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Impact of Framing on Intentions to Vaccinate Daughters against HPV: A Cross-Cultural Perspective

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Abstract

Cervical cancer incidence is marked by severe racial and ethnic disparities. Effective promotion of the recently licensed HPV vaccine across ethnic/racial groups may help curtail disparities. The purpose of this research was to investigate mothers' intentions to vaccinate daughters against HPV as a function of message framing (gain versus loss) across three cultural groups: Hispanic, non-Hispanic White, and non-Hispanic African-American. One hundred fifty mothers were recruited from WIC clinics in Wisconsin and asked to respond to information about the HPV vaccine for their daughters. In a repeated-measures experiment, two different frames (gain and loss) were used to present the information. Consistent with our expectations, results indicated that both frames are equally effective in promoting vaccination intentions in non-Hispanic White Mothers. Conversely, a loss frame message was more effective in non-Hispanic African-American and Hispanic mothers. These results suggest that current information sharing campaigns, aimed at promoting the HPV vaccine among ethnic minority groups, should be modified to not focus exclusively on the benefits of vaccination.

The Human Papillomavirus (HPV) is the leading sexually transmitted disease in the United States [1, 2]. The estimated HPV prevalence rate in sexually active women ages 14–19 is as high as 39.6 percent [3]. High-risk HPV strains, 16 and 18, are recognized as precursors of 70 percent of cervical cancers. Two low risk HPV strains, 6 and 11, are associated with 90 percent of genital warts [4]. Research suggests that racial or ethnic minorities have higher HPV prevalence [5], and Mexican-American and non-Hispanic African-American women have higher cervical cancer mortality than non-Hispanic White women [6].

In 2006 the U.S. Food and Drug Administration (FDA) approved a vaccine to protect against HPV types 16, 18, 11 and 6 [1]. The Centers for Disease Control and Prevention recommends the vaccine for pre-adolescent girls starting at 11 years of age. However, recent

estimates indicate that only 25 percent of U.S. girls in the target age group have been vaccinated [1].

Presently, considerable resources are being spent on informational campaigns to promote vaccination. Research suggests that these massive information campaigns are the primary source of HPV related information for parents [7]. Most of these campaigns highlight the health benefits of vaccination [8]. In order to increase rates of vaccine uptake, however, it is necessary to include factors shown to change intentions. Prospect Theory suggests that framing information by highlighting the benefits or the costs of a behavior may have different persuasive effects [9].

According to Prospect Theory, individuals favor riskier choices when thinking about potential losses and, conversely, prefer less risky choices when thinking about gains [10]. The aim of research on framing in the domain of health is to understand whether individuals respond differently to persuasive messages that highlight the costs of inaction (e.g., failing to perform a health behavior) versus the benefits of action.

In the context of HPV vaccine acceptance, two studies have documented that a loss frame is more effective in promoting vaccination intentions in college-aged women who engage in risky sexual behavior and show an avoidance coping tendency [11, 12]. However, data collection in these studies took place prior to licensure of the HPV vaccine and therefore vaccination was presented only as a hypothetical possibility. Moreover, the target audience was college-aged women. Given the vaccination age recommendations of the CDC and the high ethnic/racial disparities in HPV and cervical cancer, there is a need to investigate the influence of message framing in parents who make medical decisions for their children.

To our knowledge, there is only one study that has investigated the effect of information framing in parents [13]. This study investigated the effect of framing by highlighting the different diseases that the vaccine protects against. Specifically, researchers found that framing the benefits of the HPV vaccine as offering protection against HPV, cervical cancer, or genital warts had different effects on intentions to vaccinate daughters. In a sample of women from the U.S. rural south, results suggested that mothers were three times more likely to accept the vaccine for their daughters if it was framed as preventing genital warts than as preventing HPV infection or cervical cancer [13].

The objectives of this study were to address limitations of existing research by testing the effectiveness of another type of framing, a gain versus loss framing, in changing ethnically/racially diverse parents' baseline vaccination intentions post-licensure of the HPV vaccine. Research suggests that individuals from cultures that emphasize the interdependence of its members (e.g., Hispanics and non-Hispanic African-Americans) may be more persuaded by losses than cultures that emphasize the independence of its members (e.g., non-Hispanic White culture) [14]. Our study consists of comparing the influence of a gain versus loss frame on intentions to vaccinate daughters across non-Hispanic White American participants and the two largest ethnic/racial minority groups in the United States: non-Hispanic African-Americans, and Hispanics.

