The Framing of Online HPV Vaccine Information

Heewon Im
Ph.D. Candidate
School of Journalism and Mass Communication
University of Minnesota, Twin Cities
imxxx037@umn.edu

Abstract

This study examined how various non-news sources have framed online human papillomavirus (HPV) vaccine information. A content analysis demonstrated that stakeholder activists are the most prevalent HPV information providers. Among various frames, STD and cervical cancer were frequently used as the disease outcomes, and the framed messages targeted sexually inactive men and women. Positive and negative attributes of the safety and effectiveness of the vaccine and the individual responsibility frame were the most prevalent frames in the online information. Stakeholders tended to demonstrate their position more explicitly by using specific frames to support their position, whereas nonstakeholders tried to maintain a neutral position. Stakeholders used other disease outcome frames and positive attributes of safety and location frames more. The results also demonstrated that the frame usage were differed according to the non-news sources' position. HPV vaccination supporters tended to use other disease outcome frames and positive attributes frames about HPV vaccination more. Implications of the study discussed.

Key Words: HPV Vaccine, Online Health Information, Framing

The online HPV vaccine information provided by stakeholders can be a major source of information for consumers and can specifically influence their perception of the vaccine. Because of the convenience of searching for information online, individuals tend to use the Internet first when they need to know more about new health issues (Hesse, 2009), such as the use of HPV vaccines. A recent survey by the Pew Research Center showed that the Internet is the primary source of health information for Americans who are making medical decisions (Fox, 2011).

Although healthcare products, including HPV vaccines, are one of the product categories most heavily regulated by the U.S. Food and Drug Administration (FDA), some stakeholders choose a more explicit method for framing the HPV vaccine that reflects their position. News organizations' specific methods of framing HPV vaccine have been studied (Fowler, Gollust, Dempsey, Lantz, & Ubel, 2012; Johnson, Sionean, & Scott, 2011), but not much research has been conducted on non-news sources' framing of the vaccine. Some stakeholders are more likely to strategically use frames to achieve their HPV-related goals. Therefore, knowing the sources of online HPV vaccine information and how stakeholders frame such information based on their interests is important. This study examined the types of stakeholders who provide online HPV vaccine information and the frames used to provide information in the U.S.

Literature Review

Online HPV Vaccine Information Provided by Non-News Sources

Stakeholders and nonstakeholders provide information about HPV vaccination. The stakeholders include pharmaceutical companies (Merck and GlaxoSmithKline [GSK]) and retailers, public health agencies, healthcare providers, and activists, including potential consumers and health interest groups or not-for-profit advocacy/opposition groups (Bauer, 2006; Brandenberger & Wesoloskie, 2008). In addition, nonstakeholders, including for-profit and activist health information aggregators and user-generated information aggregators, provide HPV vaccine information.

Stakeholder: For-profit sources

Pharmaceutical companies are increasingly providing online health information as part of their marketing strategy (McGuire, 2005). The FDA's regulation exception for nonbranded or simple help-seeking direct-to-consumer advertisements (DTCAs) may contribute to the trend (Rollins, King, Zinkhan, & Perri, 2011).

Broadly, two types of for-profit sources have stakes in the HPV vaccine. The first type is a vaccine manufacturer. Currently, two pharmaceutical companies

have launched HPV vaccines. Gardasil, manufactured by Merck, was the first HPV vaccine approved by the FDA (Baylor, 2009), and Cervarix, manufactured by GSK, was the most recently approved one (Baylor, 2012). Merck's and GSK's primary marketing goal is to maximize profits by selling and distributing more products, which involves getting more consumers vaccinated.

The second type of for-profit stakeholder is retail clinics, particularly ones associated with pharmacies. Since many are subsidiaries of a retail pharmacy or drugstore, retail clinics are recently launched healthcare centers in commercial spaces (Spielberg, 2009). The profits for this type of stakeholder come from increased product sales, which involve vaccinating more individuals. Retail clinics provide health information to potential consumers (Williams, Khanfar, Harrington, & Loudon, 2011). Some pharmacy-associated retail clinics provide information through their relatively well-known pharmacy webpage and then allow consumers to make an appointment at one of their retail clinics.

