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What college women know, think, and do about human papillomavirus (HPV) and HPV vaccine

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ABSTRACT

Objectives: This cross-sectional study, guided by Ajzen's Theory of Planned Behavior, aimed to identify factors that influence the decision to obtain an HPV vaccine among college women and to examine the relationships among these factors.
Methods: An electronic self-administered survey was utilized to collect data. An email invitation was sent to 3074 college women attending a large, public university in southern California, aged between 18 and 26 years. The email directed the recipient to click on a link to a web-based survey if she wanted to participate in the study.
Results: Participants in this study were college women ($n = 384$; 175 HPV non-vaccinees and 209 HPV vaccinees). Women in this study knew that a Pap test is still needed after HPV vaccination and that the HPV vaccine does not protect against other Sexually Transmitted Infections. Both non-vaccinees and vaccinees had positive attitudes about mandating HPV vaccine. Knowledge and attitudes toward the vaccine were not directly linked to the outcome predictors – intention to obtain the vaccine and vaccine uptake. Attitude about receiving HPV vaccine, subjective norms (complying with the expectations of others), and perceived behavioral control were correlated with the outcome predictors. Subjective norms consistently predicted intention to obtain HPV vaccine and vaccine uptake.
Conclusions: A proposal to mandate the HPV vaccine among young girls/women was acceptable to this population. Vaccination promotion strategies to increase the vaccine uptake rate among the catch-up group (aged 13–26) should include attention to college women's subjective norms. Health care provider's recommendation and encouragement from significant others (i.e., mother and peers) are critical in order for the college women to obtain the vaccine.

1. Introduction

Cervical cancer is the second most common cancer among women worldwide and over 300,000 women die from this cancer each year [1]. In the United States (US), 12,000 women are diagnosed with cervical cancer and 4000 women die from it each year [2]. *Healthy People 2020*, the United States' 10-year agenda for improving the nation's health, called for an increase in cervical cancer screening rate and a reduction in the rates of invasive cervical cancer and human papillomavirus (HPV) infections among women in the U.S. [3].

The development of cervical cancer nearly always begins with HPV infection [1]. More than 100 different HPV types have been identified and approximately thirty types infect the genital tissues. High-risk, oncogenic HPV types (e.g., HPV 16 and HPV 18) are responsible for 99.7% of all cervical cancers while low-risk HPV types (e.g., HPV 6 and HPV 11) can result in mild cervical abnormalities, genital and respiratory tract warts [4,5]. Approximately 20 million Americans ages 15–49 are currently infected with HPV and another six million females and males become newly infected each year [1]. In the female population, the prevalence of genital HPV infection peaks among women aged 20–24 years (44.8%) and gradually declines among women aged 25–59 years (19.6–27.5%) [41,42]. About 10% of women who contract high risk HPV types develop persistent infections that can cause cervical cancer and negative health outcomes [4]. While there is no cure for HPV infection, the opportunity for prevention of HPV infection occurred in 2006 when the first HPV vaccine (Gardasil®) was approved for routine vaccination for girls aged 11–12 and "catch-up" vaccination

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among girls/women aged 13–26. In 2009, another HPV vaccine (Cervarix®) was licensed for use in females aged 10–25 [6]. Both vaccines have high efficacy against HPV 16 and 18 related cervical, vulvar, and vaginal cancers and pre-cancer lesions [6]. Recently, HPV4 was also approved for use in males aged 9–26 for prevention of anal intraepithelial neoplasia, anal cancer, and genital warts [7].

Researchers have documented an increased awareness of HPV and HPV vaccine among college-aged women since the first HPV vaccine was released [8–10]. Three studies conducted among college students reported that 78.5–94.0% of college women had heard about HPV through various sources, especially from television and radio [9,30,37]. A study conducted in 2009 among 739 college women also reported that over 97% of college women who have not received the vaccine were aware of HPV and most female students (84%) knew that genital HPV infection is linked to cervical cancer [28]. However, national data from 2009 shows low vaccine uptake. For adolescents aged 13–17, 44.3% have received at least 1 dose and 26.7% have received 3 doses of HPV vaccine [11]. For women aged 19–26, 17.1% have received at least 1 dose of an HPV vaccine [12]. A literature review reported that, depending on the setting, the HPV vaccine completion rate is between 4–47% among college-aged women [13]. From these low uptake results, arose the question "why have college women not obtained the HPV vaccine despite the fact that most of them are sexually active (70–77%)?" [14,38].

