HPV Vaccine Messages in News Videos on YouTube:
A Content Analysis based on Extended Parallel Process Model

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ABSTRACT

Although news media have distributed a large amount of information on the HPV vaccine, few studies have been conducted to understand the specific types of messages that might affect the beliefs and attitudes about the HPV vaccination. In addition, little is known about messages on the HPV vaccine distributed on YouTube, a popular representative of new media. In order to conduct content analysis of the news videos on YouTube, this study employed Witte’s Extended Parallel Process Model (EPPM), which claims that a balance of threat and efficacy messages plays a significant role in positively affecting health attitudes and behaviors. By using coding categories of messages based on EPPM, this study examined the extent to which news videos on YouTube included threat and efficacious messages about the HPV vaccine. In order to investigate specific message types to positively affect the perceptions of viewers, this study also analyzed the difference between the number of messages in two sample groups, videos that have negative comments on the HPV vaccine and videos that have positive comments on the HPV vaccine. Findings indicated that the news videos on YouTube tended to cover more efficacious messages than fear-inducing messages. On average, a news video had the fewest severity messages (M=1.01), followed by self-efficacy (M=2.21), susceptibility (M=3.63), and response efficacy messages (M=5.6). In addition, self-efficacy messages (t=2.228, p≤.05) accounted for a significant difference between videos with overall negative comments and those with overall positive comments.
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Introduction

Human papillomavirus (HPV) is a sexually transmitted disease best known as being the precursor to cervical cancer. Infection with genital HPV is very common among sexually active females and it is the most commonly sexually transmitted disease in the United States (Center for Disease Control and Prevention [CDC], 2008). It was estimated that in the United States, anywhere between 50~70% of sexually active adults will be infected with the HPV genital infection at some point in their lifetimes (CDC, 2009). The CDC (2009) also reported that about 20 million men and women were currently infected and 6 million were newly infected each year.

The highest rate of HPV infection is seen among adolescents and young adults (CDC, 2009; World Health Organization [WHO], 2008); those between 18-28 years of age have the highest rates of HPV infection. According to the National Health and Nutrition Examination Survey (NHANES) 2003-2004, HPV infection is prevalent among 24.5% of females 14-19 years of age, among 44.5% of females ages 20-24, and among 27.4% of females ages 25-29 (Dunne, Unger and Sternberg, 2007).

HPV usually displays no symptoms, and thus is difficult to detect. Even if it clears by itself within two years, chronic infection with one of the HPV types is a critical factor for and the leading cause of cervical cancer. Among various HPV strands, only certain types, such as 16 and 18, are considered high risk, stimulating the growth of cancer. Other types, that do not cause cancer but can lead to other abnormal development, are regarded as low risk (National Cancer Institute [NCI], 2010). HPV types 16 and 18 account for 70% of cervical cancer cases and HPV 1 and 6, low risk types, account for 90% of genital warts (WHO, 2009). In addition, according to the WHO (2010), HPV infections are linked to 99% of all cervical cancer cases in the world.
Prior to the development of a vaccine against HPV, the Papanicolaou smear (Pap smear) was most commonly used as a screening test to detect precancers; the Pap test attempts to see whether cell changes occurred in the cervix. According to the CDC (2010), cervical cancer can be easily prevented with the screening test for various female cancers. Thus, the test is recommended as a preventive means to detect cervical dysplasia and control the possible growth of cervical cancer (National Advisory Committee on Immunization [NACI], 2007). Once people detect early cervical abnormalities from the Pap test and receive treatment, invasive cervical cancer can be prevented.

Despite the Pap test’s efficacy in detecting cervical cancer, cervical cancer has become increasingly threatening to women. According to recently reported statistics, cervical cancer was the second most common cancer in women; there are almost 470,000 cases and there is an annual death toll of 233,000 (US Food and Drug Administration [FDA], 2006). In addition, the current report of the American Cancer Society (ACS) estimated that 12,200 women would be newly diagnosed with invasive cervical cancer, and 4,210 would die from cervical cancer in the United States in 2010.

Given such large exposure to HPV and cervical cancer, the introduction of Gardasil, the first vaccine against HPV, has stirred much attention among the media and the public. Controversies about funding and mandate policy related to HPV vaccine and vaccination programs for a STI targeted on young girls have become fiercer. Subsequently, much media attention has resulted in debates about the HPV vaccination, including sexual promiscuity, age of initiating sexual activity, and HPV vaccine’s ineffectiveness. Especially concerning is that the way news media deal with health issues largely affects the extent to which the public is informed or misinformed (Meredith, Eisenman, Rhodes, Ryan, & Long, 2007). Thus, it is necessary to
investigate what information about the HPV vaccine is delivered through mass media and to expect an impact on the public perception of the HPV vaccination as a preventive behavior. Although news is not intended to promote certain health behaviors, they are used as credible sources for health information. These sources can also possibly affect decision making later. In this respect, understanding the extent of information that addresses the possible concerns and solutions associated with certain health issues is helpful to ensure credible and accurate information for the public.

Given many issues about the HPV vaccine and wide coverage in news media, the purpose of this study is to assess the extent to which news delivered in the YouTube video channel presents threat and efficacy messages about HPV, based on Witte’s extended parallel process model (EPPM). Threat messages allow people to comprehend and perceive the risks related to an HPV infection and related diseases, namely STDs and cervical cancer, and efficacy messages would encourage people to respond to threats by getting the HPV vaccination as a preventive action. By examining the viewer-posted comments on YouTube, this study will assess if the difference in frequency of threat and efficacy messages can contribute to predicting the viewer’s perception of the HPV vaccination. This study will also analyze videos and viewer-posted comments to examine whether YouTube videos are a good source of information about the HPV vaccine, as well as a potential channel for communicating information about the HPV vaccination.

