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HPV High Risk and Protective Behaviors: The Effects of Religious Affiliation

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Abstract

The majority of Americans identify themselves as belonging to some religious group. There is a mixed body of literature on whether or not religious affiliation has an influence on engaging in risky behaviors among young adults attending college. This study examined associations between religious affiliation, risky sexual practices, substance use, and family structure among a sample of predominantly white college females attending a southeastern university. Given the high risk of acquiring genital human papillomavirus infection as a result of high risk sexual practices, gaining a better understanding of how religious affiliation can be used to promote healthy sexual behaviors is warranted.

Keywords

Religious affiliation; Risky sexual practices; Family influences; Substance use; College females

Introduction

The National Survey of Religious Identification estimates that at least 81% of the US adult population identifies with a religious group (Kosmin et al. 2001). Religious practice and beliefs may influence high risk and preventive health behaviors, yet the evidence for that influence remains mixed. For college-age adults, some studies report that religious activities are associated with a reduction in risky sexual behaviors (Manlove et al. 2008; McCree et al. 2003), while others find no association (Davidson et al. 2008; Farmer et al. 2009).

Human papillomavirus (HPV) has been identified as the main etiological cause of cervical cancer (Bosch et al. 2002; Walboomers et al. 1999) and has also been associated with some anal and oral cancers. Despite the promises of the new HPV vaccine to prevent cervical cancer, HPV remains a prevalent infection among college-age women. The Pap test, a screening tool for cervical neoplasia, is recommended every 3 years for all women with an intact cervix who are or have been sexually active.(US Preventive Services Task Force 2006) Infection with a high risk type of HPV may cause cellular changes in the cervix resulting in an abnormal Pap test. By age 50, almost 80% of sexually active women will have acquired an HPV infection at some point in their lives.(Centers for Disease Control and Prevention 2004) In early stages, cervical dysplasia can be treated; however, delays in care have been associated with progression to invasive cervical cancer.(Leyden et al. 2005).

Genital HPV infection can be transmitted from person-to-person through anal, oral, and/or vaginal sexual intercourse. As a sexually transmitted infection (STI), the risks of acquiring HPV infection increases with the number of sexual partners and/or sexual encounters. Early age of sexual debut increases a person's risk of being exposed to HPV. For those who are sexually active, engaging in protective behaviors such as consistently using a condom during any sexual activity (i.e. anal, oral, or vaginal) reduces the risk of acquiring potentially oncogenic HPV infection.

Although abstinence is the most effective means of preventing the spread of HPV, a recent phenomenon known as technical virginity has emerged which may place these “virgins” at risk for acquiring HPV infection (Uecker, Angotti, and Regnerus, 2008). Because genital HPV infection can also be transmitted during anal and oral sexual encounters, young women who substitute vaginal intercourse for non-vaginal sexual activities (i.e., anal and oral sex) may still be at risk for developing cervical, anal, and/or oral cancer later in life (Uecker et al. 2008). While anal and oral HPV infection may be more prevalent in persons infected with HIV, the growing prevalence of adolescents and young adults with HIV/AIDS alone (whether newly acquired or perinatally acquired as the cohort born to HIV-positive mothers before effective antiretroviral therapies were made available in 1996) is reason to be concerned about the various modes that genital HPV infection can be transmitted in this population.

There is a mixed review in the scientific literature on the role that religion plays on engaging in risky sexual practices. Many of these risk behaviors, such as having unprotected sex and engaging in sexual intercourse with multiple concurrent (or lifetime) partners, have been shown to be associated with an increased risk of acquiring genital HPV infection. While some researchers have reported that adolescents and young adults who are actively involved with religious group activities are less likely to engage in these risky sexual behaviors

(Manlove et al. 2008; McCree et al. 2003); others have reported no differences in sexual risk behavior solely based on religious affiliation (Davidson et al. 2008; Farmer et al. 2009). Some have suggested that in the United States (US), the trend has been toward a more permissive attitude regarding premarital sex among various religious groups (Uecker, et al.). This growing trend supports the *secularization hypothesis of religion*, which posits that there has been an increasing gap between religious doctrine and behavior. Based on this theory, we examined the role of religious affiliation on engaging in risky and protective sexual behaviors among our sample of college women attending a large public, predominantly white university located in the southeastern region of the US.

