test H_a1, religiosity is a significant predictor of HPV awareness having age, educational level, ethnicity/race, marital status, and premarital sex values included in the same model; $H_0 2$, religiosity is not a significant predictor of HPV knowledge having age, educational level, ethnicity/race, marital status, and premarital sex values included in the same model; and $H_a 2$, religiosity is a significant predictor of HPV knowledge having age, educational level, ethnicity/race, marital status, and premarital sex values included in the same model.

As mentioned in Chapter 1, the data analysis strategy was to use two models, one for HPV awareness and one for HPV knowledge. Each model contained eight predictors or independent variables (age, race/ethnicity, educational level, marital status, attitudes toward premarital sex, and three dimensions of religiosity).

Threats to Validity

An important factor to consider was whether the study sample will be representative of the general population. In this study, participants were recruited from only one Christian university; therefore, the sample may not be representative of the population of other Christian universities. However, while not generalizable to other Christian universities or to the general population, generalization may apply to other Seventh-day Adventist Universities as rarely non Adventist Christians are employed at

these institutions. To improve external validity, all eligible subjects in the population were invited to participate in the study.

Potential threats to internal validity in this study were selection and instrumentation. Selection bias was mitigated by making the survey available to all eligible subject in the population. Instrumentation-related validity threats was minimized by preserving the scoring protocols of the validated measure.

Conceivable threats to construct or statistical conclusion validity in this study included inappropriate, inadequate, or inexact definitions of constructs. To minimize this threat, operational definitions have been provided to describe the constructs that have been identified for study and the specific way they will be measured. For example, religiosity will be measured by the DUREL, which assesses three major dimensions of religious involvement—organizational religious activity (ORA), non-organizational religious activity (NORA), and intrinsic religiosity (IR) Koenig & Büssing, 2010). The psychometric properties of this instrument have been reported as a reliable and valid measure of religiosity (Storch, Strawser, & Storch, 2004). HPV knowledge was measured using a set of validated items selected from a great number of published quantitative studies on HPV knowledge and validated by Waller et al. (2013).

Ethical Procedures

This research depended on the participation of human subjects. Walden University IRB provided approval for the study prior to beginning data collection. Approval from the Andrews University IRB was also required and was be obtained prior to data collection.

Participation in this study was strictly voluntary and participants had the option to stop their participation in the survey at any time. There was no compensation for participating in this study.

No personal identifying information, such as name, was collected; therefore, the information collected cannot be traced to the participant and will remain anonymous. Participants accessed the survey via a link to Class Climate© provided in the e-mail invitation. Survey data was stored in a password protected electronic format. Class Climate© does not collect identifying information such as participants' name, email address, or IP address. The data collected for this study is not public and will be kept for a minimum of 5 years. After the specified period has passed, data will be destroyed by the most appropriate method (e.g. programmatic, software-based techniques to sanitize data; physical or logical sanitation techniques that render target data recovery infeasible using state of the art laboratory techniques). Only I, the researcher, have access to the data.

The potential risk for study participants was minimal and associated with the personal and sensitive nature of some questions. However, if at any time during the survey participants felt uncomfortable, embarrassed, or upset they were permitted to either skip the question or discontinue the survey.

I am an employee of Andrews University. However, this study was not sponsored by Andrews University; neither is Andrews University vested in the outcome of this study. There were no competing interests or special financial gain associated with this study.

Summary

This chapter discussed the methods for data collection and analysis. The target population for this study was adult females, 27 years of age and older at a Christian University in Southwestern Michigan. Study participants were recruited by e-mail and invited to participate in a web-based survey. All eligible female faculty and staff at the said university were invited to participate in the survey. The data collection tool was an anonymous self-administered survey instrument, which was designed to assure anonymity. The strategy for data analysis included the use of two models, one for each outcome or dependent variable. Eight predictors or independent variables (age, race/ethnicity, educational level, marital status, attitudes toward premarital sex, and three dimensions of religiosity) were included in each model. Data was checked prior to analysis to assess whether it met the six assumption criteria required for this type of analysis. Chapter 4 discusses the findings of this study.

Chapter 4: Results

Introduction

The purpose of this study was to determine the role of religiosity as a predictor of HPV awareness and knowledge among female faculty and staff in a Christian university. Religiosity was the predictor or independent variable. HPV awareness and knowledge were the outcome or dependent variables. In addition, the study explored the attitudes towards premarital sex in the context of HPV awareness and knowledge.

Data for this study was collected using an online survey. HPV awareness was determined using the standard HINTS 4 (NCI, 2014) HPV awareness question, "Before today, had you ever heard of HPV? HPV stands for Human Papillomavirus. It is not HIV, HSV, or herpes." Questions assessing relative HPV knowledge were taken from questionnaires used in and validated by previous studies (Gerend & Magloire, 2008; Gerend & Shepherd, 2011; Waller et al., 2013; Marlow et al., 2013). There were 16 HPV knowledge questions (Appendix C). Attitudes toward premarital sex were assessed with the question "Which of the following best describes your view on when it is appropriate for a woman to have sexual intercourse?" (Gerend & Shepherd, 2011; Rosenthal et al., 2008). Participants were able to choose one of the following options to describe their view: ''A woman should not have sexual intercourse until she is married'' = 1; ''A woman should not have sexual intercourse until she is in a serious relationship and is a young adult'' = 2; ''A woman should not have sexual intercourse until she is in a serious relationship'' = 3; ''A woman should explore her sexuality when she is ready as long as she takes care of herself'' = 4 (Gerend & Shepherd, 2011; Rosenthal et al., 2008).

Religiosity was measured by the DUREL, a five-item measure of religious involvement (Koenig & Büssing, 2010). This instrument assesses the three major dimensions of religiosity: ORA, NORA, and IR.

All females, 27 years of age and older, employed at a Christian University in Southwestern Michigan were invited to participate in this study. A list of all qualifying female employees and their e-mails was obtained from the Andrews University ITS Administration as authorized by the University's provost and upon approval by Andrews University IRB. There were 522 individuals in the list, including myself. The survey invitation was sent to 521 email addresses. A total of 173 individuals completed the survey, yielding a 33% response rate.

Informed consent was obtained prior to allowing participants access to the survey questions and required study participants to agree with the electronic statement of consent. This chapter provides a description of the data collected, describes the analytical approach used to answer the research questions, and examines the research questions in light of the analysis of pertinent survey questions.

Data analysis was performed using IBM SPSS Statistics 24, formerly known as Statistical Package for the Social Sciences (SPSS). Binary logistic regression was used to describe the relationship between religiosity (predictor or independent variable) and HPV awareness and knowledge (outcome or dependent variables). Narrative and tables aids in the presentation of the results. The chapter is organized in four sections, which is preceded by a description of the preanalytical data screening conducted, how missing data was handled, and how variables were transformed, when necessary. The first section

addresses the characteristics of study's demographic data. The second section contains a descriptive analysis of all the variables. The third section presents the analysis of the variables as it pertains to the research questions. The last portion of the chapter provides a summary of the results.

Preanalytical Data Screening and Data Transformation

Data was examined using frequency distribution and descriptive statistics. There were no outliers; however, several variables contained missing data. The reasons for missing data were investigated using frequencies and descriptive statistics. A common method to deal with missing data is to only include in the analysis cases with complete information (Pigott, 2001). However, implementing this method for this study would have resulted in a deletion of approximately 21 entries, corresponding to a reduced response rate of approximately 4%.

Rather than deleting each entry that contained missing data, missing data was remediated by substituting the missing values with estimations. The estimation method used to replace missing data varied depending on the variable. For example, the two missing age entries, due to the participants choosing not to disclose, were eventually lumped into the 65 years or older category when the age variable was recoded to reduce the number of categories to be included in the analysis. Two ethnicity entries were missing and were corrected using the typed ethnicity entered by the participants under the other category. Missing data on the HPV knowledge variable items was replaced by either a *True* or *False* value derived from the calculated relative HPV knowledge score of the participant, excluding the missing item. For higher HPV knowledge scores, meaning

that the participant answered the majority of the knowledge questions correctly, it was assumed that the participant's HPV knowledge was higher and the correct answer for the question was entered. If the participant answered the majority of the knowledge questions incorrectly, meaning that their relative HPV knowledge score was lower, then the missing value was replaced with the incorrect answer.

The following variables were recoded to facilitate analysis: Age categories were collapsed into five main categories; Ethnicity was collapsed into three categories; Education was collapsed into four categories; Marital status categories were designated as single, married, or previously married. Missing data for the religiosity items were replaced with the lowest value for the item.

Demographic Data

Demographics was a part of the research question model. Therefore, the first section of the questionnaire was designed to profile the demographic characteristics of the female participants. Table 3 outlines the summary of the study population's demographic information. Of the 173 participants, 30 (17.3%) were between the ages of 27 to 34 years old; 40 (23.1%) were between the ages of 35 to 44 years old; 43 (24.9%) were between the ages of 45 to 54 years old; 41 (23.7%) were between the ages of 55 to 64; and 19 (11%) were 65 years old or older. The majority of the participants (n = 151, 87.2%) had completed formal education equivalent to college or a graduate degree. Education beyond a college degree was reported together for Master's and Doctoral degrees.

Twenty-one (12.1%) participants reported having some college education and one (0.6%) participant responded having only attained a high school education.

The majority of participants (*n* = 120, 69.4%) described their race/ethnicity as “white”. Twenty (11.6%) participants reported “other” ethnicity, followed closely by Black/African American (*n* = 19, 11%). The lowest ethic representation in the survey were Hispanic/Latino (*n* = 14, 8.1%).

The great majority of participants (*n* = 128, 74%) reported being married. Twenty-one (12.1%) of the participants reported being single and 24 (13.9%) reported that they had been married at some point. In this category, the highest percentage (*n* = 16, 9.2%) were found in the *divorced* category (data not shown in Table 5).

Table 5

Summary of Study Participants' Demographic Variables (n = 173)

	Frequency	%
Age		
27-34 years old	30	17.3
35-44 years old	40	23.1
45-54 years old	43	24.9
55-64 years old	41	23.7
65 years old or older	19	11.0
Education		
High school	1	0.6
Some College	21	12.1
College Degree	36	20.8
Master's/Doctoral Degree	115	66.5
Ethnicity		
White	120	69.4
Black/African American	19	11.0
Hispanic/Latino	14	8.1
Other	20	11.6
Marital Status		
Single	21	12.1
Married	128	74.0
Other (Widowed, Divorced, Separated)	24	13.9

Description of Variables

Attitudes towards Premarital Sex

Participants were given four choices to describe their view about when it is appropriate for a woman to have sexual intercourse. The variable attitude was defined using a 1 to 4 scale, in which 1 represents the most conservative attitude, "A woman should not have sexual intercourse until she is married" and 4 represents the most liberal attitude towards premarital sex. Table 6 summarizes the participants' attitudes towards premarital sex. Most women (n = 148, 85.5%) favored sexual intercourse in the context of a marriage relationship and chose the option "A woman should not have sexual

intercourse until she is married.'' Thirteen women (7.5%) said, "A woman should not have sexual intercourse until she is in a serious relationship and is a young adult." Ten participants (5.8%) said, "A woman should explore her sexuality when she is ready as long as she takes care of herself.'' Only two women (1.2%) said that "A woman should not have sexual intercourse until she is in a serious relationship.''

Table 6

Summary of Participants' Attitudes towards Premarital Sex (n = 173)

Attitude	Frequency	%
A woman should not have sexual intercourse until she is married.	148	85.5
A woman should not have sexual intercourse until she is in a serious relationship and is a young adult.	13	7.5
A woman should not have sexual intercourse until she is in a serious relationship.	2	1.2
A woman should explore her sexuality when she is ready as long as she takes care of herself.	10	5.8

Note: Attitude statements adapted from "Correlates of HPV knowledge in the era of HPV vaccination: A study of unvaccinated young adult women," by M. A. Gerend and J. E. Shepherd, 2011.

A Pearson Correlation was conducted to assess the relationship between Attitudes towards Premarital Sex, the three subscales of religiosity, and HPV Knowledge. There were strong negative correlations between Attitudes towards Premarital Sex and all three subscales of religiosity: ORA, r = -0.459, n =173, p = < 0.01; NORA, r = -0.277, n =173, p = < 0.01; IR, r = -0.436, n =173, p = < 0.01. These results suggest that a conservative attitude towards premarital sex (score of 1) will likely reflect a higher levels of ORA, NORA, and IR (score of 6). However, the association between the variables was not strong. The coefficient of determination (R^2) was calculated and used cautiously to assess the effect size or magnitude of the effect between the variables. All religiosity subscales

(ORA, R^2 = .22; NORA, R^2 = .08; IR, R^2 = .19) demonstrated a relatively small effect size. Conversely, there was no significant correlation between Attitudes towards Premarital Sex and HPV knowledge (r = 0.019, n =173, p = 0.809).

Table 7 provides a summary of HPV awareness among study participants. Of the 173 women in the study, approximately 14% (n = 24) had not heard of HPV prior to participating in the survey. HPV knowledge score did not significantly vary [F(4, 136) = 2.126, p = 0.081] by HPV information source. For those that had heard of HPV (n = 149, 86.1%), the primary source of HPV information reported was public media (n = 59, 34%). Approximately one fourth of the participants (n = 44, 25.4%) reported learning about HPV from a healthcare provider. Sources of HPV listed under other included school, family, friend, and personal research. One participant (0.7%) could not remember the source of her HPV information and eight (n = 8, 5.3%) study participants did not specify the source of their HPV information. A very low number of participants (n = 8, 4.6%) pointed to the internet as their source of HPV awareness.

