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Persuasive Texts for Prompting Action: Agency Assignment in HPV Vaccination Reminders

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Abstract

Vaccination reminders must both inform and persuade, and text messages designed for this purpose must do so in 160 characters or less. We tested a strategy for improving the impact of HPV vaccination text message reminders through strategic wording. In an experiment conducted in community settings, 167 Spanish-speaking Latina mothers reviewed text message reminders that assigned the cause or “agency” for HPV transmission to their daughters or the virus, and assigned protection agency to the mothers or the vaccine. Reminder messages framing transmission as an action of the virus prompted mothers to perceive the threat as more severe than messages describing their daughters as the cause. Assigning transmission agency to the virus also held a persuasive advantage in boosting mothers’ intentions to seek vaccination, particularly when the message cast mothers as agents of protection rather than the vaccine.

Introduction

The Human Papillomavirus (HPV) is the most common sexually transmitted infection in the US and is linked to cervical, anogenital, and oropharyngeal cancers [1]. Vaccination could prevent most of the 35,000 HPV-related cancer cases occurring in the U.S. every year [2]. However, the vaccine completion rate is well below the Healthy People 2020 objective of

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Conflict of Interest

MSM: No conflicts.

KKS: No conflicts.

SAR: No conflicts.

MEF: No conflicts.

80% [3]. In 2014, completion rates for adolescent (ages 13–17) females and males were 40% and 22%, respectively [4].

Parent-directed text message reminders can improve child HPV vaccination rates [5,6]. However, text messages often simply inform parents their children are due for a vaccine dose without any strategy for encouraging compliance [7]. We investigated the impact of text message HPV vaccination reminders that used the influence strategy of “agency assignment.”

Many languages, including English and Spanish, permit speakers to grammatically assign the cause of viral transmission, or transmission “agency,” to a virus (e.g., *The virus could infect millions of people*) or people (*Millions of people could contract the virus*). Although often used interchangeably, these agency assignments shape different conceptions of transmission, as attributable to pursuit by an active predator or to social contact within one’s control. Educational materials about viral threats that consistently assign transmission agency to the virus have been shown to increase perceived threat severity and vaccination intentions relative to materials assigning transmission agency to humans [8].

Similarly, the agency for vaccination’s protective function can be assigned to a vaccine (e.g., *Vaccines can protect people*) or people (e.g., *People can protect themselves by getting vaccinated*). Assigning agency to the vaccine frames it as an active ally for fending off viral threats and has been shown to increase perceptions of response efficacy relative to human agency assignment [9]. However, this persuasive advantage may have hinged on the human agent being general and abstract. When the human agent is the parent receiving the message (e.g., *You can protect your daughter by getting her vaccinated*), it may confer an advantage by creating a role expectation for the recipient to fulfill [10]. We report an experiment investigating the effects of strategic transmission and protection agency assignments on the impact of HPV vaccination text message reminders.

Methods

Our sample consisted of 167 Spanish-speaking Hispanic/Latina mothers who a) had girls between 11 and 17 not vaccinated for HPV and b) possessed mobile phones with text-messaging capability. We recruited participants from community settings including free clinics, health fairs, and markets. After completing a pre-test demographic survey, participants received a Spanish text message on their phones described by the survey administrator as a reminder the clinic might send to arrange a vaccination appointment. The specific message they received was randomly selected from 4 versions (Table 1) created by manipulating message content in a 2×2 between-participants factorial design. The capacity for transmission or “transmission agency” was linguistically assigned to the virus or the daughter at risk. The capacity for preventing harm or “protection agency” was assigned to the vaccine or the mother.

After reviewing their messages, participants completed a post-test survey about HPV and the vaccine. Survey items consisted of statements participants rated on a 5-point Likert-type scale (1 = Strongly Disagree, 5 = Strongly Agree). The items measured perceptions

associated with five psychometric factors that predict vaccination behavior [11]: Threat severity (e.g., *HPV is dangerous*; 4 items, $\alpha = .84$), personal susceptibility (e.g., *If my daughter is not vaccinated, she is at risk for HPV*; 2 items, $\alpha = .73$), self-efficacy (e.g., *It will be easy for me to get my daughter the HPV vaccine*; 4 items, $\alpha = .81$), response efficacy (e.g., *Getting vaccinated will prevent HPV*; 4 items, $\alpha = .86$), and vaccination intention (e.g., *I will get the HPV vaccine for my daughter*; 2 items, $\alpha = .88$).

Data were analyzed in 3 steps. First, responses to items measuring the psychometric factors were subjected to a maximum likelihood confirmatory factor analysis (CFA). Loadings for items were freely estimated except for the examples above, which were fixed at 1.0 to serve as reference variables. Second, 5-point factor scales were created by averaging ratings across items measuring each factor. Third, analyses of variance (ANOVAs) were conducted to measure effects of manipulated message characteristics on the factor scales, with Cohen's d used to determine effect sizes.

Results

In the pre-test survey, the vast majority of participating mothers reported that their daughters had regular primary care providers ($n = 157, 94.0\%$). Most also claimed to have heard of HPV ($n = 103, 61.7\%$) and the vaccine ($n = 99, 59.3\%$), but few reported having been offered vaccination in the past ($n = 47, 28.3\%$). These levels of healthcare access and HPV awareness are representative of Latinas living in U.S. urban areas [12]. No significant interactions between these demographic factors and the manipulated message factors were found for the dependent variables of interest, $p > .25$ in all cases.