Stakeholder: Government public health agencies

Broadly, there are three levels of government public health agencies. At the federal level, the U.S. Department of Health and Human Services (HHS) operates several healthcare-related agencies, such as the FDA and the Centers for Disease Control and Prevention (CDC).

Although the structures and formats vary, state and local governments also have a department of health responsible for residents' health. Because the departments' responsibility and function are similar to those of the HHS (and associated with it), their approach to the HPV vaccine is also similar. In association with the HHS or state or local healthcare centers, local departments sometimes recommend HPV vaccinations to improve public health but provide balanced information to help state or local residents make an informed decision.

Stakeholder: Not-for-profit healthcare centers

Not-for-profit healthcare centers are financially supported by donations, alliances with state governments or universities, and foundations supporting health-related causes. Therefore, the main objective of most not-for-profit healthcare centers is to enhance patients' well-being. For example, according to the Mayo Clinic's *2011 Annual Report,* their mission is to incorporate patient care and medical education (Mayo Clinic, 2012).

Activists

There are three types of online not-for-profit activists: medical professional interest groups, advocacy groups, and opponent groups. Activists tend to show their position more explicitly and sometimes try to persuade their target audiences.

Medical professional interest groups sometimes make recommendations on certain topics, such as HPV vaccination. For example, the American College of Obstetricians and Gynecologists (ACOG) provides information and recommends the vaccine.

Advocacy groups, such as the HPV Project in North Carolina, try to explicitly demonstrate their support for the HPV vaccine by emphasizing its positive aspects (e.g., as a safe and effective method for preventing cervical cancer). These groups usually consist of consumers, health educators, and some healthcare providers who share the same goal. Their shared goal is to promote HPV vaccination among consumers and the public by providing information. Consumer advocacy groups are not only an online source of information for consumers but have also been a source of information for news organizations, such as newspapers (Fowler, Gollust, Dempsey, Lantz, & Ubel, 2012).

Opponent groups are a unique constellation of consumer groups and individuals. They sometimes have specific political affiliations (e.g., Conservatives) or can be healthcare providers or consumers who are cautious about vaccine safety in general. Conservatives in particular tend to oppose the HPV vaccination for sexually inactive young girls because they believe that its sexual connotation undermines the value of abstinence before marriage. The most extreme opponents question the safety and effectiveness of all types of vaccines, whereas others raise these issues only in relation to the HPV vaccine on the grounds that there has been insufficient time to observe potential side effects. Irrespective of the underlying reasons, all opponents share a suspicion of the HPV vaccine, and their information tends to focus on the side effects and associated connotations of promiscuity.

Nonstakeholders: For-profit, activist and user-generated health information aggregators

Some nonstakeholders provide online HPV vaccine information without a direct stake but aggregate health information. There are three types of health information aggregators: for-profit, activists, and user-generated. This type of aggregators insists to provide balanced, evidence-based health information to help consumers make their own medical decisions. For-profit health information aggregators, such as WebMD and Yahoo! Health, try to maximize their profits from general product advertising through their website. Activists

range from physicians or medical researchers (e.g., Kevin MD) to a foundation supporting health-related causes (e.g., the Kaiser Family Foundation). Health information from user-generated aggregators, such as Wikipedia, is provided and shared by online users who may or may not be an expert in health. . Although they do not have a direct stake in HPV vaccines or do not explicitly express their position, some nonstakeholders provide blog sections where individuals with stakes in health issues can express their opinion. For example, on one WebMD expert blog, a physician's assistant supported HPV vaccines (Moser, 2013).

Overall, various potential non-news sources provide HPV vaccine information, and their position on the HPV vaccine is reflected in the information provided, which can affect consumers' decision making. Therefore, knowing what types of non-news sources provide HPV vaccine information and their position on the vaccine is important. The following research questions were investigated in this study:

RQ1. Which non-news sources provide HPV vaccine information?

RQ2. Do the non-news sources explicitly demonstrate their position on HPV vaccines?

The Framing of Online HPV Vaccine Information

By emphasizing the message in a certain way, framing tells the reader how to understand the issue (Entman, 1993). Broadly, framing has three effects: information, persuasion, and agenda setting (Tewksbury & Scheufele, 2008). Information effects refer to the way concepts are linked to influence an individual's memory and perception. The choice of links is often based on the message provider's intentions. Thus, different frames for different intentions can be selected (Tewksbury & Scheufele, 2008). The specific use of frames can give the impression that the selected attribute is the most important aspect. Therefore, individuals can shape an attitude or behavioral intention by selecting specific attributes from the message. Among several frames studied in the framing research, the problem-definition, disease-outcome, responsibility-attribution, and attribute frames are relevant in online HPV vaccination information.