Table 7

Summary of HPV Awareness

HPV Awareness	Frequency	%
Yes	149	86.1
No	24	13.9
Source of HPV Information		
Healthcare Provider	44	25.4
Friend	5	2.9
Internet	8	4.6
Public Media (Television, radio, or magazines)	59	34.1
Other	25	14.5
All Listed Sources	2	1.4
School	2	1.4
Family	1	0.7
Friend	1	0.7
Personal Research	1	0.7
Do not recall	1	0.7
Did not Specified Source	8	5.3

Note: List for Other provided in this table is not comprehensive.

The mean HPV knowledge score for women familiar with HPV (n = 149) was 10.4 out of 16 (SD = 3.2) or 65%. The knowledge item that most participants answered correctly related to the link between HPV infection and cervical cancer (Table 8). Knowledge about HPV treatment was low (8%). More than two thirds of the women familiar with HPV (n = 136, 78.6%) reported knowing that HPV can be passed on during sexual intercourse. However, a much lower number (n = 39, 22.5%) recognized that most sexually active people will get HPV at some point in their lives.

Table 8

Mean (SD) HPV Knowledge Summary Score and Percentage Responding Correctly and Incorrectly to the16 Individual HPV Knowledge Items

Knowledge Item	% Correct Response	% Incorrect Response
HPV is very rare. (F)	70.5	29.5
HPV always has visible signs or symptoms. (F)	74.6	25.4
HPV can cause cervical cancer. (T)	82.7	17.3
HPV can be passed on by genital skin-to-skin contact. (T)	59.0	41.0
There are many types of HPV. (T)	43.9	56.1
HPV can cause HIV/AIDS. (F)	72.3	27.7
HPV can be passed on during sexual intercourse. (T)	78.6	21.4
HPV can cause genital warts. (T)	45.7	54.3
Men cannot get HPV. (F)	65.9	34.1
Using condoms reduces the risk of getting HPV. (T)	67.1	32.9
HPV can be cured with antibiotics. (F)	49.1	50.9
Having many sexual partners increases the risk of getting HPV. (T)	81.5	18.5
HPV usually doesn't need any treatment. (T)	8.1	91.9
Most sexually active people will get HPV at some point in their lives. (T)	22.5	77.5
A person could have HPV for many years without knowing it. (T)	71.1	28.9
Having sex at an early age increases the risk of getting HPV. (T)	61.3	38.7
HPV knowledge summary score.	10.4 (3.2)	

Note: (F) = False; (T) = True. HPV knowledge scores are reported for women who had heard of HPV prior to participating in the study (n = 149). An HPV knowledge score was computed for each participant by assigning the value of one for each correct response and zero for incorrect responses. Values were added to produce a relative knowledge score. Relative HPV knowledge could range from 0 to 16.

Religiosity

Religiosity was assessed using the Duke University Religion Index (DUREL) (Table 9), a five-item scale measure of religiosity (Koenig & Büssing, 2010). The DUREL scale is composed of three subscales that assess three major dimensions of religious involvement—organizational religious activity (ORA), non-organizational religious activity (NORA), and intrinsic religiosity (IR) (Koenig & Büssing, 2010).

Table 9

Items in the Duke University Religion Index (DUREL)

How often do you attend church or other religious meetings? (ORA)

1 – Never; 2 - Once a year or less; 3 - A few times a year; 4 - A few times a month; 5 - Once a week; 6 - More than once/week

How often do you spend time in private religious activities, such as prayer, meditation or Bible study? (NORA)

1 - Rarely or never; 2 - A few times a month; 3 - Once a week; 4 - Two or more; times/week; 5 – Daily; 6 - More than once a day

The following section contains 3 statements about religious belief or experience. Please mark the extent to which each statement is true or not you for you.

In my life, I experience the presence of the Divine (i.e., God) - (IR)

1 - Definitely not true; 2 - Tends not to be true; 3 – Unsure; 4 - Tends to be true; 5 - Definitely true of me

My religious beliefs are what really lie behind my whole approach to life - (IR)

1 - Definitely not true; 2 - Tends not to be true; 3 – Unsure; 4 - Tends to be true; 5 - Definitely true of me

I try hard to carry my religion over into all other dealings in life - (IR)

1 - Definitely not true; 2 - Tends not to be true; 3 – Unsure; 4 - Tends to be true; 5 - Definitely true of me

Note: DUREL adapted from Koenig & Büssing, 2010.

As recommended by Koenig & Büssing (2010), each of the religiosity subscales were analyzed separately. The first question addressed ORA and it is the only item contributing to the score for Subscale 1. Answers were scored from 1 to 6. The higher the number, the higher the ORA score. The second question, the only item for subscale 2, addressed NORA. Again, answers for question 2 were scored from 1 to 6. The higher the number, the higher the ORA score. Subscale 3 addresses IR and includes the last three items in the questionnaire. IR items were scored on a scale of 1 to 5, with 5 representing a higher IR and 1 denoting a low IR. The IR value was calculated by adding the score for

each of the last three questions. The higher the subscale score, the higher the IR for the participant.

Initially, all three subscales were included in a single analysis; however, as predicted by Koenig and Büssing (2010), this resulted in the subscale scores canceling each other out. Multiple collinearity between the subscales, resulting from using a cumulative religiosity score, obscured the estimates of effect for each subscale. Therefore, the recommendation of Koenig & Büssing (2010) to analyze each subscale separately was followed. This approach produced three distinct scores for the three religiosity subscales: ORA, NORA, and IR. Chapter 5 includes a more detailed discussion of the impact of utilizing the subscale scores rather than a total religiosity score.

Table 10 summarizes the mean and standard deviation (SD) for the three dimensions of religiosity (ORA, NORA, and IR) as measured by DUREL, according to age, education, ethnicity, marital status, and attitude towards premarital sex. A one-way ANOVA was also conducted to compare the effect of each religiosity subscale on age, education, ethnicity, marital status, and attitudes toward premarital sex respectively. The mean score for all three dimensions of religiosity were highest among women 55-64 years of age. There was a significant effect of age only on IR at the $p < .05$ level for the three conditions [$F(4, 168 = 2.57, p = 0.040]$. Post hoc comparisons using the Tukey HSD test indicated that the mean score for ages 55 to 64 ($M = 4.71$, $SD = 0.45$) was significantly different from that of the other age groups. These results suggest that age has an impact on IR. Specifically, the older the woman, the greater chance they will

demonstrate a higher level of IR. These findings are consistent with previous research. Older individuals are likely to self-report as more religious (Zimmer, Jagger, Chiu, Ofstedal, Rojo, & Saito, 2016).) Data from both cross-sectional and longitudinal studies also suggests that older individuals have higher levels of religious attitudes and religious behaviors than their younger counterparts (Levin, Taylor, & Chatters, 1994; Welgama & De Silva, 2014).

Table 10

Descriptive Statistics (Mean and Standard Deviation [SD]) for the Three Dimensions of Religiosity (ORA, NORA, and IR) as Measured by DUREL, According to Age, Education, Ethnicity, Marital Status, and Attitude Towards Premarital Sex.

	DUREL Scores		
	ORA mean (SD)	NORA mean (SD)	IR mean (SD)
Age			
27-34 years old	4.86 (0.89)	4.40 (1.49)	4.35 (0.66)
35-44 years old	4.65 (1.21)	4.25 (1.40)	4.37 (1.07)
45-54 years old	4.79 (0.70)	4.58 (1.19)	4.69 (0.45)
55-64 years old	4.95 (0.58)	4.90 (0.86)	4.71 (0.45)
65 years old or older	4.89 (0.56)	4.84 (0.89)	4.70 (0.42)
Education			
Some College	4.61 (1.11)	4.52 (1.43)	4.57 (0.61)
College Degree	4.66 (1.04)	4.27 (1.56)	4.32 (0.94)
Master's Degree	4.93 (0.76)	4.72 (1.03)	4.61 (0.71)
Doctoral Degree	4.90 (0.58)	4.70 (0.95)	4.68 (0.41)
Ethnicity			
White	4.74 (0.93)	4.53 (1.31)	4.54 (0.76)
Hispanic/Latino	5.14 (0.66)	4.78 (0.89)	4.59 (0.49)
Black/African American	5.00 (0.57)	4.84 (1.01)	4.75 (0.48)
Other	4.90 (0.55)	4.45 (1.05)	4.53 (0.56)
Marital Status			
Single	4.61 (0.92)	4.00 (1.51)	4.28 (0.79)
Married	4.83 (0.87)	4.67 (1.21)	4.61 (0.69)
Other (Widowed, Divorced, Separated)	4.91 (0.58)	4.58 (0.88)	4.58 (0.54)
Attitude Towards Premarital Sex			
A woman should not have sexual intercourse until she is married.	4.95 (0.67)	4.70 (1.10)	4.68 (0.42)
A woman should not have sexual intercourse until she is in a serious relationship and is a young adult.	4.53 (1.12)	4.15 (1.40)	4.15 (1.12)
A woman should explore her sexuality when she is ready as long as she takes care of herself.	3.50 (1.17)	3.00 (2.82)	3.83 (1.64)
A woman should not have sexual intercourse until she is in a serious relationship.	--	3.50 (1.64)	3.53 (1.58)

Note: High school was omitted because only one person responded.

The mean for ORA and NORA was highest for individuals with at least a Master's Degree. Women with Doctoral degrees evidenced a higher mean score for IR, but higher education achieved was not associated with a higher IR score. An analysis of variance showed however, a significant effect of education on both ORA and NORA at the $p < .05$ level ([$F(3, 169 = 2.97, p = 0.033$] and [$F(3, 169 = 4.273, p = 0.006$]) correspondingly. Post hoc tests were not performed for ORA or NORA because at least one group has fewer than two cases.

Hispanic/Latino women demonstrated a higher mean for ORA closely followed by Black/African American women. This trend was reversed for NORA and IR, showing that Black/African American women appear more likely than Hispanic/Latino women to participate in non-organizational religious activity and demonstrate a greater intrinsic or subjective religiosity. However, no significant variations were found for ORA, NORA, or IR based on ethnicity.

Married women showed higher means for NORA and IR. ORA's mean was higher for widowed, divorced, or separated women. However, the analysis of variance showed that the effect of Marital Status was only on NORA, [$F(2, 170 = 2.76, p = 0.066$]. Post hoc comparisons using the Tukey HSD test (Table 11) indicated that the NORA mean score for married women ($M = 4.67$, $SD = 1.21$, $p = >0.05$) was not significantly different than those of single women ($M = 4.00$, $SD = 1.51$, $p = >0.05$). There was no statistically significance between the NORA mean score for single women and previously married women ($M = 4.58$, $SD = 0.88$, $p = 0.244$).

Table 11

Tukey HSD Comparison for NORA.

(I) Marital Status	(J) Marital Status	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Single	Married	-.67188	.28554	.051	-1.3470	.0033
	Previously Married	-.58333	.36239	.244	-1.4402	.2735
Married	Single	.67188	.28554	.051	-.0033	1.3470
	Previously Married	.08854	.26978	.942	-.5493	.7264
Previously Married	Single	.58333	.36239	.244	-.2735	1.4402
	Married	-.08854	.26978	.942	-.7264	.5493

The analysis of variance for the means of ORA, NORA, and IR scores, as shown in Table 12, were significantly highest for women who said, “A woman should not have sexual intercourse until she is married.” There was a significant effect of attitude toward premarital sex for all three subscales of religiosity at the $p < .05$ level as follows: ORA [$F(3, 169 = 16.49, p = < 0.01$], NORA [$F(3, 169 = 5.11, p = < 0.01$], and IR [$F(3, 169 = 13.46, p = < 0.01$] (Table 10). Post hoc comparisons for ORA, NORA, and IR using the Tukey HSD test (not shown) indicated that the mean score for the most conservative attitude toward premarital sex (ORA: $M = 4.95$, $SD = 0.67$; NORA: $M = 4.70$, $SD = 1.10$; IR: $M = 4.68$, $SD = 0.42$) was significantly different than the ORA, NORA, and IR mean score for less conservative women. This comparison between groups suggests that the more conservative attitude towards premarital sex, the higher the levels of religiosity, as defined by the three religiosity subscales (ORA, NORA, and IR). However, the effect size for all religiosity subscales (ORA, $d = .22$, $p = < .001$; NORA, $d = .08$, $p = < .001$;

IR, d = .19, p = < .001) was considered small according to Cohen's (1988) convention for a small effect (d = .2). This is consistent with the associations between variables previously discussed.

Table 12

Summary of ANOVA for ORA, NORA, and IR Mean Scores and Attitude Toward Premarital Sex.

		Sum of Squares	df	Mean Square	F	Sig.
ORA	Between Groups	27.958	3	9.319	16.494	.000
	Within Groups	95.488	169	.565		
	Total	123.445	172			
NORA	Between Groups	21.497	3	7.166	5.116	.002
	Within Groups	236.699	169	1.401		
	Total	258.197	172			
IR	Between Groups	16.030	3	5.343	13.462	.000
	Within Groups	67.078	169	.397		
	Total	83.107	172			

Results

Logistic Regression for HPV Awareness

Data screening revealed no outliers. The methods used to correct missing values has been previously described under the *Pre-Analysis Data Screening and Data Transformation* section. Forward logistic regression was conducted to determine which predictors or independent variables (age, race/ethnicity, educational level, marital status, attitudes toward premarital sex, and three dimensions of religiosity [ORA, NORA, and IR]) were predictors of HPV awareness. The regression results indicated that the overall model of eight predictors was statistically reliable in distinguishing between HPV awareness and non-awareness [-2 Log Likelihood = 112.268, $X^2(8) = 27.048$, $p < .001$]. The Nagelkerke's R^2 of .262 indicated a marginal relationship between prediction and

grouping. The model correctly classified 89.0% of the cases. The Wald criterion showed that IR made a significant contribution to the prediction (p = .002). NORA offered a marginal contribution to the prediction (p = 0.76). Age and education demonstrated marginal contributions to the prediction (p = .060; p = .075 respectively). Regression coefficients for HPV awareness are presented in Table 13.