**Literature Review**

**Why the HPV Vaccine Matters**

*Gardasil as the HPV vaccine*
Gardasil, also largely known as the HPV vaccine, is a vaccine against four types of HPV strands (types 6, 11, 16 and 18) which cause genital warts and cervical cancer. In 2006, Merck Pharmaceuticals launched this HPV vaccine after the Food and Drug Administration in the U.S approved it to be used for women of ages between 9 and 26 (NACI, 2007). The Advisory Committee on Immunization Practices (ACIP) also recommended routine injection of the HPV vaccine to females 11 to 12 years of age and to females ages 13 through 26 (CDC, 2008). Ideally, the HPV vaccine is the most effective when administered prior to sexual activity. However, those already active can still benefit from the HPV vaccination even if they have had sexual relationships prior to vaccination. In addition, even previously infected individuals can still benefit from the HPV vaccination if the contained virus is not among the specific types of HPV that cause cancer development. To ensure immunity to the HPV infection, the vaccine should be administered three times. The second injection is administered 2 months after the first, and the third dose is administered 6 months after the first.

It is notable that Gardasil is the first vaccine to protect against particular HPV types and effectively prevent cervical cancer. According to Merck’s research, only 5% of women and girls surveyed were aware of the association between HPV and cervical cancer before the release of the HPV vaccine (Herskovits, 2007). However, since the approval of the HPV vaccine and broadcasting of Merck’s campaign, the level of awareness reached approximately 50% (Herskovits, 2007). In addition, the CDC announced that 25% of girls between the ages of 13 and 17 were vaccinated in 2007, shortly following the approval of the Gardasil vaccine in 2006 (CDC, 2008). Recognizing the effectiveness of the Gardasil vaccine, the CDC recommended Gardasil for girls and young women between the ages of 9 and 18 by initiating the Vaccines for Children (VFC) program on November 1, 2007 (CDC, 2011).
The HPV Vaccine Controversy

When the FDA approved Gardasil as the HPV vaccine and ACIP recommended this vaccine in June of 2006, opposing or concerned voices did not emerge extensively (Haber, Malow & Zimet, 2007). However, the controversy around the HPV vaccination has since spread; Texas Governor Rick Perry issued a swift executive order in February, 2007 making the HPV vaccination mandatory for girls aged 11 to 12 in middle school (Haber et.al, 2007). This legislative action triggered more intense controversy when it was known that Merck & Co., the manufacturer of the approved HPV vaccine, lobbied legislators, contributed funds toward Governor Perry’s re-election campaign, and presented funds to “Women in Government”, an organization of female legislatures who supported the use of the HPV vaccine (Wynia, 2007).

Such approval triggered wide coverage of the HPV vaccination in media and attention to the HPV vaccination grew among the public. With respect to the HPV vaccination mandate, the most controversial issue was associated with the role of parents in caring for their children’s health. People were concerned about the loss of parental autonomy in making decisions about their children’s vaccinations (Haber et al., 2007). Even though parents could opt out of the required HPV vaccination, this was still considered too burdensome for those who did not want to vaccinate their children (Haber et al., 2007).

Other than this policy issue, there also have been concerns about the HPV vaccination itself. According to Haber et al. (2007), opposition to the HPV vaccination was not largely covered by both the media and public before there were debates about the mandate legislation of the HPV vaccination. However, the spike in media attention regarding this mandate issue provided those who opposed the vaccination with opportunities to present their criticism of the HPV vaccination.
One of the most common concerns has involved social issues, such as age of sexual initiation and sexual promiscuity (Singh, Wong, & Howlett, 2008). It was claimed that young girls who were vaccinated early in their school years may consider the vaccination to be permissive of early initiation of sexual intercourse. However, others claim that the important point of vaccinating young people aged 11 to 12 is that early vaccination can be expected to most effectively protect young girls. In addition, it can be a good opportunity for parents to talk about sex and sexuality if they choose to do so (Haber et al., 2007). Even if they do not choose to discuss sex, they can explain the need for vaccination to protect the health of their daughters since most of those young girls are not aware of STIs (Haber et al., 2007).

Another consistent debate has been about the uncertainty of the HPV vaccine’s effectiveness. People are concerned that the HPV vaccination was mainly tested on adult women, that there are side effects (including serious ones such as blood clots), and that it only protects against some types of HPV but not other sexually transmitted diseases (Hammoud, 2008). However, some claim that though it has been a relatively short period of time since the HPV vaccine has been approved, it is still necessary as it can be expected to largely contribute to the decreased chance of HPV infection and cervical cancer (Singh et al., 2008). In addition, the CDC continues serious and careful surveillance of the HPV vaccination’s safety through both passive and active monitoring (Vetter & Geller, 2007).

Concerns about the HPV vaccination may have been more stimulated in part because the mandate legislation started too rapidly (Wynia, 2007). Not only the early attempt to legislate, but also the extensive distrust in Merck Company increased people’s concerns about the HPV vaccination itself. Even though the HPV vaccine may be a remarkable breakthrough in
improving women’s overall health, debate about the mandatory legislation made people criticize the HPV vaccination itself unnecessarily (Haber et al., 2009).

