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Short Communications

HPV vaccine acceptance and other health behaviors among college-age women

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Abstract

Background: College-age women have a high risk of contracting human papillomavirus (HPV) infection, but HPV vaccine uptake is suboptimal. Effective interventions require a better understanding of health behaviors associated with vaccine acceptance. We examined the relation between HPV vaccination and health-oriented and risk behaviors. Methods: Female students from a private university (N=1,401) reported health-oriented (physical activity, fruit/vegetable consumption, influenza, Hepatitis B and HPV vaccination, cancer screening [Pap test, clinical breast exam]) and risky (drinking, smoking, multiple sexual partners) behaviors in a web-based survey conducted in spring 2007. Results: In a cross-sectional analysis, we observed that women who were up-to-date with cervical cancer screening (OR=2.4; 95%CI=1.3, 4.3) and reported binge drinking within the prior month (OR=2.1; 95% CI=1.3, 3.2) were significantly more likely to have been vaccinated. Conclusions: Both healthy and risky behaviors are associated with vaccination; therefore, providers should take advantage of clinical interactions for a range of behaviors (including binge drinking) to improve vaccination rates among college-age women.

INTRODUCTION

Human papillomavirus (HPV) is the primary risk factor for cervical cancer and cervical cancer is the first vaccine preventable malignancy to date. The Advisory Committee on Immunization Practices (ACIP) recommends HPV vaccination for routine administration in girls and boys age 11 and 12, with a 'catch-up" period for ages 13 to 26 [1-3]. In females, the vaccine is administered to prevent cervical cancer, cervical cancer precursors, vaginal and vulvar cancer precursors, and angogenital warts (HPV types 6, 11, 16, 18) [2]. However, vaccine uptake has been suboptimal [4].

Accumulating evidence suggests individuals who practice one healthy behavior are more likely to practice others [5]. Likewise, those who engage in one risky behavior are more likely to engage in others [6]. For example, individuals who binge drink are more likely to have unprotected sex [7]. During late adolescence and early adulthood, many health behaviors become entrenched [8], creating a window of when health interventions can have a substantial impact on shaping health behaviors. Identifying behaviors associated with HPV vaccine uptake among college-age women can aid in improving vaccination rates and will also help inform the design of effective intervention strategies. The objective of our study was to examine the relationship between health-oriented and risky behaviors with HPV vaccination among female college students.

METHODS

Study sample

Detailed methods from the parent study have been described elsewhere [6, 9]. Briefly, in February through March 2007, months after the ACIP recommended

vaccination in adolescent girls, female college students from an urban private New England University were contacted via electronic mail address. With Institutional Review Board approval, all full-time, English-speaking students were asked if they would participate in a study of women's health and were given a link to a website for informed consent. Consenting students completed a web-based survey that collected information about demographic characteristics and health-oriented and risky behaviors. Students who reported having a history of cervical cancer (n=1) or HPV infection (n=43) were excluded.

Analytic variables

Students who reported having completed the three-dose HPV series were classified as 'vaccinated.' Those who had never heard of the vaccine, decided not to receive it, or had not completed all three vaccine doses were classified as 'non-vaccinated.'

Health-oriented behaviors included ≥60 minutes/week of moderate or vigorous activity, daily fruit/vegetable intake, clinical breast exam (CBE), papanicolaou test (Pap), influenza vaccination (in the past year), and completed three-series Hepatitis B vaccination. Risky behaviors included binge drinking (≥5 drinks at least one time in the past 30 days), current smoking status, and ≥2 sexual partners in the past year.

Demographic characteristics included year of study (1, 2, 3, ≥4), declared major (Arts and Sciences, Management, Nursing, and Education), race/ethnicity (non-Hispanic White, Hispanic, Black, Asian/Pacific Islander, or other), and current monogamous relationship. Information on the history of a STI, and history of a friend or family member with cervical cancer was also collected.

Statistical analysis

We described the distribution of demographic characteristics, health-oriented behaviors and risky behaviors among those who received the HPV vaccine and those that did not. Using logistic regression, we calculated odds ratios (OR) and 95% confidence intervals (CI) for the association between health behaviors and the prevalence of HPV vaccination at the time of the survey.

All analyses were conducted using SAS version 9.2 (Cary, North Carolina).

Table 1. Descriptive characteristics of college-age women by HPV vaccine acceptance (N=1,401).

Descriptive Characteristics	HPV vaccinated N=111		Not HPV vaccinated N=1,290	
	N	*%*	*N*	*%*
Year in school				
One year	24	21.6	336	26.0
Two years	29	26.1	334	25.9
Three years	24	21.6	281	21.8
Four or more years	34	30.6	339	26.3
Declared major				
Arts and Sciences	69	62.2	821	63.6
Management	17	15.3	165	12.8
Nursing	8	7.3	127	9.8
Education	16	14.4	168	13.0
Race/ethnicity				
White, non-Hispanic	97	87.4	996	77.2
Hispanic	6	5.4	35	2.7
Asian/Pacific Islander	1	0.9	55	4.3
Black, non-Hispanic	1	0.9	101	7.8
Other	6	5.4	103	8.0
Current relationship status				
Monogamous relationship	50	45.0	521	40.4
Not monogamous	60	54.1	735	57.0
Other	1	0.9	34	2.6
History of sexually transmitted infection	3	2.7	24	1.9
History of a friend or family with cervical cancer	13	11.7	79	6.1

RESULTS

The response rate was 40% (1,897 of 4,774). Our final analytic sample included 1,401 female college students. Approximately 8% had been HPV vaccinated at the time of the survey. In Table 1, we present demographic characteristics by vaccination status. Most of the sample was non-Hispanic White.