Table 13

Regression Coefficients for HPV Awareness (N = 173)

	B	Wald	df	Sig.	Odd Ratio	R^2
Attitude Toward Premarital Sex	-19.745	.000	1	.996	.000	
Ethnicity	.274	.920	1	.338	1.316	
Age	.369	3.543	1	.060	1.446	
Marital Status	-.786	2.479	1	.115	.455	
Education	-.558	3.181	1	.075	.572	
ORA	-.042	.012	1	.913	.959	
NORA	.517	3.146	1	.076	1.677	
IR	-1.834	9.452	1	.002	.160	
Constant	26.207	.000	1	.995	240716769300.000	
Model						.322

Logistic Regression for HPV Knowledge

Forward logistic regression was also conducted to determine which predictors or independent variables (age, race/ethnicity, educational level, marital status, attitudes toward premarital sex, and three dimensions of religiosity [ORA, NORA, and IR]) were predictors of HPV knowledge. HPV knowledge was dichotomized into low HPV knowledge (less than a score of 10 in the HPV knowledge score) and high HPV knowledge (a score of 11 or greater in the HPV knowledge score) based on the calculated HPV knowledge mean for this study of 10.4 (Table 8).

The regression results HPV knowledge indicated that the overall model of eight predictors (age, race/ethnicity, educational level, marital status, attitudes toward premarital sex, and three dimensions of religiosity [ORA, NORA, and IR]) was statistically reliable in predicting HPV knowledge above the mean [-2 Log Likelihood = 228.173, $X^2(8) = 11.373$, $p = .181$]. The Nagelkerke's R^2 of .085 indicated that the model explained roughly 85% of the variation in the outcome or relationship between prediction and grouping. The model correctly classified 52% of the cases. Regression coefficients for HPV knowledge are presented in Table 14. The Wald criterion showed that only IR ($p = 0.036$) made a significant contribution to the prediction of HPV knowledge.

Table 14

Regression Coefficients for HPV Knowledge (N = 173)

	B	Wald	df	Sig.	Odd Ratio	R2
Attitude Toward Premarital Sex	.409	2.171	1	.141	1.505	
Ethnicity	.032	.027	1	.870	1.032	
Age	-.160	1.538	1	.215	.852	
Marital Status	.810	2.503	1	.114	2.247	
Education	.104	.210	1	.647	1.109	
ORA	-.232	.843	1	.359	.793	
NORA	-.229	1.842	1	.185	.796	
IR	.664	4.384	1	.036	1.943	
Constant	-2.770	2.211	1	.137	.063	
Model						.085

Summary

This chapter presented the results of the study through narrative and tables. The first section highlighted the characteristics of study's demographic data. The second section contained a descriptive analysis of all the variables. The third section presented the analysis of the variables as it pertains to the research questions.

The logistic regression for HPV Awareness showed that the model is capable of correctly classifying 86.0% of the cases. According to the Wald criterion, IR seems to made a significant contribution to the prediction (p = .002), while NORA made a marginal contribution to the prediction (p = 0.76). Age and education also demonstrated marginal contributions to the prediction (p = .060; p = .075) respectively.

The logistic regression for HPV Knowledge showed that the model is capable of correctly classifying 58% of the cases. According to the Wald criterion, only IR (p = 0.035) made a significant contribution to the prediction of HPV knowledge, meaning that excluding all other demographic variables (age, race/ethnicity, educational level, marital status, and attitudes toward premarital sex) from the analysis would not significantly

influence the outcome. Overall, participants with greater IR scores demonstrated lower HPV awareness and HPV knowledge increased almost two-fold for every point increase in the IR score.

Chapter 5 presents a summary of the study, discussions of results, conclusions, and recommendations for affecting social change.

Chapter 5: Summary, Discussion, Conclusion, and Recommendations

Summary

The purpose of this study was to determine the role of religiosity as a predictor of HPV awareness and knowledge in a specific population: 27-year-old or older women employed at a Christian university. The correlational and quantitative cross-sectional study design was intended to make factual determinations within the target population regarding trends and potential differences between demographically segregated groups. The study did not support a determination of causation.

The predictor or independent variable was religiosity. The outcome or dependent variables were HPV awareness and knowledge. Additionally, this study explored the attitudes towards premarital sex in the context of HPV awareness and knowledge.

Study participants included 173 female faculty and staff, 27 years of age and older, employed at a Christian University in Southwestern Michigan. The modified survey instrument, comprised of questions from previously validated instruments, was made available by email invitation. The survey was available for a period of 4weeks during the fall of 2016. During this time, automated reminder messages were sent every 4 days to encourage participation. Individuals were presented with an explanation of the purpose of the study and were required to accept the conditions for survey participation as presented in the informed consent in order to gain access to the survey questions. The survey was anonymous and participation was voluntary. The data collected allowed descriptive and statistical analysis of the influence of religiosity, as defined by the three subscales of religiosity (ORA, NORA, and IR) on HPV awareness and knowledge.

Unlike other similar research, this study focused on women 27-years of age and older; women no longer eligible for HPV vaccination. A total of 173 women completed the survey. The majority of the participants were between the ages of 45 and 54 years of age. Over two thirds had completed education beyond college. Approximately 30% self-reported their ethnicity as other than white. The majority of the participants were married or had been married at some point in the past.

The majority of the participants (n = 149, 86.1%) had heard of HPV prior to participating in the survey. This number is somewhat lower when compared to other studies. In a national study, 97% (n = 718) women ages 18-26 reported having heard of HPV (Gerend & Shepherd, 2011). A multicountry study found that approximately 88% of women (18 to 70 year of age) has heard of HPV (Marlow et al., 2013).

The main source of HPV information was public media and more than 25% of women reported learning about HPV from a healthcare provider. These numbers are consistent with recently published statistics, which point to the internet as the most frequently used HPV information source and to physicians as an underused resource for HPV information (Inglehart et al., 2016). Nevertheless, the HPV knowledge score did not significantly vary by source. The mean HPV knowledge score for women who had heard of HPV (n = 149) was 10.4 in a scale of 1 to 16. This represents a score of approximately 65%, which by comparison, is higher than HPV knowledge scores reported for US women: 4.9 out of 10 or 49% (Gerend & Shepherd, 2011) and 9.22 out of 15 or 61% (Marlow et al., 2013). Therefore, while HPV awareness appeared to be lower among this study's participants; their HPV knowledge score seemed relatively higher.

There are a few possible explanations for this phenomenon. First, the level of HPV knowledge is largely influenced by various sociodemographic factors such as gender, age, and education (Blake et al., 2015). Higher educational levels have been associated with higher levels of HPV knowledge (Gerend & Shepherd, 2011). Therefore, the more advanced educational level among this study's participants could help explain the relative higher HPV knowledge. Secondly, ethnicity/race has been identified as a significant predictor of HPV awareness and knowledge. Whites are more likely than other ethnic groups to be aware of HPV (Reimer et al., 2014). Lastly, higher HPV knowledge is more likely among women classified at higher risk, such as women with multiple sexual partners, women that have been tested for HIV, and women who have been diagnosed with cervical abnormalities (Gerend & Shepherd, 2011). The majority of the women in this study were 35 years of age or older, which qualifies them for routine cervical cancer screening either by cytology alone, every 3 years, or HPV and cytology contesting, every 5 years (Saslow et al., 2012). This could also help explain the higher levels of HPV knowledge among this group.

The HPV knowledge item that most women answered correctly (83%) related to HPV infection and cervical cancer. Similarly, 84% (Gerend & Shepherd, 2011) and 93% (Marlow et al., 2013) of women knew about the link between genital HPV infection and cervical cancer. In the present study, approximately, four out of five women aware of HPV reported knowing that HPV could be contracted during sexual intercourse. These findings are consistent with previous reports suggesting that approximately 74% of US women recognize that HPV can be transmitted during sexual intercourse (Marlow et al.,

2013). Approximately one in four women in the present study recognized that most sexually active individuals would get HPV at some point in their lives. By comparison, this is lower than the 32% previously reported for women in the US (Marlow et al., 2013).

Interpretation of the Findings and Conclusion

The purpose of this quantitative cross-sectional study was to determine the role of religiosity as a predictor of HPV awareness and knowledge in a specific population: 27-year-old or older women employed at a Christian university. The predictor, or independent variable, was religiosity. The outcome, or dependent variables, were HPV awareness and knowledge. Additionally, this study explored the attitudes towards premarital sex in the context of HPV awareness and knowledge. The interpretation and discussion of the findings are presented and discussed in the context of the two research questions, as follow:

Research Question 1

Is religiosity, as defined by the DUREL, a significant predictor of HPV awareness having age, educational level, ethnicity/race, marital status, and premarital sex values included in the research model?

Religiosity, as defined by the IR subscale of the DUREL significantly contributed to HPV awareness. Of the three religiosity subscales, IR had a significant, but modest role in predicting awareness. The model predicted a decrease of 0.160 (95% CI = 0.050, 0.514) in HPV awareness for every unit increase in IR. This is a relative small decrease; nevertheless, it represents an inverse relationship between IR and HPV awareness for this

group. A possible explanation for this may relate to a decreased sense of HPV relevance resulting from a religiously influenced lifestyle. A more deliberate explanation for this outcome is articulated later in the chapter within the context of the theoretical framework for this study.

Age and *education* both had a marginal impact on HPV awareness. These marginal statistical significances are worth discussing because they are consistent with previous reports. Women in younger (18-34 and 35-49) age groups typically demonstrate higher HPV awareness (*OR* = 5.13, 95% *CI* = 2.62 – 10.06, *p* = < 0.001; *OR* = 3.30, 95% *CI* = 1.69 – 6.42, *p* = < 0.001) when compared to older women (*OR* = 1.97, 95% *CI* = 1.26 – 3.07, *p* = < 0.01) (Blake et al., 2015). A larger and more diverse sample may aid in better discriminating the role of age on HPV awareness for this population. *Age* also correlated with IR, which significantly contributed to HPV awareness.

The role of education on HPV awareness, while of marginal statistical impact in this study, suggests a potential area of further research within the target population. The majority of the women in the study reported having accomplished at least a college-level education and the majority were also aware of HPV. These findings seem somewhat inconsistent with previously reported findings that have linked lower educational attainment with low HPV awareness (Watkins et al., 2015). The sample type could explain the findings and since the statistical impact was determined marginal, it is only mentioned to support further research in this area. A larger and more diverse sample may aid in better discriminating between the various educational levels and HPV awareness for this population. Furthermore, religiosity, at all levels (ORA, NORA, and IR),

appeared to increase with age, higher education, and being or ever been married. This is a consideration for discussion since women with higher IR were less aware of HPV. Following this rationale, one could posit that age and education may indirectly influence HPV awareness by positively influencing IR scores. Thus, age and education remain relevant as constructs of HPV awareness.

While it is possible that this may be attributable to selection bias as the study participants as a group scored high on all three religiosity subscales, it is important to highlight that the association of each religiosity subscale with health may be different. For example, ORA has been related to decreased depression, better physical health, lower health care service utilization, and decreased mortality (Koenig, 2008). In contrast, NORA has been associated with mixed influences on overall health (Harvey, Story, Knutson, & Whitt-Glover, 2016; Koenig, Hays, George, Blazer, Larson, & Landerman, 1997; Miller et al., 2014). Given that study participants as a group scored high on all three religiosity subscales, it was imperative to analyze each religiosity subscale independently to avoid the possibility of them canceling each other out. The independent analysis of the religiosity subscales underscores the significant correlation of IR with lower HPV awareness.

The findings support the alternative hypothesis (H_a1), that religiosity, as defined by the DUREL, is a significant predictor of HPV awareness having age, educational level, ethnicity/race, marital status, and premarital sex values included in the research model.

Research Question 2

Is religiosity, as defined by the DUREL, a significant predictor of HPV knowledge having age, educational level, ethnicity/race, marital status, and premarital sex values included in this research model?

Religiosity, as defined by the IR subscale of the DUREL significantly contributed to HPV knowledge. Again, of the three religiosity subscales, IR had a significant and noticeable role in predicting HPV knowledge. The model predicted that as IR increases by one unit, the odds of HPV knowledge increases by 1.943 (95% *CI* = 1.043, 3.618). In other words, the chances of scoring above the mean for HPV knowledge almost doubled for every 1-point increase in the IR score. Additionally, knowledge is not in conflict with IR as demonstrated by the positive correlation; as IR increases, HPV knowledge also increases.

In the context of the IR's definition aforementioned, these findings represent a significant point of consideration for how to present and approach issues in health promotion and HPV education among religious women. Previous research has suggested that IR is able to explain a greater adherence to health-promoting behaviors even in the absence of ORA and NORA religiosity measures. For example, a hierarchal multilinear regression model examining religiosity and health promoting showing statistical significance, $R^2 = .21$, $F(4, 86) = 5.9$, $p = .02$ explained approximately 21% of the variance in health-promoting behaviors, an improvement of 11% after the incorporation of the religiosity variable in the model (Cyphers, Clements, & Lindseth, 2016). Therefore, this study's findings are in line with what has been previously reported in the

literature by also suggesting that religiosity significantly influences the level of HPV knowledge.

In summary, women with high IR scores showed low HPV awareness and relative high HPV knowledge. While it may appear that HPV awareness and HPV knowledge are not consistent in their correlation with religiosity scores, it should be noted that HPV knowledge scores were only analyzed for participants aware of HPV; those that reported having heard of HPV prior to the study. This could help explain this seeming discrepancy. Therefore, there are two important points to consider: (a) women aware of HPV demonstrated a relative high HPV knowledge; (b) religiosity seemed to play a role in both HPV awareness and HPV knowledge.