**News Media and the HPV Vaccine**

Extensive controversy and attention on the HPV vaccination was significantly attributed to a large amount of coverage in media regarding the HPV vaccination legislation. Even though the controversy was stimulated by a policy issue, this largely contributed to public debate of the HPV vaccination itself. As such, it can be implied that media can contribute to an increased demand for the HPV vaccine since potential vaccine recipients and their health care providers may recognize that the HPV vaccination is needed to protect against the risks of HPV infection and perceive the vaccine as safe and efficacious (Vetter et al., 2007). In this respect, the media provides an important context for health education as being critical information sources for the public to consider when making its decision about the HPV vaccination.

**News Media as a Source of Health Information**

The media are important sources of information regarding health issues and developments for the general public, and can serve to affect health related decision making. A study by Brodie, Kjellson, Hoff and Parker (1999) conducted a nationwide telephone survey of audience’s reliance on mass media for health information. They found that all racial groups largely rely on media coverage for health information and make behavioral decisions based on what information is presented. In addition, Dutta-Bergman (2004) suggests more active aspects of health information seeking among the general public in that each person used media differently from another as primary sources for information. Those who learn health information
from print media and the Internet are more conscious of health behaviors. On the other hand, those who learn health information mostly from television and radio are less oriented in proper health behaviors (Dutta-Bergman, 2004). This study implies that, beyond passive exposure to health information disseminated by media, people actively select and use media channels to gain health information. Likewise, as people seek a considerable amount of health information via mass media, it is important to review the role and potential of the coverage of health news and information in mass media.

Previous studies have already accounted for the relationship between news coverage of a health issue and changes in health behaviors (Pierce and Gilpin, 2001; Yanovitzsky and Blitz, 2000). They have shown that as the media focuses on a certain health issue over time, coverage can motivate people to engage in the promoted health behaviors. For instance, a study by Pierce et al. (2001) found that when news media heavily covered smoking and health, the rate of smoking cessation among audience increased. A study on news coverage of mammogram screenings, and its impact on the decisions of women, has also shown that media coverage of mammogram screenings stimulated more women to get tested (Yanovitzsky et al., 2000). These prior studies could provide some explanation for the critical role that media plays in affecting health behavioral decisions; a large amount of coverage can have an impact on the extent to which audiences perceive the importance of particular healthy behaviors. Based on the information the audience obtains, they are more likely to engage in certain health behaviors.

However, the studies should be extended to examine what information is covered (Nabi & Prestin, 2007) although the extent of coverage is still important. Most of the previous studies focused on the extent to which particular health issues are covered in the context of physical activity (Caburnay et al., 2003), sexually transmitted disease (Davidson & Wallack, 2004), and
breast cancer (Shwartz & Woloshin, 2002); on the other hand, few studies have investigated what types of information are covered in specific health contexts and media contexts and subsequent audience’s perceptions of related health behaviors.

The Portrayal of HPV and the HPV Vaccine in News Media

As much of a breakthrough as the HPV vaccine was in preventing HPV infection and cervical cancer, controversy about the HPV vaccine has continued. Given the high level of interest and concerns regarding the HPV vaccination, it has been extensively covered in the mass media (Haber et al., 2007). Accordingly, even though the vaccine was suggested as a plausible solution among health care providers, many people are still concerned about the safety and effectiveness of the vaccine, and the uncertainty about the HPV vaccination (Shwartz, Caplan, Faden & Sugarman, 2007). It was proved by previous studies that such negative perceptions of the HPV vaccination are attributed to its large and sometimes controversial coverage (Haber et al, 2007; Wynia, 2007). Accordingly, it can be assumed that people have not acquired balanced information on HPV vaccine despite the wide coverage of the subject in media.

In line with such an assumption, some studies have explored news coverage of the HPV vaccine through content analysis and found not only prevalent information covered in news media but also necessary information in order to address whether the public was well informed by news media (Anhang, Stryker, Wright & Goldie, 2004; Calloway, Jorgensen, Saraiya & Tsui, 2006; Kelly, Leader, Mittermaier, Hornik & Capella, 2009; Wallace & Ache, 2009). These studies of content analysis of the HPV vaccine-related news messages showed that the news media provided incomplete information and possibly affected people’s perceptions of the HPV vaccination (Anhang et al, 2004; Calloway et al., 2006; Kelly et al., 2009; Wallace et al., 2009).
Prior to the approval of the Gardasil vaccine, Anhang et al. (2004) attempted to review the discussion of HPV in U.S. newspapers and television networks from January 1995 to July 2002. Even though it did not directly cover the vaccination itself, this study provides information as to what kinds of information about HPV and preventive behaviors were provided in news media before the approval of Gardasil. This study revealed that the information on HPV in most news coverage was incomplete. The messages failed to include information regarding HPV’s link to cervical cancer and the risk of certain HPV types, some of which cause genital warts as well as cervical cancer (Anhang et al., 2004). Moreover, news messages did not effectively address specific information, such as prevention, transmission, and symptoms (Anhang et al., 2004). For instance, the news did not mention that condoms were imperfect in preventing the infection of HPV. The news stories about new screening tests for HPV were also less likely to cover HPV prevention and transmission.

