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Parents' views on the best and worst reasons for guideline-consistent HPV vaccination

Melissa B. Gilkey^a, Mo Zhou^b, Annie-Laurie McRee^c, Melanie L. Kornides^d, and John F. P. Bridges^e

^aDepartment of Health Behavior, University of North Carolina Gillings School of Global Public Health; Campus Box 7440; Chapel Hill, NC 27599 USA

^bDepartment of Health Policy and Management, Johns Hopkins Bloomberg School of Public Health; 624 N. Broadway; Baltimore, Maryland 21205 USA

^cDepartment of Pediatrics, University of Minnesota; 1932K (Campus Delivery Code) 717 Delaware St SE; Minneapolis, MN 55414 USA

^dDepartment of Population Medicine, Harvard Medical School & Harvard Pilgrim Health Care Institute; 401 Park Drive, Suite 401 East; Boston, MA 02215 USA

^eDepartment of Health Policy and Management, Johns Hopkins Bloomberg School of Public Health; 624 N. Broadway; Baltimore, Maryland 21205 USA

Abstract

Objective—HPV vaccination could prevent most HPV-associated cancers, but few U.S. adolescents are vaccinated according to guidelines. To inform efforts to counsel parents more effectively, we sought to quantify their views on the best and worst reasons for guideline-consistent HPV vaccination. We hypothesized that parents' views would differ according to their confidence in adolescent vaccination.

Methods—We developed a best-worst scaling experiment to evaluate 11 reasons healthcare providers commonly give for HPV vaccination. The instrument was administered in 2016 via a national, online survey to 1,177 parents of adolescents ages 11-17. Parents completed 11 choice tasks of 5 reasons each, indicating the best and worst reason in each task. We used conditional logistic regression to rank reasons for the sample overall and by vaccination confidence (low/high).

Results—Parents viewed *cancer prevention* as the best reason for HPV vaccination ($p < 0.001$). Other commonly endorsed reasons were *preventing a common infection*, having *lasting benefits*, or being a *safe vaccine* (all $p < 0.001$). Reasons viewed as worst were: *it is a scientific breakthrough*, *I got it for my own child*, and *your child is due* (all $p < 0.001$). Stratified analyses indicated small differences in how often parents with low versus high vaccination confidence endorsed messages ($p < 0.001$), but the two groups ranked reasons similarly overall.

Address correspondence to: Melissa B. Gilkey, PhD; Department of Health Behavior, University of North Carolina Gillings School of Global Public Health; Campus Box 7440; Chapel Hill, NC 27599 USA; Phone: 617-991-8240; Fax: (919) 966-2921; gilkey@email.unc.edu.

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Conclusions—Providers should emphasize cancer prevention when discussing HPV vaccination, as recommended by CDC, the President’s Cancer Panel, and others. Several other common reasons, including having vaccinated one’s own child, may warrant additional testing.

Keywords

adolescent health; human papillomavirus infections/prevention & control; human papillomavirus vaccine; health communication; persuasive communication; choice behavior

INTRODUCTION

Human papillomavirus (HPV) vaccination could prevent most HPV-associated cancers,¹ but relatively few U.S. adolescents are vaccinated at ages 11 or 12, as per the recommended schedule for routine administration.² By 2016, only about one-third (34%) of 13-year-olds were up-to-date nationally, even after accounting for the recent transition from a 3-dose to 2-dose schedule for this age group.² This suboptimal level of coverage is due, in part, to the way healthcare providers communicate about HPV vaccination.^{3–12} Although a provider’s recommendation is highly influential, many providers do not consistently endorse HPV vaccination for eligible patients at the recommended age.^{3–6} Research suggests that providers’ hesitancy stems from factors including discomfort with talking about HPV, as a sexually transmitted infection, and the misconception that many parents have serious concerns about the vaccine.^{3–4,6–7,13} Strategies are needed to help providers more effectively and efficiently deliver guideline-consistent recommendations within the complex communication surrounding HPV vaccination.