Method

The study was approved by the Medical College of Wisconsin Institutional Review Board. The research project consisted of two phases. The first phase was formative and the second phase was experimental. The formative phase was designed to select two messages framing the benefits of vaccinating and losses associated with not vaccinating. We began our formative phase by designing the six possible combinations of loss versus gain frames recommended by Levin, Schneider, and Gaeth (1998) [14]. Health care practitioners and mothers were asked on a one-to-one basis to convey their overall evaluation of the six potential messages by answering questions assessing degree of comprehension, appropriateness, breadth of content, importance, and whether they perceived the information to be personally relevant. The two most highly rated messages (gain and loss) were selected to be used in the experimental phase. Mothers who participated in the formative phase did not take part in the experimental phase.

The second phase consisted of an experiment in which all participants read both the gain and loss frame. Framed messages were presented in two laminated brochures which also contained information about the HPV virus and the vaccine, as recommended by the CDC. The messages depicting the benefits of vaccination (gain frame) stated “if you vaccinate your daughter you can protect her from cervical cancer” and the losses of not vaccinating (loss frame) stated “if you don’t vaccinate your daughter you can miss the opportunity of protecting her from cervical cancer.” After reading each of the two brochures participants completed an assessment of their intention to vaccinate their daughter. To counteract possible order effects, half of the participants were randomly assigned to read the gain frame first followed by the loss frame. Conversely, the other half read the loss frame first followed by the gain frame.

Participants

To be eligible to participate, mothers had to be the parent or legal guardian of a minor daughter who was within the CDC age recommendations to receive the HPV vaccine (9–17 years) but had not received the vaccine. In addition, mothers had to be receiving WIC program services at one of four city health department clinics in Wisconsin. To be eligible to receive WIC, women need to be pregnant or the mother of an infant up to age 5, be resident of the state where she is applying to receive WIC services, and must be between 100 and 185 percent of the Federal poverty guidelines.

Participants in the formative phase were 10 health care practitioners (9 males), who were currently administering the HPV vaccine, from pediatrics, nursing, internal medicine, and gynecology, and 15 mothers (Hispanic, non-Hispanic White, and African-American, 5 per ethnic group).

Participants in the experimental study were 150 mothers from three ethnic groups: Hispanic, non-Hispanic White, and African-American (50 per ethnic group). Mothers reported a mean age of 33.72 ($SD = 7.95$). The mean number of children reported was 3.38 ($SD = 1.42$) and the mean age of daughters was 10.94 ($SD = 4.01$) years.

Measures

Vaccination Intentions—Parents' vaccination intention was the main outcome measure and was assessed three times at baseline and after the presentation of each framed message. Participants who had more than one daughter in the recommended age range for vaccination were asked to think about the youngest daughter or one daughter only. The intentions measure consisted of five items with response options captured on a 7 point Likert-type scale ranging from 1 = "definitely no" to 7 = "definitely yes." These items were borrowed from Gerend and Shepherd (2007) [11]. The Cronbach alpha for the Hispanic group was .91, for the non-Hispanic White group was .90, and for the African-American group .88.

Manipulation Check—To determine whether our manipulation exerted the intended effect participants in the experimental phase were asked to respond to the following statement: "In your opinion, the take home message from the information that you just read focused on the losses or gains of vaccinating your daughter against HPV." Response options were captured on a 7 point Likert-type scale ranging from 1 = "emphasis on losses" to 7 = "emphasis on gains." If our framing manipulation exerted an effect, participants should perceive a greater emphasis on gains under the gain frame than under the loss frame and vice-versa.

Results

Chi-square analyses were conducted to test for demographic differences across ethnic groups. For the purpose of facilitating interpretation, we collapsed the categories of the variables insurance, education, and employment to create binary variables. Results revealed statistical significant differences in insurance status ($\chi^2 = 30.91$, $df = 2$, $p < .001$) and education level ($\chi^2 = 17.94$, $df = 2$, $p < .001$). Employment status was not significantly different across ethnic groups ($\chi^2 = 2.55$, $df = 2$, $p = .27$). Table 1 displays proportions for non-collapsed categories by racial/ethnic group. A one-way analysis of variance revealed no significant differences in baseline intentions to vaccinate as a function of racial/ethnic group $F(2,145) = .25$, $p = ns$.