In addition, another study was conducted by Calloway et al. (2006); the study analyzed the content of the HPV vaccine information published in U.S. newspapers from January 1, 2003 to June 17, 2005. This research arrived at similar conclusions as Anhang et al.’s study (2004). News coverage of the HPV vaccine in this study also frequently lacked detailed and comprehensive information and thus, failed to convey diverse aspects of critical information needed to understand the association between an HPV infection and cervical cancer. News coverage contained considerable amount of information about the vaccine’s potential efficacy but the language used to describe the efficacy of the vaccine to prevent cervical cancer was not clear contributing to the confusion about the vaccination. According to Calloway et al. (2006), understanding the link between an HPV infection and cervical cancer is necessary for audiences to appreciate the risk and thus, help them decide whether or not to vaccinate. Furthermore, news
coverage did not discuss the limitation of condom use in preventing HPV. The news studied in this research failed to include comprehensive information about HPV types and their likelihood of triggering subsequent illness.

Kelly et al. (2009) examined the news coverage of HPV vaccines in newspapers and television networks in the months both immediately before and after the approval of the HPV vaccine. Even though the analysis of this study included news coverage both before and after the approval of the HPV vaccine, it reflected similar results with a study by Calloway et al. (2006) that analyzed only the news coverage prior to the vaccine’s approval. The study demonstrated that most news stories missed significant parts of information regarding the vaccine and HPV prevention. As a result, much of the released coverage cannot be considered ideal sources of information for people to obtain knowledge about HPV or to determine their decisions (Kelly et al, 2009).

Another study explored the content of HPV vaccination information in nightly television news from 2002 to 2007 (Wallace et al., 2009); the study was conducted both six months before and after the approval of Gardasil. This study revealed a contrasting result from previous studies (Anhang et al., 2004; Calloway et al., 2006; Kelly et al, 2009) in that the news coverage continuously included the link between HPV and cervical cancer, and both general and specific information of how the HPV vaccination affects the prevention of cervical cancer. Still, the coverage did not largely emphasize the proper actions to be taken after the vaccination nor was information about the effectiveness of the Pap Test provided (screening for HPV) (Wallace et al., 2009).

Such findings from the content analysis of HPV vaccination information in news media suggested that the information delivered in news stories is not well-balanced. These results
should be seriously considered as readers or viewers of the news media may not fully comprehend the HPV vaccination as prevention against genital warts and cervical cancer and thus, fail to recognize their susceptibility to HPV. Accordingly, it can be assumed that unbalanced information could also affect perception of the HPV vaccination and possibly contribute to changes in attitude and behavior related to the HPV vaccination later.

For instance, Kelly and her colleagues (2009) demonstrated the media’s potential to be a source of information by comparing the change in knowledge about the HPV vaccine before and after the vaccine’s approval. This study noticed that the sharp increase in media coverage of HPV was positively associated with the increased knowledge of the HPV vaccine and cervical cancer (Kelly et al, 2009). In addition, even though news coverage rapidly declined two months after the approval of Gardasil, the knowledge people retained did not disappear as rapidly (Kelly et al, 2009). These results imply that, if people persistently sought and retained it, general knowledge can be helpful in influencing decisions about the HPV vaccination given that the information about the HPV vaccination is well-balanced.

Likewise, it is evident that media coverage of the HPV vaccine has potential to play an important role in supplementing educational sources to aid positive decision making regarding the vaccination. In this respect, for the current paper, it would be meaningful to suggest an effective way to present informative and detailed messages about the HPV vaccine based on analysis of the detailed information delivered in media.

**Information, Knowledge, and Perception and Attitudes about the HPV Vaccine Acceptance**
As discussed, several studies have examined the coverage of HPV and the HPV vaccine in news media by analyzing the frequency, accuracy, and types of information. They claimed that the news media did not contain complete and accurate information about the HPV vaccine. Subsequently, they also expressed concerns that imbalance of information could affect the public’s perception and attitude about the HPV vaccination as news media were usually primary sources for health information. In order to account for such expected concerns specifically in the context of HPV vaccination, it would be necessary to examine whether information about the HPV vaccine is really associated with increase in knowledge and whether such information and knowledge are really associated with perception and attitudes about HPV vaccine acceptance. This investigation would be helpful to gain insight into why HPV vaccine information in news media would affect decision making on vaccinations.

**Information and Knowledge**

A study by Dempsey, Zimet, Davis and Koutsky (2006) pointed out an important finding about the association between exposure to HPV and HPV vaccine information and an increase in knowledge. This study demonstrated that participants exposed to information about HPV and the HPV vaccine showed a significantly higher score of average knowledge about HPV and HPV vaccine compared to those who did not read the detailed information (e.g. specific information on infection and transmission and efficacy of HPV vaccine). These studies suggest that an increase in knowledge and an awareness of the need for the HPV vaccine are important for both potential recipients and their parents in deciding to get vaccinated.

**Knowledge, Perception and Attitude**
Before the HPV vaccine was approved, several studies attempted to discover an association between knowledge about HPV related diseases and vaccinations and the willingness to receive a vaccination. Hoover, Carfioli and Moench (2000) conducted a study on knowledge of HPV and its association with the hypothetical acceptability of an HPV vaccine and the intention to participate in an HPV vaccine clinical trial. They interviewed women aged 15-28 asking about their knowledge of HPV and attitude towards vaccinations. The results showed that less than half the women had heard of HPV and intended to get trial shots of the HPV vaccine (Hoover et al., 2000). This study suggests that a low level of willingness to get the vaccination is associated with a lack of knowledge about the risks of HPV and efficacy of the HPV vaccination (Hoover et al., 2000).

