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Review Article

## Prior Experience and Knowledge as Correlates of Parental Acceptance of HPV Vaccination

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### Abstract

#### Objectives

Although the advent of the Human Papillomavirus (HPV) vaccine holds the promise of preventing a major female reproductive cancer and genital warts, it is recognized that several factors may impact vaccine acceptance. Parental knowledge of HPV and its relation to cervical cancer, sources of HPV vaccine information, and prior experience with a sexually transmitted infection (STI) may contribute to attitudes toward this primary prevention effort.

#### Purpose

The purpose of this study was to examine the relationship of factors contributing to knowledge of HPV and parental acceptance of HPV vaccination for their 9-18 year old daughters.

#### Design

A descriptive correlational study was conducted using an online survey platform. The sample consisted of 323 parents/guardians of 9-18 year old daughters from the greater New York area.

#### Methods

Parental HPV vaccine acceptability was measured by 4-item Likert scale. Responses of those who had not had daughters vaccinated (N = 218) were compared to responses of those (N = 105) that had already vaccinated their daughters against HPV. Those who did not intend to vaccinate were compared to those who intended to vaccinate.

#### Findings

There was a significant positive relationship between knowledge and prior experience; however, knowledge and prior experience with HPV related diseases were not significant predictors of HPV acceptance.

**Keywords:** Human Papillomavirus; Parental Acceptance; HPV Knowledge; Prior Experience with HPV

#### Abbreviations

HPV: Human Papillomavirus;

STI: Sexually Transmitted Infection

## Introduction

In June 2006, the Food and Drug Administration (FDA) licensed Gardasil® for use in girls and women 9–26 years of age [1]. This is the first vaccine developed to prevent cervical cancer and other diseases in females caused by certain types of genital human papillomavirus (HPV). The main efficacy studies of the vaccine demonstrate nearly 100% effectiveness in preventing cervical precancers, vulvar and vaginal precancers, as well as 90% vaccine efficacy in preventing genital warts. Over 99% of vaccinated girls in these studies developed antibodies after vaccination. Data indicate that the vaccine is effective, with no evidence of waning protection [2].

Successful vaccination programs are expected to substantially reduce the incidence of HPV infection, the incidence of HPV-associated disease, and the economic as well as emotional burden related to HPV infection [3]. There is a tremendous opportunity to prevent a female reproductive cancer through utilization of primary prevention tactics such as immunization. Parental acceptance of HPV vaccine may be critical in decreasing the incidence of cervical cancer, since parents are the primary decision makers for child and adolescent immunization.

The purpose of this descriptive, correlational study was to examine the relationship between parental knowledge of HPV and intention to vaccinate their 9-18 year old daughters. In addition, this study examined the relationship between parental knowledge of HPV and vaccine status. This study also tested the hypothesis that parents who have had a personal history or know of someone who has had a sexually transmitted infection (STI) or cervical cancer will be more likely to intend to have their daughters receive HPV vaccination than parents who have not had a personal history or know of someone who has had a STI or cervical cancer. In addition, the relationship of these personal history variables to vaccine status was examined.

### Knowledge of Diseases Associated With Human Papillomavirus

Misunderstanding and misconceptions about transmission of HPV, its role in cervical cancer, and the need for early vaccination may hamper vaccine acceptability [4]. Despite the link between HPV and cervical cancer, studies indicated that parents have limited knowledge regarding this association [5]. Overall knowledge about HPV vaccine is inadequate [6]. A study of women's knowledge regarding HPV infection, cervical cancer, and HPV vaccines obtained via questionnaire by Giles and Garland [7] found that women had little knowledge regarding transmission or potential complications of HPV, such as cervical cancer and genital warts.

Likewise, research on focus groups with 38 parents of 12-16 year olds conducted by Robbins and colleagues [8] revealed a

general lack of knowledge of what HPV is, how it is transmitted, and the HPV and cervical cancer connection. Focus groups conducted by Friedman and Sheppard [9] in 2007 found that HPV knowledge was low among participants; this lack of knowledge served as a barrier to vaccine acceptance, because participants did not know the prevalence or potential consequences of HPV.

The hypothesis that increased knowledge would lead to greater vaccine acceptance was supported in several studies [10-12]. Gerend, et al., [13], conducted a study examining responses to HPV vaccine acceptability and found that HPV vaccine knowledge was higher among the group of parents who had already vaccinated their daughter than those who had not vaccinated their daughter. These results were in direct contrast to a cross-sectional, experimental study conducted by Dempsey, Zimet, Davis, and Koutsy [10] that found that despite an improvement in knowledge scores in the experimental group, there was no significant difference with respect to vaccine acceptability between study groups.

