

RESEARCH PAPER

Adolescents' intention and self-efficacy to follow Pap testing recommendations after receiving the HPV vaccine

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ABSTRACT

Human papillomavirus (HPV) vaccines are recommended in the US for girls and women 11–26 y of age. Because these vaccines do not prevent all cervical cancers, Papanicolaou (Pap) screening is still recommended after vaccination. Young women who have been vaccinated may perceive themselves at lower risk for HPV infection and cervical cancer, which could lead to lower intention and self-efficacy to follow cervical cancer screening guidelines, and subsequent nonadherence to Pap testing. The aim of this study was to examine whether perceived risk of human papillomavirus (HPV) after vaccination and other factors are associated with adolescents' intention and self-efficacy to get Pap testing after HPV vaccination. Women 13–21 y of age ($N = 339$) receiving their first HPV vaccine dose completed a survey. Multivariable logistic regression examined associations between perceived risk of HPV and intention/self-efficacy to get a Pap test while adjusting for other factors. Approximately half of participants reported high intention and half reported high self-efficacy to get a Pap test. Factors significantly associated with high intention were Pap testing history and knowledge about HPV/HPV vaccines; factors significantly associated with high self-efficacy included insurance plan, Pap testing history, communication with clinician about needing a Pap test after vaccination, lifetime number of male sexual partners, and recent smoking. In conclusion, educating adolescents about HPV/HPV vaccines and the need for Pap testing may increase self-efficacy/intention to get a Pap test after vaccination.

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Introduction

The US Advisory Committee on Immunization Practices recommends human papillomavirus (HPV) vaccines for girls and women 11–26 y of age.¹ Because these vaccines do not prevent all cervical cancers, Papanicolaou (Pap) screening is still recommended after vaccination.² Young women who have been vaccinated may perceive themselves at lower risk for HPV infection and cervical cancer, which could lead to lower intention and self-efficacy to follow cervical cancer screening guidelines, and subsequent nonadherence to Pap testing. Although two studies in adults demonstrated high intention to participate in Pap screening after vaccination,^{3,4} a study in 20–29 year-old women in Australia demonstrated that vaccinated vs. unvaccinated women were less likely to participate in screening.⁵

Intention is defined as an individual's motivation to perform a behavior.⁶ Self-efficacy is defined as confidence in oneself to exert personal control to perform a behavior.⁷ Both have been shown to predict health-related behaviors, including adherence to Pap testing recommendations.^{8,9} They may serve as reasonable proxies for behavior, given the challenge of measuring actual Pap testing at the recommended age, which may be years after HPV vaccination. The aims of this study were to examine adolescent intention and self-efficacy to follow recommendations for future Pap testing after HPV vaccination, and to examine whether perceived risk of HPV and other factors, including demographics,

knowledge, and behavior, are associated with intention and self-efficacy. We hypothesized that intention and self-efficacy to follow recommendations would be high, and lower perceived risk of HPV after vaccination would be associated with lower intention and self-efficacy to follow recommendations.

Results

The mean age of the 339 participants was 16.8 years; 259 (76.4%) were African-American, 59 (17.4%) White, and 21 (6.2%) Multiracial; 11 (3.2%) were Hispanic (Table 1). Mean scale score for perceived risk of HPV was 5.0 (SD 2.2, range 0–10), 168 (49.6%) reported high intention to get a Pap test within the next 6 months, and 199 (58.7%) reported high self-efficacy to get a Pap test when recommended.

Factors significantly associated with high intention and high self-efficacy to get a Pap test in univariable logistic regression models are shown in Table 2. Perceived risk of HPV after vaccination was associated with intention at a marginal level of significance, but was not associated with self-efficacy to follow Pap testing recommendations. In multivariable models, factors associated with high intention to get a Pap test among all participants included history of Pap testing and knowledge about HPV and HPV vaccines (Table 3), and factors associated with high self-efficacy among all participants included insurance

Table 1. Results of descriptive analyses: participant intention and self-efficacy to get a Pap test after HPV vaccination; demographic characteristics; medical history; communication about Pap testing; HPV knowledge; and behaviors.