Message testing to understand how parents prioritize reasons for HPV vaccination offers one opportunity to support provider communication. To date, many quantitative and qualitative studies, including our own, have assessed parents’ decision making about HPV vaccination.^{14–19} However, few have directly compared the persuasiveness of the many possible reasons parents may have for vaccinating. Such an approach could help providers focus their communication efforts and discuss reasons for HPV vaccination that are most compelling to parents, while simultaneously testing whether reasons appeal differently to different audiences. Thus, we sought to quantify parents’ views on the best and worst reasons that providers commonly give for guideline-consistent HPV vaccination, using a preference elicitation method known as best-worst scaling (BWS). We also hypothesized that parents would prioritize reasons differently depending on their level of vaccination confidence, given that health behavior theories such as the Health Belief Model emphasize the importance of individual perceptions on parents’ vaccination decisions.²⁰ By identifying high priority messages for key populations of parents, findings can inform quality improvement efforts to increase HPV vaccination coverage through provider outreach and communication training.

MATERIALS AND METHODS

Participants and procedures

The Adolescent Cancer Prevention Communication Study was a national survey of parents of adolescents ages 11-17, conducted in September 2016. Respondents were members of a standing online panel of U.S. adults maintained by a survey research company.²¹ The company constructs the panel using a probabilistic, address-based sampling approach that allows for coverage of households with and without landline telephones. To facilitate the participation of lower-income respondents, the company provides Internet access and an Internet-enabled device to households without these resources; this incentive is provided across multiple surveys for the duration of participation in the panel. Households with established Internet access instead receive points towards small cash incentives. Additional methodological information related to the panel is reported elsewhere.²¹

Of 2,580 parents invited via email to participate in our study, 1,523 responded by visiting the survey website, completing an eligibility screener to confirm having an age-eligible child, and indicating informed consent electronically (without a signature). A total of 1,259 were eligible and completed the survey. The resulting response rate was 59%, calculated using the American Association for Public Opinion Research (AAPOR) formula 4.²² For the present analysis, we excluded respondents who did not fully complete choice tasks related to provider communication about HPV vaccination ($n = 82$), resulting in a final analytic sample of 1,177 parents. Harvard Pilgrim Health Care Institute's Institutional Review Board approved the study protocol.

Experimental design and measures

We used BWS to assess parents' views on the best and worst reasons providers give for guideline-consistent HPV vaccination. BWS is a stated-preference method used to prioritize a list of ideas, attributes, or messages.²³ When the number of messages to be tested is relatively long, this approach offers several important advantages to more traditional methods. For example, best-worst scaling is less burdensome for participants than rank ordering and is not susceptible to the problems of scale bias that are inherent in rating.²³⁻²⁵

We first developed a list of 11 reasons that providers commonly give for recommending guideline-consistent HPV vaccination (Table 1). These reasons came from two sources: 1) educational materials developed by government agencies and professional organizations that offer providers guidance about how to counsel patients and their parents about HPV vaccination^{26,27}; and 2) prior research on messages that providers use to motivate HPV vaccination at the recommended ages of 11 or 12 years.^{7,15,28,29} Prior to fielding our survey, we conducted cognitive interviewing with a convenience sample of parents ($n = 13$) to improve readability and interpretation of reasons as intended.

Next, we developed the experiment with three parts: a scenario, an orientation to the 11 reasons to be tested, and a series of choice exercises. First, respondents read a scenario about a family attending a well child visit:

“Mr. and Mrs. Williams are at the doctor’s office with their child, Sam. Sam is a healthy 12-year-old who is seeing the doctor for a checkup. During the visit, the doctor talks with Mr. and Mrs. Williams about the HPV vaccine. Below are reasons the doctor might give for getting the HPV vaccine.”

Next, respondents read the list of reasons. Reasons were presented in a random order and accompanied by a brief explanation that gave additional background information (Table 1). Finally, respondents completed 11 choice tasks that each consisted of a subset of 5 messages (Figure 1). For each choice task, respondents indicated the best and the worst reason the doctor could give for getting the HPV vaccine at that visit. To construct the experiment, we used a balanced incomplete block design (BIBD) which ensured that reasons occurred and co-occurred an equal number of times for each respondent. We pretested our experiment with online panel members ($n = 30$) to ensure proper functioning. Parents who participated in pretesting or cognitive interviewing were excluded from further participation in the study.