Proposals to make HPV vaccination routine and mandatory for girls in the United States have raised concerns. Some politicians, religious groups, and advocacy groups believe that mandating the HPV vaccine may send mixed messages between abstinence and premarital sex, and create confusion about the need for continued Pap testing [15,16]. Concerns have been voiced by these same groups about whether receipt of HPV vaccine might also encourage unsafe sexual practices due to a misunderstanding that HPV vaccine prevents all sexually transmitted infections (STIs) [15,16].

A review of the literature found some inconsistency among research findings regarding the factors that influence HPV vaccine uptake [17]. Moreover, no study was found that directly examined what college women think about getting vaccinated against HPV and whether the HPV vaccine controversies that exist are indeed related to a woman's decision to obtain the HPV vaccine [17]. The aim of this cross-sectional study was to identify factors that influence the decision to obtain an HPV vaccine among college women and to examine the relationships among these factors. The theory of planned behavior (TPB) guided this study as it has been widely used to understand health-related behaviors in various populations, including the college-aged population [18]. The TPB provided a framework for understanding the antecedents to HPV vaccine uptake [18]. The theory purports that a person's behavior is determined by his/her intention to perform the behavior and that this intention is, in turn, a function of attitude toward the behavior, subjective norms (complying with the expectations of others), and perceived behavioral control [18]. Variables of interest to this study were: knowledge, attitudes toward HPV vaccine, demographic characteristics, and past behavioral experiences that may influence HPV vaccine related behaviors, subjective norms, and perceptions of control [18]. The study related variables and their relationships are illustrated in Fig. 1. For this study, attitude toward getting vaccinated against HPV was defined as a woman's belief about the consequences of performing the behavior. Subjective norms were defined as a woman's beliefs about how her significant others view the behavior in question. Perceived behavioral control was defined as a woman's perceptions of her ability to perform a given behavior.

2. Methods

2.1. Study sample

Female, undergraduate college students aged 18–26 who were enrolled at a large public university in California participated in this study. This age range was chosen because it represents the traditional age range of college students. The maximum age range also aligns with the age limit (26 years old) to receive the HPV vaccine. The study was approved by the University's Institutional Review Board. A random sampling list of the students' email addresses was requested through the University's Enrollment Services. Based on the University's records, the email addresses were sorted by the student's self-identified ethnicities (Caucasian, Asian, Hispanic and African–American). Within each ethnicity, a random sample of 800 emails per ethnic group was generated using SPSS. However, only 674 emails could be generated for the African–American group as that was the total number of eligible participants, resulting in a total sample of 3074.

2.2. Data collection

An email invitation asking recipients to participate in the study was sent to 3074 women at the university in February 2012. In the email invitation, the recipient was directed to click on a link to a web-based survey if she chose to participate. The survey began with an informed consent page. If the woman did not agree to participate, the webpage would automatically close. If the woman agreed to participate, she was directed to another page to complete the study questionnaire. Two email reminders were sent 1 week and 2 weeks after the initial invitation was sent, unless an individual requested to be removed from the email list. The web-based survey was closed 4 weeks after the invitation was sent out.

The web-based survey consisted of an "HPV and HPV vaccine related Knowledge, Attitudes, and Behaviors" questionnaire and demographic, sexual history, and vaccine uptake questions. The

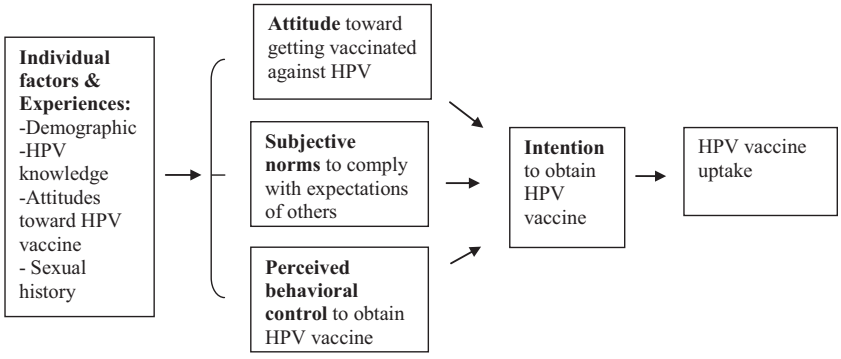

Fig. 1. Study theoretical framework.