### Prior Experience

Knowledge of HPV related diseases can be garnered through personal experience or vicariously through observation or interaction with others who have been infected with the virus. Having prior experience with HPV or related diseases may confer tacit knowledge of the virus. A parent's prior experience with cancer or a STI has been associated with greater HPV vaccine acceptability. Having been tested for HIV, having had cervical cancer or genital warts, and the belief that one's child was at greater risk for an STI emerged as correlates of vaccine acceptance in several studies [14-18]. Zimet and colleagues [19] conducted a cross-sectional study of 320 parents and their adolescent children, in order to identify predictors of STI vaccine acceptability. Parents in this study who reported a personal history of an STI were nearly four times more likely to be accepting of vaccination for their children than those parents who did not have a history of STI [19]. A larger study of 1,350 Canadian parents revealed that parents were more likely to intend that their daughters receive HPV vaccination if they thought someone they knew was likely to get cervical cancer [16].

### Materials and Methods

Institutional Review Board (IRB) approvals were sought and obtained prior to conducting the study. A paper and pencil version of the questionnaire was pilot tested on a convenience sample of 9 subjects (XXX faculty members) in order to assess clarity of the questions and approximate time for completion. An online version of the questionnaire was pilot tested on a convenience sample of 15 parents of females in the 8th grade of a local parochial school, in order to ensure clarity and ease of administration. Average time for completion of the

questionnaire was 15 minutes.. Parents (mother, father, or legal guardian) of 9- to 18-year old female children were recruited for the study. Inclusion criteria were ability to read English and access to the internet. There were no exclusions due to age, race, or ethnicity. Survey Monkey was used to create an on-line survey. Participants were recruited via e-mail blasts sent to all those who hold a valid XXXX University e-mail account, providing them with a direct link to the survey, with follow-up reminders sent 4 and 8 weeks later. In an effort to intensify recruitment, an online Google advertisement was purchased. In addition, the researcher had the support of several local parochial grammar and high school principals who posted the survey invitation on the parent-teacher website. Letters were also given to the children in grades 4 thru 8 to take home to their parents. The letter briefly described the purpose of the study and directed the parents to the survey. All responses were collected anonymously through an online platform. A comparison of the characteristics of respondents in other studies assessing parental attitudes towards HPV vaccinations indicated that the sample is reasonably representative and mirrored demographic information reported in other quantitative HPV studies conducted in the United States, Canada, and the United Kingdom (U.K.) [6,10, 16, 18, 20-22]

**Participants**

A parent, in this study, is defined as a biological parent or guardian of a female child 9-18 years of age. For ease of reading, parents or guardians will be referenced as “parents” throughout the study. The majority of the respondents were female (97.4%), White (78.1%), married (71.7%), Catholic (63%), between the ages of 24-65 (mean 43.8). The sample was well educated with most having earned a Bachelor’s degree or higher (Table 1).

Age	Mean 43.8	Range 24-65
	%	N
<b>Gender</b>		
Male	5.3	16
Female	94.7	288
<b>Marital status</b>		
Divorced/widowed	10.9	33
Living with partner	5.6	17
Married	71.7	218
Separated, not divorced but living apart	5.3	16
Single	4.9	15
Prefer not to answer	2.6	8

<b>Race</b>		
Hispanic/Latino	7.9	24
White	78.1	218
Black or African American	11.5	32
Other (Asian, American Indian, Pacific Islander)	4.0	11
Prefer not to answer	10.5	30
<b>Education</b>		
High school grad or GED	11.2	34
Some college	16.8	51
Associate’s degree	13.5	41
Bachelor’s degree	27.1	82
Master’s degree	22.4	68
Doctoral degree or higher	6.3	19
Prefer not to answer	2.3	7
<b>Religious affiliation</b>		
Catholic	63.0	191
Christian (non-Catholic)	19.8	60
Jewish	5.6	17
None	5.6	17
Other	3.9	12
Prefer not to answer	2.0	6
<b>Health Insurance</b>		
Have health insurance	96.0	291
Do not have health insurance	4.0	12
Child covered under health insurance	97.0	294
Child not covered under health insurance	3.0	9
Think health insurance plan covers HPV vaccination	66.3	201
Health insurance plan will not cover HPV vaccination	3.6	11
Not sure if health insurance covers HPV vaccination	30.0	91

NB: Unaccounted percentage is missing demographic data. *Prefer not to answer* was recoded as missing data.