The survey assessed parents’ vaccination confidence using the short form of the Vaccination Confidence Scale, a validated measure of parents’ beliefs about adolescent vaccination.^{30,31} Developed using data from the National Immunization Survey-Teen, this scale consists of 4 items assessing perceptions of vaccine necessity (“Vaccines are necessary to protect the health of teenagers”), safety (“Vaccines are safe”), and effectiveness (“Vaccines do a good job in preventing the diseases they are intended to prevent”), as well as the consequences of not vaccinating (“If I do not vaccinate my teenager, he or she may get a disease such as meningitis.”). Parents rated items using response options ranging from 1 (“strongly disagree”) to 5 (“strongly agree”). We averaged responses to the scale’s 4 items to create a composite score and then categorized parental vaccination confidence as low (1-4) or high (4.25-5), based on the mean composite score of 4.2. Vaccination confidence items preceded the BWS experiment.

Data on demographic characteristics were assessed via additional survey items or provided by the survey company. These measures included the respondents’ sex, age, race/ethnicity, and educational attainment, as well as the sex, age, and HPV vaccination status (1 dose) of the respondents’ children. Measures also included households’ annual income and geographic region.

Analysis

Using data from the choice tasks, we analyzed parents’ prioritization of reasons for HPV vaccination using conditional logistic regression to model choice as the dependent variable. We assumed sequential best-worst decision-making, which means that respondents’ first chose the best reason among the five messages and then the worst reason among the remaining four messages. Effects coding was used to estimate scores for each reason. To test our hypothesis that parents’ with low versus high vaccination confidence would prioritize reasons differently, we repeated these analyses after stratifying on this variable. To probe our findings, we examined different cut-points to define categories of Vaccination Confidence Scale scores; because results did not differ from the primary analysis, we do not report further on the findings of this sensitivity analysis. In exploratory analyses, we also stratified our findings by children’s vaccination status, sex, and age. We conducted analyses using

Stata Version 13 (College Station, TX). Statistical tests were two-tailed with a critical alpha of 0.05.

RESULTS

Sample characteristics

Parents reported on similar numbers of children by sex (53% male) and age (mean=14 years; Table 2). Most children were non-Hispanic white (63%), non-Hispanic black (9%), or Hispanic (20%). Over half (57%) had initiated HPV vaccination (1 dose). Our sample included parents of both sexes (51% female), as well as those with lower socioeconomic status (40% with a high school degree or less education; 20% with household income less than \$35,000). Parents resided in all regions of the U.S.

Best and worst reasons for HPV vaccination

Table 3 shows reasons for HPV vaccination ranked according to results of the conditional logit analysis. In the overall sample, parents viewed *cancer prevention* as the best reason for guideline-consistent HPV vaccination ($\beta=2.07$). Other highly ranked reasons were *preventing a common infection* (0.68), having *lasting benefits* (0.67), or being a *safe vaccine* (0.41). Reasons for HPV vaccination that parents viewed as worst were: *it is a scientific breakthrough* (-0.67); *I got it for my own child* (-0.98); and *your child is due for it* (-1.08).

Stratified analyses indicated differences in how parents with low versus high vaccination confidence viewed reasons for HPV vaccination ($p<0.001$, Table 3, Figure 2). Parents with low less often endorsed *cancer prevention*, *fewer shots*, or *I got it for my own child*. However, these differences were small and resulted in few differences in overall rankings. In exploratory analyses, we found similarly few differences in parents' overall ranking of reasons when we stratified our findings by child's vaccination status, sex, or age (Supplemental Tables 1-3).

