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HPV Vaccination and Sexual Behavior in a Community College Sample

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Abstract

Many US parents are concerned that vaccinating daughters against human papillomavirus (HPV) will communicate implicit approval for sexual activity and be associated with early or risky sexual behavior (Scarinci et al. in *J Womens Health* 16(8):1224–1233, 2007; Schuler et al. in *Sex Transm Infect* 87:349–353, 2011) [7, 8]. The aims of this study were to understand (a) whether the HPV vaccine was associated with risky sexual behavior among a diverse sample of female adolescents and young adults, and (b) to better understand the chronology of HPV vaccination and sexual behavior. An anonymous web-based survey was used to collect data from 114 female community college students. *T* test and Chi square analyses were used to compare vaccinated and unvaccinated groups on age at first intercourse and proportion who had ever had sexual intercourse. Linear multiple regression was used to predict frequency of condom use and number of sexual partners in the past year, using vaccination status and demographic factors as predictors. About 38 % reported receiving at least one dose of the HPV vaccine. Many of those vaccinated (45 %) received the vaccine after having initiated sexual activity. The proportion of women who were sexually experienced did not differ by HPV vaccine status, nor did age at first intercourse, number of partners in the past year, or frequency of condom use. Current findings suggest that HPV vaccination is not associated with riskier sexual activity for the young women in this sample. Adolescents and their parents may benefit from education about the need to receive the HPV vaccine before onset of sexual activity.

Keywords

HPV vaccine; Human papillomavirus; Cervical cancer prevention; College health; Sexual behavior

Introduction

Two vaccines to prevent human papillomavirus (HPV) infection have been introduced in recent years. Both vaccines protect against the two strains of HPV that cause 70 % of cervical cancers [1, 2]. The Advisory Council on Immunization Practices (ACIP) recommends routine vaccination of girls 11–12 years old with either vaccine, and “catch-up” vaccination for those 13–26 years of age who were not previously vaccinated [3, 4]. Wide use of HPV vaccines could drastically reduce morbidity and mortality associated with cervical cancer in the US, but vaccine coverage has been low. Approximately 53 % of girls 13–17 years old and 29 % of young women 19–26 years old had initiated the vaccine in 2011 [5, 6].

Research indicates a substantial number of parents in the US are concerned that vaccinating daughters against HPV will communicate implicit approval for sexual activity, and will be associated with earlier or riskier sexual behavior [7,8]. Fears that HPV vaccination will lead to adolescent sexual activity are linked to lower parental acceptance of the vaccine, [7, 8] and possibly to lower vaccine coverage.

However, very few studies have directly examined the relation of HPV vaccination to sexual attitudes and behavior among young girls and adolescents in the US. A handful of reports have not found evidence of a link between HPV vaccination and more permissive sexual attitudes [9] or behavior among adolescent girls and young women in the United States [10, 11]. Therefore, additional work is needed to understand whether the HPV vaccine consistently lacks an association with risky sexual behavior, especially among diverse samples of women, and also to better understand the chronology of HPV vaccination and sexual behavior. Thus the aim of the current study is to investigate (a) when HPV vaccination occurred in relation to onset of sexual activity among a sample of female community college students, and (b) whether HPV vaccination status is associated with sexual behavior among these young women.

Method

Participants and Recruitment

Data for the current study were collected as part of a larger project. Additional details about study methods are described in Marchand et al. [12]. Participants were recruited from the campus of a community college in central Los Angeles with total enrollment of 15,037. All female students between 18 and 26 years of age were eligible to participate in the study. The research team recruited participants in person and with posted fliers, class announcements, and word of mouth. Interested students self-selected to participate, and a total of 176 students provided usable survey data. Recruitment took place from September to November 2011. The UCLA Institutional Review Board approved the study protocol, and community college administrators granted necessary permissions.

Survey Procedures

An anonymous web-based survey was used to collect data. Surveys were administered in two ways: (a) *In person*: 1 day per week during the data collection period, participants completed surveys on campus using laptop computers in a designated conference room, with the principal investigator present. (b) *Remote*: Participants were also able to log on to the survey website to self-administer the survey from any computer, at their convenience, with no study staff present. In both cases, participants went to the survey web address, read the online consent form, and indicated consent by clicking a button at the bottom of the page. The survey took 20–30 min to complete. Participants received a \$10 gift card and printed information on HPV, cervical cancer screening, and the HPV vaccines.

Survey Instrument

Survey items were drawn from measures used in prior studies of HPV vaccination, [13–15] adolescent sexual behavior, [16] and health care experiences. [17] Constructs used in the current study were:

1. *Demographic information*: Age; ethnicity (coded 0 = African American, 1 = other ethnicity); major in school (coded 0 = non-health-related, 1 = health-related); income (coded 0 = <\$20,000 per year, 1 = \$20,000 per year or more), and relationship status (coded 0 = married or committed, 1 = single, dating, separated, widowed, or divorced).