The purpose of this paper is to describe the relationship between participation in high risk behaviors, protective behaviors and religious affiliation among college-age women in a large, predominately white southeastern university. The high risk behaviors examined for this study are risky sexual behaviors (e.g., not using a condom during sexual intercourse or engaging in anal, oral, or vaginal sex with more than one partner) and substance use including cigarette smoking, alcohol usage, and marijuana smoking, with the protective behavior being condom use.

Methodology

The Carolina Women's Care Study (CWCS) explored the molecular basis for HPV persistence, with a goal to identify and define the determinants ("biomarkers") for the identification of women at the highest risk for cervical cancer development. Female students attending the Women's Care Clinic and the Thomson Student Health Center, at the University of South Carolina, were recruited for the study, which began in November 2004. Types of potential biomarkers assessed include immunologic, genetic, lifestyle, and gene expression profiles using microarrays. Every 6 months for the duration of their college experience, beginning as freshman, CWCS participants completed a questionnaire assessing the following: demographics, sexual history, smoking habits, alcohol usage, physical activity, food frequency, stress, depression, and discrimination.

A variety of studies were conducted using the data from the CWCS. The objectives of this study were to describe the relationship between participation in high risk behaviors, protective behaviors, and religious affiliation. The high risk behaviors examined for this study included cigarette smoking, alcohol usage, and marijuana smoking. The protective behavior examined was condom usage. Other variables examined were demographic variables, which included age at first vaginal sexual intercourse, family structure, and rurality. Specifically, we examined:

1. The association between condom usage and religious affiliation, family structure, and rurality.
2. The association between HPV high risk behaviors and religious affiliation, family structure, and rurality.

Religious affiliation was measured using two questions: (1) Do you belong to a religious group? (2) If yes, what religious group do you belong to? Participants were given the following options from which to choose: No group, Catholic, Christian (but not Catholic), or Other. The high risk behaviors studied were cigarette smoking, marijuana smoking, and alcohol usage. The study participants were labeled as cigarette smokers and/or marijuana smokers depending on their responses to questions about how often they engaged in such an activity. Alcohol usage was assessed using three questions (1) how many drinks did you have within the past week, (2) how many days within the last 2 weeks have you had at least one drink, and (3) how many days within the last 2 weeks have you had four or more drinks at once.

The descriptive statistics for the demographics, condom usage, high risk behaviors, and religious affiliation in college women were examined followed by the statistical modeling. A set of hierarchical log linear models determined the association between participation in condom usage and religious affiliation and HPV high risk behaviors and religious affiliation in college women.

Results

Demographics of College Women

This study is a secondary analysis of an unbalanced dataset of 467 college women; most of who were born between 1985 and 1990. Approximately 95% of the women reported their zipcode ($n = 441$), which was matched to data from the Economic Research Service in the US Department of Agriculture (2005) to determine the zipcode type. Most of the participants were White women from traditional family structures in urban areas across the southeastern United States. The traditional family structure represents the main male and main female influence being the mother and father. The non-traditional family structure represents any other combination of adult influence. The study participants were also asked whether or not they were religious and if so, to which religious group they belong. Approximately 76.4% of the participants were religious with 58% belonging to a non-Catholic Christian group. The family structure, zipcode type, ethnicity, and religious group of the sample are presented in Table 1.

The SAT and ACT scores were self-reported by the participating women. The maximum score possible on the SAT is 2,400, if a student takes the three equally weighted portions (i.e., critical reading, mathematics, and writing). The maximum score possible on the ACT is 36. The women in the study scored relatively well with a mean SAT Score of 1,181 and mean ACT score of 25 (Table 2).