Attitudes towards Premarital Sex, Religiosity, and HPV Knowledge

This study also explored the relationship between *attitudes towards premarital sex*, the three subscales of religiosity, and HPV Knowledge. As reported in Chapter 4, there were strong negative correlations between *attitudes towards premarital sex* and all three subscales of religiosity. These results suggest that higher levels of ORA, NORA, or IR likely result in a more conservative attitude towards premarital sex. This *religiosity*-promoted behavioral conservativism may explain the legitimate disregard for HPV-related information.

Additional factors that may be considered include *age* and *marital status*. The majority of the women in the study participants were between the ages of 45 and 54 years of age and were married or had been married at some point in the past. As previously discussed, being older, being married, or ever been married corresponded to higher levels

of religiosity, at all levels (ORA, NORA, and IR); thus, a more conservative attitude towards premarital sex. Married women demonstrated higher scores for both NORA & IR, while women widowed, divorced, or separated had higher ORA scores. A component of IR, participation in private religious activities such as prayer, reading the Bible, watching or listening to religious programming, is a significant predictor of NORA (non-organizational religious activity). However, IR is not a significant predictor of ORA. The higher scores for ORA among this group, which represent higher involvement in organizational religious activities such as attending church or participating in other group-related religious activities including prayer groups and bible study groups, may be related to a greater need or desire for the socialization aspect of ORA.

Findings in the Context of the Theoretical Framework

The schemata theory and social identity theory posed the theoretical framework for this study. The schemata theory describes how new knowledge is organized to facilitate its classification and organization based on prior knowledge (Mazzone, 2015). The social identity theory explores how an individual's perceptions, attitudes, and behaviors are defined by their categorization of themselves and others (Turner & Tajfel 2004). Associations with other individuals, social, cultural, or religious groups forge social identities (Haslam, Jetten, Postmes, & Haslam, 2009). Therefore, religiosity represents a construct of interest when reconciling gaps in HPV awareness and knowledge in certain population groups.

It has been established that religion exerts a strong influence on lifestyle and health (Yeary, Ounpraseuth, Moore, Bursac, & Greene, 2012). Intrinsic religiosity (IR), a

subscale of the DUREL, evaluates the level of a person's religious commitment or motivation (Koenig & Büssing, 2010). Allport and Ross (1697) described this intrinsic orientation as follows:

> Persons with this orientation find their master motive in religion. Other needs, strong as they may be, are regarded as of less ultimate significance, and they are, so far as possible, brought into harmony with the religious beliefs and prescriptions. Having embraced a creed, the individual endeavors to internalize it and follow it fully. It is in this sense that he [she] *lives* his [her] religion. (Allport & Ross, 1967, p. 434).

This definition of IR suggests that decreased HPV awareness among some women could be explained by self-exclusion and the result of a perceived lack of personal relevance of the topic. This assessment aligns with the premise posited by the social identity theory (Wynne, 1992) and previously discussed in Chapter 2. In fact, Koenig and Büssing (2010) found that the one item on the IR subscale that best predicted the total subscale score was question 4: "My religious beliefs are what really lie behind my whole approach to life" (p. 82). It is not surprising then that a high level of religiosity also correlated with a conservative attitude towards premarital sex. Women with high IR scores project a level of religiosity that frames their *whole approach to life* (Koenig & Büssing, 2010). This religious framework also informs their conservative attitude toward premarital sex, which presents a reasonable explanation for the lower HPV awareness; a lower HPV awareness influenced by IR-induced diminished personal relevance between STIs/STDs and HPV. Furthermore, the influence of religiosity on self-regulation and

self-control may also play a role in diminished HPV awareness. General religiosity and IR are associated with higher self-control (McCullough & Willoughby, 2009) and could explain the associations of religiousness with many important life outcomes. The mediating influence of religiosity on implicit self-regulation tends to be "more pronounced among individuals who had fully internalized their religious beliefs" (Koole, McCullough, Kuhl, & Roelofsma, 2010, p. 103). Therefore, women that demonstrate a higher level of intrinsic religiosity (IR) may exhibit two very important characteristics. First, they may be less likely to participate in sexual behaviors that are considered *risky*, as the correlation between religiosity and attitude towards premarital sex suggests, and more likely to possess an increased sensitivity to the stigma associated with STDs/STIs as supported by their religious commitment. Being that HPV is categorized as an STI, these women may legitimately disregard HPV-related information as personally irrelevant because they do not see themselves participating in sexual behaviors commonly associated with STDs/STIs. The heuristic form of information processing, the most economical way of processing information by requiring minimum cognitive effort (Chaiken, 1980), may help explain why women in his category may disregard information about HPV due to low personal involvement or a perceived lack of relevance. This cognition bias result from the violation of rationality standards as well as "systematic and predictable errors in judgment [resulting] from reliance on heuristics" (Blumenthal-Barby & Krieger, 2015, p. 1).

Among older married individuals, religiosity is largely unrelated to sexual frequency (McFarland, Uecker, & Regnerus, 2011). Therefore, it should be emphasized

that this study's findings do not suggest that religious women are less likely than non-religious women to engage in sexual activities within the context of marriage, but rather than they understand marriage to be the appropriate context for sexual activities.

Among adolescents, religiosity does not seem to moderate sexual abstinence, but rather the type of sexual encounter, which could stem from a desire to avoid potential long-lasting and life-changing consequences such as pregnancy and/or STD/STIs (Uecker, Angotti, & Regnerus, 2008). Nevertheless, religious adolescents, those that claim to internalize religion (measured in this study as IR) are more likely to choose total abstinence (Uecker, Angotti, & Regnerus, 2008), whatever their motivation may be. Although these findings further support the proposed mediating role of religiosity on self-regulation/self-control, they are based on a much younger population, do not incorporate the boundaries of a marriage relationship, and therefore, should be evaluated cautiously when used to compare associations between religiosity and sexual behaviors in older individuals.

Second, these women may be more likely to inform themselves about HPV upon developing HPV awareness. A factor that may explain the high HPV knowledge seen among the participants in this study.

Limitations of the Study

A limitation in this study is that participants were recruited from only one Christian university leading to possible section bias. Because of this, the sample may not be representative of the population of other Christian universities. However, the results may be generalized to other Seventh-day Adventist Universities as rarely non Adventist

Christians are employed at these institutions. Nevertheless, the nature of the study population may have contributed to the high scores in all of the religiosity subscales and the absence of clear discriminating differences in areas such as the role of *age* and *education* on HPV awareness.

Additionally, religiosity is a complex construct and while the DUREL has been validated as tool to assess religiosity in epidemiological studies (Koenig & Büssing, 2010) there are aspects of it (i.e. intrinsic religiosity versus health locus of control) that remain difficult to ascertain with precision (Darvyri et al., 2014).

Recommendations

To my knowledge, this is the first study that has investigated religiosity as a construct of HPV awareness and knowledge in women 27 years of age at a Christian university. Based on the review of the literature and the findings of this study, there are several areas in which recommendations can be made.

First, this research points towards the importance of recognizing religiosity as a constructor HPV awareness and knowledge. It supports the notion that religiosity should be taken into consideration when designing and delivering HPV-related public health messages. A popular HPV vaccination campaign used a “risk message” to promote vaccination (Grantham, Ahern, & Connolly-Ahern, 2011). This approach may prove ineffective in gaining compliance from religious women as their religiosity, particularly IR, may promote a sense of decreased personal relevance between STIs/STDs and HPV. Further research is recommended to determine the efficacy of health promotion campaigns that account for levels of religiosity.

Second, this study emphasizes the need to consider women 27 years of age as key players in primary prevention of cervical cancer and HPV vaccination campaigns. Further research in this area would help determine suitable health promotion marketing strategies. One suggestion is to incorporate HPV education as part of their health and wellness program and annual health fair all employees are required to attend.

Lastly, some limitations to this study provide ideas for further research. This study recruited participants from only one Christian university. Opening the survey to other Seventh-day Adventist sister institutions as well as other Christian colleges could prove valuable. Another area of interest would be a further clarification between intrinsic religiosity and health locus of control.

Implications for Social Change

While preventable, cervical cancer continues to be a significant cause of morbidity for women in the Unites States (Siegel, Miller, & Jemal, 2016). This research study contributes to the field of public health by addressing religiosity, a seldom-explored construct of HPV awareness and knowledge.

Religiosity has been favorably associated with physical health and health promoting behaviors (Koenig, King, & Carson, 2012). However, the findings of this study suggest that higher levels of religiosity may influence lower levels of HPV awareness and knowledge, a factor that has the potential to be detrimental to health. Therefore, public health interventions should account for religiosity as a construct for HPV awareness and knowledge. Furthermore, this study underscores the need to consider women 27 years of age as key players in HPV prevention campaigns. While no longer

eligible for the HPV vaccine themselves, these women represent the caretakers of the younger generation of girls and boys and possess within the power the shape a new generation of HPV-protected individuals. In addition to the findings of this study, others have reported that women with higher levels of religiosity have reported feeling a greater level of discomfort in discussing sexual topics with their children (Farringdon, Holgate, McIntyre, & Bulsara, 2014). This, coupled with the *modesty* constrains that may be inherent to or imposed by religiosity, constitutes an area for serious consideration when addressing HPV awareness and knowledge and planning for HPV vaccination campaigns.

In line with the premise of this study, the findings suggest that HPV prevention campaigns should take into consideration social identities such as religiosity. The findings also suggest that public health educational strategies could take advantage of organizational religious activities (ORA) to increase HPV awareness, disseminate HPV information, and clarify HPV knowledge. Understanding how the schemata and social identity theories facilitate, and in some cases impede, the uptake of information appears essential in dissemination of HPV information among religious women. The schemata theory posits that knowledge is organized into categories or schemas defined by established frames of reference and relevance (DiMaggio, 1997). Once these categories or schemas have formed, organization of knowledge occurs mostly without a conscious effort for further evaluation for personal meaning or relevance. This heuristic approach to information processing (Chaiken, 1980) may help explain why older religious women may disregard information about HPV.

Understanding that heuristics may be at the root of low HPV awareness in certain population groups allows for better designed targeted campaigns. One recommendation might be to consider the *increasing argument quantity and quality* approach to improving HPV awareness among older highly religious women. This approach can influence a change in attitude even if the individual is not specifically thinking about the argument (Petty, Cacioppo, & Goldman, 1981). This expert *argument manipulation* works by ushering the unmotivated individual to rationalize that "the more arguments the better" and their attitude may change even in the absence of intentionally thinking or scrutinizing the arguments (Petty & Cacioppo, 1984, p. 70).

Lastly, understanding ways in which religiosity may pose as a barrier to health is of paramount value to Seventh-day Adventist Christians who subscribe to the Health Message as presented by Ellen G. White, an early church writer whose writings are acknowledged as inspired by God. The Health Message is an integral part of the Seventh-day Adventist church teaching and it is actively encouraged for all members. The Health Message has been a hallmark of the Seventh-day Adventist Church and it encompasses a wholesome lifestyle including diet, exercise, and the abstinence of drugs such as alcohol and tobacco. By describing the role of religiosity in HPV awareness and knowledge, this study expands the boundaries of knowledge and provides additional resources that may be helpful in improving communication strategies when presenting and discussing the topic of HPV to Seventh-day Adventist Christian women.

Conclusion

In conclusion, religiosity was a significant predictor of HPV awareness and knowledge. IR was inversely related to HPV awareness. In contract, high IR scores predicted higher HPV knowledge among women aware of HPV.

These findings contribute to the field of public health by addressing religiosity and support the inclusion of religiosity as a construct of HPV awareness and knowledge. Addressing HPV knowledge gaps is an importance aspect of cancer prevention and control. Therefore, HPV prevention campaigns should take into consideration religiosity as a social identity.

The results of this study also highlighted that while religiosity traditionally has been associated with enhanced health, there may be instances in which religiosity may pose as a barrier to health. These instances relate to the reliance on heuristics.

Lastly, the findings suggest that public health educational strategies could take advantage of organizational religious activities (ORA) to increase HPV awareness, disseminate HPV information, and clarify HPV knowledge. Therefore, public health interventions should account for religiosity as a construct for HPV awareness.

References

Adamczyk, A. (2012). Investigating the role of religion-supported secular programs for explaining initiation into first sex. *Journal for the Scientific Study of Religion, 51*(2), 324-342. doi: 10.1111/j.1468-5906.2012.01644.x

Adamczyk, A., & Felson, J. (2006). Friends' religiosity and first sex. *Social Science Research, 35*(4), 924-947. Retrieved from http://www.sciencedirect.com/science/article/pii/S0049089X0500030X

Allport, G. W., & Ross, J. M. (1967). Personal religious orientation and prejudice. *Journal of Personal and Social Psychology, 5*(4), 432-443. Retrieved from https://scholar.google.com/scholar?cluster=15176561718092331198&hl=en&as_sdt=0,23

American Cancer Society. 2016. What is HPV? http://www.cancer.org/cancer/cancercauses/othercarcinogens/infectiousagents/hpv/humanpapillomavirusandhpvvaccinesfaq/hpv-faq-what-is-hpv

Anye, E. T., Gallien, T. L., Bian, H., & Moulton, M. (2013). The relationship between spiritual well-being and health-related quality of life in college students. *Journal of American College Health, 61*(7), 414-421. Retrieved from http://web.b.ebscohost.com.ezp.waldenulibrary.org/ehost/detail/detail?sid=757b0a09-e970-43d7-b946-2157d6017e4d%40sessionmgr102&vid=0&hid=116&bdata=JnNpdGU9ZWhvc3QtbGl2ZSZzY29wZT1zaXRl#AN=104223711&db=rzh

Avanzi, S., Alvisi, G., & Ripalti, A. (2013). How virus persistence can initiate the tumorigenesis process. *World Journal of Virology*, *2*(2), 102–109. doi: 10.5501/wjv.v2.i2.102

Bandura, A. (2002). Social cognitive theory in cultural context. *Applied Psychology*, *51*(2), 269-290. doi: 10.1111/1464-0597.00092

Barkan, S. E. (2006). Religiosity and premarital sex in adulthood. *Journal for the Scientific Study of Religion*, *45*(3), 407-417. doi: 10.1111/j.1468-5906.2006.00315.x

Benevolo, M., Dona, M. G., Ravenda, P. S., & Chiocca, S. (2016). Anal human papillomavirus infection: Prevalence, diagnosis and treatment of related lesions. *Expert Review of Anti-Infective Therapy*, *14*(5), 465-477. doi: 10.1586/14787210.2016.1174065

Benjamins, M. R., & Brown, C. (2004). Religion and preventative health care utilization among the elderly. *Social Science & Medicine, 58*(1), 109-118. Retrieved from http://www.sciencedirect.com/science/article/pii/S0277953603001527

Benjamins, M. R., Ellison, C. G., Krause, N. M., & Marcum, J. P. (2011). Religion and preventive service use: do congregational support and religious beliefs explain the relationship between attendance and utilization? *Journal of Behavioral Medicine, 34*(6), 462-476. doi: 10.1007/s10865-011-9318-8

Berg, K. E., & Latin, R. W. (2008). *Essentials of research methods in health, physical education, exercise science, and recreation*. Philadelphia, PA: Lippincott Williams & Wilkins.

