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# Knowledge and Perceptions of HPV Vaccine Acceptance among African-American College Women

Lauren R. Darensbourg, MPH, Ivette A. López, PhD,  
Matthew T. Dutton, PhD, C. Perry Brown, DrPH

## ABSTRACT

*Human papillomavirus (HPV) is the most prevalent sexually transmitted disease in the United States. Prevalence rates among sexually active young women are approximately 50%. An HPV vaccine has been created that has high efficacy in preventing persistent HPV infection, cervical cancer precursor lesions, and genital warts caused by four HPV subtypes. The purpose of this study was to assess African-American college women's knowledge and perceptions of HPV, and their association with the acceptance of HPV vaccination. Variable selection was guided by the Health Belief Model and the Theory of Planned Behavior. Written surveys were administered to 122 African-American women between the ages of 18 and 26 who were enrolled as undergraduates at Florida Agricultural and Mechanical University (FAMU). Statistically significant associations were found between planning to get vaccinated against HPV and several perception variables. Health education efforts aimed at African-American women in college should be renewed, given the high percentage of misconceptions about HPV among members of the study population. Interventions should appeal to social networks of the young women, as their opinions regarding the vaccine weighs in their decision to plan to get vaccinated. This study underscores the need for continuous and consistent health education interventions directed at African-American women of college age.*

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## BACKGROUND

Approximately 25 million women ages 14-59 carry the human papillomavirus (HPV). Prevalence increases yearly among women starting at age 14 and peaks at 45% among women 20 to 24 (Dunne, 2007; Gonik, 2006; Slomovitz, Sun, Frumovitz, Soliman, Schmeler, et al. 2006). HPV is often contracted by adolescents and young adults shortly after the onset of sexual activity (Hoover, 2000). Moreover, a Centers for Disease Control and Prevention (CDC) study based on an analysis of the 2003-2004 National Health and Nutrition Examination Survey estimates that one in four (26%) young women between the ages of 14 and 19 in the United States – or 3.2 million teenage girls – are infected with at least one of the most common sexually transmitted diseases: HPV, chlamydia, herpes simplex virus, and trichomoniasis (CDC, 2008). Of these, HPV is the most prevalent.

HPV infection has been established as the most important causative factor of cervical cancer, as well as penile and anal cancers (Muñoz et al, 2003; Muñoz et al., 2000; Walboomers et al., 1999). HPV infection also leads to clinically apparent genital warts in 10.5% of all infections among women 25-34 years of age

(Dempsey, Koutsky & Golden, 1997). Although this number is relatively small, genital warts can cause considerable morbidity and emotional stress for patients, as well as increased risk for cervical cancer.

A prophylactic human papillomavirus (HPV) vaccine has been developed called Gardasil® (Markowitz et al., 2007). Clinical trials of the vaccine indicate that it has high efficacy in preventing persistent HPV infection, cervical cancer precursor lesions, vaginal and vulvar cancer precursor lesions, and genital warts caused by HPV types 6, 11, 16, or 18 among girls and women who have not previously been infected with the respective HPV type (Markowitz et al., 2007). Knowledge among the general population remains sparse regarding both HPV and the HPV vaccine to prevent infection and future development of cervical cancer (Licht et al, 2010; Hopenhayn, 2007). Also, because HPV is sexually transmitted, cervical cancer also may be classified as a sexually transmitted infection (STI), which raises concerns of a possible stigma (Hopenhayn, 2007). However, one study found that presenting a vaccine to prevent sexually related problems did not seem to be a deterrent to its

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acceptance (Boehner, 2003). In fact, the same study found that college students were willing to accept a vaccine for an STI because there are so many individuals that have perceived susceptibility to the diseases (Boehner, 2003). Consistent with the previous study's findings, Hoover et al. (2000) found that girls and young women actually preferred a vaccine that targeted the STI rather than cervical cancer. Young women's acceptance of the vaccine also will be affected by the roles of their peers, their healthcare coverage or the cost-effectiveness of the vaccine, as well as educational campaigns on HPV transmission and the effects of HPV infection on cervical cancer risk within their community (Zimet et al., 1997; Zimet et al., 2000). Markowitz et al. (2013) showed that the vaccine had reduced overall HPV prevalence among females aged 14-19 but did not consider racial and ethnic differences in vaccine acceptance.

Previous studies in the United States show that knowledge of HPV is limited among adolescents, university undergraduates, and even women with abnormal Pap smears referred for further testing (Rosenthal et al, 2011; Licht et al, 2010; Hoover, 2007). D'Urso, Thompson-Robinson and Chandler (2007) found that lack of awareness knowledge of HPV was high in a sample of black college students at a historically black university. Yet, few studies to date have evaluated perceptions of the HPV vaccine among African-American women. The purpose of this study is to assess the knowledge and perceptions of HPV and acceptability of the HPV vaccine among African-American college women enrolled at Florida A&M University, a premier historically black college/university (HBCU).