CFA indicated our measurement model provided a good fit for the data: $\chi^2(104) = 117.15$, $p = .18$; normed $\chi^2 = 1.13$; $CFI = 0.971$; $TLI = 0.962$; $SRMR = .045$; $RMSEA = .026$ (90% $CI[0.00, 0.04]$). ANOVAs revealed significant main effects of transmission agency in the reminder message on scale ratings of threat severity ($F(1, 163) = 13.66$, $p < .001$, $d = .41$), personal susceptibility ($F(1, 163) = 18.12$, $p < .001$, $d = .47$), and vaccination intention ($F(1, 163) = 12.91$, $p = .001$, $d = .39$). Comparison between participating mothers who received reminder messages assigning transmission agency either to the virus or the daughter indicated that the former perceived the threat as more severe ($M_{\text{virus}} = 4.67$, $SD = 1.01$; $M_{\text{daughter}} = 4.14$, $SD = 0.96$), considered their daughters more susceptible to it ($M_{\text{virus}} = 3.38$, $SD = 0.99$; $M_{\text{daughter}} = 2.81$, $SD = 0.92$), and reported a stronger intention to get their daughters vaccinated ($M_{\text{virus}} = 4.51$, $SD = 1.05$; $M_{\text{daughter}} = 4.04$, $SD = 0.98$) than the latter.

Protection agency moderated the effect of threat agency on vaccination intention in an ordinal interaction, $F(1, 163) = 9.45$, $p = .002$, $d = .34$. When the message assigned protection agency to the mother, the persuasive advantage of assigning transmission agency to the virus rather than the daughter was stronger ($M_{\text{virus}} = 4.60$, $SD = 1.05$; $M_{\text{daughter}} = 3.96$, $SD = 0.98$) than when protection agency was assigned to the vaccine ($M_{\text{virus}} = 4.42$, $SD = 1.05$; $M_{\text{daughter}} = 4.10$, $SD = 0.98$). No other main effects or interactions were significant.

Discussion

Parent-directed text message reminders have been shown to improve HPV vaccination uptake. We explored the potential for boosting this impact through strategic wording. Reminder messages that framed HPV transmission as the action of a predatory virus prompted mothers to perceive the health threat as more severe and their daughters as more susceptible than messages casting their daughters as the transmission cause. This finding is consistent with previous studies demonstrating an advantage in severity perceptions for messages assigning threat agency to pathogens such as H1N1 and *E. coli* [8,13]. It also comports with evolutionary accounts of human fear, which posit attentional mechanisms that prioritize threats perceived as exogenous and autonomous [14]. Message wording ascribing the HPV threat to an external, offensive agent served to heighten activation of these mechanisms.

Assigning transmission agency to the virus also held a persuasive advantage in boosting mothers' vaccination intentions, particularly when messages cast mothers as agents of protection. The message framing motivated participants by making salient the "guardian" role most parents strive to fulfill [10, 15]. This motivation may have been especially keen in our sample, given the prevalence of "marianismo" (i.e., expectations of extreme maternal effort) in Latino families [16].

An important limitation of our study is its focus on participants' perceptions of HPV and intentions to vaccinate, rather than actual uptake. Circumstances in the community settings where testing occurred did not permit us to directly examine uptake. However, several studies have found parents' intention to vaccinate to be a strong predictor of uptake, consistent with the theory of planned behavior [17, 18, 19]. Nevertheless, the direct effect of our agency assignment manipulation on uptake merits future research.

Implications

Vaccination reminders must both inform and persuade, and text messages designed for this purpose must do so in 160 characters or less. Our findings suggest the persuasive impact of text message reminders may be improved within these narrow constraints through strategic wording. Messages casting the HPV virus and the parent as respective agents of transmission and protection were most effective in prompting parents to express concern about this health threat and conviction about vaccinating their children.

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Highlights

- The impact of strategic wording on HPV vaccination text message reminder efficacy was tested.
- Texts cast the virus or child as transmission agent, and the parent or vaccine as protection agent.
- Texts with virus transmission agents and parent protection agents were most effective.

Table 1

Text Message Reminder Stimuli by Transmission and Protection Agency Condition, in Spanish [and English]

		Protection Agency	
		Vaccine	Human (Mother)
Transmission Agency	Virus	<i>El VPH puede infectar a su hija y dañar seriamente su salud. La vacuna del VPH puede protegerla. Llame a la clínica al XXX-XXX-XXXX. [HPV can infect your daughter and seriously harm her health. The HPV vaccine can protect her. Call the clinic at XXX-XXX-XXXX.]</i>	<i>El VPH puede infectar a su hija y seriamente dañar su salud. Usted puede protegerla vacunándola contra el VPH. Llame a la clínica al XXX-XXX-XXXX. [HPV can infect your daughter and seriously harm her health. You can protect her by getting her vaccinated. Call the clinic at XXX-XXX-XXXX.]</i>
	Human (Daughter)	<i>Su hija puede contraer el VPH y dañar seriamente su salud. La vacuna del VPH puede protegerla. Llame a la clínica al XXX-XXX-XXXX. [Your daughter can get HPV and seriously harm her health. The HPV vaccine can protect her. Call the clinic at XXX-XXX-XXXX.]</i>	<i>Su hija puede contraer el VPH y dañar seriamente su salud. Usted puede protegerla vacunándola contra el VPH. Llame a la clínica al XXX-XXX-XXXX. [Your daughter can get HPV and seriously harm her health. You can protect her by getting her vaccinated. Call the clinic at XXX-XXX-XXXX.]</i>