

**Influence of Parent Characteristics and Disease Outcome Framing on HPV Vaccine
Acceptability among Rural, Southern Women**

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ABSTRACT

Objective. A prophylactic vaccine is available that protects against infection with HPV types that cause most cervical cancer and genital warts. This study explored the impact of framing the vaccine's benefits, with respect to the disease outcome being prevented, on women's HPV vaccination intentions for themselves and for an adolescent daughter.

Methods. A cross-sectional study was conducted in a rural North Carolina area with a high cervical cancer mortality rate. A questionnaire was administered among female attendees of a low-income public clinic and a private OB/GYN office. Data were analyzed using a generalized estimable model.

Results. Women reported high intentions to vaccinate against HPV. Women reported higher intentions to vaccinate adolescent daughters than themselves, and this relationship varied by how the HPV vaccine was framed (preventing HPV, cervical cancer, or genital warts). Older women reported lower vaccination intentions than younger women.

Conclusions. Rural women, especially those who are younger, may be more accepting of the HPV vaccine for their daughters when it is framed as a cervical cancer vaccine. Messages to mothers about the HPV vaccine might be more effective by framing the vaccine in terms of cancer and sexually transmitted disease prevention and by targeting older mothers.

MESH keywords: HPV; vaccine acceptability; vaccination; cervical cancer; genital warts

INTRODUCTION

Human papillomavirus (HPV), one of the most common sexually transmitted infections, is the cause of cervical cancer and genital warts [1]. A prophylactic vaccine is currently available that protects against infection with two cervical cancer-causing HPV types (16 and 18) and two genital wart-causing HPV types (6 and 11). This vaccine is recommended for girls and women aged 9-26, the ideal age being before sexual debut [2]. It may be particularly beneficial for women without access to regular Pap smear screening, such as rural or economically disadvantaged women [3]. Acceptability, however, will be a key factor in ensuring wide coverage, and parents will be key decision makers regarding childhood vaccination.

Although research shows that parents are generally supportive of vaccinating their adolescent children against HPV infection [4-6], many gaps in the literature still exist. Because most acceptability studies have been conducted in urban settings, the literature offers little insight into vaccination intentions among rural populations [7]. A survey of predominantly rural, high-risk Appalachian women [8] found that most respondents (85.2%) were interested in receiving an HPV vaccine for themselves. Vaccine acceptability was lower among older respondents, with the lowest rate of interest among women 70 years of age and older (57%). Another important finding is that the women would be less willing to vaccinate girls aged 10 to 15 (68%) than themselves.

Although the vaccine is widely promoted as a “cervical cancer vaccine”, little research has examined the impact of framing the vaccine with respect to the disease outcome being prevented [5, 9]. The different prevalence of disease outcomes, such as cervical cancer, cervical cancer precursors, and genital warts, across the lifespan may influence women’s motivations to vaccinate themselves and their daughters. The present survey was conducted in North Carolina

to explore the relationship of framing and age on HPV vaccine intentions among rural women.

METHODS

A survey was administered from April to May, 2006 (prior to federal approval of the HPV vaccine) in Person County, North Carolina, an area with a notably high annual cervical cancer mortality rate of 5.8/100,000 women (compared to the national average of 2.8/100,000 women) [10, 11]. A convenience sample of women attending a low-income public clinic and a private OB/GYN office completed a questionnaire about HPV vaccinations for themselves and for their actual or hypothetical daughters (aged 11-16). Eligibility criteria included being at least 18 years of age and being proficient with English. Of 190 women approached, 149 (77%) completed the survey. The study was approved by the UNC institutional review board.

The 110 item, 30-minute questionnaire assessed awareness, attitudes, and knowledge about cervical cancer, HPV and the HPV vaccine, as well as participant characteristics. The first part of the survey asked questions pertaining to vaccinating themselves and the second part asked about vaccinating adolescent daughters. Study pilot testing included review by experts and testing with residents of the county next to the community where the study was conducted. The primary findings are reported elsewhere [12].

The main outcome of interest for the present paper was intention to obtain the HPV vaccine. Six items assessed how likely respondents would be to obtain a free HPV vaccine, that prevents HPV, cervical cancer, or genital warts, for themselves or their adolescent daughters (Cronbach's alphas = .89, for daughters and themselves).