	N (%)	Mean (SD) ¹
Intention and Self-Efficacy to Get a Pap test after HPV Vaccination		
Intention²		
Extremely likely	168 (49.6)	
Somewhat likely/neither/somewhat unlikely/extremely unlikely	171 (50.4)	
Self-efficacy³		
Completely sure	199 (58.7)	
Not at all sure/somewhat sure	140 (41.3)	
Demographic Characteristics		
Age (years)⁴		16.8 (2.4)
Race		
White, Asian/Pacific Islander, Native American/Alaskan Native	59 (17.4)	
African American	259 (76.4)	
Multiracial, other	21 (6.2)	
Ethnicity		
Appalachian	13 (3.8)	
Hispanic	11 (3.2)	
Insurance Status		
Have insurance		
Yes	286 (84.4)	
No/not sure	53 (15.6)	
Insurance plan		
Medicaid/Caresource	193 (56.9)	
Private/self pay/other	68 (20.1)	
No insurance or missing	78 (23.0)	
Medical History		
Ever had a Pap test	151 (44.5)	
Pap test in past year	123 (36.3)	
Ever had abnormal Pap test	46 (13.6)	
Ever had colposcopy	13 (3.8)	
Family history of cervical cancer	44 (13.0)	
Communication about Pap Testing		
Frequency mother talked about getting a Pap test		
Never/once	248 (73.2)	
Several times/ frequently	91 (26.8)	
Today doctor/nurse talked about needing Pap test after HPV vaccination	169 (49.8)	
Today doctor/nurse gave written information about HPV/HPV vaccines	268 (79.1)	
HPV and HPV vaccine knowledge⁵		
Scale score (mean)		5.3 (2.5)
Relevant individual items		
Women with HPV need Pap tests more often (% correct responses)	204 (60.2)	
Women who have received the HPV vaccine still need Pap testing (% correct responses)	235 (69.3)	
Perceived risk of HPV		
Scale score (mean)		5.0 (2.2)
Dichotomized⁶		
Low perceived risk	116 (34.2)	
High perceived risk	223 (65.8)	
Behaviors		
Sexual History		
Age at first sexual contact		14.5 (1.6)
Age at first sexual intercourse		14.6 (1.5)

(Continued on next column)

Table 1. (Continued)

	N (%)	Mean (SD) ¹
Number of lifetime male partners		
0	144 (43.2)	
1	42 (12.6)	
2-4	72 (21.6)	
5 or more	75 (22.5)	
Number of lifetime female partners		
0	319 (94.7)	0.3 (2.8)
1 or more	18 (5.3)	
Substance Use		
Cigarettes: smoked at least 5 packs in lifetime		
Cigarettes: number of days smoked in past 30 d		
0	299 (88.2)	
1 or more d	40 (11.8)	
Marijuana: used past year		
Alcohol: drank in past year		
Alcohol: number of drinks consumed at one time		
0	225 (66.8)	
1 or more	112 (33.2)	

¹SD = standard deviation²Measured using the following item: If you knew you were supposed to get a Pap test done within the next six months, how likely or unlikely is it that you would get a Pap test within that time frame?³Measured using the following item: How sure are you that you will get a Pap test when your doctor or nurse recommends that you get one?⁴Measured as a continuous variable⁵13-item scale measuring knowledge about HPV and HPV vaccines⁶Scale score dichotomized into upper and lower 2 tertiles: upper tertile represents low and lower two tertiles represent high perceived risk

plan (Medicaid vs. none/unsure), history of Pap testing in the past year, communication with a clinician about needing a Pap test after HPV vaccination, lifetime number of male sexual partners, and cigarette smoking in the past 30 d (Table 4).

Results differed somewhat when multivariable models were stratified by sexual experience and age. Variables associated with high intention in stratified models were as follows (Table 3). Among sexually experienced women, having had a Pap test, knowledge about HPV and HPV vaccines, and number of lifetime male sexual partners were associated with intention. Among sexually inexperienced women, having had a Pap test and knowledge about HPV and HPV vaccines were associated with intention. Among those > 18 y of age, having had a Pap test in the past year was associated with intention. Among those < 18 y of age, having had a Pap test and knowledge about HPV and HPV vaccines were associated with intention. Variables associated with self-efficacy in stratified models were as follows (Table 4). Among sexually experienced women, having insurance, having had a Pap test in the past year, communication from a clinician that a Pap test was needed after vaccination, and recent cigarette smoking were associated with self-efficacy. Among sexually inexperienced women, having Medicaid (vs. no) insurance and communication from one's mother about the need for Pap testing were associated with self-efficacy. Among women > 18 y of age, having had a Pap test was associated with self-efficacy. Among women < 18 y of age, having Medicaid (vs. no) insurance, having had a Pap test, communication from a clinician that Pap testing was needed after vaccination, and marijuana use were associated with self-efficacy.

Table 2. Variables associated with intention and self-efficacy to get a Pap test after HPV vaccination among all participants: results of unadjusted logistic regression models.