The theoretical framework that provides the foundation for this study is the Theory of Planned Behavior (TPB) (Ajzen, 1991). The TPB explores the relationship between behavior, attitudes and behavioral intentions. This theory was utilized to help determine if there is an association between African-American college women planning to get the HPV vaccine and their own normative, behavioral, and control beliefs. The knowledge variable was added to provide insight into whether or not an association exists between the modifying factors of HPV knowledge among African-American college women and to determine if this association would influence their perceived threat of disease and intention to be vaccinated against HPV.

## METHODS

We used a cross-sectional research design to survey African-American college women's knowledge and perceptions of HPV and the HPV vaccine. The study was reviewed and approved by the Institutional

Review Board of Florida A&M University (FAMU IRB), and a signed informed consent form was obtained from each study participants.

We used a convenience sample; participants were recruited from 5 different classes of the journalism and psychology departments at FAMU. A total of 122 eligible students participated. The entire sample was female, and 98% were African-American. Sample participants ranged in age from 18 to 25, and were mostly freshmen (30.3%) or seniors (34.4%) (Table 1). Data were derived from self-reported confidential surveys supplied by the 122 eligible participants. No overlap occurred within the study samples.

**Table 1. Demographic Characteristics of Study Participants**

Characteristic	Percentage	Sample Size
Gender		
Female	100.0	122
Age		
18 – 19	33.6	41
20 – 21	34.4	42
22 – 25	32.0	39
Race		
African American	97.5	119
Mixed Race	2.5	3
Classification		
Freshman	30.3	37
Sophomore	15.6	19
Junior	19.7	24
Senior	34.4	42

## Instruments

The survey instrument was a self-administered, confidential questionnaire with three sections: (1) HPV knowledge; (2) HPV vaccine perceptions; and (3) demographics. The sample was recruited from selected classes after permission was granted from the respective professors. On an agreed upon day, the researcher came at the beginning of class, described the study, and asked for volunteer participants. Women who volunteered to answer the self-administered survey completed them in the classroom, after reading and signing the informed consent form. The researcher then collected the completed surveys.

## HPV Knowledge Test

A 17-item knowledge test was administered to the participants. This test was adapted using the Digene HPV Test (Digene, 2007). A knowledge variable was included in this study to account for any confounding potential, as well as to assess its significance in covariate and multivariate analyses. The inclusion of

the knowledge test is not guided by the Theory of Planned Behavior.

**HPV Vaccine Perceptions Test**

This 14-item selection of survey questions was guided by the Theory of Planned Behavior, and addresses the following theoretical constructs and concepts: behavioral intention (dependent variable); subjective norm, attitude toward behavior, normative beliefs, and perceived behavioral control (independent variables). Responses were measured using a 7-item Likert scale with levels of agreement ranging from ‘Strongly Disagree’ to ‘Strongly Agree.’ Table 2 displays the theoretical constructs in relation to the study variables that were established for this study.

**Data Analysis**

The responses to the HPV Knowledge test were scored (number of correct responses/total number of questions) for descriptive analysis to determine knowledge levels among students as well as for use in multivariate analysis. Bivariate analyses were utilized to determine if correlations existed between the dependent variable (planning to be vaccinated against HPV) and the independent variables derived from the Theory of Planned Behavior (HPV and HPV vaccine knowledge and perceptions). For multivariate analyses, responses to the HPV Perceptions Test were recoded into binary variables (Agree, Disagree/No Opinion). A multivariate logistic regression model was employed to determine which independent variables (subjective norm, normative beliefs, attitude toward the behavior, and perceived behavioral control) were associated with planning to be vaccinated against HPV (behavioral intent). A stepwise elimination procedure was used until all variables were statistically significant at  $\alpha = .05$  in the final model. All analyses were conducted using SPSS version 13.0 statistical software (SPSS Inc., Chicago, Illinois).

**RESULTS**

The proportion of correct answers on the HPV Knowledge Test ranged from 35% to 100%, with a mean of 74%. Of the 122 participants, 53.3% (n = 65) did not know that HPV was the most common STD in the United States.; 53.3% (n = 65) thought HPV was only transmitted through vaginal and anal sexual intercourse; moreover, 52.5% (n = 64) thought HPV did not affect both men and women. Bivariate and multivariate analyses revealed no significant correlations or associations between scores on the HPV