Sexual Behaviors: Protective and High Risk

Most of the women in this study were at least 14 years of age at their first vaginal intercourse with 22 of the women not yet having engaged in sexual intercourse at the beginning of the study. There were nine women who engaged in oral or anal sex, but not vaginal sex, thus labeled as technical virgins. Table 3 shows the frequency and percent of women by age at first vaginal intercourse. On average, the women in the study had three to four vaginal and/or oral sex partners. Of the 30 women who engaged in anal sex, most of them only had one partner (Table 4). The study participants reported their protective and risk behaviors every 6 months beginning with their freshman year for the duration of the time enrolled as an undergraduate student with the university. Most of the participants had at least four visits to the health center. With each visit, the number of people from whom information was retrieved decreased, by the ninth visit there were only five participants, suggesting 462 of the cases were censored. During these semi-annual visits, the participants reported the last time they had vaginal sexual intercourse, condom usage during the last vaginal intercourse, and use of various methods of birth control during the last time they engaged in sexual intercourse. Table 5 shows the last time the participants had vaginal sexual intercourse by visit. Most of the participants reported the last time for vaginal sexual intercourse as being more than one month ago and most of them reported using a condom during this last vaginal sexual intercourse (See Tables 5, 6). These data are self-reported; thus, there were some discrepancies in the counts for never having vaginal intercourse on both tables.

Other time-varying demographics reported were cigarette smoking, marijuana smoking, and alcohol usage. Most of the participants were not smokers nor were they marijuana smokers.

The participants typically had at least one alcoholic drink fewer than three days per week. Not many of the participants exceeded two drinks per week. Also, within a 2-week period, most of the women had four or fewer days in which they had four or more drinks at once. Tables 7, 8, 9, 10 show the number of cigarette smokers, marijuana smokers, and alcohol usage by visit.

Statistical Analysis

This study sought to examine the relationship between HPV high risk and protective behaviors and religious affiliation, family structure and rurality. The protective behavior was condom usage. Most of the participants used a condom during intercourse. The number of vaginal, oral, and anal sex partners, cigarette smoking, pot smoking, and drinking were examined for the high risk behaviors. The religious affiliation included in the study were those with no religious group, Catholic, Christian (but not Catholic), and other. Family structure was described as traditional or non-traditional. The traditional family structure represented the mother and father being the main influence in the life of the woman. The non-traditional family structure included any other combination of the main female and main male influence that did not include the biological father and mother. The study participants were given the option to choose a mother, stepmother, grandmother, aunt, other relative, a non-relative, or none as the main female influence in their life. They were given similar options for the main male influence in their life (i.e., father, stepfather, grandfather, uncle, other relative, non-relative, or none). Rurality was described as urban, large rural, small rural, and isolated.

A set of hierarchical log linear models were used to determine the association between condom usage, HPV high risk behaviors, religious affiliation, family structure, and rurality in college women. The most parsimonious model was selected using the difference in likelihood chi-square test for nested models. The analysis was completed using the model selection loglinear analysis in the Statistical Package for Social Scientists.

Religious Affiliation, Family Structure, Rurality, and Condom Usage

The first objective was to determine the association between condom usage and religious affiliation, family structure, and rurality. The data were analyzed using model selection for loglinear analysis with backward selection (Table 11). The significant association is between religion, family structure, and condom usage. This suggests there is an interaction effect between religion, family structure, and condom usage. The main effects were significant as well, but there is not enough evidence to conclude a significant relationship between the remaining variables.

HPV High Risk Behaviors

The high risk behaviors were divided into two categories—high risk sexual behaviors and high risk substance use behavior. The high risk sexual behaviors were defined as age at first vaginal intercourse, number of vaginal partners, number of oral partners, and number of anal partners. The high risk substance use behaviors were defined as cigarette smoking, marijuana smoking, number of days within the last 2 weeks with at least one drink, number of days within the last 2 weeks with four or more drinks at one time, and number of drinks per week. The analysis was run using one model for high risk sexual behavior and a second model for high risk substance use behavior for each of the religious affiliation, family structure, and rurality. The data were analyzed using model selection for loglinear analysis with backward selection.