2. *HPV vaccine uptake:* One item assessed whether respondents had received any doses of the HPV vaccine; responses were coded 1 = yes, 0 = no/don't know.
3. *Sexual behavior:* We focused on intercourse with male partners since this is the primary mode of HPV transmission for women. [18] Four items were used to assess sexual behavior. (a) 'Have you ever had sexual intercourse with someone of the opposite sex?' Responses were coded 1 = yes, 0 = no. (b) 'How old were you the first time you had intercourse with someone of the opposite sex?' Responses were continuous numeric values. (c) 'During the past year, how many different people have you had sexual intercourse with?' Responses were continuous numeric values. (d) 'When you have sexual intercourse, how often do you or your partner wear a condom or use other barrier protection?' Responses were coded 0/every time, 1/most of the time, 2/about half the time, 3/less than half the time, 4/never.

Data Analysis

Data were screened for errors, improbable values, and duplicate submissions. This left a total of 176 surveys, 144 of which were completed in person and 32 completed remotely. Current analyses are conducted with the subset of participants who (a) had heard of HPV vaccines and therefore responded to the item assessing HPV vaccination, and (b) responded 'yes' or 'no' to the item asking whether they had ever engaged in sexual intercourse (final $n = 114$).

Ethnicity was coded to facilitate comparisons between African American and other ethnic groups, since African American women have poorer sexual health outcomes in many domains, including higher rates of STI. [19] African American respondents ($n = 37$) were coded 0, and those who were Latina ($n = 64$) and other ethnicities ($n = 13$) were coded 1.

T-test and Chi square analyses were used to compare vaccinated and unvaccinated groups on age at first intercourse and proportion who had ever had sexual intercourse. Linear multiple regression was used to predict frequency of condom use and number of sexual partners in the past year, using vaccination status and demographic factors as predictors.

Results

Descriptive Statistics and Bivariate Comparisons

Table 1 displays descriptive and bivariate statistics for vaccinated and unvaccinated women. The final analytic sample included 114 women; 42 of whom (36.8 %) reported receiving at least one dose of the HPV vaccine. Those who had initiated the vaccine were younger, on average, than unvaccinated peers. Of the women vaccinated, 19 (45 %) reported initiating sexual activity prior to vaccination, 7 (17 %) began sexual activity after vaccination, and 8 (19 %) experienced vaccine and sexual initiation at the same age. Overall, the average age at vaccination was approximately 18 years, while the average age at first intercourse was 16 years. Since the majority had been vaccinated after initiating sexual activity, we did not conduct further analyses to examine the relationship of vaccination to age at first intercourse. Participants reported an average of 1.7 partners in the past year and used condoms, on average, "about half the time." These values did not differ between vaccinated and unvaccinated women.

Multiple Regression Predicting Condom Use and Number of Sexual Partners

Linear multiple regression models were used to examine associations of HPV vaccination with number of partners in the past year and frequency of condom use, controlling for demographic variables. For number of partners (Table 2), the regression model accounted for about 8 % of variance, but did not fit the data well ($R^2 = 0.08$, $F = 1.30$, $p = 0.27$). None

of the variables examined were significantly associated with number of sexual partners in the past year. For condom use (Table 3), the regression model accounted for 25 % of variance ($R^2 = 0.25$, $F = 4.67$, $p < 0.01$). Older age, lower income, and committed relationship status were associated with less frequent condom use. HPV vaccination was not associated with either sexual outcome.

Since being in a committed relationship may have overshadowed other factors in predicting sexual behavior, exploratory multiple regression analyses were conducted with the subset of women in non-committed relationships ($n = 53$). For number of partners (Table 2), the model explained about 7 % of variance, but again did not fit the data well ($R^2 = 0.07$, $F = 0.66$, $p = 0.65$). None of the predictors were significantly associated with number of partners. For condom use (Table 3), the model accounted for about 19 % of variance ($R^2 = 0.19$, $F = 2.27$, $p = 0.06$). African American ethnicity was associated with more frequent condom use, but HPV vaccination was not related to the outcome.

Discussion

The current findings suggest that HPV vaccination is not associated with riskier sexual activity for the young women in this sample. These results are consistent with other findings [10, 11]. Our sample was unique in that many women had received the vaccine at a relatively late age, and most of them after onset of sexual activity. This likely reflects the fact that many of these women were already in their teens at the time of the HPV vaccine's FDA approval, and were therefore vaccinated at older than currently recommended ages. Still, it is possible that parents and young women themselves need to be educated about the optimal timing of HPV vaccination (i.e., completion of the three-dose series before the onset of sexual activity).

It is notable that number of sexual partners and condom use, the main risk outcomes, were not related to vaccine status. Contrary to some concern about the vaccine encouraging riskier behavior, it does not appear that young women in this sample who were vaccinated chose to engage in riskier behavior than those who were not vaccinated. Indeed, factors other than those measured in the current study seem to account for much of the variation in numbers of sex partners.

Some limitations in this study included the use of a relatively small convenience sample and self-report of vaccination, which may introduce inaccuracy or recall bias [20]. Still, the study had several strengths, including use of an anonymous survey to decrease socially desirable responding about sexual behavior, recruitment of a community college sample diverse in ethnicity and socioeconomic status, and assessment of contextual factors relevant to sexual behavior. The current results are consistent with other research finding no evidence of risky or sexual activity among young women vaccinated for HPV, and adds to a growing body of literature that may put to rest public fears about this issue.