One hundred and five had vaccinated their daughter against HPV while 218 had not. Responses from 323 were included in the final analysis. Sixty-seven potential respondents indicated that they did not have a daughter between the ages of 9-18 years of age and were precluded from continuing with the study. There were an additional 105 parents who did not complete all sections excluding them from the study.

## Measures

A 108-item online questionnaire that assessed knowledge and additional factors that may contribute to vaccine acceptance was administered to the respondent participants. Since research in the area of HPV vaccination is relatively new, few tools exist that measure issues surrounding parental acceptance of the vaccine. As a result, two instruments were selected to assess the variables of interest. It should be noted that the knowledge items were taken from questionnaires that were administered before the vaccine was approved for use and psychometric properties were not previously reported for these items. Knowledge was assessed with a total of 14 items; seven were taken from a questionnaire created by Dempsey, Zimet, Davis, & Koutsky [10] in 2006, *How do parents feel about new vaccines?* An additional 6 items were taken from *Parental views on vaccination* questionnaire authored by Marlow, Waller, & Wardle, [22] with a final item that assessed knowledge (receiving HPV vaccination means Pap smears will no longer be necessary) was developed for the current study. Prior experience was assessed with 4 dichotomous items taken from the questionnaire by Dempsey and colleagues (2006) [10], that asked respondents if they or anyone close to them had experience with HPV-related diseases, abnormal Pap smears, cervical cancer, STI, or genital warts. Additional questionnaire items assessed other factors associated with parental acceptance or refusal of HPV vaccine such as concerns about safety, efficacy, promiscuity, and health provider recommendation not reported in this manuscript [23].

Because they were developed prior to the approval of HPV vaccine, both instruments required subjects to respond to a hypothetical situation of intent to vaccinate. Therefore, a question was added about vaccine status by having participants indicate whether their child had or had not received the HPV vaccine. If the parent indicated that they had already vaccinated their child, they were able to skip the intent questions that followed. Four additional questions were developed for the current study that assessed the dependent variable, intention to vaccinate, with Likert scale responses *definitely not* (0), *Probably not* (1), *Not sure* (2), *Yes probably* (4), or *Yes definitely* (5). Respondents were categorized as non-intenders if they indicated "2" or less on the first question, "I intend to have my daughter receive the HPV vaccine." Subsequent questions referred to the immediacy with which intent to vaccinate would be achieved. A "Not sure" response was coded as a non-intender, as there was no immediacy to their decision making. Analysis of the raw data

indicated that none of the respondents who answered the first question with a "2" or less, responded with a *Yes probably* (4), or *Yes definitely* (5) to subsequent questions, therefore, intent to vaccinate was dichotomized, based upon responses to the first question. Demographic information collected included age and gender of the parent, child's age, marital status, race, level of education, religious affiliation, and insurance coverage for the child.

## Results/Analysis

### Parental knowledge of HPV and intent to vaccinate

The responses of 336 parents were considered in the analysis of the knowledge questions (Table 2). Eleven respondents exited the questionnaire before indicating vaccine status and were not included in this analysis; therefore the final analysis was based on 325 responses. There were 142 non-intenders, 76 intenders, and 107 parents who had already vaccinated. Item discrimination analysis was conducted for all 14 of the knowledge questions. Items 4k and 4l were poor discriminators of knowledge based on that item analysis and were dropped. Internal consistency reliability estimated by Cronbach's alpha for the remaining 12 items was .787. Further analysis was conducted on a total of 12 items.

Review of the percent response of each item, indicated that parents who had not vaccinated were not knowledgeable of HPV transmission or the consequences of being infected with the virus (Table 2). Logistic Regression is a statistical method used to assess the association between independent variable(s) (X<sub>i</sub>) — sometimes called exposure or predictor variables — (knowledge) and a dichotomous dependent variable (Y) — sometimes called the outcome or response variable (intent to vaccinate) [24] (Logistic regression analysis regressing intent of vaccinating on knowledge demonstrated that knowledge was not a statistically significant predictor of intent. Those who intended to vaccinate ( $n = 76$ ) and those who had no intent to vaccinate ( $n = 142$ ) had similar knowledge scores (mean = 8.72, 8.65 respectively).