Disease-outcome frames: The associated disease outcomes

The disease-outcome frame is a method of defining vaccines by connecting them with disease outcomes. Among the associated disease outcomes, STD and cervical cancer can generate a different perception of the vaccine among consumers. According to Friedson's categorization of illness, a STD can be a less serious but socially stigmatized illness, whereas cervical cancer is serious and fatal (Friedson, 1970). Because of the different social meanings, consumers may be more reluctant to take the HPV vaccine when it is framed as a STD vaccine than when it is framed as a cervical cancer vaccine.

The types of disease outcomes related to HPV vaccines can change consumers' attitudes toward the vaccines and their intention to vaccinate themselves or their children. Sperber, Brewer, and Smith (2008) demonstrated that women showed more interest in the vaccines when they were framed as cervical cancer vaccines (80%) than when they were framed as genital warts vaccines (76%). Leader and colleagues' quasi-experiment with framed messages also demonstrated that individuals tend to show higher vaccination intention when HPV vaccines are framed as cervical cancer vaccines (Leader, Weiner, Kelly, Hornik, & Cappella, 2009).

Problem-definition frames

The frames chosen to define HPV imply the information's presumed audience. When it comes to the vaccination target, gender and sexual activeness are important frames. Some information providers target a specific gender more, because of the vaccines' connection to cervical cancer, which is contracted only by women. Sexual activeness is another issue in defining a vaccination target. In particular, sexually active adults are targeted mainly because HPV is mostly transmitted by sexual activity. However, sexually inactive groups are also important targets, because the current HPV vaccines are most effective for people who are not yet sexually active.

Responsibility-attribution frame

Most studies (e.g., Iyengar, 1991) of the responsibility-attribution frame focus on whether the cause of the problem is the individual or the society in which the individual lives. This frame can be also applied to HPV vaccination. If it is an individual issue, contracting HPV-related diseases are individual issues; therefore, treatment responsibility is confined to the patient. However, some individuals live in a society or community where safe sex is not a social norm or where HPV prevention resources, such as clinics and vaccines, are limited. In such cases, HPV vaccination becomes a social rather than an individual issue.

The responsibility-attribution frames can generate attitudinal outcomes (Iyengar, 1991; Tewksbury & Scheufele, 2008) for the HPV vaccine and policies. For example, Oliver and Lee (2005) demonstrated that individuals support more public health

policies on obesity when people are exposed to messages that attribute the condition to social determinants. When this logic is applied, the responsibility-attribution frame can influence recipients' attitudes toward HPV vaccines. For instance, if HPV vaccination is framed as an individual health issue, the target of the vaccine and their medical decision makers are perceived as the key players.

Attribute frame

Attribute frames describe qualities that are part of the topic in either a positive or negative manner (Levine, Schneider, & Gaeth, 1998). The relevant attributes of HPV vaccines are safety, effectiveness, cost, and promiscuity. Safety refers to how harmful or risky the vaccine is. Side effects are commonly included in safety information. Effectiveness refers to how well the vaccine prevents the disease. The cost of the vaccines refers to the time, money, and effort required to vaccinate. Finally, promiscuity is a unique attribute of HPV vaccines. Because HPV is most frequently transmitted through sexual activity and has been labeled an STD, which tends to attract social stigma, some parents have a negative attitude about vaccination. Researchers report that a common barrier to vaccination cited by parents is the belief that their children are not sexually active (Hitt, 2010).

The attitude shaped by attribute frames tends to be valence consistent, which means that positive-attribute frames generate a positive attitude, whereas negative-attribute frames generate a negative attitude (Levine, Schneider, & Gaeth, 1998). The attribute frame can influence an individual's attitude toward HPV vaccination by emphasizing the positive or negative attributes of vaccination. To show the influence of attribute frames on subjects' intention to vaccinate, Bigman, Cappella, and Hornik (2010) manipulated five attribute conditions: positive only, positive–negative, negative–positive, negative only, and control. They then measured the subjects' intentions to vaccinate (or not vaccinate). The results demonstrated that positive-attribute frames generated the highest intention to vaccinate. Furthermore, in mixed-frame messages, messages that presented positive frames first generated high intentions from the subjects.