The second objective was to determine the association between HPV high risk behaviors and religious affiliation, family structure, and rurality (Table 12). Given the main effects were

the only significant effects there is not enough evidence to suggest there is a relationship between these variables. The only significant interaction effect is between religious affiliation and marijuana smoking (Table 13). The main effects suggest there is no relationship between alcohol usage, cigarette smoking, religious affiliation, family structure, and rurality. Overall the findings suggest a relationship exists between religion, family structure and condom usage and marijuana smoking and religion. A post hoc logistic regression was performed to further examine the effects of family structure, condom usage, and marijuana smoking on religion.

The women in this study from a non-traditional family structure have a significantly higher probability of belonging to a religious group than those from a traditional family (Wald statistic₁ = 5.172, $P=0.023$). The interaction effect between non-traditional family and condom use is significant. This suggests that women from non-traditional families who used condoms have a higher probability of belonging to no religious group than other women from non-traditional families who are virgins (Wald statistic₁ = 5.322, $P=0.021$) (Table 14).

Discussion

HPV infection is prevalent among sexually active adolescents and young adults. This is attributed in large part to engaging in risky sexual behaviors such as having unprotected sexual intercourse. Because HPV infection can be transmitted through anal, oral, or vaginal intercourse, technical virgins may also be at risk for becoming infected with potentially oncogenic HPV types if they engage in unprotected anal and/or oral sexual intercourse.

We examined the relationship between religious affiliation and engaging in both risky and protective sexual behaviors, as well as substance use. While religious young adults are sexually active, it appears that they engage in protective sexual behaviors such as using condoms. Family structure plays a key role in the association between religious affiliation and condom usage.

The findings reported in this study were obtained via self-report and therefore has some limitations. Our sample was also largely white, urban, female college students from traditional two parent households. Therefore, our findings are limited in its generalizability to other populations. Although religious affiliation appears to play a role in condom usage, our study's interpretation is limited because we were not able to assess key factors such as actual participation in religious activities, individual/family religious beliefs, etc. This was an inherent limitation of using secondary data.

Future Research

The majority of the participants in the CWCS study had been sexually activated despite the fact that the majority were affiliated with a religious group. These findings support the secularization of religion hypothesis. Interestingly, religious affiliation was significantly associated with condom usage and not engaging in risky sexual behaviors. Further research is needed to explore the associations between sexually active young adults' religious beliefs and engaging in protective sexual behaviors. Health promotion activities are also warranted to educate technical virgins about HPV transmission risk via anal and oral sexual intercourse.

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Table 1Participant demographics ($N = 467$)

	Frequency	Percent
Family structure		
Traditional	343	73.4
Non-traditional	123	26.3
Total	466	99.7
Zipcode type		
Urban	350	74.9
Large rural	57	12.2
Small rural	23	4.9
Isolated	11	2.4
Total	441	94.4
Ethnicity		
Native American or Alaska native	0	0.0
Asian	11	2.4
Black or African-American	113	24.2
Hispanic or Latino	13	2.8
Native Hawaiian or other Pacific Islander	2	0.4
White (Caucasian)	325	69.6
Total	464	99.4
Religious		
No	108	23.1
Yes	357	76.4
Total	467	100.0
Religion		
No group	34	7.3
Catholic	71	15.2
Christian (but not Catholic)	272	58.2
Other	17	3.6
Total	394	84.4

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Table 2

Descriptive statistics for SAT and ACT scores

	<i>N</i>	Minimum	Maximum	Mean	Std. Deviation
SAT Score	422	1	2,460	1,181.22	255.648
ACT Score	111	11	31	24.91	3.786

Table 3Frequency and percent of age at first vaginal intercourse ($N = 467$)