Variables		Intention		Self-efficacy	
		OR ¹ (95% CI) ²	P-value	OR (95% CI)	P-value
Demographics					
Age (years) ³		1.3 (1.2-1.4)⁴	<0.0001	1.4 (1.3-1.6)	<0.0001
Perceived Risk of HPV					
	Low vs. high perceived risk	1.6 (1.0-2.5)	0.05	1.2 (0.8-2.0)	0.36
Insurance					
Has insurance	Yes vs. no	1.2 (0.7-2.2)	0.5	2.8 (1.5-5.1)	0.001
Insurance plan	Medicaid vs. none/unsure	1.6 (1.0-2.8)	0.07	3.0 (1.7-5.1)	<0.0001
Medical History					
Ever had a Pap test	Yes vs. no/not sure	4.6 (2.9-7.2)	<0.0001	6.9 (4.2-11.6)	<0.0001
Pap test in past year	Yes vs. no/not sure	4.3 (2.7-6.9)	<0.0001	7.6 (4.3-13.5)	<0.0001
Ever had abnormal Pap test	Yes vs. no/not sure	4.4 (2.1-9.3)	<0.0001	7.0 (2.7-18.5)	<0.0001
HPV and HPV Vaccine Knowledge					
Scale					
HPV and vaccine knowledge	Scale score	1.2 (1.1-1.4)	<0.0001	1.2 (1.1-1.3)	0.0002
Individual items					
Women with HPV need Pap tests more often	Correct vs. Incorrect	1.6 (1.0-2.4)	0.05	1.6 (1.0-2.5)	0.04
Women who have received HPV vaccine still need Pap tests	Correct vs. Incorrect	3.5 (2.1-5.8)	<0.0001	3.0 (1.8-4.8)	<0.0001
Communication					
Today doctor or nurse talked about needing a Pap test after HPV vaccine	Yes vs. no/not sure	2.2 (1.4-3.4)	0.0005	3.0 (1.9-4.7)	<0.0001
Frequency with which mother talked about getting a Pap test	Frequently/several times vs. once/never	1.4 (0.9-2.3)	0.2	2.1 (1.3-3.6)	0.004
Sexual History					
Number of lifetime male partners	≥ 5 vs. 0	4.3 (2.3-7.7)	<0.0001	7.5 (3.9-14.6)	<0.0001
	2-4 vs. 0	3.5 (2.0-6.4)	<0.0001	7.1 (3.7-13.9)	<0.0001
	1 vs. 0	0.9 (0.5-2.0)	0.87	3.1 (1.5-6.2)	0.002
Substance Use					
Cigarettes, number of days smoked in past 30 days	≥ 1 vs. 0	2.1 (1.0-4.1)	0.04	5.8 (2.2-15.1)	0.0004
Marijuana, used in past year	Yes vs. no	2.4 (1.4-4.2)	0.002	3.8 (2.0-7.3)	<0.0001
Beer, wine or liquor average times drunk in past year	≥ 1 vs. 0	2.1 (1.3-3.3)	0.002	2.7 (1.7-4.5)	<0.0001
Alcohol, amount consumed when drinking	≥ 1 vs. 0	2.1 (1.3-3.3)	0.002	2.6 (1.6-4.2)	0.0002

¹OR = odds ratio.²CI = confidence interval.³Age measured as a continuous variable.⁴Independent variables associated with the outcome variables at P < .10 (included in multivariable models) are bolded.

Discussion

We found that approximately half of adolescents who received an HPV vaccine reported high intention to receive a Pap test in the next 6 months and high self-efficacy to follow Pap testing recommendations after HPV vaccination. This is in contrast to 2 studies in adults, which demonstrated that greater than 90% of participants reported high intention to receive a Pap test after vaccination.^{3,4} Our results, combined with another finding in a study of 20–29 year-old women which demonstrated that vaccinated women are less likely to participate in screening compared to unvaccinated women,⁵ suggest that educational messages given at the time of HPV vaccination and at follow-up visits should focus on the importance of following future Pap screening recommendations.

Perceived risk of HPV was not associated with intention or self-efficacy to receive a Pap test after HPV vaccination as hypothesized, suggesting that risk perceptions are not the mechanism by which vaccinated girls might develop lower intention or self-efficacy to get a Pap test. However, we identified several modifiable factors associated with high intention and self-efficacy to get a

Pap test after vaccination. Knowledge about HPV and HPV vaccines was associated with intention among all and among participants who were sexually experienced, sexually inexperienced, and <18 y of age, implying that improving adolescent knowledge and understanding of HPV vaccines in the setting of vaccination may improve intention to get a Pap test after HPV vaccination. Moreover, communicating with a clinician about needing a Pap test after HPV vaccination was associated with self-efficacy among all participants and among those who were sexually experienced and <18 y of age, and communicating with one's mother about Pap testing was associated with self-efficacy among sexually inexperienced participants, suggesting that clinicians and parents may be able to enhance self-efficacy for Pap testing if they educate adolescents about the importance of Pap testing after vaccination.