Bhar, V. S., Gupta, N., Singh, M. P., Nijhawan, R., Srinivasan, R., Suri, V., & Rajwanshi, A. (2015). Human papillomavirus (HPV) types 16 and 18 in liquid-based cervical cytology samples. *Virchows Archiv*, *466*(6), 711-715. doi:10.1007/s00428-015-1750-7

Blake, K. D., Ottenbacher, A. J., Rutten, L. J. F., Grady, M. A., Kobrin, S. C., Jacobson, R. M., & Hesse, B. W. (2015). Predictors of human papillomavirus awareness and knowledge in 2013: Gaps and opportunities for targeted communication strategies. *American Journal of Preventive Medicine, 48*(4), 402-410. doi:10.1016/j.amepre.2014.10.024.

Blumenthal-Barby, J. S., & Krieger, H. (2015). Cognitive biases and heuristics in medical decision making: A critical review using a systematic search strategy. *Medical Decision Making*, *35*(4), 539-557. doi: 10.1177/0272989X14547740

Bonelli, R. M., & Koenig, H. G. (2013). Mental disorders, religion and spirituality 1990 to 2010: A systematic evidence-based review. *Journal of Religion and Health*, *52*(2), 657-673. doi: 10.1007/s10943-013-9691-4

Burchell, A. N., Winer, R. L., de Sanjosé, S., & Franco, E. L. (2006). Chapter 6: Epidemiology and transmission dynamics of genital HPV infection. *Vaccine, 24*(Suppl. 3), S52-S61. Retrieved from http://www.sciencedirect.com/science/article/pii/S0264410X06005767

Bzhalava, D., Guan, P., Franceschi, S., Dillner, J., & Clifford, G. (2013). A systematic review of the prevalence of mucosal and cutaneous human papillomavirus types.

Virology, *445*(1), 224-231. Retrieved from http://www.sciencedirect.com/science/article/pii/S0042682213004352

Centers for Disease Control and Prevention. (2012). Human papillomavirus-associated cancers-United States, 2004-2008. *MMWR. Morbidity and Mortality Weekly Report*, *61* (15), 258-261. doi: 10.1111/j.1600-6143.2012.04188.x

Centers for Disease Control and Prevention. (2016). Genital HPV infection-fact sheet. Retrieved from http://www.cdc.gov/std/hpv/stdfact-hpv.htm

Chaiken, S. (1980). Heuristic versus systematic information processing and the use of source versus message cues in persuasion. *Journal of Personality and Social Psychology*, *39*(5), 752-766. Retrieved from http://www.unc.edu/~fbaum/teaching/articles/jpsp-1980-Chaiken.pdf

Chaitanya, N. C., Allam, N. S. J., Babu, D. G., Waghray, S., Badam, R. K., & Lavanya, R. (2016). Systematic meta-analysis on association of human papilloma virus and oral cancer. *Journal of Cancer Research and Therapeutics*, *12*(2), 969-974. doi: 10.4103/0973-1482.179098

Clifford, G. M., Rana, R. K., Franceschi, S., Smith, J. S., Gough, G., & Pimenta, J. M. (2005). Human papillomavirus genotype distribution in low-grade cervical lesions: comparison by geographic region and with cervical cancer. *Cancer Epidemiology Biomarkers & Prevention*, *14*(5), 1157-1164. doi: 10.1158/1055-9965.EPI-04-0812

Clifford, G. M., Smith, J. S., Plummer, M., Munoz, N., & Franceschi, S. (2003). Human papillomavirus types in invasive cervical cancer worldwide: A meta-analysis. *British Journal of Cancer*, *88*(1), 63-73. doi:10.1038/sj.bjc.6600688

Coggin Jr, J. R., & zur Hausen, H. (1979). Workshop on papillomaviruses and cancer. *Cancer Research*, *39*(2), 545-546. Retrieved from http://cancerres.aacrjournals.org/content/canres/39/2_Part_1/545.full.pdf

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: Lawrence Earlbaum Associates.

Constantine, N. A., & Jerman, P. (2007). Acceptance of human papillomavirus vaccination among Californian parents of daughters: A representative statewide analysis. *Journal of Adolescent Health*, *40*(2), 108-115. Retrieved from http://www.sciencedirect.com/science/article/pii/S1054139X06004137

Cornet, I., Gheita, T., Franceschia, S., Vignata, J., Burkb, R. D., Syllaa, B. S., … IARC HPV Variant Study Group. (2012). Human papillomavirus type 16 genetic variants: Phylogeny and classification based on E6 and LCR. *Journal of Virology*, *86*(12), 6855-6861. doi: 10.1128/JVI.00483-12

Cubie, H. A. (2013). Diseases associated with human papillomavirus infection. *Virology*, *445*(1), 21-34. Retrieved from http://www.sciencedirect.com/science/article/pii/S0042682213003565

Cyphers, N. A., Clements, A. D., & Lindseth, G. (2016). The relationship between religiosity and health-promoting behaviors in pregnant women. *Western Journal of Nursing Research*, 1-18. doi: 10.1177/0193945916679623

Daley, E. M., Perrin, K. M., McDermott, R. J., Vamos, C. A., Rayko, H. L., Packing-Ebuen, J., … McFarlane, M. (2010). The psychosocial burden of HPV: A mixed-method study of knowledge, attitudes and behaviors among HPV+ women. *Journal of Health Psychology*, *15*(2) 279-290. doi: 10.1177/1359105309351249.

Darvyri, P., Galanakis, M., Avgoustidis, A. G., Pateraki, N., Vasdekis, S., & Darviri, C. (2014). The Revised Intrinsic/Extrinsic Religious Orientation Scale in a sample of Attica's inhabitants. *Psychology, 5*(13), 1557. Retrieved from http://file.scirp.org/pdf/PSYCH_2014092909275333.pdf

de Villiers, E. M. (2013). Cross-roads in the classification of papillomaviruses. *Virology, 445*(1), 2-10. Retrieved from http://www.sciencedirect.com/science/article/pii/S0042682213002456

Dickson, E. L., Isaksson Vogel, I., Bliss, R. L., & Downs, L.S. (2013). Multiple-type HPV infections: A cross-sectional analysis of the prevalence of specific types in 309,000 women referred for HPV testing at the time of cervical cytology. *International Journal of Cancer*, 23(7). doi: 10.1097/IGC.0b013e31829e9fb4

DiMaggio, P. (1997). Culture and cognition. *Annual Review of Sociology, 23*, 263-287. doi:10.1146/annurev.soc.23.1.263.

DiStefano, A. S., Hui, B., Barrera-Ng, A., Quitugua, L. F., Peters, R., Dimaculangan, J., … Park Tanjasiri, S. (2012). Contextualization of HIV and HPV risk and prevention among Pacific Islander young adults in Southern California. *Social Science Medicine, 75*(4), 699-708. doi:10.1016/j.socscimed.2012.04.011.

Dodd, R. H., McCaffery, K. J., Marlow, L. A. V., Ostini, R., Zimet, G. D., & Waller, J. (2014). Knowledge of human papillomavirus (HPV) testing in the USA, the UK and Australia: An international survey. *Sexually Transmitted Infections*, *90*, 201–207. doi:10.1136/sextrans-2013-051402

Doorbar, J. (2006). Molecular biology of human papillomavirus infection and cervical cancer. *Clinical Science, 110*(5), 525-541. doi: 10.1042/CS20050369

Doorbar, J. (2016). Model systems of human papillomavirus-associated disease. *The Journal of Pathology*, *238*(2), 166-179. doi: 10.1002/path.4656

Doorbar, J., Egawa, N., Griffin, H., Kranjec, C., & Murakami, I. (2015). Human papillomavirus molecular biology and disease association. *Reviews in Medical Virology*, *25*(S1), 2-23. doi: 10.1002/rmv.1822

Dunne, E. F., Unger, E. R., Sternberg, M., McQuillan, G., Swan, D. C., Patel, S. S., & Markowitz, L. E. (2007). Prevalence of HPV infection among females in the United States. *Journal of the American Medical Association, 297*(8), 813-819. doi:10.1001/jama.297.8.813

Farringdon, F., Holgate, C., McIntyre, F., & Bulsara, M. (2014). A level of discomfort! Exploring the relationship between maternal sexual health knowledge, religiosity and comfort discussing sexual health issues with adolescents. *Sexuality Research and Social Policy, 11*(2), 95-103. doi: 10.1007/s13178-013-0122-9

Fernandez, M. E., McCurdy, S. A., Arvey, S. R., Tyson, S. K., Morales-Campos, D., Flores, B., … Sanderson, M. (2009). HPV knowledge, attitudes, and cultural

beliefs among Hispanic men and women living on the Texas-Mexico Border. *Ethnic Health, 14*(6), 607-624. doi: 10.1080/13557850903248621

Formana, D., de Martelb, C., Laceyc, C. J., Soerjomatarama, I., Lortet-Tieulenta, J., Brunid, L.,… Franceschib, S. (2012). Global burden of Human Papillomavirus and related diseases. *Vaccine, 30*(Supp. 5), F12–F23. Retrieved from https://www.researchgate.net/profile/Joannie_Lortet-Tieulent/publication/233836601_Global_Burden_of_Human_Papillomavirus_and_Related_Diseases/links/56a62f7a08aeca0fddcb472d.pdf

Francis, S. A., Battle-Fisher, M., Liverpool, J., Hipple, L., Mosavel, M., Soogun, S., & Mofammere, N. (2011). A qualitative analysis of South African women's knowledge, attitudes, and beliefs about HPV and cervical cancer prevention, vaccine awareness and acceptance, and maternal-child communication about sexual health. *Vaccine, 29*(47), 8760-8765. Retrieved from http://www.sciencedirect.com/science/article/pii/S0264410X11011662?via%3Dihub

Friedman, A. L. & Shepeard, H. (2007). Exploring the knowledge, attitudes, beliefs, and communication preferences of the general public regarding HPV. *Health Education & Behavior*, *34*, 471-485. doi: 10.1177/1090198106292022

Gao, H., Okoror, T. A., & Hyner, G. C. (2016). Focus group study of Chinese international students' knowledge and beliefs about HPV vaccination, before and after reading an informational pamphlet about Gardasil®. *Journal of Immigrant and Minority Health*, 1-8. doi: 10.1007/s10903-016-0349-7

Garcini, L. M., Murray, K. E., Barnack-Tavlaris, J. L., Zhou, A. Q., Malcarne, V. L., & Klonoff, E. A. (2015). Awareness and knowledge of human papillomavirus (HPV) among ethnically diverse women varying in generation status. *Journal of Immigrant and Minority Health, 17*(1), 29-36. doi: 10.1007/s10903-013-9913-6

Gerend, M., & Magloire, Z. F. (2008). Awareness, knowledge, and beliefs about human papillomavirus in a racially diverse sample of young adults. *Journal of Adolescent Health, 42*(3), 237-242. doi:10.1016/j.jadohealth.2007.08.022.