### Parental knowledge of HPV and vaccine status

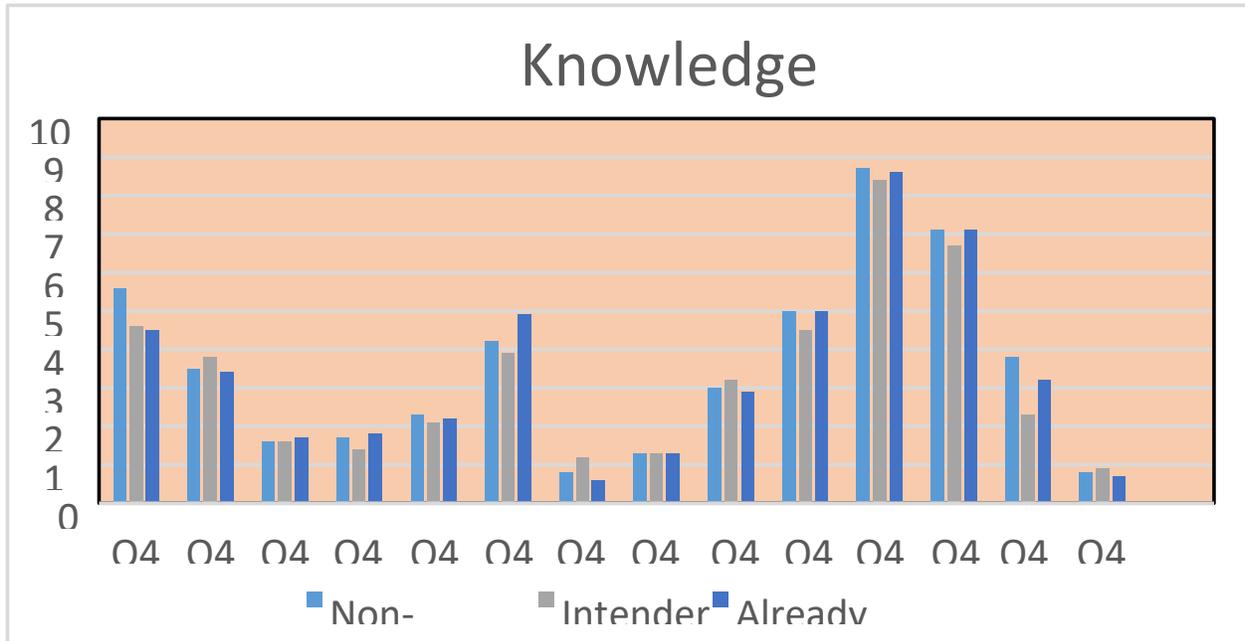
One hundred and seven parents indicated that they had already vaccinated their daughter against HPV. The mean knowledge scores for those parents who had already vaccinated their daughters were 8.78 (73%). These scores were similar to those of the group that had not vaccinated. Logistic regression analysis was conducted to compare differences in knowledge between the respondents who had already vaccinated their daughter and those who had not. Mean knowledge scores for parents who had already vaccinated ( $n = 107$ ) were slightly higher (mean = 8.78 out of 12 points) than the group that did not vaccinate ( $n = 218$ ) (mean 8.65) but this difference did not reach statistical significance.