Overall, among various frames, the problem-definition, disease-outcome, responsibility-attribution, and attribute frames can be used by non-news sources. The following research questions were addressed to investigate the types and method of framing used by various stakeholders:

RQ3. What types of frames are used in non-news sources of information about HPV vaccines?
RQ4. Do the non-news sources use frames differently, based on their positions on HPV vaccines?

Method

To investigate the research questions, a content analysis was conducted.

Unit of Analysis

Online text information about HPV vaccines from non-news sources was the focus. Only the first page of the directly linked search result was included in the sample because different pages from the same organization (e.g., the CDC) sometimes appeared as different results. Table 1 provides a list of the sources and pages. If no HPV vaccine information appeared on the first full page of the link, the source was not included in the analysis. Only information about HPV vaccines, such as Gardasil or Cervarix, cervical cancer vaccines, and HPV vaccines in other HPV-related products (e.g., HPV screening products), was examined. Information about HPV only, news articles about HPV vaccines (e.g., articles from CNN and *The New York Times*), and video clips about HPV vaccines (e.g., YouTube clips) were excluded.

Table 1 ***List of Analyzed Links***

Stakeholder	Type	Host	No. of links
Stakeholder	For-profit	Cervarix	1
		Gardasil	2
		Preciva	1
		Walgreens	1
	Government Agencies	Centers for Disease Control and Prevention (CDC)	6
		Florida Department of Health	1
		Healthfinder.gov	1

		The City of Kansas City	1
		Medline Plus	1
		The National Cancer Institute (NCI)	1
		The New Jersey Department of Health	1
		The Washington State Department of Health	1
	Healthcare centers	The Baylor College of Medicine	1
		The Children's Hospital of Philadelphia (CHOP)	1
		The Mayo Clinic	1
		The University of Washington, Seattle Primary Health Care Center	1
	Activist Groups	The American College of Obstetricians and Gynecologists (ACOG)	1
		The American Cancer Society (ACS)	1
		The Association of Reproductive Health Professionals (ARHP)	1
		Cervical Cancer Action	1
		Conservapedia	1
		The Doctor Within	1
		Genital Warts.org	1
		HPV vaccine project	2
		The Immunization Action Coalition (IAC)	1
		Medinstitute	1
		Mercola	1
		The National Cervical Cancer Coalition (NCCC)	1
		Planned Parenthood.org	1
		Think Twice Global Vaccine Institute (ThinkTwice)	1
		Vaccine Info.net	1
Total-Stakeholders			38
Nonstakeholders	For-profit	About.com	2
		Drugs.com	1
		Mahalo	1
		MedicineNet.com	2
		WebMD	2
		Yahoo Health	1
	Activist Groups	Epigee	1
		The National Conference of State Legislatures (NCSL)	1
		The Henry J. Kaiser Family Foundation	1
		KevinMD	1
		Kids Health.org	1
		Ohio State University (OSU) Extension	1
		Organization of Teratology Information Services (OTIS)	1
		Netwellness.org	1
		Science-Based Medicine	1
	User-generated	Kiwix	1
		Wikidoc	1
		Wikipedia	1

Total-Nonstakeholders	21
Total	59

Sample

"HPV vaccine" was used as the search term. Because online information tends to change within a short period (Neuendorf, 2002), the search results were recorded as PDF files and sent to coders. Internet Explorer 8 was used for the sampling. A sample was drawn from Google and Bing search results. These search engines were selected because of their popularity in the United States (Nielsen Wire, 2010). The first 10 pages of the results were analyzed because consumers believe that the most relevant sources are likely to appear at the top of the search results (Rowley, 2004).

Coding Procedures

Two coders analyzed the search engine results in the same computer-usage environment, because search results may differ across computer types, web browsers, and connection times. The coders were instructed to select each link in the PDF file of the search engine results and access these files.