Kahn, Rosenthal, Hamann and Bernstein (2003) also performed a study to reveal attitudes associated with receiving the hypothetical HPV vaccine; yet, the latest study showed a more positive attitude toward the HPV vaccination than those found in the study by Hoover et al. (2000). Kahn et al. (2003) surveyed women ages 18-30 and measured their knowledge of HPV vaccination related information and attitudes toward the HPV vaccination. This study found that most of the subjects perceived the HPV vaccine as good for their own (89%) and their children’s health (81%). In addition, they also suggested the positive association between knowledge about HPV and the HPV vaccination and the willingness to vaccinate themselves and their daughters. An interesting finding was that the higher they perceived the susceptibility to an HPV infection based on their own sexual history, the more they intended to get vaccinated (Kahn et al., 2003).

Another study tried to extend the research to focus on the parent’s intention to allow the HPV vaccination for their children, since parents are the critical decision makers regarding their children’s health. A study conducted interviews of parents from an urban academic adolescent
clinic and a suburban private pediatric practice to examine important factors for parents to accept the HPV vaccine for their children (Woods, Austin, Luskin & Bauchner, 2005). After the subject listened to information about the prevalence of HPV, related diseases, and the effectiveness of the HPV vaccine, parents were asked about their thoughts on HPV and the HPV vaccine. The results indicated that many parents did not know very much about HPV but those who recognized their children’s susceptibility to the HPV infection were more likely to vaccinate their children (Woods et al., 2005). Most parents, however, were concerned that the vaccination would lead to unsafe sexual activity.

**Information, Knowledge, Perception and Attitudes**

Just as previous studies revealed a positive association between knowledge and the acceptability of the HPV vaccination among young women (Hoover et. al., 2000; Kahn et al., 2003), the following study conducted an extensive study to demonstrate the importance of providing useful information on HPV vaccination to increase relevant knowledge and change attitudes about the vaccination. This study investigated the association among exposure to information, knowledge of HPV and HPV vaccine, and the perception and attitudes about HPV vaccine acceptance (Davis, Dickman, Ferris & Dias, 2004). Parents of 10 to 15 year old adolescent girls answered questions regarding their knowledge and the acceptability of the HPV vaccination after intervened with information. Results suggested that providing more information on HPV and the HPV vaccine contributed to more parental acceptance of the vaccination. As participants begin to correctly answer questions about HPV and its relation to cervical cancer and genital warts, they begin to perceive the HPV vaccine as being beneficial to their children’s health and are more willing to vaccinate. In addition, 20% of participants who did not want to
vaccinate their children changed their opinions after receiving more information about HPV and HPV vaccines. Such findings suggest the importance of information and knowledge of HPV and HPV vaccines in changing the perception and attitude about the HPV vaccination.

**Balance of HPV Vaccine Messages: Extended Parallel Process Model**

**Risk Messages and Perception of the HPV Vaccination**

It was shown above that information and knowledge about HPV and the HPV vaccine are related to the perception and attitudes about the HPV vaccination (Dempsey et al., 2006; Hoover et al., 2000; Kahn et al., 2003; Woods et al., 2005). However, despite the extensive coverage of the HPV vaccine in news media after the approval of Gardasil, the public was still hesitant to accept the HPV vaccine. To find out message factors that possibly affect the perceptions and attitudes about accepting the HPV vaccine, it is necessary to identify particular characteristics of HPV vaccine-related messages and an effective way to balance information as potentially useful sources of HPV vaccine information.

In particular, the previous studies have implied the importance of the messages that discuss the risk of an HPV infection and cervical cancer as well as ways to reduce such risks (Friedman & Sheperd, 2007; Brewer and Fazekas, 2007). One study examined the knowledge and beliefs of the general public about HPV and the introduction of a vaccine prior to its approval (Friedman et al., 2007). The interesting finding was that discussions with participants about HPV and its relation to cervical cancer created much concern and fear about diseases. In particular, the message, that HPV is often sexually transmitted, affected the means of communicating the risks of HPV infection (Friedman et al., 2007).
A further study by Brewer et al. (2007) examined the public’s perception of the HPV vaccination and perceived barriers to HPV vaccine acceptance. In particular, this study showed that adults, or parents, positively perceived the HPV vaccine and the vaccination of their daughters. The study further explained the preexisting barriers to vaccination among respondents; people were concerned about the safety, cost, and prejudiced sexual perception of those who received the vaccination.

These findings imply specific types of messages that could possibly affect the change in perception and attitudes about accepting the HPV vaccine; messages about the risks related to an HPV infection and cervical cancer and messages about demonstrating effectiveness and benefits of HPV vaccination could be critical to deliver information that would positively affect the perception of the HPV vaccination. In particular, mass media could better inform the public by presenting information on the risk of HPV and cervical cancer as well as risk reductive behaviors, namely the HPV vaccination as a preventive means.

In particular, such risk can be defined as “uncertainty connected to future outcomes or as the probability and impact of an event with a potential positive or negative influence” (Abdelmutti & Hoffman-Goetz, 2009, p.12). In addition, health risk can be perceived based on several characteristics, such as the seriousness of the health threat and one’s susceptibility or likelihood of experiencing it (Abdelmutti et al., 2009). Disproportional representation of health risks in mass media could lead to the public’s perception of risks as threats. For instance, if the media overrepresented risk messages about the severity of HPV and cervical cancer and one’s susceptibility to the HPV infection, or amplified the perceived threat, the media could serve to negatively affect the acceptability of the preventive behavior of vaccinating. Covello and Peters (2002) offered some evidence by examining the correlation between the skewed portrayal of
women’s health in mass media and their perceptions of which health risks are the most detrimental. The women in this study reported that breast cancer is more threatening than heart disease. This finding corresponded with the increased coverage of breast cancer in media although heart disease was the cause of more deaths. The public’s risk perception can be swayed by coverage of certain health risks in mass media.