Age at first vaginal intercourse	Frequency	Percent
Virgin	22	4.7
Technical virgin	9	1.9
Non-virgin < 18 years old	333	71.3
Non-virgin 18 years or older	101	21.6
Total	465	99.6

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Table 4

Descriptive statistics for number of vaginal, oral, and anal sex partners

	<i>N</i>	Minimum	Maximum	Mean	Std. Deviation
Number of vaginal sex partners	462	0	33	3.67	4.075
Number of oral sex partners	203	0	24	3.00	3.240
Number of anal sex partners	181	0	3	0.19	.473

Table 5

Last time for vaginal sexual intercourse by visit

	Visit									Total
	1	2	3	4	5	6	7	8	9	
Never	33	19	12	8	5	3	2	0	0	82
Within last 24 h	33	23	27	19	14	12	7	1	0	136
1 to 2 days ago	67	49	46	34	27	26	13	8	0	270
2 to 3 days ago	68	40	37	40	34	19	14	5	0	257
Last week	81	70	44	41	36	27	15	7	0	321
2 weeks ago	64	37	33	31	22	16	21	7	1	232
About 1 month ago	54	48	27	24	16	19	7	7	3	205
More than 1 month ago	66	69	59	51	46	38	31	8	1	369
Total	465	355	285	248	200	160	110	43	5	1,872

Table 6

Condom usage during last vaginal sexual intercourse by visit

	Visit									Total
	1	2	3	4	5	6	7	8	9	
No	140	137	123	114	100	81	51	18	1	765
Yes	291	199	150	124	94	75	57	25	4	1,019
Never had vaginal sexual intercourse	32	19	12	8	5	4	2	0	0	82
Total	463	355	285	246	199	160	110	43	5	1,866

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Table 7

Number of cigarette smokers and marijuana smokers by visit

	Visit									Total
	1	2	3	4	5	6	7	8	9	
Cigarette smoker	51	32	26	20	15	9	7	1	0	161
Marijuana smoker	10	9	11	6	5	3	0	0	0	44

Table 8

Number of days within last 2 weeks with at least one drink by visit

	Visit									Total
	1	2	3	4	5	6	7	8	9	
None	148	106	75	62	40	23	22	6	1	483
1 to 2 days	152	121	108	98	82	60	31	14	3	669
3 to 4 days	87	72	60	58	45	46	30	16	1	415
5 to 6 days	55	33	19	17	22	17	17	5	0	185
7 to 8 days	16	13	13	4	7	4	5	1	0	63
9 to 10 days	5	6	5	8	4	9	2	0	0	39
11 to 14 days	3	7	5	1	0	0	2	1	0	19

Table 9

Number of days within last 2 weeks with four or more drinks at once by visit

	Visit									Total
	1	2	3	4	5	6	7	8	9	
None	256	193	146	124	99	72	50	20	3	963
1 day	68	63	56	48	42	35	24	10	1	347
2 days	58	39	32	38	28	22	22	9	1	249
3 to 4 days	54	43	32	24	25	23	9	3	0	213
5 to 6 days	19	14	12	12	6	6	3	0	0	72
7 to 9 days	9	6	5	2	0	1	0	1	0	24
10 to 14 days	3	0	2	0	0	0	1	0	0	6

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Table 10

Number of drinks per week by visit

	Visit									Total
	1	2	3	4	5	6	7	8	9	
None	185	137	97	83	56	33	22	7	2	622
1 to 2 drinks	105	90	82	75	67	55	38	20	2	534
3 to 5 drinks	90	66	44	47	48	40	27	8	1	371
6 to 9 drinks	47	36	36	28	16	17	14	4	0	196
10 to 19 drinks	33	22	19	15	12	14	8	4	0	127
20-29 drinks	2	4	6	2	1	1	1	0	0	17
All 30 drinks	4	2	1	0	0	0	0	0	0	7

Table 11

Partial associations for religious affiliation, family structure, rurality, and condom usage