Gerend, M., & Shepherd, J. E. (2011). Correlates of HPV knowledge in the era of HPV vaccination: A study of unvaccinated young adult women. *Women & Health, 51*(1), 25-40. doi:10.1080/03630242.2011.540744

Ghittoni, R., Accardi, R., Chiocca, S., & Tommasino, M. (2015). Role of human papillomaviruses in carcinogenesis. *Ecancermedicalscience, 9*, 526. doi: 10.3332/ecancer.2015.526

Glenn, B. A., Tsui, J., Singhal, R., Sanchez, L., Nonzee, N. J., Chang, L. C., … Bastani, R. (2015). Factors associated with HPV awareness among mothers of low-income ethnic minority adolescent girls in Los Angeles. *Vaccine, 33*(2), 289-293. doi:10.1016/j.vaccine.2014.11.032

Gold, M. A., Sheftel, A. V., Chiappetta, L., Young, A. J., Zuckoff, A., DiClemente, C. C., & Primack, B. A. (2010). Associations between religiosity and sexual and contraceptive behaviors. *Journal of Pediatric and Adolescent Gynecology, 23*(5), 290-297. doi: 10.1016/j.jpag.2010.02.012

Gonnerman, M. E., Jr, Lutz, G. M., Yehieli, M., Meisinger, B. K. (2008). Religion and health connection: A study of African American, Protestant Christians. *Journal of Health Care for the Poor and Underserved*, *19*(1), 193–199. doi: 10.1353/hpu.2008.0020

Grantham, S., Ahern, L., & Connolly-Ahern, C. (2011). Merck's One Less campaign: Using risk message frames to promote the use of Gardasil® in HPV prevention. *Communication Research Reports*, *28*(4), 318-326. doi: 10.1080/08824096.2011.616243

Guan, P., Howell-Jones, R., Li, N., Bruni, L., de Sanjose, S., Franceschi, S., & Clifford, G. M. (2012). Human papillomavirus types in 115,789 HPV-positive women: A meta-analysis from cervical infection to cancer. *International Journal of Cancer*, *131*(10), 2349-2359. doi: 10.1002/ijc.27485

Harvey, I. S., Story, C. R., Knutson, D., & Whitt-Glover, M. C. (2016). Exploring the relationship of religiosity, religious support, and social support among African American women in a physical activity intervention program. *Journal of Religion and Health*, *55*(2), 495-509. doi: 10.1007/s10943-015-0017-6

Haslam, S. A., Jetten, J., Postmes, T., & Haslam, C. (2009). Social identity, health and well-being: An emerging agenda for applied psychology. *Applied Psychology*, *58*(1), 1-23. doi: 10.1111/j.1464-0597.2008.00379.x

Hassan, S. H. (2015). Effects of religious behavior on health-related lifestyles of Muslims in Malaysia. *Journal of religion and health*, *54*(4), 1238-1248. doi: 10.1007/s10943-014-9861-z

Hill, T. D., Ellison, C. G., Burdette, A. M., & Musick, M. A. (2007). Religious involvement and healthy lifestyles: Evidence from the survey of Texas adults. *Annals of Behavioral Medicine*, *34*(2), 217-222. doi: 10.1007/BF02872676

Homan, K. J., & Boyatzis, C. J. (2010). Religiosity, sense of meaning, and health behavior in older adults. *The International Journal for the Psychology of Religion*, *20*(3), 173-186. Retrieved from http://www.tandfonline.com/doi/full/10.1080/10508619.2010.481225

Hopenhayn, C., Christian, A., Christian, W. J., Watson, M., Unger, E. R., Lynch, C. F., … Saraiya, M. (2014). Prevalence of human papillomavirus types in invasive cervical cancers from seven US cancer registries prior to vaccine introduction. *Journal of Lower Genital Tract Disease, 18*(2), 182–189. doi: 10.1097/LGT.0b013e3182a577c7

Hutton, H. E., McCaul, M. E., Chander, G., Mollie, W. J., Nollen, C., Sharp, V. L., & Erbelding, E. J. (2013). Alcohol use, anal sex, and other risky sexual behaviors among HIV-infected women and men. *AIDS and Behavior, 17*(5), 1694–1704. doi: 10.1007/s10461-012-0191-4.

Inglehart, R. C., Taberna, M., Pickard, R. K. L., Hoff, M., Fakhry, C., Ozer, E., ... Gillison, M. L. (2016). HPV knowledge gaps and information seeking by oral cancer patients. *Oral Oncology, 63*, 23-29. Retrieved from http://www.sciencedirect.com.ezp.waldenulibrary.org/science/article/pii/S136883751630197X

Insinga, R. P., Liaw, K. L., Johnson, L. G., & Madeleine, M. M. (2008). A systematic review of the prevalence and attribution of Human Papillomavirus types among cervical, vaginal, and vulvar precancers and cancers in the United States. *Cancer Epidemiology, Biomarkers & Prevention, 17(7),* 1611- 1622. doi: 10.1158/1055-9965.EPI-07-2922

International Agency for Research on Cancer [IARC]. (2012). Human Papillomaviruses. *Monograph on the Evaluation for Carcinogenic Risks to Humans, 100B,* 255-296. Lyon: France. Retrieved from http://monographs.iarc.fr/ENG/Monographs/vol100B/mono100B.pdf

Jayaprakash, V., Reid, M., Hatton, E., Merzianu, M., Rigual, N., Marshall, J., ... Popat, S. (2011). Human papillomavirus types 16 and 18 in epithelial dysplasia of oral cavity and oropharynx: A meta-analysis, 1985–2010. *Oral Oncology*, *47*(11), 1048-1054. doi: 10.1016/j.oraloncology.2011.07.009

Jemal, A., Bray, F., Center, M. M., Ferlay, J., Ward, E., & Forman, D. (2011). Global cancer statistics. *CA: A Cancer Journal for Clinicians*, *61*(2), 69-90. doi: 10.3322/caac.20107

Jemal, A., Simard, E. P., Dorell, C., Noone, A.-M., Markowitz, L. E., Kohler, B., …Edwards, B. K. (2013). Annual report to the nation on the status of cancer, 1975–2009, featuring the burden and trends in human papillomavirus (HPV)–associated cancers and HPV vaccination coverage levels. *Journal of the National Cancer Institute, 105*(3), 175-201. doi: 10.1093/jnci/djs491

Kaye, J., & Raghavan, S. K. (2002). Spirituality in disability and illness. *Journal of Religion and Health, 41*(3), 231–242. doi: 10.1023/A:1020284819593

Keith, T. Z. (2014). *Multiple regression and beyond: An introduction to multiple regression and structural equation modeling* (2nd ed.). New York: Routledge Taylor & Francis Group.

Kim, K. H. C., & Sobal, J. (2004). Religion, social support, fat intake and physical activity. *Public Health Nutrition, 7*(6), 773-781. doi: 10.1079/PHN2004601

Klug, S. J., Hukelmann, M., & Blettner, M. (2008). Knowledge about infection with human papillomavirus: A systematic review. *Preventive Medicine*, *46*(2), 87–98. doi:10.1016/j.ypmed.2007.09.003

Koenig, H. G. (2008). *Medicine, religion, and health: Where science and spirituality meet.* Pennsylvania: Templeton Foundation Press.

Koenig, H. G., & Büssing, A. (2010). The Duke University Religion Index (DUREL): A five-item measure for use in epidemiological studies. *Religions*, *1*, 78-85. doi: 10.3390/rel1010078

Koenig, H. G., Hays, J. C., George, L. K., Blazer, D. G., Larson, D. B., & Landerman, L. R. (1997). Modeling the cross-sectional relationships between religion, physical health, social support, and depressive symptoms. *The American Journal of Geriatric Psychiatry*, *5*(2), 131-144. Retrieved from http://www.sciencedirect.com/science/article/pii/S1064748112610975

Koenig, H. G., King, D. E., & Carson, V. B. (2012). *Handbook of religion and health* (2nd ed.). New York: Oxford University Press.

Koole, S. L., McCullough, M. E., Kuhl, J., & Roelofsma, P. H. (2010). Why religion's burdens are light: From religiosity to implicit self-regulation. *Personality and Social Psychology Review, 14*(1), 95-107. doi: 10.1177/1088868309351109

Kuwabara, M., & Smith, L. B. (2016). Cultural differences in visual object recognition in 3-year-old children. *Journal of Experimental Child Psychology, 147*, 22-38. Retrieved from http://www.sciencedirect.com/science/article/pii/S0022096516000345

León, L., Brown, B., Torres, L., Allen-Leigh, B., Salmeron, J., & Lazcano-Ponce, E. (2015, November). Stigma of having a sexually transmitted infection: Perceptions of human papillomavirus infection and the needs for counseling. Presentation at the American Public Health Association annual meeting, Chicago, IL.

Levin, J. S., Taylor, R. J., & Chatters, L. M. (1994). Race and gender differences in religiosity among older adults: Findings from four national surveys. *Journal of Gerontology, 49*(3), S137-S145. doi: https://doi.org/10.1093/geronj/49.3.S137

Levin, K. A. (2006). Study design III: Cross-sectional studies. *Evidence-Based Dentistry, 7*, 24–25. doi:10.1038/sj.ebd.6400375

Li, N., Franceschi, S., Howell-Jones, R., Snijders, P. J., & Clifford, G. M. (2011). Human papillomavirus type distribution in 30,848 invasive cervical cancers worldwide: Variation by geographical region, histological type and year of publication. *International Journal of Cancer*, *128*(4), 927-935. doi: 10.1002/ijc.25396

Markowitz, L. E., Dunne, E. F., Saraiya, M., Chesson, H., Curtis, C. R., Gee, J., … Unger, E. R. (2014). Human papillomavirus vaccination: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Recommendations & Reports, 63*(RR05), 1-30. Retrieved from https://www.cdc.gov/mmWR/preview/mmwrhtml/rr6305a1.htm

Markowitz, L. E., Hariri, S., Lin, C., Dunne, E. F., Steinau, M. McQuillan, G., & Unger, E. R. (2013). Reduction in Human Papillomavirus (HPV) prevalence among young women following HPV vaccine introduction in the United States, National Health and Nutrition Examination Surveys, 2003–2010. *The Journal of Infectious Diseases, 208*(3), 385-393. doi: 10.1093/infdis/jit192

Marlow, L. A. V., Waller, J., & Wardle, J. (2015). Barriers to cervical cancer screening among ethnic minority women: a qualitative study. *Journal of Family Planning and Reproductive Health Care, 0*, 1-7. doi: 10.1136/jfprhc-2014-101082

Marlow, L. A. V., Zimetb G. D., McCaffery, K. J., Ostini, R., & Waller, J. (2013). Knowledge of Human Papillomavirus (HPV) and HPV vaccination: An international comparison. *Vaccine, 31*(5), 763–769. doi:10.1016/j.vaccine.2012.11.083

Mazzone, M. (2015). Constructing the context through goals and schemata: Top-down processes in comprehension and beyond. *Frontiers in Psychology, 6*, 651. doi: 10.3389/fpsyg.2015.00651

McCullough, M. E., & Willoughby, B. L. (2009). Religion, self-regulation, and self-control: Associations, explanations, and implications. *Psychological Bulletin, 135*(1), 69-93. Retrieved from https://www.researchgate.net/profile/Michael_Mccullough2/publication/24001207_Religion_Self-Regulation_and_Self-Control_Associations_Explanations_and_Implications/links/00463525bc60172b69000000.pdf

McFarland, M. J., Uecker, J. E., & Regnerus, M. D. (2011). The role of religion in shaping sexual frequency and satisfaction: Evidence from married and unmarried older adults. *Journal of Sex Research, 48*(2-3), 297-308. doi: 10.1080/00224491003739993

McLaughlin-Drubin, M. E. (2015). Human papillomaviruses and non-melanoma skin cancer. *Seminars in Oncology, 42*(2), 284–290. Retrieved from http://www.sciencedirect.com/science/article/pii/S0093775414003030

Mighty, K. K., & Laimins, L. A. (2014). The role of human papillomaviruses in oncogenesis. *Viruses and Human Cancer, 193*, 135-148. doi: 10.1007/978-3-642-38965-8_8

Miller, L., Bansal, R., Wickramaratne, P., Hao, X., Tenke, C. E., Weissman, M. M., & Peterson, B. S. (2014). Neuroanatomical correlates of religiosity and spirituality: a study in adults at high and low familial risk for depression. *Journal of the American Medical Association Psychiatry, 71*(2), 128-135. doi:10.1001/jamapsychiatry.2013.3067

Monsonego, J., Cox, J. T., Behrens, C., Sandri, M., Franco, E. L., Yap, P. S., & Huh, W. (2015). Prevalence of high-risk human papilloma virus genotypes and associated risk of cervical precancerous lesions in a large US screening population: Data from the ATHENA trial. *Gynecologic oncology*, *137*(1), 47-54. Retrieved from http://www.sciencedirect.com/science/article/pii/S0090825815006034

Morris, J. L., Lippman, S. A., Philip, S., Bernstein, K., Neilands, T. B., & Lightfoot, M. (2014). Sexually transmitted infection related stigma and shame among African American male youth: Implications for testing practices, partner notification, and treatment. *AIDS Patient Care & Standards, 28*(9), 499-506. doi:10.1089/apc.2013.0316

Muñoz, N., Bosch, F. X., de Sanjosé, S., Herrero, R., Castellsagué, X., Shah, K. V., … Meijer, J. L. M. (2003). Epidemiologic classification of Human Papillomavirus types associated with cervical cancer. *New England Journal of Medicine, 348*(6), 518-527. doi: 10.1056/NEJMoa021641

National Cancer Institute (2014). Health Information National Trends Survey 4, Cycle 4. Retrieved from http://hints.cancer.gov/instrument.aspx

Nielsen, A. R., & Hayney, M. S. (2014). Human papillomavirus: A brief overview and recommendations for pharmacists. *Journal of the American Pharmacists Association, 54*(5), 558-561. Retrieved from http://www.sciencedirect.com/science/article/pii/S1544319115302442?via%3Dihub

Nygård, M., Hansen, B. T., Dillner, J., Munk, K., Oddsson, K., Tryggvadottir, L., … Krüger Kjær, S. (2014). Targeting human papillomavirus to reduce the burden of cervical, vulvar and vaginal cancer and pre-invasive neoplasia: Establishing the baseline for surveillance. *PLoS One, 9*(2), e88323. doi: 10.1371/journal.pone.0088323

Osborne, J., & Waters, E. (2002). Four assumptions of multiple regression that researchers should always test. *Practical Assessment, Research & Evaluation, 8*(2), 1-9. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.463.508&rep=rep1&type=pdf

Petty, R. E., & Cacioppo, J. T. (1984). The effects of involvement on responses to argument quantity and quality: Central and peripheral routes to persuasion. *Journal of Personality and Social Psychology, 46*(1), 69-81. Retrieved from https://www.researchgate.net/profile/Richard_Petty/publication/232578958_The_effects_of_involvement_on_responses_to_argument_quantity_and_quality_Central_and_peripheral_routes_to_persuasion/links/02bfe50d05b12501e5000000/The-effects-of-involvement-on-responses-to-argument-quantity-and-quality-Central-and-peripheral-routes-to-persuasion.pdf

Petty, R. E., Cacioppo, J. T., & Goldman, R. (1981). Personal involvement as a determinant of argument-based persuasion. *Journal of Personality and Social Psychology*, *41*(5), 847-855. Retrieved from http://neuron4.psych.ubc.ca/~schaller/Psyc590Readings/PettyCacioppoGoldman1981.pdf

Piaget, J. (1923). "Langage et pensée chez l'enfant" (PDF). (3e éd. 1948 revue et avec un nouvel avant-propos et un nouveau chapitre II inséré utgave bind). Neuchâtel: Delachaux et Niestlé, p. 43f.