Coding Schemes

Position on HPV vaccination. A stance on HPV vaccination was analyzed regarding whether the sources of information supported, opposed, or were neutral. The position was judged based on the explicit stances on HPV vaccine expressed in the mission statement or any part in the *About Us* page; the webpage was coded as support or oppose. If the source claimed to be balanced, accurate, or avoiding conflict of interest, or there was no information on their position on the vaccine, the source was coded as neutral.

*Disease-outcome frame for HPV vaccines***.** The disease outcomes linked to HPV vaccination were coded. For example, whether it is linked to STDs (including genital warts), cervical cancer, or diseases other than an STD or cervical cancer (e.g., oral cancer). Each frame was coded in terms of whether it exists (not exist = 0, exist = 1).

Problem-definition frame. The information was coded for the recommended vaccine recipients' gender (women = 1, men = 2, or both = 3) and their sexual activeness (not active = 1, active = 2, or both = 3).

Responsibility - attribution frame. The information was coded regarding whether the responsibility for being vaccinated was assigned to individuals, society, or both (individual = 1, social = 2, both = 3).

Attribute frame. The advantages and disadvantages of the HPV vaccine were coded. Positive-attribute frames were coded in terms of safety, effectiveness, cost, insurance coverage, accessible locations, the convenience of the vaccination steps, and other information. Negative frames were coded in terms of their safety, effectiveness, cost, insurance coverage, inaccessible locations, inconvenience of the vaccination steps, link to promiscuity, and others. Each frame was coded in terms of whether it existed (not exist = 0, exist = 1).

Statistical Analysis

In examining RQ1 and RQ3, descriptive statistics were used to count the number and types of stakeholders and frames. Several chi-square tests were conducted to investigate RQ2 and RQ4, because the variables in RQ2 and RQ4 are categorical. For RQ2, two chi-square tests were conducted to investigate whether stakeholders' position on HPV vaccination differed from that of nonstakeholders and whether stances differed among the types of non-news sources. For RQ4, two chi-square tests were conducted whether stakeholders use various types of frames differently from nonstakeholders and whether there were frame use differences based on the sources' position on HPV vaccination.

Results

Descriptive Statistics

Among 122 links from Google and 194 links from Bing from the first 10 pages of the search results, 59 links were analyzed. Table 1 lists the links. Cohen's kappa was calculated for each coding scheme. Overall, because of the intensive training, coder reliability reached a good level to continue analysis (K = 1 for all coding schemes).

RQ1. Type of Non-News Sources

Overall, more HPV information was provided by stakeholders (n = 38) than nonstakeholders (n =21). Stakeholder activists were the major provider (n = 16), followed by government agencies (n = 13). Table 1 summarizes the list of non-news sources.

RQ2. Non-News Sources' Position on HPV Vaccine

Twenty-two sources supported HPV vaccination, 31 sources were neutral, 6 sources explicitly opposed it, and 2 sources' positions were unidentifiable. A chi-square test was conducted to investigate whether there were differences in the sources' positions on the

topic. The analysis demonstrated the sources differed significantly, based on their stakes on the topic (χ^2 (2) = 6.19; *p*< .05). Stakeholders demonstrated their positions more explicitly while most nonstakeholders remained neutral on HPV vaccination. The differences between the sources are shown in detail in Table 2.

Table 2 ***Non-News Sources' Positions on the HPV Vaccine: Stakeholders vs. Nonstakeholders***

	Position			Total	χ^2
	Support	Neutral	Oppose		
Stakeholders	16	16	6	38	6.19*[a]
Nonstakeholders	6	15	0	21	
Total	22	31	6	59	

Note.[+]*p* < . 1;**p* < .05;***p* < .01; [a]*df* = 2.

Another chi-square test showed that there were differences in the sources' positions on the topic according to the non-news sources type (χ^2 (12) = 19.07; *p*< .1).In particular, stakeholder activists tended to be more explicit than other types of organizations. The results are summarized in Table 3.

Table 3 ***Non-News Sources' Positions on the HPV Vaccine: Types of Sources***

		Position			Total	χ^2
		Support	Neutral	Oppose		
Stakeholder	FP	2	2	1	5	19.07[+a]
	GA	4	9	0	13	
	HP	3	1	0	4	
	AG	7	4	5	16	
Nonstakeholder	FP	2	7	0	9	
	AC	3	6	0	9	
	UG	1	2	0	3	
Total		22	31	6	59	

Note. FP = For-Profit; Gov = Government Agency; HP = Healthcare Provider; AC = Activists; UG = User Generated; [a]*df* = 12.

