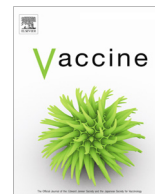


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Pharmacies versus doctors' offices for adolescent vaccination

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ABSTRACT

Purpose: We evaluated how parents' willingness to get their children HPV vaccine from pharmacists related to their perceptions of relative advantages of vaccination in pharmacies compared to doctors' offices.

Methods: Participants were a national sample of 1500 U.S. parents of adolescents ages 11–17 recruited in 2014–15. In an online survey, items informed by Diffusion of Innovation Theory assessed parents' perceptions of the relative advantages of HPV vaccine delivery in pharmacies and doctors' offices.

Principle findings: Many parents believed doctor's offices offered a better health care environment than pharmacies, with more privacy (77%) and a safer place for vaccination (70%). However, many parents also believed pharmacies were more accessible than doctors' offices, requiring less time for vaccinations (71%) and offering more convenient hours (59%). Parents were more willing to get HPV vaccine from pharmacists if they indicated more relative advantages in vaccine delivery in pharmacies ($\beta = .29$; $p < .001$) and believed patient accessibility more important than health care environment ($\beta = .20$; $p < .001$).

Conclusions: To be more appealing to parents as HPV vaccine providers, pharmacy providers within community and hospital settings should build on their relative advantage with respect to accessibility and enhance their appeal of their healthcare environment.

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1. Introduction

Human papillomavirus (HPV) vaccine coverage in the US has lagged behind two other adolescent vaccines introduced around the same time: tetanus, diphtheria, and acellular pertussis (Tdap) and meningococcal vaccines. To improve HPV vaccine uptake among adolescents, the President's Cancer Panel and the National Vaccine Advisory Committee recommended expanding HPV vaccine provision in pharmacies [1,2]. Pharmacy-located vaccination presents advantages for adolescents over vaccination in traditional medical settings given their convenient locations within communities [3–5], longer operating hours [3], and ability to

administer vaccines with no appointment and short wait times [4]. Past studies have identified why pharmacies may be acceptable to parents as vaccination settings for their children [6–10]. However, no studies have directly compared how parents view important features of vaccine delivery in pharmacies versus doctors' offices.

According to the Diffusion of Innovation (DOI) Theory widespread adoption of an innovation like pharmacy-located adolescent vaccination depends on five traits: relative advantage, compatibility, complexity, trialability, and observability [11,12]. Among these, relative advantage, “the degree to which an innovation is perceived as better than the idea it supersedes,” is the most important predictor of adoption [11]. Parents may perceive pharmacies or doctors' offices as having relative advantage for vaccine delivery based on important delivery features like safety [6,10] and convenient hours [8,9]. In turn, these relative advantages in vaccine delivery could be viewed as meeting parents' expectations of either patient accessibility or acceptable health care environment.

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The objectives of our study were to characterize how parents perceive relative advantages of vaccine delivery between pharmacies and doctors' offices, and how these perceptions relate to parents' willingness to get HPV vaccine for their children from pharmacists. We proposed three hypotheses based on pharmacies' relative advantages. Parents with positive attitudes about vaccinating their children in pharmacies like the convenience and easy access to vaccination services [8,9]. We hypothesized that, compared to doctors' offices, parents believe pharmacies are superior vaccination settings when considering vaccine delivery features related to patient accessibility (*Hypothesis 1a*). However, parents and adolescents who prefer going to traditional medical settings to get vaccines [6–10] have expressed safety and privacy concerns about alternative vaccination settings like pharmacies [6,10]. Therefore, we hypothesized that compared to doctor's offices, parents believe pharmacies are inferior vaccination settings when considering vaccine delivery features related to the health care environment (*Hypothesis 1b*). Additionally, since parents must account for the strengths or benefits of vaccination in either setting in order to determine if one setting has relative advantage over another, we also hypothesize that parents are more willing to get their children HPV vaccine from a pharmacist if they identify more relative advantages at pharmacies (*Hypothesis 2*). Finally, a parent's preference to vaccinate their child in either a pharmacy or doctor's offices also depends on the utility parents derive from the vaccination features. As such, we hypothesize that parents who place more importance on vaccine delivery features related to patient accessibility are more willing to get HPV vaccine from pharmacists compared to parents who place more importance on features related to the health care environment (*Hypothesis 3*).