DISCUSSION

Using data from a national sample, we found that parents of adolescents prioritized *cancer prevention* as the best reason healthcare providers commonly give for guideline-consistent HPV vaccination. This finding is consistent with a large body of work that highlights the value parents place on protecting their children from cancer,^{7,14,15,26,27} but also extends prior research in several important ways. First, by using best-worst scaling, this study quantifies the extent of parents' preference for cancer prevention through direct comparison with other common reasons. Furthermore, through stratified analyses, we found that prioritization did not vary by vaccination confidence; although parents with low versus high confidence somewhat less often selected cancer prevention as a best reason, both groups favored it far more highly than any of the other reasons we tested. In this way our findings provide empirical support for the guidance given by public health and professional organizations, including the Centers for Disease Control and Prevention, the American Academy of Pediatrics, and the President's Cancer Panel, which urge providers to frame HPV vaccination as cancer prevention.^{26,27,32} Interestingly, other high-performing reasons,

including *lasting benefits*, were also related to HPV vaccination's ability to protect, and may be useful for supplementing the primary cancer prevention message.

In contrast to cancer prevention, several other reasons for HPV vaccination tested poorly among parents. For example, *it is a scientific breakthrough* ranked near the bottom of our list, despite being perceived as an effective message by pediatricians and family physicians in a prior study.²⁸ Given that parents still invoke the “newness” of HPV vaccine as a concern more than a decade post-licensure,³³ it is likely that references to scientific novelty, although understandably appealing to medical professionals, are best avoided with parents. *I got it for my own child* was another low-ranked reason, which is surprising given that both providers and professional organizations promote this message as being effective for motivating HPV vaccination.^{26,28,29} Parents have also given this message relatively low marks in a traditional message rating study,¹⁴ raising the possibility that providers should prioritize their professional versus personal experience unless explicitly asked about their own vaccination decisions. Finally, *your child is due for it* was similarly ranked poorly. It may be that this message is effective for introducing the topic of adolescent vaccination, but is not viewed by parents as a reason for vaccinating per se. We also interpret our findings with care to acknowledge that reasons with low rankings were not necessarily “bad” messages; rather, they were reasons parents chose not to prioritize in relation to other available options.

Contrary to our hypothesis, we found relatively little evidence to suggest that parents with low versus high vaccination confidence prioritized reasons for HPV vaccination differently. In several cases, we found that parents with low confidence expressed less extreme preferences for or against individual reasons. However, the two groups ranked the 11 reasons similarly overall, suggesting that, although parents with low confidence may find top reasons for HPV vaccination less compelling, they would not necessarily benefit from targeted messaging. These findings may give busy providers more confidence in communicating about HPV vaccination, enabling them to begin conversations uniformly with messages about cancer prevention and then tailoring the conversation to address each parent's specific concerns only if necessary. Given that this study is specific to provider communication, future research is needed to determine how messaging in other contexts, such as social media, may inform the decision making of parents with low vaccination confidence.

This study used BWS to provide novel data on parents' views on HPV vaccination. Strengths include a large, national sample of parents of adolescents, with coverage for HPV vaccine initiation similar to the national average in 2016 (64% versus 60%, respectively, for ages 13-17).² Best-worst scaling methodology is becoming increasingly common in health-related research,³⁴⁻³⁶ and offers advantages to traditional rating or ranking techniques as a low-burden method for quantitatively prioritizing a relatively large number of messages.²³⁻²⁵ Similar to many other approaches to message testing, the primary limitation of best-worst scaling is its focus on “stated” preferences, or parents' perceptions of what constitutes a good reason for HPV vaccination, which may be different from “revealed” preferences, or the messages that would motivate them to vaccinate in an actual encounter with their adolescent's provider. Most notably, our BWS scenario was not designed to test preferred messages to address specific parental concerns. Similarly, we were not able to assess how parents' prioritization of reasons was influenced by contextual factors, such as visit type or

patient-provider relationship quality, or other communication factors, such as the use of “bundled” recommendations for all vaccines in the adolescent platform. For this reason, continued intervention research is needed to extend the present study, including work to identify efficient strategies for training providers to improve their communication about HPV vaccination and to assess the impact of such training on parents’ HPV vaccine decision making.