In the same manner, it is important that the media include complete and accurate information about risk-reduction or self-efficacy to solve the problems caused by health risks. It should fairly portray the effectiveness of preventive behaviors. For instance, messages should include information on how the HPV vaccine effectively protects against genital warts and cervical cancer. However, many studies found little efficacy information in news coverage. A study of content analysis on breast cancer news coverage found that few presented risk reduction behaviors, such as individual preventive behaviors (e.g., diet and smoking) and detection behaviors (Atkin, Smith, McFeters & Ferguson, 2008). In addition, Stryker, Moriarty and Jenson (2008) found that few stories discussed cancer prevention behaviors. They also found the positive association between the attention of the news coverage to preventive behaviors and the awareness of cancer prevention knowledge.

In regard to the efficacy of the vaccine, a study by Goodyear-Smith, Petousis-Harris, Vanlaar, Turner & Ram (2007) reported that media sources often failed to cover balanced and complete information about vaccines. It was found that the negative coverage of the pertussis vaccine and the MMR vaccine was associated with a decrease in vaccine acceptability and an increase in prejudice about the vaccines’ effectiveness.

Likewise, in order to achieve fair delivery of information in news media and thus positively affect the perception of the HPV vaccine, it is important to project messages that
discuss both the concern and fear about the risks of the HPV and cervical cancer and the need to accept the HPV vaccination as a preventive means.

**Risk Messages based on Fear Appeal of EPPM**

In particular, to identify balanced health risk messages that can affect people’s perceptions of risk and risk reduction behaviors, it would be helpful to use components and constructs addressed in a theoretical model to develop messages on health risks and risk reduction behaviors. Such an attempt could also complement previous content analyses of news coverage of HPV vaccine. These studies tend to investigate the content of information about the HPV vaccine covered in news media (Anhang et al., 2004; Calloway et al., 2006; Kelly et al., 2009; Wallace et al., 2009); they did not provide critical insight into the characteristics and attributes of information that could stimulate health messages, which then contribute to the positive perception of the HPV vaccination as a preventive behavior.

In this respect, this study adopted theoretical concepts of EPPM which posits that the balance of threat and efficacy messages is important in designing persuasive health messages. Specifically, the message constructs used in EPPM could provide not only a useful criteria to classify messages that induce perceived risk about HPV and cervical cancer, but also messages that provide the way to reduce risks with the HPV vaccination.

In particular, the extended parallel process model (EPPM) is a theoretical model based on the assumption that scaring people into doing something can be one of the strategies used to make them pay attention to messages communicating risk (Witte, Meyer & Martell, 2001). Abdelmutti et al. (2009) also claims that fear appeals and health risk messages are directly connected in that “people are naturally fearful of illness, disease, injuries, and death and want to
stay healthy. By definition, most health risk messages are fear appeals” (Witte et al., 2001, p.2)”. It is also argued that the ability to create effective risk messages improves if findings from fear appeal research are applied to risk communication research (Witte, 1994). In this respect, the constructs identified in the EPPM model can offer a useful direction to analyze the balance of threat messages on the risks of an HPV infection and cervical cancer and efficacy messages on the HPV vaccination as a risk reduction behavior in media, and account for differences in audience perceptions of the HPV vaccination.

**Conceptualizing Constructs: EPPM**

The EPPM is a theoretical model, based on Levanthal’s (1970) Parallel Processing Model and Roger’s (1975) Protection Motivation Theory (Witte, 1992, 1998; Witte et al., 2001). The EPPM tries to explain how and why fear appeals either succeed or fail in influencing certain health behaviors by using fear arousal, the fear component, and recommended actions (Witte et al., 2001). The key constructs of the EPPM are perceived threat and perceived efficacy. These two main factors play roles in evaluating the message and affecting the individuals’ response to fear appeals or health risk messages. Fear is a negatively valenced emotion that is aroused when perceiving a threat (Witte, 1994). The perceived threat is a person’s cognition of thought about the threat (Witte, 1994). The perceived threat in the EPPM specifically refers to perceived susceptibility and severity. Perceived efficacy refers to the perceived self-efficacy and response efficacy. In particular, perceived susceptibility indicates a person’s belief in the likelihood of experiencing the threat while the perceived severity indicates a person’s expectation of the magnitude of the threat. In addition, perceived self-efficacy indicates the
confidence in one’s ability to take recommended actions and perceived response efficacy indicates one’s belief in the usefulness of recommendations in lessening the threat.

In the EPPM, three types of outcomes from fear appeal or health risk messages are expected: no effect, intended effects, and unintended effects. With low perceived threat, fear appeals or health risk messages tend to be ignored (no effect) since individuals do not regard the health risk to be significant. In addition, with high perceived threat, the fear appeal messages effects are dependent on the level of perceived efficacy. However, if an individual perceives the threat as high, he or she will be under the “second appraisal” in which the individual evaluates the efficacy of the recommended behaviors (Witte, 1998). In the case of high perceived threat and low perceived self-efficacy, a person may go into “fear control process” where the person denies the threat and rejects the messages (unintended effect) since the person thinks that the recommended response is too hard. Thus, it will not work. In the case of high perceived threat and high perceived self-efficacy, a person may go into the “danger control process” where the person tries to respond to the recommendation to avert risks. In this respect, it is necessary that health risk messages incorporate self-efficacy and response efficacy messages, suggesting specific ways to reduce the threat. In other words, considering the perceived efficacy is critical in designing fear appeals that avoid a negative response to risk messages (Witte, 1994).