	Mean	Standard Deviation	Non-Intenders <i>n</i> =142	Intenders <i>n</i> = 76	Already vaccinated <i>n</i> =107
Item			Frequency Incorrect	Frequency Incorrect	Frequency Incorrect
Q4a Genital warts are caused by HPV <sup>1</sup>	.4940	.50071	80 (56.%)	35 (46%)	48 (45%)
Q4b Condoms can prevent the spread of HPV from person to person <sup>1</sup>	.6518.	.47711	49 (35%)	29 (38%)	36 (34%)
Q4c People who have been infected with HPV might not have symptoms <sup>1</sup>	.8333	.37323	23 (16%)	12 (16%)	18 (17%)
Q4d HPV infection can cause abnormal Pap smears <sup>1</sup>	.8274	.37848	24 (17%)	11 (14%)	19 (18%)
Q4e HPV is a sexually transmitted disease <sup>1</sup>	.7798	.41503	32 (23%)	16 (21%)	24 (22%)
Q4f HPV makes you unable to have children <sup>1</sup>	.5595	.49718	59 (42%)	30 (39%)	52 (49%)
Q4g Having an abnormal Pap smear means you have cervical cancer <sup>1</sup>	.9077	.28983	11 (8%)	9 (12%)	7 (6%)
Q4h Having many sexual partners increases the risk of getting HPV <sup>2</sup>	.8661	.34108	18 (13%)	10 (13%)	14 (13%)
Q4i HPV is related to the AIDS virus <sup>2</sup>	.6935	.46175	42 (30%)	24 (32%)	31 (29%)
Q4j HPV can be treated with antibiotics <sup>2</sup>	.5089	.50067	71 (50%)	34 (45%)	53 (50%)
Q4k HPV usually goes away without needing any treatment <sup>2</sup>	.1399	.34738	124 (87%)	64 (84%)	92 (86%)
Q4l Most sexually active people will get HPV at some point in their lives <sup>2</sup>	.2976	.45789	101 (71%)	51 (67%)	76 (71%)
Q4m Men cannot get HPV <sup>2</sup>	.6250	.48484	54 (38%)	32 (23%)	34 (32%)
Q4n Receiving HPV vaccination means Pap smears will no longer be necessary <sup>3</sup>	.9077	.28983	12 (8%)	7 (9%)	8 (7%)

<sup>1</sup>Dempsey, Zim et, Davis, & Koutsky, [10]

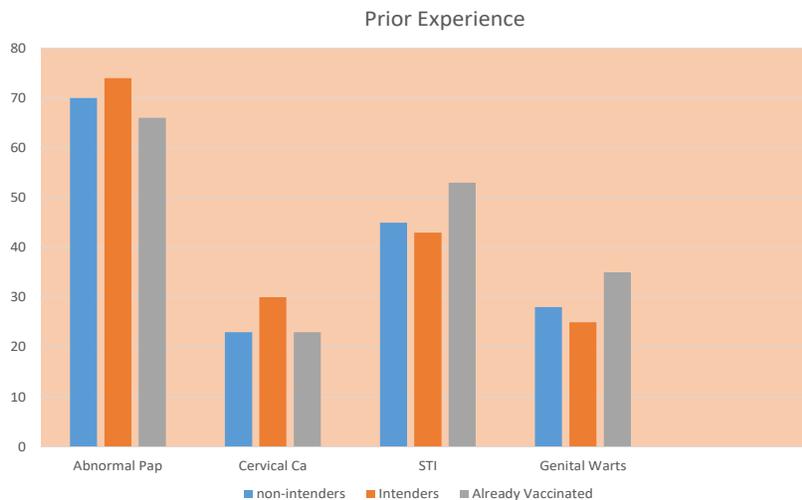
<sup>2</sup>Marlow, Waller, &, Wardle, [22]

<sup>3</sup>Developed by Reynolds [23]



**Table 2.** Knowledge questionnaire indicating percent correct/incorrect for each item N = 325.

	<b>Non-Intenders</b> n=142	<b>Intenders</b> n = 76	<b>Already vaccinated</b> n = 107
Had Prior experience with abnormal Pap smear	99 (69.7%)	56 (73.7%)	71 (66.4%)
Had Prior experience with cervical ca	33 (23.2%)	23 (30.3%)	25 (23.4%)
Had Prior experience with STI	64 (45.1%)	33 (43.4%)	57 (53.3%)
Had Prior experience with genital warts	40 (28.2%)	19 (25%)	37 (34.6%)



**Table 3.** Frequencies of Prior experience for all groups.

**Prior experience and intent to vaccinate**

Prior experience was assessed by asking participants to respond to 4 questions with dichotomous choices about their own personal experience with an abnormal Pap smear, cervical cancer, a sexually transmitted disease, or genital warts, or knew of anyone close to them had these HPV related disorders.

A total of 218 respondents who had not yet vaccinated their daughters answered questions related to prior experience 1Dempsey, Zim et, Davis, & Koutsky, [10] 2Marlow, Waller, & Wardle, [22] 3Developed by Reynolds [23]with 142 expressing no intent to vaccinate, and 76 indicated intent to have their daughter vaccinated. The percentage of those who had experience with cervical cancer was low overall, but higher for those who were intending to vaccinate (Table 3).

**Prior experience and vaccine status**

Comparison was made between those who had already vaccinated and those who did not. Results indicated that a greater percentage of those who had already vaccinated had prior experiences with a STI and genital warts. Those who had not vaccinated had more experience with an abnormal Pap smear than those in the vaccinated group (Table 4).