RQ3. Type of Frame Used by Non-News Sources

A frequency test was conducted to count the use of each frame.

Disease-outcome frame. The STD (*n* = 45) and cervical cancer (*n* = 50) frames were similarly used to describe the disease outcomes attached to HPV vaccines. Other disease outcomes were also associated (*n* = 26).

Problem-definition frame. For the vaccinations target, no source targeted men only or sexually active individuals only. Most sources designed information for both genders (*n* = 32) and sexually inactive individuals (*n* =28). Table 4 summarizes the results.

Table 4 ***Frequencies of Problem-Definition Frames***

Types	Frequency	Percent	Valid Percent
Vaccine Target-Gender			
Female	22	37.3	40.7
Male	0	0	0
Both	32	54.2	59.3
Vaccine Target-Sexual Activity			
Inactive	28	47.5	65.1
Active	0	0	0
Both	15	25.4	34.9

Responsibility - attribution frame. Most sources framed the HPV vaccine as an individual issue (n = 45). Very few described it as a social issue (n = 3) or individual and society should take responsibility for being vaccinated (n = 3).

Attribute frame. Among the positive attributes, safety (n = 41) and effectiveness (n = 50) were used most frequently. In terms of negative attributes, safety (n = 47) and effectiveness (n = 48) were also the most frequently addressed. Table 5 summarizes the results.

Table 5 ***Frequencies of Attribute Frames***

Type	Frequency	Percent	Valid Percent
Positive			
Safety	41	69.5	69.5
Effectiveness	50	84.7	84.7
Cost	18	30.5	30.5
Insurance	18	30.5	30.5
Location	6	10.2	10.2
Steps	0	0	0
Other	1	1.7	1.7
Negative			
Safety	47	79.7	79.7
Effectiveness	48	81.4	81.4
Cost	19	32.2	32.2
Insurance	17	28.8	28.8
Location	0	0	0
Steps	1	1.7	1.7
Promiscuity	5	8.5	8.5
Other	3	5.1	5.2

RQ4. Do the non-news sources use frames differently?

Several chi-square tests were conducted to investigate whether non-news sources' use of frames differed.

*Disease-outcome frame***.** There was not much significant difference in the use of disease-outcome frames between stakeholders and nonstakeholders. Particularly, stakeholders and nonstakeholders tend to use the STD and cervical cancer frame similarly, but stakeholders tended to use more disease outcomes other than STD or the cancer (χ^2 (1) = 3.18; p < .1). However, in terms of position on HPV vaccination, the use of STD (χ^2 (2) = 21.51; p < .001) and cervical cancer frames (χ^2 (2) = 13.66; p < .01) differed

significantly. The STD frame was used more by neutral position sources while no opponents used the frame. The cervical cancer frame was used similarly by supporters and neutral position sources, but opponents were less likely to use the frame. Tables6 and 7 show the differences across the sources.

Table 6 ***Disease-Outcome Frames by Non-News Sources: Stakeholders vs. Nonstakeholders***

Frames	Stakeholder	Nonstakeholder	Total	χ^2
STD	27	18	45	1.61[a]
Cervical Cancer	31	19	50	.83[a]
Other	20	6	26	3.18[+a]

Note. $^{+}p < .1$;$^{*}p < .05$;$^{**}p < .01$; $^{a}df = 1$

Table 7 ***Disease-Outcome Frames by Non-News Sources: Positions***

Frames	Positions			Total	χ^2
	Support	Neutral	Oppose		
STD	19	26	0	45	21.51***[a]
Cervical Cancer	20	28	2	50	13.66**[a]
Other	13	12	1	26	4.20[a]

Note. $^{+}p < .1$;$^{*}p < .05$;$^{**}p < .01$; $^{a}df = 2$

Problem-definition frame. The sources' use of the responsibility-attribution frames and positions on HPV vaccination did not differ significantly. All sources consistently tended to use nonparents as a message target. However, as vaccine targets, sexually inactive men and women were most frequently used.

Responsibility-attribution frame. The use of the responsibility-attribution frames did not differ significantly by source. All sources consistently tended to use individual frames more than other frames. The use of attribute frames was also not significantly different.