**Table 2. Theoretical Constructs and Selected Study Variables for Theory of Planned Behavior (TPB)**

<p><i>Behavioral Intention</i></p> <ul style="list-style-type: none"> <li>o I plan to get vaccinated against HPV.</li> </ul>
<p><i>Normative Beliefs</i></p> <ul style="list-style-type: none"> <li>o My family thinks I should get vaccinated against HPV.</li> <li>o My friends think I should not get vaccinated against HPV.</li> <li>o When it comes to getting vaccinated, my family’s opinion is important.</li> <li>o When it comes to getting vaccinated, my friends’ opinions are important.</li> </ul>
<p><i>Subjective Norm</i></p> <ul style="list-style-type: none"> <li>o Many people like me are vaccinated against HPV.</li> <li>o If a celebrity whose opinions I value would approve of the HPV vaccine, I would be more likely to get vaccinated.</li> <li>o I would be more likely to be vaccinated if influential women whose opinions I value would approve of my vaccination.</li> </ul>
<p><i>Attitude toward the Behavior</i></p> <ul style="list-style-type: none"> <li>o Vaccination is bad.</li> <li>o Vaccination is valuable.</li> </ul>
<p><i>Perceived Behavioral Control</i></p> <ul style="list-style-type: none"> <li>o If I wanted to, I could get vaccinated against HPV.</li> <li>o It is mostly up to me whether or not I get vaccinated against HPV.</li> </ul>
<p><i>Modifying Factor (cognitive measure external to TPB)</i></p> <ul style="list-style-type: none"> <li>o HPV Knowledge Test.</li> </ul>

knowledge test and planning to be vaccinated against HPV in this population.

Statistically significant correlations were found at  $\alpha = .05$  level between planning to be vaccinated against HPV and: agreeing that ‘Vaccination is valuable,’ agreeing that ‘I could get vaccinated if I wanted to,’ disagreeing that ‘My family thinks I should get vaccinated against HPV,’ disagreeing that ‘Most people important to me think I should not be vaccinated against HPV,’ and disagreeing that ‘I would be more likely to get vaccinated if influential women whose opinions I value would approve of my vaccination.’ Table 3 presents the bivariate results.

**Table 3. Bivariate Results: HPV Perceptions Associated with Vaccination Intent**

Statement	Spearman correlation	p value
o Vaccination is bad.	.083	.365
o Vaccination is valuable.	.539*	<.001
o I could get vaccinated if I wanted to.	.287*	.001
o My family thinks I should be vaccinated.	.252*	.005
o Important people think I should not get vaccinated.	.269*	.003
o More likely to get vaccinated if valued influential women would approve of vaccination.	.528*	<.001

\*Indicates the correlation is significant at the .05 level (2-tailed).

**Table 4. Multivariate Results of HPV Perceptions Test: Logistic Regression**

Characteristic	Odds Ratio	p value
<b>Classification</b>		
Freshman (Reference group)	-	-
Sophomore	.491	.422
Junior	.108	.009*
Senior	1.118	.880
<b>Vaccination is valuable.</b>		
No Opinion or Disagree (Reference group)	-	-
Agree	5.805	.015*
<b>My family thinks I should get vaccinated.</b>		
No Opinion or Disagree (Reference group)	-	-
Agree	10.877	.008*
<b>If influential women whose opinions I valued approved of my vaccination, I would be more likely to get vaccinated.</b>		
No Opinion or Disagree (Reference group)	-	-
Agree	6.496	.003*

\*Indicates the association is significant at the 0.05 level (2-tailed).

In the multivariate model for HPV perceptions (i.e., intent to be vaccinated against HPV), there were no significant associations between HPV knowledge and planning to be vaccinated in this population. However, after stepwise elimination, variables measuring attitude toward planning to get vaccinated for HPV, normative beliefs, and social norms related to

the HPV vaccine were found to be significantly associated with planning to get vaccinated against HPV in this population. Table 4 displays the odds ratios (OR) and p-values of the significant predictors. The following factors were found to be significantly associated: being a college Junior increased the likelihood of vaccination relative to being a Freshman; those who agreed ‘Vaccination is valuable’ were over 5 times more likely to plan to be vaccinated than those who disagreed/had no opinion; those who agreed ‘My family thinks I should get vaccinated against HPV’ were almost 11 times more likely to plan to be vaccinated than those who disagree/had no opinion; those who agreed ‘I would be more likely to get vaccinated against HPV if influential women whose opinions I valued approved of my vaccination’ were 6.5 times more likely to plan to be vaccinated than those who did not agree; all other variables were not significant at the  $\alpha = .05$  level.

## DISCUSSION

In this study, we examined African American college women’s level of HPV knowledge and perceptions of HPV and the HPV vaccine in association to planning to be vaccinated against HPV. Although HPV knowledge was not found to be significantly correlated or associated with planning to be vaccinated against HPV in this population, constructs of the Theory of Planned Behavior such as, attitude toward the behavior, subjective norms, and normative beliefs were found to influence planning to be vaccinated against HPV. Further, there was an overall high intent to be vaccinated against HPV in this population (68%). This study has the potential to become important to the development and implementation of public health strategies and interventions to increase awareness and education of HPV and the HPV vaccine among African American young women on college campuses across the nation.