Logistic regression analysis was also conducted to test the relationship between prior experience and vaccine status for those who had already vaccinated ( $n = 107$ ).

Logistic regression analysis was used to test the relationship between prior experience and intent to vaccinate.

	<b>B</b>	<b>Std Error</b>	<b>β</b>	<b>t</b>	<b>p</b>
Constant	7.482	.277		26.996	<.001
Prior experience with abnormal Pap smear	1.467	.344	.245	4.266	< .001
Prior experience with cervical cancer	-.697	.357	-.109	1.950	.052
Prior experience with STI	.391	.343	.071	1.140	.255
Prior experience with genital warts	.641	.383	.106	1.675	.095

Dependent variable = knowledge

Note  $R^2 = .097$

**Table 4.** Regression Analysis for Knowledge and Prior Experience.

	<b>B</b>	<b>Std. Error</b>	<b>Beta</b>	<b>t</b>	<b>p</b>
(Constant)	5.077	1.929		2.632	.009
Age Child	-.019	.062	-.020	-.309	.758
Age parent	-.010	.030	-.022	-.333	.740
Gender	-.464	.760	-.037	-.610	.543
Marital status	.185	.208	.054	.890	.374
Level of Ed.	.522	.175	.182	2.983	.003
Religion	-.681	.357	-.119	-1.908	.057
Child Health insurance	2.850	1.123	.152	2.539	.012
Race	.564	.420	.085	1.343	.180

Dependent var iable = knowledge  $R^2 = .085$

**Table 5.** Regression Analysis for Demographics and Knowledge.

Prior experience with an abnormal Pap smear, cervical cancer, a sexually transmitted disease, or genital warts was not a statistically significant predictor of intent to vaccinate for this group of respondents (Table 4)

### Knowledge and Prior experience

A multiple linear regression was calculated for all respondents to determine the relationship of knowledge score to prior experience. A significant regression equation was found ( $F(4, 323) = 8.069, p < .001$ ), and accounted for 9.7% of the variance. Increased knowledge was related to having an abnormal Pap smear (Table 4). Prior experience with an abnormal Pap smear, cervical cancer, a sexually transmitted disease, or genital warts were not a statistically significant indicators when comparing those who had already vaccinated ( $n = 107$ ) their daughter with those that had not ( $n = 218$ ). Multiple regression analysis suggested that neither knowledge nor prior experience were predictive of intent to vaccinate or vaccine status.

### Knowledge and demographics

A multiple linear regression was calculated for all respondents to determine the relationship of knowledge to demographic variables. A significant regression equation was found ( $F(8, 261) = 3.027, p .003$ ), and accounted for 8.5% of the variance. Increased knowledge was related to health insurance for the child and having higher levels of education (Table 5).

### Discussion

The purpose of this study was to examine if a relationship existed among factors contributing to knowledge of HPV and parental acceptance of HPV vaccination for their 9 to 18 year old daughters. Results of this study suggested that knowledge was not predictive of intent to vaccinate. Parents lacked knowledge of HPV, and approximately one quarter were not aware that HPV is a sexually transmitted disease. Although parents may have a general knowledge of HPV, it is possible that the respondents in this study did not have a firm understanding of the sequelae of HPV infection or genital warts. Perhaps these questions were not representative of the requisite knowledge parents required in order to make informed vaccine decisions. For instance, the set of knowledge questions in the survey did not assess if parents made the connection that the vaccine is most effective if given before sexual debut. This may be an important piece of knowledge needed for decision making. The wide range of ages in the guidelines may contribute to confusion as to the optimal age of vaccination. The knowledge items in this study did not assess parents' knowledge that the target population for the vaccine is 11 to 12 year olds. Several focus group discussions related to HPV have revealed that parents did not see the benefit of vaccination because their child was not currently sexually active [15,25,26]. Delaying vaccination may be based on parental reluctance to believe that their ad-

olescent daughter may be sexually active rather than knowledge related to the benefits the vaccine can afford if given prior to exposure to the virus. Perhaps if parents understood that vaccination before exposure to the HPV virus through sexual intercourse results in higher vaccine titers and may indicate longer lasting immunity, they may be more likely to accept vaccination.