Conclusion

HPV vaccination could substantially reduce the burden of HPV-related cancers in the U.S., but to achieve widespread coverage, healthcare providers need strategies for more effectively and efficiently communicating its value. Message testing to identify ways of motivating guideline-consistent vaccination while also meeting parents’ communication preferences may be especially valuable. Findings of this best-worst scaling study provide support for prioritizing cancer prevention as a reason for HPV vaccination, even among parents with low vaccination confidence. At the same time, this study identifies several commonly suggested reasons for HPV vaccination that parents perceived as less compelling and may warrant additional testing. This study illustrates the value of using stated-preference methods to inform public health communication strategies. Our findings provide an evidence base for efforts to support providers in recommending HPV vaccination and addressing parents’ concerns so as to increase guideline-consistent uptake of this important preventive service.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Which is the **best** and **worst** reason the doctor could give for getting the HPV vaccine at that visit?

Best reason		Worst reason
	It can prevent some types of cancer.	
	I got it for my own child.	
	It is a scientific breakthrough.	
	It is a safe vaccine.	
	Getting it on time may mean fewer shots.	

Figure 1.

Example of a best-worst scaling choice task.

Figure 1 shows an example choice task. Parents completed 11 tasks, indicating the best and worst reason for HPV vaccination in each subset of 5 reasons.

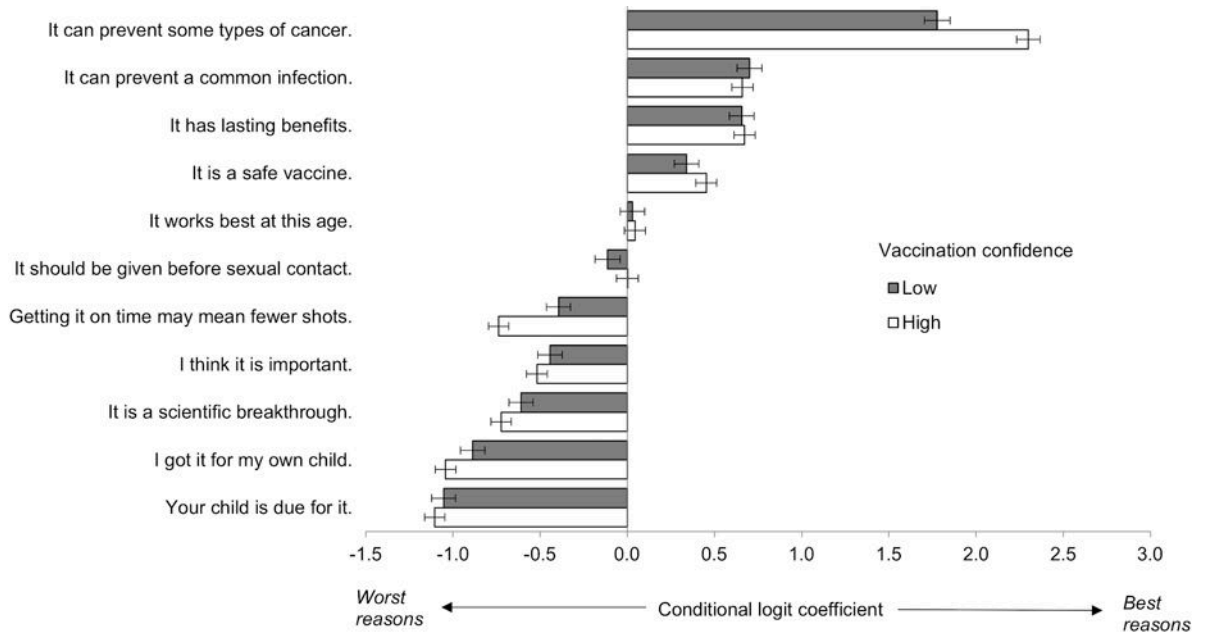


Figure 2. Best and worst reasons for HPV vaccination by vaccination confidence. Parents with low and high vaccination confidence prioritized messages similarly. Both groups endorsed cancer prevention as the best reason for HPV vaccination. Bars show 95% confidence intervals

Table 1

Reasons a doctor might give for HPV vaccination.