A mixed MANOVA on our manipulation check -with order of presentation (loss-gain versus gain-loss) and racial/ethnic group (Hispanic versus Non-Hispanic White versus African-American) as the between-subjects factors and framing (gain versus loss) as a repeated measures factor-revealed a main effect of framing Wilks' $\lambda = 20.53$, $p < .001$, partial $\eta^2 = .12$ indicating that the framing manipulation was successful. The perception of emphasis on gains was higher under the gain frame ($M = 6.09$, $SD = 1.35$) than under the loss frame ($M = 5.34$, $SD = 1.90$), effect size ($d = .45$).

To investigate whether intentions to vaccinate varied as a function of gain versus loss frame we computed a repeated measured mixed ANCOVA with order of presentation (loss-gain versus gain-loss) and racial/ethnic group (Hispanic versus Non-Hispanic White versus African-American) as between-subjects factors and framing (baseline versus gain versus loss) as the repeated measures factor with the re-coded variables education level and insurance status as covariates. Table 2 presents the results of the ANCOVA and Figure 1 presents the results for the three racial/ethnic groups. As Table 2 indicates, results revealed a significant main effect of framing. Planned comparison tests revealed a significant difference

between baseline intentions and the loss frame $F(1,2) = 6.75, p < .05, d = .98$. Intentions to vaccinate were higher for the loss frame ($M = 6.51, SD = 1.13$) than at baseline ($M = 5.13, SD = 1.63$). Moreover, baseline intentions were significantly different than the gain frame $F(1,2) = 7.47, p < .01, d = .74$. Intentions to vaccinate were higher for the gain frame ($M = 6.22, SD = 1.28$) than at baseline ($M = 5.13, SD = 1.63$). Lastly, a significant interaction emerged between framing, order, and ethnic group.

To facilitate the interpretation of results we computed separate repeated measures mixed ANOVAs for each ethnic group with order of presentation (loss-gain versus gain-loss) as the between-subjects factor and framing (baseline versus gain versus loss) as the repeated measures factor.

For the Hispanic group, results revealed a significant main effect of framing $F(2, 92) = 23.38, p = .001$, partial $\eta^2 = .33$. Planned comparisons revealed that loss frame intentions ($M = 6.68, SD = .88$) were significantly higher than baseline intentions ($M = 5.31, SD = 1.58$), $F(1,46) = 32.85, p < .001, d = 1.15$. In addition, the gain frame intentions ($M = 6.42, SD = 1.09$) were higher than baseline ($M = 5.31, SD = 1.58$), $F(1,46) = 19.12, p < .001, d = .81$. Moreover, the significant effect of framing was qualified by a significant interaction of framing and order $F(2, 92) = 2.88, p = .06$, partial $\eta^2 = .06$. Figure 2 displays the interaction. As Figure 2 shows, mean intentions were highest under the loss frame ($M = 6.69, SD = .55$) when participants read the gain frame first followed by the loss frame.

For the non-Hispanic White group, only a significant main effect of framing emerged $F(2,92) = 17.28, p < .001$, partial $\eta^2 = .27$. Planned comparisons revealed that loss frame intentions ($M = 6.32, SD = 1.30$) were significantly higher than baseline intentions ($M = 5.08, SD = 1.83$), $F(1,46) = 19.43, p < .001, d = .78$. Moreover, gain frame intentions ($M = 6.17, SD = 1.41$) were also higher than baseline ($M = 5.08, SD = 1.83$), $F(1,46) = 10.20, p < .01, d = .66$.

For the African-American group, a significant main effect of framing emerged $F(2, 92) = 27.38, p < .001$, partial $\eta^2 = .37$. Planned comparisons revealed a significant difference between baseline and the loss frame condition $F(1,46) = 47.26, p < .001, d = 1.18$. Intentions were higher for the loss frame condition ($M = 6.53, SD = 1.15$) than at baseline ($M = 4.98, SD = 1.46$). Moreover, there was also a significant difference, $F(1,46) = 16.55, p < .001, d = .79$, between the gain frame and baseline. The gain frame intentions ($M = 6.08, SD = 1.33$) were higher than baseline ($M = 4.98, SD = 1.46$). In addition, a significant difference, $F(1,46) = 5.94, p < .05, d = .36$, between the gain versus loss frame was detected. Intentions were higher in the loss frame condition ($M = 6.53, SD = 1.15$) than in the gain frame condition ($M = 6.08, SD = 1.32$).