Data were analyzed using a 3x2 factorial generalized estimable equation in SAS 9.1 [SAS Institute, Inc., Cary, NC]. Independent variables were framing of the disease outcome to be

prevented (HPV, cervical cancer or genital warts; within subjects) and role of the vaccine recipient (self or daughter, within subjects), and the outcome variable was intention to vaccinate. To allow the calculation of odds ratios, the outcome measures were dichotomized, with “0” representing “very unlikely”, “unlikely, and “neither unlikely nor likely” and “1” representing “likely” and “very likely”. Analysis with continuous variables yielded the same pattern of findings. The analyses adjusted for age of respondent (<40, ≥40 years), race (African American or other), recruitment location, and cervical abnormality history.

RESULTS

Respondents’ mean age was 42 (range 18-84). The majority of the 146 female participants who completed the questionnaire were African American (62%), and one-third were White (32%). Few participants reported having completed college (11%) or histories of HPV or cervical cancer (10%). Most respondents had a daughter (62%), and 19% had an adolescent daughter 11-16 years of age.

Interest in vaccinating was high regardless of whether the vaccine was framed as preventing HPV (70%), cervical cancer (80%), or genital warts (76%). Women were consistently more likely to intend to vaccinate daughters than themselves (55% vs. 45%, respectively; OR=1.9; 95% CI:1.2,3.0). Their intentions to vaccinate daughters compared to themselves, however, varied by the framing of the disease outcome to be prevented (Figure 1). Women were more likely to intend to vaccinate their daughters than themselves when the vaccine was described as preventing genital warts (OR=3.6; 95% CI:2.3, 5.6), HPV infection (OR=2.3; 95% CI:1.5, 3.7), and cervical cancer (OR=1.9; 95% CI:1.2, 3.0), but this difference was strongest for genital warts. Women who had daughters between the ages of 11 and 17 were more likely to intend to

obtain the HPV vaccine compared to women who answered about hypothetical daughters within this age range (OR=3.2 , 95% CI:1.2,8.4). This variable did not interact with any other variables.

Younger women (less than age 40) were more likely than older women to intend to vaccinate (regardless of disease outcomes or role) (60% vs. 40%, OR=2.6; 95% CI:1.2,5.4). Other socio-demographic characteristics (race, recruitment location, and history of cervical abnormality) were not related to vaccine intentions.

DISCUSSION

Rural, Southern women in this study showed strong interest in vaccinating adolescent daughters against HPV, consistent with findings in other United States populations [4-6]. Older women expressed lower intentions to provide the HPV vaccine to their female adolescents than younger women did, and most women were less interested in vaccinating themselves than their daughters.

These findings are similar to those of a study of rural women in Kentucky by Hopenhayn et al. [8]. Like Hopenhayn et al., our results showed that older participants were less likely to intend to vaccinate themselves. Other studies of non-rural women have shown no effect of age [4,6].

A notable difference from the Hopenhayn study is that we found that Southern, rural women were more likely to intend to vaccinate adolescent girls than themselves, while they found the opposite. These different results may be due to the two studies having asked subtly, but importantly, different questions. While Hopenhayn et al. asked women about their interest in obtaining an HPV vaccine for girls in general, our study asked women to answer about their own daughters. Women may have different notions about sexually transmitted infections and cancer

prevention for their own daughters compared to adolescent girls in general. Another possibility is that asking about one's own daughter elicits a greater sense of duty to act to protect her from harm through action (i.e., prevent cervical cancer by vaccinating), whereas asking about girls in general elicits a sense of duty to avoid policies with the potential for harms from action (i.e., prevent side effects by not vaccinating) [13]. Whatever the cause of the discrepancy, we expect that questions about women's own adolescent daughters, as opposed to girls in general, may be more likely to reflect caregivers' subsequent vaccination decisions. Questions about girls in general may be more likely to reflect a typical policy makers' point of view.

High vaccination intentions were found for the prevention of all disease targets. Our findings are similar to those in previous studies, one of which found that interest in a cervical cancer vaccine and genital warts vaccine were similar while another found higher interest in a cervical cancer vaccine than an HPV vaccine [6,9]. The present study further demonstrated that intentions to vaccinate daughter or self varied by the framing of the disease outcome to be prevented, which may reflect women's beliefs that adolescent daughters have greater proximal risk than themselves for genital warts as opposed to cervical cancer. An important next step is identifying mediators of the relationship between the framing of disease outcome to be prevented and intention to obtain the vaccine. Although we speculate that potential mediators of our effects may include perceived likelihood of the disease outcomes or perceived effectiveness of the vaccine against these outcomes, the present study does not address this question.