Students who had a Pap test in the past year (OR=2.4; 95%CI=1.3, 4.2) and reported binge drinking (OR=2.2; 95%CI=1.4, 3.3) were more likely to have been vaccinated than their counterparts. Those who had daily fruit/vegetables intake (OR=1.6; 95%CI=1.0, 2.4) were also more likely to have been vaccinated. None of the other behaviors was associated with HPV vaccination (Table 2). Results did not substantially differ after adjusting for school year, study area, race/ethnicity, and relationship status.

Table 2. Association between health-oriented, risky behaviors and HPV vaccine acceptance among college-age women.

Health-oriented and At-risk Behaviors	HPV vaccinated N=111		Not HPV vaccinated N=1,290		OR [a]	95% CI	OR [b]	95% CI
	N	*%*	*N*	*%*				
Health-oriented behaviors								
Moderately or vigorously active ≥60 minutes/ week	21	18.9	238	18.4	1.0	(0.61, 1.7)	1.0	(0.63, 1.7)
Consumed fruit/vegetables daily	80	72.0	828	64.2	1.6	(1.0, 2.4)	1.5	(0.98, 2.4)
Received a clinical breast exam	109	98.2	1,250	96.9	0.99	(0.55, 1.8)	0.98	(0.54, 1.8)
Received a PAP test	85	76.6	699	54.2	2.4	(1.3, 4.2)	2.4	(1.3, 4.3)
Received the influenza vaccination	32	28.8	302	23.4	1.4	(0.90, 2.2)	1.4	(0.91, 2.2)
Completed 3-series Hepatitis B vaccination	98	88.3	1,134	87.9	1.0	(0.57, 1.9)	1.1	(0.58, 2.0)
Risky behaviors								
Binge drinking in past 30 days	70	63.1	530	41.1	2.2	(1.4, 3.3)	2.1	(1.3, 3.2)
Current smoker	54	48.6	513	39.8	1.0	(0.68, 1.6)	1.1	(0.70, 1.6)
≥2 sexual partners in past 12 months	85	76.6	740	57.4	1.3	(0.78, 2.1)	1.2	(0.71, 2.1)

a. Unadjusted
b. Adjusted for year in school, declared major, race/ethnicity, and relationship status
Legend:
OR = Odds ratio
CI = Confidence interval
PAP = papanicolaou

DISCUSSION

In this large sample of college-age women, those who had completed the three-dose HPV vaccination series were health-oriented in terms of adhering to recommended gynecologic care (Pap tests). Yet, those vaccinated were also more likely to report binge drinking.

To our knowledge, only one other study of the Health Information National Trends Survey (HINTS) [10] has examined health behaviors in relation to HPV vaccine acceptance. The HINTS study, also of cross-sectional design, observed that parents who were current or former smokers and engaged in physical activity in the past month were more likely to report that they would vaccinate their daughters [10]. Parental adherence to cervical cancer screening (within the past 3 years) was not significantly associated with intention to vaccinate their daughter(s) [10]. Several factors may account for the differences between our results and those reported in HINTS data. HINTS examined parental health behaviors and willingness to vaccinate their 11-12 year old daughter, whereas we evaluated health behaviors among female college students who decided to vaccinate themselves. Moreover, the national HINTS sample was highly diverse in terms of race/ethnicity, had a wider range of educational levels, and included those who lacked insurance.

Study limitations include the use of a relatively homogeneous convenience sample, self-reported health behaviors, and cross-sectional design. Nonetheless, this study is the first to assess the co-occurrence of health-oriented and risk behaviors with HPV vaccination status. Our findings suggest that while some health behaviors are associated with HPV vaccination, others are not. It is unclear whether health-oriented and risk behaviors increase vaccination rates or whether vaccination leads to an increase in these behaviors. It seems logical that those receiving preventive gynecologic care would also be more likely to obtain

the HPV vaccine. Our finding that binge drinking was associated with vaccination is less intuitive. In prior analyses of these data, we found that behaviors did not cluster into health-oriented and risky behaviors, as expected [6]. However, researchers have documented the association of binge drinking in college aged women and related health consequences including sexually transmitted infections and physical injuries [7]. Therefore, a possible explanation is that high-risk drinkers are more likely to visit health care providers and thus, may have an opportunity to be vaccinated. Alternatively, vaccination may lead to higher health risks starting with the binge drinking.

A large body of research suggests that vaccine uptake is strongly influenced by clinician recommendation [8]. The college health, gynecologic, and primary care settings provide advantageous venues for health interventions that target multiple behaviors. It is important to capitalize on routine women's health exams, as well as visits for health concerns related to binge drinking, as a window of opportunity for vaccination and emphasize the importance of completing all three vaccine doses.

With skyrocketing use of multiple forms of social networking technology, public health campaigns should not neglect social media as a means for disseminating health information to broad audiences. Various online websites and/or social networking (i.e. Facebook, Twitter) can serve as a mechanism for health communication to the public, in which health behavior messages are targeted at addressing multiple safe health behaviors among young women.

Additional research is needed to replicate our findings using prospective designs with validated behavioral measures among diverse populations. Improving HPV vaccination rates will likely require multipronged approaches among all primary health providers to screen for multiple behaviors, capitalize on all clinical interactions to screen for multiple health behaviors, and use social networking to offer comprehensive health behavior messages.

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