Discussion

A gain versus loss frame exerted a differential effect across ethnic groups. For the African-American and Hispanic groups, results indicated that a loss frame is the most effective frame in increasing intentions to vaccinate. However, findings suggest that in order to obtain the larger effect of the loss frame in Hispanics, both frames should be used in a specific order.

Specifically, a gain frame should be followed by loss. On the other hand, for non-Hispanic White participants, results indicate that either a gain or a loss frame will be equally effective in promoting intentions. These results question the value of current information sharing campaigns that target ethnic minority groups and focus exclusively on the benefits of vaccination.

Prospect theory suggests that a gain frame message should be more effective in promoting vaccination intentions [15]. Our findings indicate that this is only the case for non-Hispanic White mothers. Why is a loss frame more effective in promoting intentions to vaccinate in African-Americans and Hispanics? Prior research [16, 17] suggests that individuals from individualist cultures attempt to differentiate themselves from others through personal achievements and accomplishments, and consequently may be more oriented towards securing gains. Conversely, individuals from collectivist cultures attempt to “fit in” by fulfilling roles and obligations and hence may be more oriented towards avoiding losses. Our findings support these predictions.

Our repeated measures design captured the differential effect exerted by framing in the same individual across cultures. Moreover, inclusion of the order of presentation allowed us to uncover the added benefit of presenting both frames to Hispanics. We would like to point that to our knowledge, our study is the first one to explore the influence of gain versus loss framing using a repeated measures design. Thus, the implications of our findings need to be taken cautiously until further research replicates them. We would like to highlight that a repeated measures design is a novel way of testing the effects of framing and, pending replication, our findings indicate that there may be an added persuasive effect of presenting both frames, and that the order of frame presentation might matter depending on the race/ethnicity of the target population.

There are several limitations of the present study. First, we assessed participants’ intentions to have daughters vaccinated rather than actual vaccination behavior. Second, our sample was one of convenience. Third, we did not measure potential mediating variables of the effect of framing on intentions such as parents’ perceived risk of side-effects as a result of vaccination. In addition, we did not assess potential mediating variables of the effect of culture on framing such as goal orientations. Future research should investigate the generalizability of these findings to other culturally diverse populations and assess plausible mediator variables.

In conclusion, our study is among the first to investigate the influence of gain versus loss framing on the vaccination intentions of parents from diverse ethnic groups. Research indicates that the burden of sexually transmitted infections falls disproportionately on socially and economically disadvantaged populations [18], which, in the US, consist mainly of racial and ethnic minority populations. Therefore, it is critical to understand factors that influence the effectiveness of prevention messages that target populations disproportionately affected by sexually transmitted infections.

Despite limitations, this study represents an advance beyond the existing literature and represents an important step towards the design of culturally tailored campaigns that can

help parents from diverse social and economic backgrounds in the U.S. make effective decisions for their daughters' health. Targeted interventions may be more effective than one-size-fits-all approaches, and our findings point to the potential benefits of tailoring health promotion campaigns aimed at specific ethnic groups.

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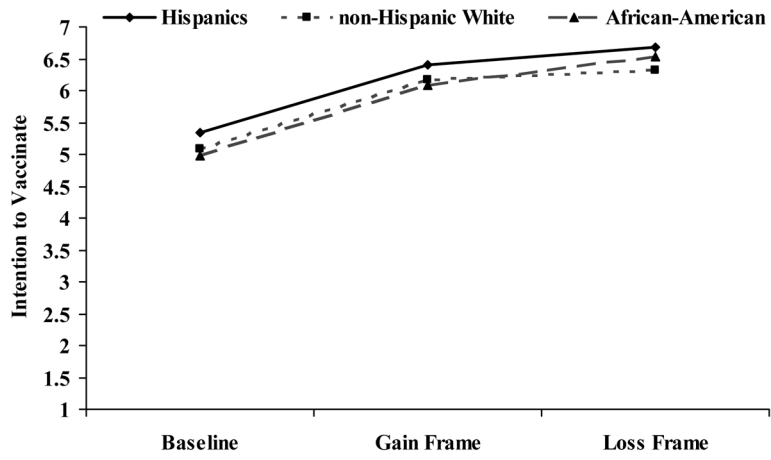


Figure 1. Intention to vaccinate as a function of framing and ethnic group.