Effect	df	Partial Chi-Square	Sig.	Number of iterations
Rurality*Family structure*Religion	9	9.467	0.395	3
Rurality*Family structure*Condom usage	6	4.330	0.632	5
Rurality*Religion*Condom usage	18	6.599	0.993	3
Family structure*Religion*Condom usage	6	18.652	0.005	3
Rurality*Family structure	3	4.707	0.195	3
Rurality* Religion	9	15.241	0.085	3
Family structure*Religion	3	7.708	0.052	3
Rurality*Condom usage	6	9.792	0.134	3
Family structure*Condom usage	2	0.021	0.990	3
Religion*Condom usage	6	7.896	0.246	3
Rurality	3	506.889	0.000	2
Family structure	1	79.146	0.000	2
Religion	3	369.458	0.000	2
Condom usage	2	179.219	0.000	2

Table 12

Significant main effects for high risk behavior (sexual), religious affiliation, family structure, and rurality

Effect	<i>df</i>	Partial Chi-Square	Sig.	Number of iterations
Rurality	3	188.411	0.000	2
Family structure	1	34.724	0.000	2
Religious affiliation	3	138.616	0.000	2
Age at first vaginal intercourse	3	194.512	0.000	2
Number of anal partners	3	238.461	0.000	2
Number of oral partners	24	318.389	0.000	2
Number of vaginal partners	33	382.185	0.000	2

Table 13

Significant effects for high risk behavior (substance use), religious affiliation, family structure, and rurality

Effect	df	Partial Chi-Square	Sig.	Number of iterations
Marijuana smoking*Religion	3	12.824	0.005	14
Number of drinks per week*Number of days within the last 2 weeks with at least one drink	36	164.111	0.000	15
Number of drinks per week*Number of days within the last 2 weeks with four or more drinks at one time	36	172.503	0.000	10
Number of days within the last 2 weeks with at least one drink *Number of days within the last 2 weeks with four or more drinks at one time	36	97.132	0.000	11
Cigarette smoking	1	280.071	0.000	2
Marijuana smoking	1	470.049	0.000	2
Rurality	3	484.492	0.000	2
Family structure	1	82.353	0.000	2
Religion	3	347.040	0.000	2
Number of drinks per week	6	379.446	0.000	2
Number of days within the last 2 weeks with at least one drink	6	481.958	0.000	2
Number of days within the last 2 weeks with four or more drinks at one time	6	347.566	0.000	2

Table 14

Post hoc effects of family structure, condom usage, and marijuana smoking on religion

	Estimate	Std. Error	Wald	df	Sig.	95% Confidence interval	
						Lower bound	Upper bound
Dependent variable							
No religious group	−0.578	0.826	0.489	1	0.484	−2.198	1.042
Catholic	0.785	0.823	0.909	1	0.340	−0.829	2.398
Christian (but not Catholic)	5.033	0.878	32.827	1	0.000	3.311	6.754
Non-traditional family	2.253	0.991	5.172	1	0.023	0.311	4.194
Traditional family	0 ^a	–	–	0	–	–	–
No condom	0.195	0.488	0.160	1	0.690	−0.761	1.151
Condom used	0.540	0.464	1.350	1	0.245	−0.371	1.450
Virgin	0 ^a	–	–	0	–	–	–
No marijuana	1.340	0.698	3.684	1	0.055	−0.028	2.709
Marijuana	0 ^a	–	–	0	–	–	–
Non-traditional family * No condom	−0.960	1.084	0.783	1	0.376	−3.085	1.166
Non-traditional family * Condom used	−2.399	1.040	5.322	1	0.021	−4.438	−0.361
Non-traditional family * Virgin	0 ^a	–	–	0	–	–	–
Traditional family * No condom	0 ^a	–	–	0	–	–	–
Traditional family * Condom used	0 ^a	–	–	0	–	–	–
Traditional family * Virgin	0 ^a	–	–	0	–	–	–

Link function: Logit

^aThis parameter is set to zero because it is redundant