The convenience sample surveyed may not fully generalize to other rural women. Answers about hypothetical daughters may have been different if women had an actual daughter, although this was not a significant covariate in a sensitivity analysis (data not shown). This study

was prior to vaccine licensure and, for this reason, measured intention and not actual vaccine uptake. Intentions, however, are reliable and strong predictors of many subsequent health behaviors [14]. After this study was conducted, the United States Food and Drug Administration approved the HPV vaccine, a milestone that received substantial media coverage. These events are likely to have increased women's awareness of and, perhaps, their intentions to obtain the vaccine and thus potentially limit the generalizability of the findings of the present study.

This study suggests that rural women, and in particular younger women, may be accepting of the HPV vaccine for their daughters, especially when framed as a cervical cancer vaccine. However, because the difference between women's intentions to vaccinate daughters compared to themselves was strongest when asked about preventing genital warts, research on communication to mothers about vaccinating their daughters might be more effective by adding language focused on cervical cancer and sexually transmitted disease prevention and by targeting older mothers.

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REFERENCES

1. Trottier H, Franco EL (2006) The epidemiology of genital human papillomavirus infection. *Vaccine* Mar 30; 24 Suppl 1: S1-15.
2. Markowitz LE, Dunne EF, Saraiya M, Lawson HW, Chesson H, Unger ER (2007) Quadrivalent human papillomavirus vaccine: Recommendations of the advisory committee on immunization practices (ACIP). *MMWR Recomm Rep* Mar 23;56(RR-2):1-24.
3. Akers AY, Newmann SJ and Smith JS. Factors underlying disparities in cervical cancer incidence, screening and treatment in the United States (2007). *Current Problems in Cancer* May-June; 31(3):157-181.
4. Constantine NA, Jerman P (2007) Acceptance of human papillomavirus vaccination among californian parents of daughters: A representative statewide analysis. *J Adolesc Health* Feb;40(2):108-15.
5. Zimet GD (2005) Improving adolescent health: Focus on HPV vaccine acceptance. *Journal of Adolescent Health* 37:S17-23.
6. Slomovitz BM, Sun CC, Frumovitz M, et al (2006) Are women ready for the HPV vaccine? *Gynecol Oncol* Oct;103(1):151-4.
7. Brewer N, Fazekas K. Predictors of HPV vaccine acceptability: A theory-informed literature review. *Preventive Medicine* (in press).
8. Hopenhayn C, Christian A, Christian WJ, Schoenberg, NE (2007) Human papillomavirus

vaccine: knowledge and attitudes in two Appalachian Kentucky counties. *Cancer Causes Control* 18:627-634.

9. Leader A, Weiner J, Kelly B, et al. In: The effects of information framing on intentions to vaccinate against human papilloma virus (HPV). Presented at the American Association of Cancer Research's Frontiers in Cancer Prevention Research Meeting; November 12, (2006) ; Boston, MA.

10. North Carolina Department of Health and Human Services (2000) County health data book. Raleigh, NC: State of North Carolina Center for Health Statistics.

11. Ries LAG, Melbert D, Krapcho M, Mariotto A, Miller BA, Feuer EJ, Clegg L, Horner MJ, Howlader N, Eisner MP, Reichman M, Edwards BK (eds). SEER Cancer Statistics Review, 1975-2004, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2004/, based on November 2006 SEER data submission, posted to the SEER Web site, 2007.

12. Fazekas, K, Brewer, NT, Smith JS (2007) HPV Vaccine Acceptability in a Rural, Southern Area. *Journal of Women's Health* (under review).

13. Johnson EJ, Goldstein D (2003) Medicine: Do defaults save lives? *Science*; 302:1338-9.

14. Sheeran P (2002) Intention-behavior relations: A conceptual and empirical review. In: Stroebe W, Hewstone M, editors. *European Review of Social Psychology*. John Wiley and Sons, pp. 1-36.

Figure 1. Rural women in the Southern United States expressed stronger intentions to vaccinate daughters than themselves. This mother-daughter difference was largest when women were asked about vaccinating against genital warts. Statistical significance for group comparisons: HPV v cervical cancer, $p < .01$, HPV v genital warts, $p < .01$, cervical cancer v genital warts, $p = .86$. Error bars depict standard errors.