2. Methods

2.1. Data source and procedures

The Adolescent Vaccinations in Pharmacies (AVIP) Study was an online, cross-sectional survey of U.S. parents of adolescents conducted from November 2014 to January 2015. The Institutional Review Board at the University of North Carolina at Chapel Hill approved the study protocol. Informed consent was obtained from all individual participants included in the study. Study participants were members of an existing, national panel of non-institutionalized adults maintained by a survey company [13]. The national panel was created through probability-based sampling of U.S. households using a combination of random-digit dialing and address-based sampling frames. Eligible respondents were parents of at least one child ages 11 to 17 who lived with them at least half of the time. Parents answered survey items about their children who they identified at the beginning of the survey.

The survey company randomly contacted 2845 parents from a panel comprised of members from all 50 states and the District of Columbia. About 14% ($n = 391$) of invited panelists were not eligible to complete the survey based on a screener that verified they had at least one child aged 11 to 17. Of the 2454 eligible parents, 1518 completed some portion of the survey. After we excluded 14 panelists who did not complete at least two-thirds of the survey and four panelists who did not complete our study's variables of interest, our final analytic sample contained 1500 parents. The response rate was 61% (1,500/2454) based on American Association for Public Research Response Rate Five [14,15]. Participants' sociodemographic characteristics appear in Table 1.

2.2. Measures

Survey item development. We developed survey items based on previous research among parents, adolescents, and health care

providers [16–20], or adapted items from other sources [21–23]. We cognitively tested the AVIP survey with a convenience sample of 18 local parents of adolescents ages 11 to 17 to ensure the clarity of survey items. We pre-tested the instrument with 26 parents from the national panel (not included in the final sample) to ensure proper survey functionality. The full AVIP survey instrument is available online at www.unc.edu/~ntbrewer/hpv.htm.

Outcome variable. The outcome of interest for this study is willingness to get HPV vaccine from an immunizing pharmacist. Parents were first prompted with the statement “Imagine you and [child's name] decided to get the HPV vaccine for [him/her].” Parents were then asked “How willing would you be to have [child's name] receive it from an immunizing pharmacist?” Parents indicated the extent of their willingness with a four-point scale ranging from “definitely not willing” [1] to “definitely willing” [4].

Relative advantages of vaccine delivery by setting. The survey told parents to “imagine [child's name] needed a vaccine such as tetanus booster, meningitis vaccine, or HPV vaccine. Also imagine these vaccines are available at pharmacies and doctors' offices.” Parents then answered seven questions about whether a pharmacy or doctor's office would be better at a particular vaccine delivery feature. Parents could respond by selecting “pharmacy”, “doctor's office”, or “they're the same”. The seven features were: (1) providing privacy during vaccination, (2) being a safer place for vaccinations, (3) having more welcoming staff, (4) more likely to get vaccinated without an appointment, (5) taking less time for vaccinations, (6) more convenient hours for vaccinations, and (7) telling the cost of vaccines before delivery. The seven items were conceptualized into two broad categories during analysis: “health care environment” consisting of the first three features, and “patient accessibility” consisting of the last four features. Finally, parents were asked “which of these is most important when choosing between a pharmacy and a doctor's office as a place to get [child's name] vaccinated?” Parents responded by selecting the vaccine delivery feature they believed was most important.

We conducted confirmatory factor analysis to evaluate how well the seven delivery feature items loaded onto the two dimensions of “health care environment” and “patient accessibility.” The hypothesized measurement model demonstrated adequate fit (Comparative Fit Index: .94; Tucker-Lewis Index: .91; root mean squared error of approximation: .089) and good internal consistency reliability (health care environment coefficient- $\omega = .76$; patient accessibility coefficient- $\omega = .85$). We created a relative advantage composite score to get parents' overall ratings of vaccine delivery between pharmacies and doctors' offices. We coded the seven vaccine delivery feature items so that indicating a doctor's office was better was “-1,” a pharmacy and doctor's office were the same was “0,” and a pharmacy was better was “1.” We then summed the seven contrast-coded items and scaled it so that the relative advantage composite score ranged from “-1” to “1.”

Sociodemographic characteristics. The survey company provided parent and household demographic characteristics including parent sex, age, race and ethnicity, education, household income, urbancity (“non-metropolitan statistical area” or “metropolitan statistical area”), and U.S. region of residence. The survey included five items about parents' HPV vaccine confidence from the Carolina HPV Immunization Attitudes and Beliefs Scale (CHIAS) [17]. The survey also assessed what kind of pharmacy parents typically use for their child's prescription medications (“chain pharmacy,” “independent pharmacy,” or “pharmacy in clinic or hospital”), and how many minutes it takes parents to get to that pharmacy. Additionally, the survey assessed parents' familiarity with the pharmacists at the pharmacy they use (three-point response scale ranging from “not well at all” [1] to “very well” [3]). For demographic and health characteristics for the parent's index child (reported by the parent), the survey assessed sex, age, race and ethnicity, HPV

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