The finding of low knowledge levels among participating women is not dissimilar from other study results. D’Urso and colleagues (2007) found that black students at one HBCU were as misinformed about HPV as their white counterparts. The study participants reported alarming misconceptions, although different knowledge tests were utilized (D’Urso et al, 2007). Clearly, there is an urgent need to address the lack of accurate HPV information created for this population segment.

Despite the level of misinformation, most of the participants had a positive outlook regarding the HPV vaccine. Whereas this is a mostly constructive finding, the HPV vaccination decision should optimally be taking place at an earlier age (ideally 9-13 years of age,

but any time after that until the age of 26), in order to benefit fully from the vaccines protection. Therefore, the benefit of the vaccine is limited due to risky sexual activity that a young woman may have participated in by the time she attends college. Some of the negative associations between being a junior college student (presumably older) and the behavioral intent of getting the HPV vaccine may be related to the women's perception that it may be too late for them.

Regarding the multivariate model for HPV perceptions (i.e. intent to be vaccinated against HPV), the following factors were found to be significantly associated: being a college Junior, agreeing 'Vaccination is valuable,' agreeing 'My family thinks I should get vaccinated against HPV,' and agreeing 'I would be more likely to get vaccinated against HPV if influential women whose opinions I valued approved of my vaccination.' Regarding the association of intent to vaccinate and agreeing the "vaccination is valuable" and "my family thinks I should get vaccinated against HPV," these are areas where health education interventions tailored for African American young women should center. The importance of familial support for vaccination is supported by much of the literature despite barriers to vaccine acceptance among many parents (Keane et al, 2005; Taylor et al, 2002; Diekema, 2005, Davis et al, 2004). Furthermore, positive perceptions of the vaccine ('vaccination is valuable') were expressed by a majority of the study participants. Yet since these perceptions showed a significant association with vaccination intent, they should be an area of focus for health education interventions. Finally, the last significant associations were found between intent to vaccinate and agreement with 'I would be more likely to get vaccinated against HPV if influential women whose opinions I valued approved of my vaccination.' The study participants express openness toward a female role model regarding the vaccination. The opinions of influential others are clearly associated with the intention of becoming vaccinated against HPV. A physician's recommendation may have also swayed some women, as stated by Rosenthal et al (2011), but this was not measured in the present study. Health educators and service providers should incorporate the social influence of family members, friends, peers and role models.

### Conclusion

In conclusion, HPV interventions should be developed taking into consideration the opinions of the social networks in the lives of African American college women. Emphasis should be placed on comprehensive sexual education given the high

misconceptions about HPV within this population, and should focus on education, awareness and prevention of HPV, cervical cancer, and genital warts. Furthermore, public health initiatives should be tailored to account for the differences in perceptions between different college classifications.

Limitations for this study may have included instrument bias, as reliability of the tests were not obtained. The small sample size may have impeded the detection of existing correlations. Future studies on HPV should explore the knowledge and perceptions of males because knowing which factors influence their intention to be vaccinated against HPV will be important in the effective development of audience appropriate HPV awareness and prevention interventions. A larger study sample should be recruited to make the data set more generalizable to the national population and to support the data analyses to be run. Moreover, future studies should explore the possibility of an association between intent to get vaccinated against HPV and perceived threat and severity of HPV (Health Belief Model), as well as control and behavioral beliefs related to intent to be vaccinated against HPV (Theory of Planned Behavior). Additionally, a factor analysis should be performed on the HPV knowledge test to develop a knowledge scale to further explore if an association exists between HPV knowledge and intent to be vaccinated against HPV.

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**Lauren R. Darensbourg** ([Lauren.Darensbourg@hhs.gov](mailto:Lauren.Darensbourg@hhs.gov)) is Director of the *I Can do it, You Can do it* Program, President's Council on Physical Fitness, Tallahassee, FL. **Ivette A. López** ([ivette.lopez@famuedu](mailto:ivette.lopez@famuedu)) is Associate Professor, Institute of Public Health, Florida A&M University, Tallahassee, FL. **Matthew T. Dutton** ([matthew.dutton@famuedu](mailto:matthew.dutton@famuedu)), *corresponding author*, is Assistant Professor Institute of Public Health, Florida A&M University, Tallahassee, FL. **C. Perry Brown** ([perry.brown@famuedu](mailto:perry.brown@famuedu)) is Professor, Institute of Public Health, Florida A&M University, Tallahassee, FL. Copyright 2015 by the *Florida Public Health Review*.