The doctor could say...	This means....	Source
I think it is important. [<i>personal endorsement</i>]	Doctors may give their own medical opinion about whether to get the HPV vaccine.	7, 27–29
Your child is due for it. [<i>Due for it</i>]	Public health experts and professional medical organizations recommend that all children receive the HPV vaccine by age 12.	27
I got it for my own child. [<i>My own child</i>]	Doctors may say whether they decided to get the HPV vaccine for their own children.	26, 28, 29
It can prevent some types of cancer. [<i>Cancer prevention</i>]	The HPV vaccine can prevent cancer in both men and women. Cancers caused by HPV include cancers of the cervix, head and neck, anus, vagina, and penis.	7, 15, 26–28
It should be given before sexual contact. [<i>Before sex</i>]	HPV is spread through sexual contact, including intercourse and oral sex. To work best, the HPV vaccine must be given before someone becomes sexually active.	7, 15, 27–29
It can prevent a common infection. [<i>Infection prevention</i>]	HPV is an extremely common infection. Almost everyone will get HPV at some point in their lives.	26, 28
It is a safe vaccine. [<i>Safety</i>]	The safety of HPV vaccine has been closely studied. There are no long-term side effects. Short-term side effects, like pain and redness, are similar to other vaccines.	26, 28
It is a scientific breakthrough. [<i>Scientific breakthrough</i>]	The HPV vaccine is one of the first vaccines developed to prevent cancer.	28
It works best at this age. [<i>Best age</i>]	The HPV vaccine provides the most protection when given before children become teenagers.	27, 28
Getting it on time may mean fewer shots. [<i>Fewer shots</i>]	Guidelines for HPV vaccination may soon change. In the future, children who get the HPV vaccine at age 12 may only need 2 shots. Older children may still need 3 shots.	26
It has lasting benefits. [<i>Lasting benefits</i>]	Children who get the HPV vaccine are protected into adulthood. For this reason, even people who wait until marriage to have sex can benefit from HPV vaccination.	28

Note. Italics indicate message labels and were not shown to respondents.

Table 2Sample characteristics ($n=1,177$).

	<i>n</i>	(%)
Child characteristics		
Sex		
Male	620	(53)
Female	557	(47)
Age (years)		
11-12	318	(27)
13-15	479	(41)
16-17	380	(32)
Race		
Non-Hispanic white	740	(63)
Non-Hispanic black	100	(9)
Hispanic	241	(20)
Other	96	(8)
HPV vaccination status		
0 doses	508	(43)
1+ doses	669	(57)
Parent characteristics		
Sex		
Male	576	(49)
Female	601	(51)
Educational attainment		
High school degree or less	470	(40)
Some college, no degree	307	(26)
College degree or more	400	(34)
Household characteristics		
Annual income		
<\$35,000	240	(20)
\$35,000-\$74,999	332	(28)
\$75,000	605	(51)
Region		
Northeast	211	(18)
Midwest	287	(24)
South	403	(34)
West	276	(23)

Table 3
Relative persuasiveness of reasons for HPV vaccination, overall and by vaccination confidence.

	Overall			Low vaccination confidence			High vaccination confidence		
	β	SE	Rank	β	SE	Rank	β	SE	Rank
Cancer prevention	2.07	0.03	1 st	1.78	0.04	1 st	2.30	0.03	1 st
Infection prevention	0.68	0.02	2 nd	0.70	0.04	2 nd	0.66	0.03	3 rd
Lasting benefits	0.67	0.02	3 rd	0.66	0.04	3 rd	0.67	0.03	2 nd
Safety	0.41	0.02	4 th	0.34	0.04	4 th	0.45	0.03	4 th
Best age	0.04	0.02	5 th	0.03	0.04	5 th	0.04	0.03	5 th
Before sex	-0.05	0.02	6 th	-0.11	0.04	6 th	0.00	0.03	6 th
Personal endorsement	-0.49	0.02	7 th	-0.44	0.04	8 th	-0.52	0.03	7 th
Fewer shots	-0.60	0.02	8 th	-0.40	0.04	7 th	-0.74	0.03	9 th
Scientific breakthrough	-0.67	0.02	9 th	-0.61	0.04	9 th	-0.73	0.03	8 th
My own child	-0.98	0.02	10 th	-0.89	0.04	10 th	-1.04	0.03	10 th
Due for it	-1.08	0.02	11 th	-1.05	0.04	11 th	-1.11	0.03	11 th

Note. Shading indicates difference from overall ranking.