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The effects of vaccine characteristics on adult women's attitudes about vaccination: A conjoint analysis study

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ABSTRACT

The number of current and future vaccines for adults has been steadily increasing. Yet, vaccine coverage rates for adult vaccinations have historically been low, and less is known about how adults in the mid-adult age range make vaccine decisions for themselves. The purpose of this study was to assess which vaccine characteristics affect vaccine decision-making among mid-adult women. Adult women, aged 27–55 ($n = 258$) rated 9 hypothetical vaccine scenarios, each of which was defined along 4 dimensions: mode of transmission (STI or non-STI), severity of infection (curable, chronic, or fatal), vaccine efficacy (50%, 70%, or 90%), and availability of behavioral methods for prevention (available or not available). Ratings ranged from 0 to 100. Conjoint analysis was used to assess the effect of relative preferences for the vaccine scenario characteristics on participant ratings of scenarios. The mean vaccine scenario rating was 78.2. Nearly half (40%, $n = 104$) of participants rated all nine scenarios the same, with the majority of those (84%) holding strongly positive views. Conjoint analysis of the other 154 participants who discriminated between scenarios indicated that the main drivers for vaccine acceptability were severity of the disease and the efficacy of the vaccine to prevent the disease. Mode of transmission and availability of a preventative behavioral measure did not play a significant role. Future studies should further assess how women's understanding of severity of the disease and efficacy of the vaccine to prevent disease may be useful for increasing vaccine acceptability.

1. Introduction

The number of current and future vaccines for adults has been steadily increasing. In some cases, this is due to extension of recommendations to the general adult population of existing vaccines licensed for that age group such as the influenza vaccine [1]. In other cases, such as for the human papillomavirus (HPV) vaccine, manufacturers are seeking extension of licensure into the mid-adult age range, up to 45–55 years [2]. Still more new vaccines are in development for adults, particularly against sexually transmitted infections (STI) such as human immunodeficiency virus, *Chlamydia trachomatis*, and *Neisseria gonorrhoeae* [3]. Although vaccine coverage rates for childhood vaccinations are, in general, high [4], in large part due to school requirements, and coverage rates for adolescent vaccinations are improving [5], coverage rates for adult vaccinations have historically been lower. For example, only 63.1% of adults 19–49 years old are up to date for tetanus [6], compared to 83.9% of 19–35-month olds [4]. Likewise, HPV vaccination coverage (≥1 dose) for adults for whom it is licensed (19–26 year olds) is 17.1% compared to 44.3% of adolescents 13–17 years old [5,6].

A key to improving vaccination rates among adults and to increasing uptake of future vaccines is to understand factors that motivate adults in the mid-adult range to seek vaccination [7]. There are many studies focusing on vaccine choices that adult women make for their children, and some assessing their interest in specific vaccines for themselves [8–11].

Yet, little is known about the relative importance women place on different vaccine associated factors when making vaccine decisions for themselves. Using hypothetical vaccine scenarios is a useful method for identifying such factors since there are few current vaccines utilized for this population. Therefore, the goal

Abbreviations: HPV, human papillomavirus; STI, sexually transmitted infections; ACASI, audio-computer assisted self-interview.

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of this study was to understand what vaccine characteristics affect vaccine decision-making among adult women, using hypothetical vaccine scenarios and conjoint analysis.

2. Materials and methods

Mothers accompanying their adolescents to a medical appointment from 2002 to 2004 at participating urban adolescent health clinics and pediatric private practices located in Indiana were interviewed about their attitudes regarding vaccination of their child and themselves [12]. Adolescents were sons or daughters aged 12–17. Findings regarding participants' beliefs about adolescent vaccination have previously been reported [12–14].

Research assistants approached women in the waiting room, and nearly two thirds (62.8%) of those eligible who were approached provided written consent to participate in the study. The majority of those who declined did so because of lack of time to complete the study. For the purposes of the present study, only mothers 27–55 years old were included, and we evaluated the data regarding their views of vaccination for themselves. This age range was selected because the makers of the quadrivalent and bivalent HPV vaccines are seeking extension of licensure to women 27–45 years old and 27–55 years old, respectively. Of the original 299 parents interviewed who answered questions regarding self-vaccination, 23 were excluded from this analysis since they were male, 5 since they were older than 55 years and 13 since they were younger than 27 years old. After obtaining written informed consent, anonymous, audio, computer-assisted, self-administered interviews (ACASI) were completed. Surveys were conducted in a private room using a notebook computer with a touch sensitive screen. Women received $15 compensation for the time and effort required to complete the survey. The study was approved by the Indiana University Institutional Review Board.