In experimental studies for persuasive communication, the EPPM has been used to examine whether fear appeals successfully encourage people to accept recommended health behaviors. These studies found results that prove that fear appeals can be an effective persuasive strategy if they generate strong perceptions of threat and efficacy related to the recommended health behaviors. Witte, Berkowitz, and Cameron (1998) analyzed fear appeal in a campaign to decrease the prevalence of genital wart infections. The intervention exposed students to fear
appeals with messages about their susceptibility to genital warts, the severity of symptoms, the consequences of contracting genital warts, and the efficacy of condom use. The finding was that participants exposed to high fear appeal messages reported high perceived severity and susceptibility to genital warts. In addition, participants who received high threat messages that scored the efficacy of condoms, tended to show a greater intention to use condoms.

Morman (2000) examined whether fear appeals targeted at men would be effective in motivating them to regularly perform the testicular self-exam. He found similar results to those of Witte et al. (1998) in which men exposed to high threat/high efficacy messages were more motivated to comply with the testicular self-exam. In addition, Witte and Allen (2000) conducted meta-analysis of fear appeal literature and reinforced similar findings in previous studies showing that strong fear appeals generated higher perceived severity compared to weak fear appeals. Also, strong fear appeals and high-efficacy messages most greatly changed behaviors to comply with the recommended behaviors. Strong fear appeals with low-efficacy messages were most likely to reduce the likelihood of responding to recommended behaviors.

**Application of EPPM Constructs**

In a similar way of applying the EPPM model to persuading people to engage in recommended behaviors, the current study will use important concepts of health messages in the EPPM model for content analysis of news coverage and investigate both threat messages about HPV and efficacy messages of the HPV vaccination. Several studies have already used the EPPM to analyze messages in mass media with the purpose of improving them to the extent that people perceive the threat as critical and can follow the recommended health behavior. Kline and Mattson (2000) analyzed promotional texts in breast cancer self-examination pamphlets and
identified messages that corresponded with severity, susceptibility, response efficacy, and self-efficacy, as critical components in fear appeal research. They found a lack of efficacy messages compared to threat messages.

In addition, Brown and Lewis (2003) analyzed messages about cervical cancer in women’s magazines and found that women’s magazines include more messages about the severity and susceptibility of cervical cancer than messages about the prevention and detection of cervical cancer and the barriers implementing prevention and detection behaviors.

Furthermore, Ngondo (2009) conducted content analysis of the Gardasil vaccination campaign in Merck’s commercials to examine messages about HPV and the balance of threat and efficacy components based on the EPPM. Overall, the number of messages that would induce threat was less than that of messages that would provide ways of responding and dealing with the threat. This study found that according to the EPPM, the message content of the Gardasil campaign would be able to help the target audience deal with the threat of HPV and cervical cancer but it would fail to make the target audience regard the HPV infection and cervical cancer as being critical issues threatening their health.

Even though these previous studies have investigated the balance of threat and efficacious message in magazines and the Gardasil campaign commercials, no studies examined threat and efficacy messages in a particular news media. In addition, no studies examined whether the difference in threat and efficacy information could be associated with a difference in perception of the HPV vaccination. In order to reflect on this question further, the current study chose YouTube as a new context in which we can simultaneously investigate characteristics of messages and message recipients.
YouTube as a New Media Context

New Platform for Health Communication

From the studies on traditional news media coverage of health, it was proven that communicating healthy behaviors to the public is primarily based in delivering accurate information about certain health behaviors or illnesses. Learning from information presented in media can possibly aid people to engage in certain behaviors and acquire certain skills to prepare for and protect against possible vulnerability to health risks. Unlike the traditional media, new media uses technology to provide alternative and complementary tools to extend the role of traditional media in delivering information and interactively communicating such information.

The World Wide Web (Web 1.0) has been recognized as a significant channel to communicate health information (Tian, 2010). For instance, Beckjord et al. (2007) conducted a national survey to ask respondents about their use of email or the Internet to communicate with health care providers. They found that 10% of the Internet users use email or the Internet to communicate with a health care provider in 2005, a 3% increase from 7% in 2003. In addition, according to Dutta-Bergman (2005), people actively seek additional health information online; people go beyond the information communicated by health care providers. According to the National Cancer Institute’s 2005 Health Information National Trends Survey, the Internet has become the primary source for health information in that 41.7% of respondents reported their use of the Internet as the first channel of finding information about cancer (NCI, 2005).

In addition, Web 2.0 has offered new tools for health communication deficient in traditional media. Blogs, wikis, and social networking sites allow users to openly and interactively share information and content related to health, and even participate directly in
generating or collaborating on content (Boulos & Wheeler, 2007). As these participatory technologies have greatly promoted consumption of health information, Web 2.0 technologies can be used to examine the audience’s perception of health information and messages.