Vaccine acceptance despite low levels of knowledge and misconceptions about HPV was reported in a recent qualitative study by Robbins and colleagues [8]. Interestingly, although 107 respondents in this study indicated that they had already vaccinated their daughter, knowledge scores for this group were similar to those who had not vaccinated, suggesting that parents may accept HPV vaccination without having adequate levels of knowledge about the virus. These data are similar to findings from a 2009 correlational study conducted by Das and colleagues [27] that found no difference in the mean score on a knowledge test between people that did or did not consent to HPV vaccination for their child [27]. Parents may have differing information needs which may range from simple to complex. Comprehensive understanding about vaccine characteristics may not be necessary for decision making.

Personal experience or knowing someone with HPV related diseases did not contribute to intent to vaccinate. These results contradict findings by previous researchers indicating that there was a relationship between prior experience with cervical cancer, abnormal Pap smear or STI and vaccine acceptability [14-16,18]. In this current study, there was a significant relationship between personal experience or knowing someone who had experience with an abnormal Pap smear, or cervical cancer and knowledge, suggesting that experience in itself can be a source of knowledge. The current findings build upon previous research and suggest that prior experience with HPV associated diseases may contribute to knowledge but knowledge alone may not be sufficient to spur parents to vaccinate their adolescent daughters.

With the exception of age of the child, demographic variables did not predict intention to vaccinate nor did they play a role for those who had already vaccinated. Although demographics did not contribute to intent to vaccinate, having health insurance for the child and a higher education level were associated with knowledge. Cost of the vaccine (360.00 for the series of 3 injections) may be prohibitive for those who do not have insurance for their child. The relationship between having insurance coverage and knowledge is unclear, but it is plausible that those who have health insurance may be more likely to receive more health related information from their insurance company.

In this sample, vaccine acceptance was poor; with 53.5% of parents who had not vaccinated their daughter against HPV indicated that they had no intent to do so. This proportion

included parents who were not sure about whether to vaccinate, suggesting that there is still a great deal of work to be done to uncover factors related to parental acceptance of this prophylactic vaccine.

## Conclusion

Although the advent of the HPV vaccine holds the promise of preventing a major female reproductive cancer and genital warts, it is recognized that psychological and social barriers may compromise the effort. Parental acceptance is an important area for research given that parents are in a position of authority over their minor children and as such are the main decision makers for whether their daughters should receive vaccine administration. Prior experience can be a source of knowledge. Knowledge alone is not an adequate stimulus for action. Further research is needed to identify parental concerns regarding HPV vaccination.

## Limitations

The results of this study may not be generalizable to parents living outside of the research recruitment area. A convenience sample of those who had access to the internet was used. Given the nature of online recruitment, it is difficult to know how many individuals actually saw the Google advertisement. In addition, Catholic parents were oversampled in this study, which may have created a potential bias. Research should be done that is more inclusive of those from lower socioeconomic groups. Demographic data were missing for those who exited the survey before completion so a comparison on demographic variables could not be made between those who completed and those who did not complete the questionnaire. The time consuming nature of answering a 108 item questionnaire may have contributed to responder fatigue. Although the reliability of the knowledge questions was acceptable the items that were selected for inclusion in this study may not be representative of core knowledge competency.

## Implications for Practice

The potential exists for cervical cancer rates to decrease but only if parents recognize the importance of vaccinating against Human Papillomavirus. The findings of this study offer health care providers and policy makers a greater understanding of parental knowledge or lack thereof in primary prevention efforts through HPV vaccination. The challenge is to understand parents' perspective and to assist them in determining the benefit of preventative vaccination for their child. Conducting focus groups to uncover informational needs parents have may help develop knowledge items for future studies and frame relevant and meaningful HPV vaccine messages. Future research should address the type of information that parents are seeking. This may be achieved during small focus group sessions.

The type of knowledge parents possess may have changed based upon post-vaccine approval media campaigns and from the time this study was initially conducted. Comparing different educational approaches may serve to uncover which messages are most effective in increasing knowledge of HPV. In turn, intervention studies that aim to increase vaccine uptake can be conducted. Health care providers, namely pediatricians, are the most likely proponents of vaccine information. Practitioners need to be aware that vaccine side effects such as syncope, nausea, headache, urticaria, redness, pain, and swelling at the injection site may impact parental decision making [28]. Further research could also include how pediatricians are framing recommendations and conveying knowledge to parents/guardians regarding HPV and its relationship to cervical cancer and other health related diseases.

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