Pigott, T. D. (2001). A review of methods for missing data. *Educational Research and Evaluation, 7*(4), 353-383. Retrieved from http://www.stat.uchicago.edu/~eichler/stat24600/Admin/MissingDataReview.pdf

Pimenta, J. M., Galindo, C., Jenkins, D., & Taylor, S. M. (2013). Estimate of the global burden of cervical adenocarcinoma and potential impact of prophylactic human papillomavirus vaccination. *BioMed Central Cancer, 13*(553), 1-12. doi: 10.1186/1471-2407-13-553

Powell, L. H., Shahabi, L., Thoresen, C. E. (2003). Religion and Spirituality: Linkages to Physical Health. *American Psychologist, 58*(1), 36-52. doi: 10.1037/0003-066X.58.1.36

Raymond, N. C., Osman, w., O'Brien, J. M., Ali, N., Kia, F., Mohamed, F., … Okuyemi, K. (2014). Culturally informed views on cancer screening: a qualitative research study of the differences between older and younger Somali immigrant women. *BioMed Central Public Health, 14*(1188), 1-8. doi:10.1186/1471-2458-14-1188

Reimer, R. A., Schommer, J. A., Houlihan, A. E., & Gerrard, M. (2014). Ethnic and gender differences in HPV knowledge, awareness, and vaccine acceptability among white and Hispanic men and women. *Journal of Community Health, 39*(2), 274-284. doi: 10.1007/s10900-013-9773-y

Reyna, V. F. (2011). Risk perception and communication in vaccination decisions: A fuzzy-trace theory approach. *Vaccine, 30*(25), 3790–3797. Retrieved from http://www.sciencedirect.com/science/article/pii/S0264410X11018664

Reynolds, D. (2014). Religiosity and parental acceptance of human papillomavirus (HPV) vaccine in 9-18 year-old girls. *Journal of Christian Nurses, 31*(3), 172-177. doi: 10.1097/CNJ.0000000000000076

Richardson, H., Kelsall, G., Tellier, P., Voyer, H., Abrahamowicz, M., Ferenczy, A., ... Franco, E. L. (2003). The natural history of type-specific human papillomavirus infections in female university students. *Cancer Epidemiology Biomarkers & Prevention, 12*(6), 485-490. Retrieved from http://cebp.aacrjournals.org/content/12/6/485.short

Rosenthal, S. L., Rupp, R., Zimet, G. D., Meza, H. M., Loza, M. L., Short, M. B., & Succop, P. A. (2008). Uptake of HPV vaccine: Demographics, sexual history and values, parenting style, and vaccine attitudes. *Journal of Adolescent Health, 43*(3), 239-245. Retrieved from http://www.sciencedirect.com/science/article/pii/S1054139X08002644

Sadry, S. A., De Souza, L. R., & Yudin, M. H. (2013). The impact of ethnicity on awareness and knowledge of and attitudes towards the human papillomavirus and vaccine among adult women. *Journal of Obstetrics Gynaecology Canada, 35*(11), 995-1003. Retrieved from http://www.sciencedirect.com/science/article/pii/S1701216315307878

Santos-López, G., Márquez-Domínguez, L., Reyes-Leyva, J., & Vallejo-Ruiz, V. (2015). General aspects of structure, classification and replication of human papillomavirus. *Revista Médica del Instituto Mexicano del Seguro Social, 53,* S166-S171. Retrieved from http://revistamedica.imss.gob.mx/editorial/index.php/revista_medica/article/view/184

Saraiya, M., King, J., Thompson, T., Watson, M., Ajani, U., Li, J., Houston, K. A. (2013). Cervical cancer screening among women aged 18-30 years - United States, 2000-2010. *Journal of the American Medical Association, 309*(9), 868-870. doi:10.1001/jama.2013.107

Saraiya, M., Unger, E. R., Thompson, T. D., Lynch, C. F., Hernandez, B. Y., Lyu, C. W., ... Goodman, M. T. (2015). US assessment of HPV types in cancers: Implications for current and 9-valent HPV vaccines. *Journal of the National Cancer Institute, 107*(6), 1-12.

Saroglou, V. (2011). Believing, bonding, behaving, and belonging: The big four religious dimensions and cultural variation. *Journal of Cross-Cultural Psychology*, 42(8), 1320-1340. Retrieved from https://academic.oup.com/jnci/article-lookup/doi/10.1093/jnci/djv086

Saslow, D., Runowicz, C. D., Solomon, D., Moscicki, A. M., Smith, R. A., Eyre, H. J., & Cohen, C. (2002). American Cancer Society guideline for the early detection of cervical neoplasia and cancer. *CA: A Cancer Journal for Clinicians*, *52*, 342–362. doi: 10.3322/canjclin.52.6.342

Saslow, D., Solomon, D., Lawson, H. W., Killackey, M., Kulasingam, S., Cain, J., … Myers, E.R. (2012). American Cancer Society, American Society for Colposcopy and Cervical Pathology, and American Society for Clinical Pathology screening guidelines for the prevention and early detection of cervical cancer. *CA: A Cancer Journal for Clinicians, 62*(3), 147-172. doi/10.3322/caac.21139

Satterwhite, C. L., Torrone, E., Meites, E., Dunne, E. F., Mahajan, R., Banez Ocfemia, M. C., … Weinstock, H. (2013). Sexually transmitted infections among US women and men: Prevalence and incidence estimates, 2008. *Sexually Transmitted Diseases, 40*(3), 187–193. doi: 10.1097/OLQ.0b013e318286bb53

Sawaya, G. F., & Huchko, M. J. (2017). Cervical cancer screening. *Medical Clinics of North America, 101*(4), 743-753. doi:10.1016/j.mcna.2017.03.006

Schiffman, M., Wentzensen, N., Wacholder, S., Kinney, W., Gage, J. C., & Castle, P. E. (2011). Human papillomavirus testing in the prevention of cervical cancer. *Journal of the National Cancer Institute, 103*(5), 368-383. doi: 10.1093/jnci/djq562

Schottenfeld, D., & Beebe-Dimmer, J. (2015). The cancer burden attributable to biologic agents. *Annals of Epidemiology, 25*(3), 183-187. Retrieved from http://www.sciencedirect.com/science/article/pii/S1047279714005171

Sedgwick, P. (2014). Cross sectional studies: Advantages and disadvantages. *British Medical Journal, 348,* 1-2. doi: 10.1136/bmj.g2276

Seguin, R. A., Aggarwal, A., Vermeylen, F., & Drewnowski, A. (2016). Consumption frequency of foods away from home linked with higher body mass index and lower fruit and vegetable intake among adults: A cross-sectional study. *Journal of Environmental and Public Health, 2016(2016), 1-12*. Retrieved from https://www.hindawi.com/journals/jeph/2016/3074241/

Serrano, B., de Sanjosé, S., Tous, S., Quiros, B., Muñoz, N., Bosch, X., & Alemany, L. (2015). Human papillomavirus genotype attribution for HPVs 6, 11, 16, 18, 31, 33, 45, 52 and 58 in female anogenital lesions. *European Journal of Cancer, 51*(13), 1732-1741. Retrieved from http://www.sciencedirect.com/science/article/pii/S0959804915004918

Shelton, R. C., Snavely, A. C., De Jesus, M., Othus, M. D., & Allen, J. D. (2013). HPV Vaccine decision-making and acceptance: Does religion play a role? *Journal of Religion and Health*, 52, 1120–1130. doi: 10.1007/s10943-011-9553-x

Shukla, S., Mahata, S., Shishodia, G., Pande, S., Verma, G., Hedau, S., ... Das, B. C. (2014). Physical state & copy number of high risk human papillomavirus type 16 DNA in progression of cervical cancer. *The Indian Journal of Medical Research, 139*(4), 531-543. Retrieved from http://www.ijmr.org.in/article.asp?issn=0971-5916;year=2014;volume=139;issue=4;spage=531;epage=543;aulast=Shukla

Siegel, R. L., Miller, K. D., & Jemal, A. (2016). Cancer statistics, 2016. *CA: A Cancer Journal for Clinicians, 66*(1), 7-30. doi: 10.3322/caac.21332

Stanley, M. (2010). Pathology and epidemiology of HPV infection in females. *Gynecologic Oncology, 117*(2), S5–S10. doi:10.1016/j.ygyno.2010.01.024

Steinau, M., Unger, E. R., Hernandez, B. Y., Goodman, M. T., Copeland, G., Hopenhayn, C., … Saraiya, M. (2013). Human Papillomavirus prevalence in invasive anal cancers in the United States prior to vaccine introduction. *Journal of Lower Genital Tract Disease, 17*(4): 397-403. doi: 10.1097/LGT.0b013e31827ed372

Storch, E. A., Roberti, J. W., Heidgerken, A. D., Storch, J. B., Lewin, A. B., Killiany, E. M., ... Geffken, G. R. (2004). The Duke Religion Index: A psychometric investigation. *Pastoral Psychology, 53*(2), 175-181.

Storch, E. A., Strawser, M., S., & Storch, J. B. (2004). Two-week test-retest reliability of the Duke Religion Index 1. *Psychological Reports, 94*(3), 993-994. doi: 10.1023/B:PASP.0000046828.94211.53

Thomas, T. L., Strickland, O. L., DiClemente, R., Higgins, M., & Haber, M. (2012). Rural African American parents' knowledge and decisions about human papillomavirus vaccination. *Journal of Nursing Scholarship, 44*(4), 358–367. doi: 10.1111/j.1547-5069.2012.01479.x

Tiro, J. A., Meissner, H. I., Kobrin, S., & Chollette, V. (2007). What do women in the U.S. know about human papillomavirus and cervical cancer? *Cancer Epidemiology, Biomarkers & Prevention*, *16*, 288-294. doi: 10.1158/1055-9965.EPI-06-0756

Torre, L. A., Bray, F., Siegel, R. L., Ferlay, J., Lortet-Tieulent, J., & Jemal, A. (2015). Global cancer statistics, 2012. *CA: A Cancer Journal for Clinicians, 65*(2), 87-108. doi: 10.3322/caac.21262

Trim, K., Nagji, N., Elit, L., & Roy, K. (2011). Parental knowledge, attitudes, and behaviors towards human papillomavirus vaccination for their children: A systematic review from 2001 to 2011. *Obstetrics and Gynecology International*, *2012* (2012), 1-12. doi:10.1155/2012/921236

Trottier, H., & Franco, E. L. (2006). The epidemiology of genital human papillomavirus infection. *Vaccine*, *24*(Suppl 1), S4-S15. Retrieved from http://www.sciencedirect.com/science/article/pii/S0264410X05010182

Tunc, S. Y., Onan, M. A., Turp, A. B., Kusvuran, E. D., Fidans, I., & Guner, H. (2016). Prevalence and types of cervical human papillomavirus among Turkish women and its relationship with demographic factors in a gynecology outpatient clinic. *European Journal of Gynaecological Oncology*, *37*(1), 53-58. doi: 10.1186/1471-2334-9-191

Turner, J. C. & Reynolds, K. J. (2010). "The story of social identity". In T. Postmes & N. Branscombe. *Rediscovering Social Identity: Core Sources* (pp. 13-32). New York, NY: Psychology Press.

Turner, J. C., & Tajfel, H. (2004). The social identity theory of intergroup behavior. In J. Jost & J. Sidanius (Eds.), *Political psychology: Key readings* (pp. 276-293). New York, NY: Psychology Press.

Uecker, J. E., Angotti, N., & Regnerus, M. D. (2008). Going most of the way: "Technical virginity" among American adolescents. *Social Science Research, 37*(4), 1200-1215. Retrieved from http://www.sciencedirect.com/science/article/pii/S0049089X07000750

U.S. Cancer Statistics Working Group (2015). United States Cancer Statistics: 1999–2012 incidence and mortality web-based report. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute. Retrieved from www.cdc.gov/uscs.

Walboomers, J. M. M., Jacobs, M. V., Manos, M. M., Bosch, F. X., Kummer, J. A., Shah, K. V.,… Muñoz, N. (1999). Human papillomavirus is a necessary cause of invasive cervical cancer worldwide. *Journal of Pathology, 189*, 12-19. Retrieved from https://www.researchgate.net/profile/Nubia_Munoz/publication/12847339_Walboomers_JM_Jacobs_MV_Manos_M_Bosch_F_Kummer_A_Shah_K_Snijders_PJ_Peto_J_Meijer_CJ_Munoz_NHuman_papillomavirus_is_a_necessary_cause_of_invasive_cervical_cancer_worldwide_J_Pathol_189_12-19/links/554488fd0cf23ff716854167.pdf

Waller, J., & McCaffery, K. (2004). Measuring cancer knowledge: Comparing prompted and unprompted recall. *British Journal of Psychology, 95*(2), 219–234. doi: 10.1348/000712604773952430

Waller, J., Ostini, R., Marlow, L. A.V., McCaffery, K., & Zimet, G. (2013). Validation of a measure of knowledge about human papillomavirus (HPV) using item response theory and classical test theory. *Preventive Medicine, 56*(1), 35-40. doi:10.1016/j.ypmed.2012.10.028

Watkins, K. L., Reitzel, L. R., Wetter, D. W., McNeill, L. H. (2015). HPV awareness, knowledge and attitudes among older African-American women. *American Journal of Health Behavior, 39*(2), 205-211. doi: 10.5993/AJHB.39.2.7

Welgama, W. M. J., & De Silva, M. W. A. (2014). The Sinhalese old age and religiosity. [Abstract No. 126]. *Proceedings of the Peradeniya Univ. International Research Sessions, Sri Lanka, Vol. 18*, 4th & 5th.