Having Medicaid insurance (vs. none/unsure) and having any insurance (vs. none/unsure) were associated with high self-efficacy to get a Pap test after vaccination, suggesting that insurance coverage may increase self-efficacy to obtain preventive health services in the future and underscoring the importance of adequate insurance for young women. A

Table 3. Variables associated with intention to follow recommendations for Pap testing after HPV vaccination, among all participants and stratified by sexual experience and age: results of adjusted logistic regression models.¹

Variables		AOR ² (95% CI ³)				
		All	Sexually experienced	Sexually inexperienced	≥ 18 years	< 18 years
Medical History						
Ever had a Pap test	Yes vs. no/not sure	3.8 (2.4-6.2)	2.4 (1.1-5.2)	5.5 (1.2-24.4)		3.4 (1.8-6.3)
Had a Pap test in past year	Yes vs. no/not sure				3.9 (1.4-10.9)	
HPV and HPV Vaccine Knowledge						
HPV and vaccine knowledge	Mean scale score	1.2 (1.1-1.3)	1.2 (1.0-1.3)	1.3 (1.1-1.5)		1.2 (1.1-1.4)
Sexual History						
Number of lifetime male partners	≥ 5 vs. 1		2.9 (1.2-7.2)			
	2-4 vs. 1		3.1 (1.3-7.2)			

¹Variables included in the multivariable models were all variables associated with each outcome variable at $p < .10$ in the univariable models, and variables associated with the outcomes at $p < .05$ in the final models are shown in the table. For the model predicting intention among all participants, the following variables were included: age, perceived risk of HPV, insurance plan, history of Pap testing (ever, in the past year), history of an abnormal Pap test, HPV and HPV vaccine knowledge (scale score), communication with doctor/nurse about Pap testing after vaccination, number of lifetime male sex partners, cigarette use, marijuana use, and alcohol use and consumption. Variables excluded were those shown in Table 1 that were not associated with the outcome variables at $p < .10$. For stratified models, there were differences in the variables included in the multivariable models due to differences in the results of the univariate models; only those variables associated with the outcome variable at $p < .10$ in the stratified univariable models were included.

²AOR = adjusted odds ratio

³CI = confidence interval

number of studies have shown that insurance status is associated with Pap screening behaviors across racial and ethnic groups.¹⁰ A recent study demonstrated that implementation of the Affordable Care Act in the US, which allows young adults to remain on their parents' health insurance plan

until the age of 26 years, was followed by a net increase of 9.0% in the diagnosis of early-stage cervical disease, and an increase of 11.9% in receipt of fertility-sparing treatments among young women 21 to 25 y of age compared to those 26 to 34 y of age.¹¹ In our study, higher number of sexual

Table 4. Variables associated with self-efficacy to follow recommendations for Pap testing after HPV vaccination, among all participants and stratified by sexual experience and age: results of adjusted logistic regression models.¹

Variables		AOR ² (95% CI ³)				
		All	Sexually experienced	Sexually inexperienced	≥ 18 years	< 18 years
Insurance Coverage						
Insurance Plan	Medicaid vs. none/unsure	3.1 (1.6-5.9)		4.1 (1.4-11.9)		4.2 (1.9-9.3)
Have insurance	Yes vs. no/not sure		2.9 (1.1-6.1)			
Medical History						
Ever had a Pap test	Yes vs. no/not sure				5.7 (1.6-20.0)	2.8 (1.4-5.8)
Had a Pap test in past year	Yes vs. no/not sure	3.6 (1.6-8.0)	2.9 (1.4-6.0)			
Communication						
From clinician: Pap needed after HPV vaccination	Yes vs. no/not sure	2.2 (1.3-3.7)	2.1 (1.0-4.3)			2.9 (1.6-5.3)
From mother: need for Pap testing	Several times/frequently vs. never/once			3.1 (1.3-7.7)		
Sexual History						
Number of lifetime male partners	≥ 5 vs. 0	2.2 (0.9-5.5)				
	2-4 vs. 0	3.4 (1.6-7.4)				
	1 vs. 0	1.7 (0.8-3.7)				
Substance Use						
Cigarette smoking previous 30 days	≥ 1 vs. 0 days	3.5 (1.0-11.9)	5.0 (1.1-22.8)			
Marijuana use previous year	Yes vs. no					4.5 (1.7-12.0)