Attribute frame. Among positive attribute frames, safety (χ^2 (1) = 4.05; $p < .05$) and location (χ^2 (1) = 3.69; $p < .1$) frames were used significantly differently by stakeholders versus nonstakeholders. Particularly, positive safety frames were used more frequently than nonstakeholders. No nonstakeholders used the positive location frame. Among negative attribute frames, the link to promiscuity was used only by nonstakeholders (χ^2 (1) = 9.89; $p < .01$). The use of positive attribute frames also significantly differed by organization position.

HPV vaccination supporters tended to use more positive attribute frames, except the insurance coverage frame, than neutral position sources or opponents. Among negative attribute frames, the negative other frame was the only frame used differently in terms of organizations' positions, and only opponents used the frame. The results are summarized in Tables 8 and 9.

Table 8 ***Attribute Frames by Non-news Sources: Stakeholders***

Position on HPV Vaccine	Stakeholders	Non stakeholders	Total	Valid Cases	χ^2
Attribute Frame - Positive					
Safety	23	18	41	59	4.05*
Effectiveness	32	18	50	59	0.02
Cost	14	4	18	59	2.02
Insurance	14	4	18	59	2.02

Location	6	0	6	59	3.69+
Other	1	0	1	59	0.56
Attribute Frame - Negative					
Safety	31	16	47	59	0.24
Effectiveness	33	15	48	59	2.12
Cost	15	4	19	59	2.59
Insurance	12	5	17	59	0.4
Location	0	0	0	59	N/A
Promiscuity	0	5	5	59	9.89**
Other	3	0	3	58	1.80

Note. $^{+}p < .1$; $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$ $^{a}df = 1$.

Table 9 ***Attribute Frames by Non-news Sources: Positions***

Frames	Positions			*Total*	*Valid Cases*	χ^2
	Support	*Neutral*	*Oppose*			
Attribute Frame - Positive (a)						
Safety	19	22	0	41	59	16.65***
Effectiveness	22	27	1	50	59	25.60***
Cost	10	8	0	18	59	5.28+
Insurance	8	10	0	18	59	3.04
Location	5	1	0	6	59	6.11*
Other	0	0	1	1	59	8.99*
Attribute Frame - Negative (a)						
Safety	18	23	6	47	59	2.17
Effectiveness	18	24	6	48	59	1.70
Cost	9	7	3	19	59	2.95
Insurance	8	8	1	17	59	1.18
Location	0	0	0	0	59	N/A
Promiscuity	1	4	0	5	59	1.78
Other	0	0	3	3	58	27.42***

Note. $^{+}p < .1$; $^{*}p < .05$; $^{**}p < .01$; $^{a}df = 2$

Discussion

Results Summary

Since the Internet has become the primary health information source for consumers (Hesse, 2009), online health information can potentially influence consumers' health-related decisions. This study explored the online HPV vaccine information provided by various non-news sources. An analysis of the first 10 pages of the search results generated by Google and Bing showed that stakeholders were the most prevalent HPV information providers and among the stakeholders, activists were the most prevalent source. Of the various frames, the cervical cancer and STD frames were used similarly as disease outcomes. In terms of the vaccination target, few sources targeted sexually inactive individuals of either gender. Most of the sources

framed getting HPV vaccination as an individual responsible behavior. The positive and negative attributes of the safety and effectiveness of the vaccine were the most frequently used frames.

The results demonstrated that the types of non-news sources differ on expressing their position on HPV vaccine when providing information. Stakeholders tended to demonstrate their position more explicitly by using specific frames to support their position, whereas nonstakeholders tried to remain neutral. Among the stakeholders, activists tended to explicitly demonstrate their position on the vaccination.

A series of chi-square tests showed significant differences in how non-news sources used some frames. Particularly, stakeholders used more other disease-outcome frames and the positive attributes of safety and location frames. Stakeholders provided more information about HPV-related diseases other than STD or cervical cancer and provided more positive information about the safety of the vaccine and the convenience of the vaccination locations. The results also demonstrated that the frame usages differed according to the non-news' sources position. HPV vaccination supporters tended to use more other disease outcome frames and positive attributes frames about HPV vaccination. Supporters tended to provide more information about disease outcomes that can be prevented by HPV vaccination and various positive aspects of the vaccine.