3. Survey instrument

A purpose-built survey was developed based on prior vaccine research, and formative semi-structured interviews [15]. In addition, the survey was pretested in the study population and the feedback incorporated into the final study instrument. Parents were given nine hypothetical vaccine scenarios. Each of these scenarios was uniquely defined along four dimensions. The first was mode of transmission of infection (sexually transmitted or not). Participants were told that "this vaccine keeps people from getting a disease that can be sexually transmitted" or "this vaccine keeps people from getting a disease that cannot be sexually transmitted". The second focused on vaccine efficacy (50%, 70% or 90%); for example, participants were told that "the vaccine works for 9 out of 10 people who get it". The third defined the severity of the infection (curable, chronic or fatal). Participants were told either (a) "the disease can be cured with antibiotics"; (b) "the disease cannot be cured, but people don't die from it"; or (c) "people die from this disease in most cases". The fourth included whether a behavioral strategy was available that could prevent the infection (hand washing for non-STI and condom use for STI; see Table 1). Examples are: "using condoms will keep a person from getting the disease" or "washing hands several times a day will *not* keep a person from getting the disease". After each scenario was presented, the participant was asked: "If this vaccine was available today, and you had time, would you get vaccinated?"

Participants rated each scenario was rated on an 11-point scale in intervals of 10 points (0–100), where 0 represented that they would never get the vaccine, and 100 signified that they would definitely get the vaccine. A full factorial design would have required the presenting of 36 combinations of scenarios, which would have represented an unreasonable response burden. Therefore, we instead used a fractional factorial design with a representative subset of 9 scenarios, which allowed us to examine the main effect of each of the four dimensions, but prevented us from evaluating interaction effects. The nine scenarios were selected using the conjoint analysis procedure available in SPSS Conjoint 8.0 (SPSS Inc, Chicago, IL). The vaccine scenarios were presented in a random order across participants to eliminate bias due to ordering effects. Sociodemographic information was also collected including participant age, race/ethnicity and educational level.

4. Analysis

We used SPSS 17.0 (SPSS Inc, Chicago, IL) to describe basic characteristics of the study population. We then used ratings-based conjoint analysis to examine how vaccine scenario characteristics influenced ratings of the scenarios for those participants who did not assign the same ratings to all scenarios. Ratings-based conjoint analysis is a methodological and statistical technique used to understand how product preferences are influenced by product attributes that it has been validated for the use in health related studies [16–18]. Unlike a traditional survey, it allows respondents to consider attributes jointly, allowing them to make trade-offs. Conjoint analysis of the nine scenarios was used to reveal the relative preferences participants placed on each of the characteristics within each dimension. These relative preferences are called part-worth utilities. The stronger the preferences within a dimension, the wider the range of the part-worth utility. Within each dimension, the sum of the part-worth utilities must equal zero. For example, mode of transmission compares a vaccine that protects against an STI to a vaccine that does not protect against an infection that is sexually transmitted. If a woman consistently rated vaccines against STI more positively than non-STI vaccines, then her part-worth utility score would be highly positive for the STI attribute, and would be equally negative for non-STI vaccines; therefore the sum of the values would be zero. A negative part-worth utility does not necessarily imply opposition to a vaccine with that attribute (e.g., non-STI vaccine), it simply indicates a relative preference for the alternative attribute (e.g., STI vaccine).

In addition, we calculated the contribution of each dimension to the overall vaccine ratings using importance scores, defined as the relative ranges of the part-worth utilities across the 4 dimensions. The sum of importance scores across dimensions must equal 100.

5. Results

5.1. Subjects

A total of 258 women were included in this analysis, with a mean age of 39 ± 5.8. Approximately one third (38.7%) were Latina, 24.1% were non-Latina Black, and 35.6% were White, non-Latina. Most (67.8%) were married or living with a partner. A little over one third did not graduate from high school (36.0%), 20.2% solely finished high school and 43.8% had at least some college education.

Across all nine vaccine scenarios, the mean score was 78.2 (SD = 24.1; median = 85.6). The vaccine scenario with the highest rating was one that was for a non-STI, protected against a fatal disease, was 90% efficacious and for which there was not a preventative behavioral measure available. For that vaccine scenario, the mean score was 85.7 (SD = 23.0; median = 100). The distribution of scores was quite skewed, with 61.9% of women giving this scenario a score of 100 and only 1.6% giving it a score of 0. The lowest rated vaccine scenario was also for a non-STI, but for a chronic infection for which the vaccine was only 50% efficacious and there was a preventative behavioral measure available. The mean score for this