¹Variables included in the multivariable models were all variables associated with each outcome variable at $p < .10$ in the univariable models, and variables associated with the outcomes at $p < .05$ in the final models are shown in the table. For the model predicting self-efficacy among all participants, the following variables were included: age, insurance status, insurance plan, history of Pap testing (ever, in the past year), history of an abnormal Pap test, HPV and HPV vaccine knowledge (scale score), communication with doctor/nurse about Pap testing after vaccination, communication with mother about Pap testing, number of lifetime male sex partners, cigarette use, marijuana use, and alcohol use and consumption. Variables excluded were those shown in Table 1 that were not associated with the outcome variables at $p < .10$. For stratified models, there were differences in the variables included in the multivariable models due to differences in the results of the univariate models; only those variables associated with the outcomes at $p < .10$ in the stratified univariable models were included.

²AOR = adjusted odds ratio

³CI = confidence interval

partners was associated with intention as well as self-efficacy, and both cigarette and marijuana use were associated with self-efficacy. It is possible that those who practice riskier behaviors have also participated in other screening procedures such as STI testing, increasing their confidence in and intention to obtain other types of preventive screening such as Pap testing in the future. It is also possible that they are more comfortable with a pelvic examination.

This study had several limitations. Predictor variables are not necessarily causally associated with intention and self-efficacy, given that the study was cross-sectional. In addition, the study sample was comprised of predominantly low-income, African-American young women, limiting its generalizability. The lack of a control group was also a limitation; given the recommendations for later onset of Pap screening and less frequent screening, an unvaccinated cohort of young women might respond similarly. Finally, participants were asked how likely or unlikely it would be that they would get a Pap test in the next 6 months if it were recommended. Pap testing is not recommended until 21 y of age in the US; therefore, participants were asked to respond to a future scenario which may affect the validity of their responses. Despite these limitations, this study provides new insights into the importance of adolescent education about HPV and HPV vaccines and the need for Pap testing after vaccination in order to increase intention and self-efficacy, which may ultimately improve adherence to Pap testing recommendations.

Patients and methods

Baseline data were obtained from a longitudinal study examining the attitudinal and behavioral impact of HPV vaccination, which was approved by the hospital's Institutional Review Board. Women 13–21 y of age ($N = 339$) receiving their first HPV vaccine dose in an urban adolescent clinic completed a survey. The primary predictor, perceived risk of HPV, was assessed using a 5-item scale, with each item measured using a 10-point visual analog scale ranging from “strongly disagree” to “strongly agree.”¹² The mean score was dichotomized into upper vs. lower 2 tertiles (high vs. low perceived risk). The primary outcome variables were self-efficacy and intention to follow Pap test recommendations after HPV vaccination. Intention to get a Pap test after HPV vaccination was assessed using the question: “If you knew you were supposed to get a Pap test done within the next 6 months, how likely or unlikely is it that you would get a Pap test within that time frame?” Responses were dichotomized into extremely likely (high intention) vs. somewhat likely/neither likely nor unlikely/somewhat unlikely/extremely unlikely (low intention). Self-efficacy was assessed using the question: “How sure are you that you will get a Pap test when your doctor or nurse recommends that you get one?” Responses were dichotomized into completely sure (high self-efficacy) vs. somewhat/not at all sure (low self-efficacy).

Univariable and multivariable logistic regression models examined associations between perceived risk of HPV and intention and self-efficacy to get a Pap test. Covariates included: demographic characteristics, insurance status, medical history, HPV and HPV vaccine knowledge, communication with physician and mother about the need for Pap testing after vaccination, sexual history, and

substance use. Analyses were also stratified by age (<18 y vs. >18 years) and sexual experience (yes vs. no). Covariates associated with the outcome variables in univariable models with a p value of <.10 were included in the multivariable model. A stepwise selection method was used in the multivariable models, and covariates associated with the outcome variables in multivariable models with a p value of <.05 were retained in the final models.

Abbreviations

HPV human papillomavirus
Pap Papanicolaou

Disclosure of potential conflicts of interest

The study sponsor had no involvement in the design, data collection, data analysis and interpretation of this study, as well as the writing and submission for publication of this brief. No payment was received to produce this brief. Lisa Higgins was the program manager and Dr. Kahn chaired the review committee for a grant to the Society for Adolescent Health and Medicine evaluating public health demonstration project proposals to improve adolescent vaccination; grant funding for this program was from Merck, Inc. Dr. Kahn co-chaired 2 HPV vaccine clinical trials in HIV-positive individuals, for which Merck & Co., Inc., provided vaccine and immunogenicity titers. The remaining co-authors declared no conflicts of interest.

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