Wilson, J. A., & Waghel, R. C. (2015). HPV: An updated guide to treatment and prevention. *US Pharmacist, 9*, 15. Retrieved from http://stage.uspharmacist.com/article/hpv-an-updated-guide-to-treatment-and-prevention

Wynne, B. (1992). Misunderstood misunderstanding: Social identities and public uptake of science. *Public Understanding of Science, 1*(3), 281-304. doi: 10.1088/0963-6625/1/3/004

Xi, L. F., & Koutsky, L. A. (1997). Epidemiology of genital human papillomavirus infections. *Bulletin de l'Institut Pasteur, 95*(3), 161-178. Retrieved from http://www.sciencedirect.com/science/article/pii/S002024529781370X

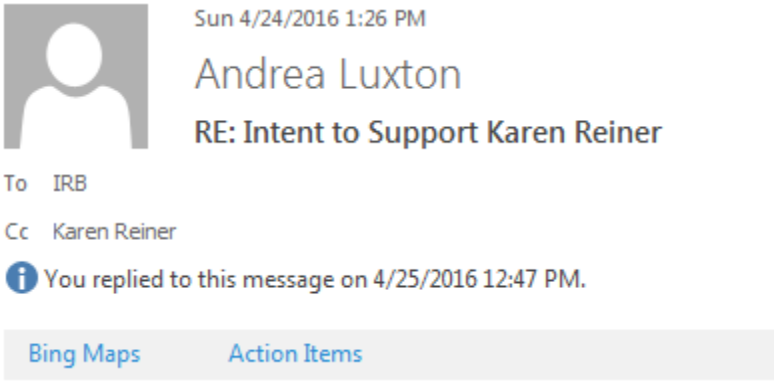
Yang, Z., Cuzick, J., Hunt, W. C., & Wheeler, C. M. (2014). Concurrence of multiple human papillomavirus infections in a large US population-based cohort. *American Journal of Epidemiology, 180*(11), 1066-1075. doi: https://doi.org/10.1093/aje/kwu267

Yeary, K., Ounpraseuth, S., Moore, P., Bursac, Z., & Greene, P. (2012). Religion, social capital, and health. *Review of Religious Research, 54*(3), 331-347. doi: 10.1007/s13644-011-0048-8

Young, M., Denny, G., Penhollow, T., Palacios, R., & Morris, D. (2015). Hiding the word: Examining the relationship between a new measure of religiosity and sexual behavior. *Journal of Religion and Health, 54*(3), 922-942. doi: 10.1007/s10943-013-9777-z

Zimmer, Z., Jagger, C., Chiu, C. T., Ofstedal, M. B., Rojo, F., & Saito, Y. (2016). Spirituality, religiosity, aging and health in global perspective: A review. *SSM-Population Health, 2*, 373-381. Retrieved from http://www.sciencedirect.com/science/article/pii/S2352827316300179

Appendix A: Intent to Support



From: Andrea Luxton
Sent: Sunday, April 24, 2016 1:26 PM
To: IRB
Cc: Karen Reiner
Subject: RE: Intent to Support Karen Reiner

I would like to confirm my support of Karen Reiner's project and her collecting information from AU. I understand this is all that is needed from me at this point. Please let me know if more is needed. I am also willing to help with the dissemination of the survey if and when that is needed.
Sincerely

Andrea Luxton
Provost

From: IRB
Sent: Friday, April 22, 2016 11:32 AM
To: Andrea Luxton
Subject: RE: Intent to Support Karen Reiner

Dr. Luxton,

This is in regard to Karen Reiner's request. Since she will be collecting data from AU personnel her protocol will have to be reviewed by AU IRB. What she is asking for now is an email or a response indicating that she will get support in administering her survey at Andrews University. The two IRB's (AU's and Walden's) will figure out who has primary oversight over her project. However, this can be figured by the two IRB's when Karen's protocol is submitted for review.
We are ready to review her protocol whenever it is submitted.
Thank you.

Mordekai Ongo
Research Integrity & Compliance Officer
Andrews University

From: Karen Reiner
Sent: Friday, April 22, 2016 11:05 AM
To: Andrea Luxton <
Cc: IRB <
Subject: Intent to Support

Greetings Dr. Luxton,

I received approval for my dissertation prospectus and I am now finalizing my dissertation proposal. The working title of my dissertation is: Religiosity as Predictor of HPV Knowledge and Awareness. The study will be a quantitative cross-sectional survey. The study population is all 27 years of age or older female faculty and support staff employed at Andrews University (this exclusion will be program in the on-line survey invitation). Assuming approval from Walden University and Andrews University IRBs, and based on conversations with Mordekai Ongo (Research & Creative Scholarship), the AU Office of the Provost would be one to send the official e-mail invitation to the survey on my behalf. I am required to provide written documentation (an email would be fine) to include in my proposal that I would have support from your office and AU IRB on this matter. In this documentation of Intent to Support there should also be a statement of any expectations/declarations of Andrews University – e.g. obtaining approval from the AU-IRB if you feel it is needed; AU has no vested interest in the findings of this study; or any other conflict(s) of interest.

I know this is a busy time of the year so I greatly appreciate and value your time and feedback.

Regards,

Karen

Karen A. Reiner, PhDc, MT(ASCP)
Department Chair, Program Director & Clinical Coordinator
Associate Professor
Medical Laboratory Sciences
Andrews University

" Seek Knowledge. Affirm Faith. Change the World."

Appendix B: Survey Invitation

Dear [Participant's Name],

My name is Karen Reiner and I am working on my doctoral dissertation at Walden University.

You are invited to take part in a research study to assess HPV awareness and knowledge among women employed at a Christian university. All female faculty and staff, ages 27 years or older, employed at Andrews University are being invited to participate. If you want to volunteer to support this research effort, click on the link below. The survey will take 20-25 minutes to complete.

Thank you for considering this invitation. Your participation and support of this research would be greatly appreciated!

[Insert Link to Survey HERE]

Sincerely,

Karen

Karen A. Reiner, PhD Candidate, MT(ASCP)
IRB #: _____
Expires: _____

Appendix C: Human Papillomavirus (HPV) Awareness and Knowledge Questionnaire

Thank you for agreeing to answer the questions in this questionnaire. Your answers will be confidential. This means that your name will not be recorded on the questionnaire and no one other than the researcher will have access to your responses.

Please read each question carefully and select one answer or write the answer in the space provided. If you have any questions about the study, contact the researcher. If you do not feel comfortable answering a question, you may leave it blank.

Demographics (5 items):

1. Age: What is your age?

   27-34 years old
   35-44 years old
   45-54 years old
   55-64 years old
   65-74 years old
   75 years or older

2. Ethnicity origin (or Race): Please specify your ethnicity.

   White
   Hispanic or Latino
   Black or African American
   Native American or American Indian
   Asian / Pacific Islander
   Other _____

3. Education: What is the highest degree or level of school you have completed? *If currently enrolled, highest degree received.*

   No schooling completed
   Nursery school to 8th grade
   Some high school, no diploma
   High school graduate, diploma or the equivalent (for example: GED)
   Some college credit, no degree
   Trade/technical/vocational training
   Associate degree
   Bachelor's degree
   Master's degree

Professional degree
Doctorate degree

4. Marital Status: What is your marital status?

   Single, never married (0)
   Married (1)
   Widowed (2)
   Divorced (3)
   Separated (4)
   Domestic partnership (living together, not married) (5)

Premarital Sex Values (1 item)

5. Which of the following best describes your view on when it is appropriate for a woman to have sexual intercourse?

   4 - A woman should not have sexual intercourse until she is married.
   3 - A woman should not have sexual intercourse until she is in a serious relationship and is a young adult.
   2 - A woman should not have sexual intercourse until she is in a serious relationship.
   1 - A woman should explore her sexuality when she is ready as long as she takes care of herself.

HPV Awareness (2 items)

6. Before today, had you ever heard of HPV? HPV stands for Human Papillomavirus. It is not Human Immunodeficiency Virus (HIV), Herpes Simplex Virus (HSV), or herpes.

   Yes
   No (if "no", GO TO question 24)

7. If yes, please indicate the source(s) of information:

   Healthcare provider
   Friend
   Internet
   Public media such as television, radio, or magazines
   - Other: _____

HPV knowledge (16 items) (Waller et al., 2013) - **Answer options: T, F, Don't Know**

8. HPV is very rare. (F)
9. HPV always has visible signs or symptoms. (F)
10. HPV can cause cervical cancer.
11. HPV can be passed on by genital skin-to-skin contact.
12. There are many types of HPV.
13. HPV can cause HIV/AIDS. (F)
14. HPV can be passed on during sexual intercourse.
15. HPV can cause genital warts.
16. Men cannot get HPV. (F)
17. Using condoms reduces the risk of getting HPV.
18. HPV can be cured with antibiotics. (F)
19. Having many sexual partners increases the risk of getting HPV.
20. HPV usually does not need any treatment.
21. Most sexually active people will get HPV at some point in their lives.
22. A person could have HPV for many years without knowing it.
23. Having sex at an early age increases the risk of getting HPV.

Religiosity (5 items):

24. How often do you attend church or other religious meetings? (ORA)
    1 – Never
    2 - Once a year or less
    3 - A few times a year

4 - A few times a month
5 - Once a week
6 - More than once/week

25. How often do you spend time in private religious activities, such as prayer, meditation or Bible study? (NORA)

1 - Rarely or never
2 - A few times a month
3 - Once a week
4 - Two or more times/week
5 – Daily
6 - More than once a day

The following section contains 3 statements about religious belief or experience. Please mark the extent to which each statement is true or not true for you.

26. In my life, I experience the presence of the Divine (*i.e.*, God) - (IR)

1 - Definitely *not* true
2 - Tends *not* to be true
3 – Unsure
4 - Tends to be true
5 - Definitely true of me

27. My religious beliefs are what really lie behind my whole approach to life - (IR)

1 - Definitely *not* true
2 - Tends *not* to be true
3 – Unsure
4 - Tends to be true
5 - Definitely true of me

28. I try hard to carry my religion over into all other dealings in life - (IR)

- 1 - Definitely *not* true
- 2 - Tends *not* to be true
- 3 – Unsure
- 4 - Tends to be true
- 5 - Definitely true of me

Appendix D: Permission to Use Survey Item

Dear Karen

Thanks for checking about this, but no, there's no copyright so please do go ahead and use the items. Good luck with your dissertation - it sounds very interesting.
Best wishes
Jo
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Dr Jo Waller
Cancer Research UK Career Development Fellow in Behavioural Science
Principal Research Associate
CR-UK Health Behaviour Research Centre
Department of Epidemiology and Public Health
UCL, 1-19 Torrington Place
LONDON WC1E 6BT

From: Karen Reiner <
Sent: 05 May 2016 00:31
To: Waller, Jo
Subject: Inquiry

Greetings Dr. Waller,

My name is Karen Reiner and I am a PhD in Public Health student at Walden University. I am working on completing my dissertation on the topic of religiosity and HPV awareness and knowledge. Your research article entitled *Validation of a measure of knowledge about human papillomavirus (HPV) using item response theory and classical test theory* has been extremely relevant to my dissertation. I wanted to inquire if the 16-item HPV Knowledge questions used to collect data for HPV knowledge in your study were copyrighted. If they are, I am kindly requesting your permission to use them. These 16 questions will be part of the questionnaire that will be used to collect the data for my study.

I would greatly appreciate your help and support in this matter.

Regards,

Karen

Karen A. Reiner, PhDc, MT(ASCP)
Department Chair, Program Director & Clinical Coordinator
Associate Professor
Medical Laboratory Sciences
Andrews University

" Seek Knowledge. Affirm Faith. Change the World."
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Hello Karen,

Thanks for your email. It sounds like you're doing a fascinating study for your dissertation. I'm fine with you using that item in your work, but want you to know that we actually adapted that question from work done by Rosenthal and colleagues (2008). Please see the attached paper for more information.
Please let me know if you have any additional questions. Also, please direct any future correspondence to my new email address: mary.gerend@northwestern.edu
Thanks and I wish you the best with your work.

Mary
Mary A. Gerend, Ph.D.
Associate Professor
Department of Behavioral Sciences & Social Medicine
Florida State University College of Medicine
Tallahassee, Florida 32308-4300

From: Karen Reiner
Sent: Wednesday, May 04, 2016 7:21 PM
To: Gerend, Mary
Subject: Inquiry

Greetings Dr. Gerend,

My name is Karen Reiner and I am a PhD in Public Health student at Walden University. I am working on completing my dissertation in the topic of the role of religiosity on HPV awareness and knowledge. Your research article entitled *Correlates of HPV knowledge in the Era of HPV Vaccination: A study of unvaccinated young adult women* has been extremely relevant to my dissertation. I wanted to inquire if the question used to collect data for this study were copyrighted. If they are, I am kindly requesting your permission to use the same question you used in your study to determine women's attitudes toward premarital sex: "Which of the following best describes your view on when it is appropriate for a woman to have sexual intercourse?" This question will be one of the items in the questionnaire that will be used to collect the data for my study.
I would greatly appreciate your help and support in this matter.

Regards,

Karen

Karen A. Reiner, PhDc, MT(ASCP)
Department Chair, Program Director & Clinical Coordinator
Associate Professor
Medical Laboratory Sciences
Andrews University

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