Implications

*Online information framing as stakeholder's voicing strategy***.** This study demonstrates that online information on HPV vaccination from different sources is framed differently to advance their agenda. Particularly, activists tend to show their position on the vaccine more explicitly by using the frames more strategically. The results can be understood in two ways. First, different sources use framing as their voicing strategy to achieve their goals. For example, HPV vaccine supporters try to use more positive-attribute frames than opponents or neutral position sources. Second, framing studies can be extended to other forms of information provided by non-news sources. As Frooman (1999) observed, stakeholders use voicing strategies to inform, persuade, and influence the public. Framing can engender three effects—informing, persuading, and agenda setting—that match the purpose of the voicing strategy. This study suggests that stakeholders in the HPV vaccination issue seem aware of the framing effects and apply them to online voicing strategies.

*Potential information and persuasion effect of framing***.** The results showed an imbalanced use of frames, which can shape consumers' perception of HPV vaccination, an information effect of framing. Tewksbury and Scheufele (2008) stated that the way that concepts are linked can influence an individual's memory and perception, which is an information effect of framing. This study showed that stakeholders provide more HPV vaccine information than nonstakeholders. The positions of other stakeholders, except government agencies, on HPV vaccination were more explicit due to matching frames. HPV vaccine-supporting activists provide more positive aspects of the HPV vaccine, while opponent activists try to provide more negative aspects such as HPV's link to promiscuity. Consumers who received information from the supporters may have a more positive view of the HPV vaccine, and vice versa.

In terms of problem definition frame, the men-only target frame and sexually active frame were never used. Since the frames are related to the information's presumed audience, it means that HPV vaccine information from non-news sources assumed that the vaccine is for sexually inactive women. Although current use problem definition frame is effective for the CDC recommended vaccine target, it may not accurately represent the vaccine's target. The vaccine is also applicable for sexually active men and women (CDC, 2012).

Imbalanced use of responsibility attribution frames can influence consumers to think that HPV vaccination is an individual health issue. Only a few sources used the social frame when providing HPV vaccine information. Thus, consumers may perceive that HPV-related disease and vaccination must be solved at the individual level. However, HPV and HPV vaccination can be a socially responsible issue. The total costs of the HPV vaccine are much higher than other types of vaccines, and accessibility to HPV vaccine can also differ according to social status. For example, 2013 WHO report on HPV vaccine includes community-based vaccine distribution and information campaign plans for countries where healthcare accessibility is limited. The current online HPV information from non-news sources may misrepresent to consumers that this health issue must be solved at the individual level.

The strategic use of the frame not only provides information to consumers but also influences consumers' attitudes. Therefore, the prevalence of online HPV vaccine information can challenge consumers to get balanced information. The stakeholders' imbalanced used of attribute frame shape the valance consistent attitude (Levine, Schneider, & Gaeth, 1998), thus consumers who received information from the HPV Project may have a more positive view of the HPV vaccine, and vice versa. The imbalanced use of

responsibility frame can influence consumer's attitude toward HPV vaccine related policies. As Oliver and Lee (2005) showed less supports for community-based obesity policy from individual responsibility frame exposed individuals, the current version of online HPV vaccine information may lead consumers perceive that HPV vaccine is responsible for the vaccine target and can become less supportive for community-based HPV vaccine campaigns.

Limitations and future research directions

The major limitation comes from the scope of the study. This study focused only on text information provided by U.S. non-news sources. However, as WHO pointed out, HPV vaccination is an international public health issue (WHO, 2013). Consumers in other countries may get more local-based online information when they search HPV vaccination. Future researchers should compare international online HPV vaccine information. In addition, non-news sources provide online information in various formats, such as video clips. For example, about 29,400 video clips about HPV were uploaded on YouTube, and some clips are included in the search engine results. Future research should analyze other information formats.

This study is based on the assumption that online HPV vaccine information can influence the public's perception, but the assumption should be validated. As Scheufele (1999) pointed out, a framed message may not always produce the intended effects; a framed message can be processed differently based on the recipients' cognitive perceptions. Several experimental studies have examined framing effects in HPV vaccine information presentation, but individual differences in cognitive structure have not been fully considered.

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