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Table 1Demographic and descriptive statistics ($n = 114$)

	Vaccinated		Unvaccinated			
	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)	<i>t</i>	<i>p</i>
Age	42	21.0 (2.59)	72	22.0 (2.66)	2.06	0.04
Age at first intercourse ^a	33	16.2 (1.79)	61	16.7 (2.29)	1.01	0.32
Number of partners in the past year ^a	33	1.7 (1.45)	61	1.7 (1.18)	-0.04	0.97
Condom use frequency	33	1.9 (1.47)	61	1.9 (1.64)	0.07	0.94
Age at vaccination	41	18.34 (3.10)	n/a	n/a	n/a	n/a
	<i>n</i>	%	<i>n</i>	%	chi ²	<i>p</i>
Ever had intercourse ^b						
Yes	34	81.0	61	84.7	0.27	0.60
No	8	19.0	11	15.3		
Ethnicity						
Hispanic/Latina	25	59.5	39	54.2	0.07 ^d	0.79 ^d
African American	13	31.0	24	33.3		
Asian American	2	4.8	1	1.4		
European American	1	2.4	1	1.4		
Other/prefer not to answer	1	2.4	7	9.7		
Annual income						
\$0-\$19,999	31	73.8	54	75.0	0.02 ^e	0.89 ^e
\$20,000 or more	8	19.1	10	13.9		
Prefer not to answer	3	7.1	8	11.1		
Relationship status						
Married/in a committed relationship	18	42.9	25	35.7	0.57	0.45
Single, dating, separated, divorced, or widowed	24	57.1	45	64.3		
How many vaccine doses received ^c						
1	13	33.3	n/a	n/a	n/a	n/a
2	11	28.2				
3	15	38.5				

^aThese items were asked only of those who reported ever having intercourse^bResponses of "prefer not to answer" are omitted, so totals add to <100 %^cThese items were asked only of women who had heard of the HPV vaccine^dChi square value is for comparison of African-American to other groups combined^eChi square value is for comparison of <\$20,000 to other groups combined

Table 2

Multiple regression analyses predicting number of partners in the past year

	Beta	SE	t	p	Effect size (r)	95 % CI for B
Committed and non-committed relationships (n = 92) ^a						
Age	0.02	0.06	0.31	0.76	0.03	[-0.09, 0.13]
Ethnicity (AA ^b vs. all others)	-0.43	0.29	-1.46	0.15	0.15	[-1.00, 0.15]
Relationship status	0.54	0.28	1.92	0.06	0.20	[-0.02, 1.11]
Income	0.05	0.31	0.15	0.88	0.02	[-0.56, 0.65]
Major	-0.22	0.29	-0.75	0.45	0.08	[-0.80, 0.36]
Received vaccine	0.06	0.29	0.22	0.83	0.02	[-0.51, 0.64]
Non-committed relationships only (n = 53) ^a						
Age	0.02	0.09	0.26	0.80	0.04	[-0.16, 0.20]
Ethnicity (AA ^b vs. all others)	-0.67	0.44	-1.54	0.13	0.22	[-1.56, 0.21]
Income	0.42	0.50	0.84	0.40	0.12	[-0.58, 1.42]
Major	0.09	0.49	0.18	0.86	0.03	[-0.90, 1.07]
Received vaccine	-0.25	0.49	-0.52	0.61	0.07	[-1.24, 0.74]

^aModel includes only respondents who reported ever having intercourse^bAA = African American

Table 3

Multiple regression analyses predicting frequency of condom use

	Beta	SE	t	p	Effect size (r)	95 % CI for B
Committed and non-committed relationships (<i>n</i> = 92) ^a						
Age	0.13	0.06	2.04	0.04	0.19	[0.00, 0.25]
Ethnicity (AA ^b vs. all others)	0.47	0.32	1.44	0.15	0.14	[-0.18, 1.11]
Relationship status	-0.05	0.32	-0.32	<0.01	0.31	[-1.67, -0.42]
Income	-0.73	0.34	-0.13	0.04	0.20	[-1.40, -0.05]
Major	0.11	0.33	0.34	0.73	0.03	[-0.54, 0.76]
Received vaccine	0.12	0.32	0.36	0.72	0.03	[-0.52, 0.75]
Non-committed relationships only (<i>n</i> = 53) ^a						
Age	0.08	0.08	-0.61	0.54	0.14	[-0.07, 0.24]
Ethnicity (AA ^b vs. all others)	1.00	0.38	2.63	0.01	0.35	[-0.24, 1.75]
Income	-0.68	0.43	-1.58	0.12	0.21	[-1.54, 0.19]
Major	0.17	0.42	0.40	0.69	0.05	[-0.68, 1.01]
Received vaccine	0.39	0.42	0.93	0.36	0.12	[-0.46, 1.25]

^aModel includes only respondents who reported ever having intercourse^bAA = African American