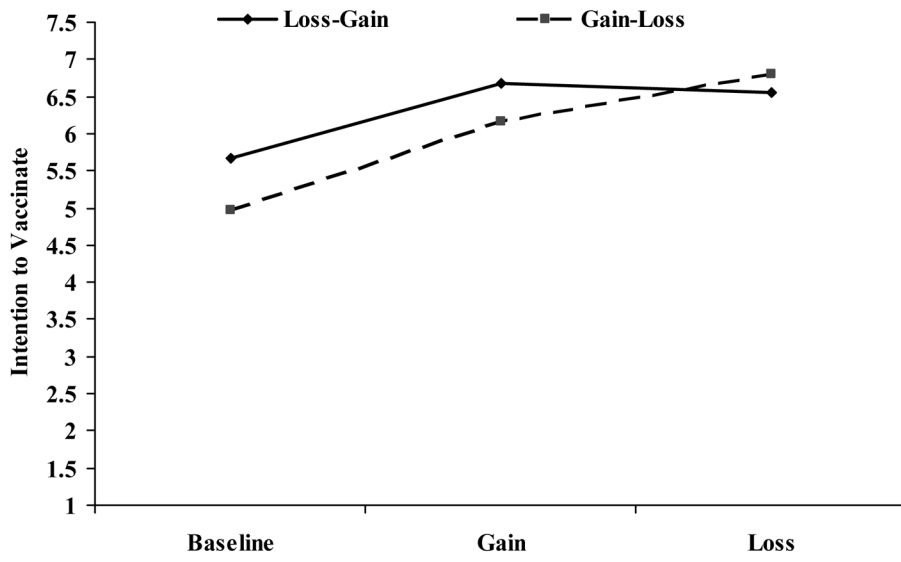


Figure 2. Intention to vaccinate as a function of framing and order in the Hispanic group.

Table 1

Demographic Variables across Ethnic Group

Variable	Ethnic Group					
	Hispanic		Non-Hispanic White		African-American	
	n	%	n	%	n	%
Employment Status						
Employed	35	70.0%	37	75.5%	32	64.0%
Unemployed	12	24.0%	12	24.5%	15	30.0%
Retired	3	6.0%	--	--	3	6.0%
Insurance Status						
Don't have	22	44.0%	4	8.2%	2	4.0%
Medicaid or State	20	40.0%	29	59.1%	38	76.0%
Private	8	16.0%	16	32.7%	10	20.0%
Education						
Grade 0–12	41	82.0%	28	57.1%	20	40.0%
Technical School	3	6.0%	2	4.1%	4	8.0%
1–3 Years College	3	6.0%	11	22.4%	21	42.0%
Bachelors Degree	3	6.0%	7	14.3%	4	8.0%
Postgraduate	--	--	1	2.0%	1	2.0%

Note. Some proportions do not add to 100% due to missing data.

Table 2

Repeated Measures Mixed Analysis of Covariance

Source	df	SS	MS	F	p	η^2
Between Subjects						
Insurance (Covariate)	1	.69	.69	.61	.43	.00
Education (Covariate)	1	.33	.33	.30	.58	.00
Frame Order (FO)	1	.21	.21	.19	.66	.00
Ethnic Group (EG)	2	1.01	.51	.42	.63	.00
FO x EG	2	.04	.02	.02	.98	.00
Error 1	135	151.81	1.12			
Within Subjects						
Frame (F)	2	11.27	5.63	4.88	.01	.03
F x Insurance	2	1.60	.80	.70	.50	.00
F x Education	2	.78	.39	.33	.71	.00
F x FO	2	3.09	1.54	1.34	.26	.01
F x EG	4	1.15	.29	.25	.91	.00
F x FO x EG	4	10.50	2.63	2.27	.06	.03
Error 2	270	311.83	1.15			