In particular, YouTube, founded in 2005, is a representative channel based on its participatory technologies and remarkable growth in the number of users based on “user communities” (Paek, Kim & Hoove, 2010, p.1086). It is “a free service that provides its subscribers with a convenient and user-friendly interface for uploading and sharing videos” (Paek et al, 2010, p. 1086). In addition, YouTube visits are attributed to about 10% of Web traffic (Cheng, Dale & Liu, 2007). MacLean indicated that in January of 2008, almost 79 million users watched more than three billion videos (as cited in Tian, 2010, p. 239).

Likewise, based on its popularity, YouTube users share not only videos but also their opinions and video-related experiences through “comment threads” (Paek et al., 2010, p.1086). These comments are often important sources for viewers to perceive the issues described in the videos. For instance, a reader’s comments posted to an online newspaper stories affected other readers’ attitudes about the issues portrayed in the news article (Lee, Jang & Kim, 2009). The interactive feature of posting comments on YouTube videos can be helpful for the current study in examining overall perception of the HPV vaccination among viewers.

Though not many studies have been conducted on YouTube to see its potential as a channel to communicate information about health, one analyzed the kinds of health messages and content being delivered. A study by Keelan, Pavri-Garcia, Tomlinson & Wilson (2007) examined the role of YouTube in communicating information on immunization. They analyzed a sampling of YouTube videos which included any information on immunizations. They found that 48% of videos describe the mostly positive aspects of immunizations (e.g. the benefits and
safety of immunizations or the outright recommendation of immunizations for the public). About 32% of videos described mostly negative aspects of immunizations (e.g. the risk of immunization or the explicit opposition to immunization). This study also found that the negative videos received much higher ratings and more views on average than the positive videos. Based on these findings, the study suggested YouTube users were critical of immunization overall (Keelan et al., 2007). Health care professionals should consider the impact of their communication with patients who have access to information sources like YouTube, an Internet video-sharing site.

Another study questioned the use of YouTube as a channel to disseminate anti-smoking messages. Freeman and Chapman (2007) studied YouTube as a channel through which tobacco-related contents were disseminated. They examined the type of content in two samples: 50 videos with the highest number of views and 50 videos highly relevant to the topic of tobacco. They found that pro-smoking content was more prevalent in both samples; antismoking messages were few among the videos: 5 out of 26 videos in the first sample and 3 out of 14 videos in the second sample (Freeman et al., 2007). Based on the higher viewer counts for antismoking videos and the popularity of humorous ads related to tobacco, this study suggests that YouTube is a potentially useful platform to communicate antismoking messages if the videos can serve to entertain or amuse audiences (Freeman et al., 2007).

However, these studies only investigated the content of videos to understand what kinds of health messages were delivered through the YouTube channel and assess its potential function of communicating health information. Different from these studies, two other studies analyzed both the video content and the viewer-posted comments to determine audience response to a certain health message or topic in the videos (Tian, 2010; Ache and Wallace, 2008).
One study analyzed 335 organ donation videos on YouTube to see how organ donation was framed (Tian, 2010). This study revealed that positive videos (95.8%) were dominant on this topic. In addition, the majority of comments (92%) were positively framed (e.g. “It is important to donate organs because of organ shortage”) and viewers’ average rating scores of videos were also high (M=4.6), which ranged from 1 to 5 on a 5 point scale. The positive frames found in the comments and the high rating scores for these videos did not, however, necessarily indicate a high level of behavioral intentions. Like the others, this study also suggests the significant potential of YouTube as a new and useful platform to communicate messages (Tian, 2010). In addition, the “reciprocity” between media frames and audience frames was highlighted to show interactive communication with the audience.

In the context of HPV vaccine research, Ache et al. (2008) analyzed 146 video clips to examine the portrayal of the HPV vaccination in those videos and in viewers’ comments about the topic. This study found that 74% of videos positively portrayed the HPV vaccination and 32% of videos negatively portrayed the HPV vaccination. In addition, even if the total number of comments left totaled more than 1,000, most of the comments were not about the HPV vaccination or cervical cancer. It did find a strong relationship between the total number of views and the total number of viewer posted comments overall (r=0.817, p<0.01). This study found that YouTube can be considered an important channel that affects viewers’ attitudes both positively and negatively towards the HPV vaccination (Ache et al., 2008).
Research Questions

Given the importance of investigating HPV vaccine messages in news media based on EPPM and YouTube as a new context of content analysis of news messages, the research questions of this study should aim at investigating the extent of information that discusses possible concerns and solutions associated with the HPV vaccine and ensuring the necessary information sought by the public. Thus, it is important for research questions to assess the amount of threat and efficacy messages regarding the HPV vaccine present in news coverage in YouTube and the audience’s response to the HPV vaccination based on such information. In this respect, this study will ask the following questions:

Research Question 1: To what extent do news videos on YouTube about the HPV vaccine address the severity and susceptibility of this disease, and contain messages that would enhance self-efficacy and response-efficacy?

Research Question 2: Are there differences in the amount of severity, susceptibility, self-efficacy and response-efficacy across videos on YouTube?

Research Question 3: What is the overall perception of viewers about the HPV vaccine across videos on YouTube?

Research Question 4: To what extent are severity, susceptibility, self-efficacy, and response-efficacy messages contained in videos with negative perceptions of the HPV vaccine and videos with positive perceptions of the HPV vaccine?

Research Question 5: Are there differences between the amount of severity, susceptibility, self-efficacy, and response-efficacy messages in videos with negative perceptions of the HPV vaccine and videos with positive perceptions of the HPV vaccine?
Method

Sample

Data for this study were retrieved by entering three key words into YouTube’s search engine and locating video clips related to the HPV vaccination. The three key words were *HPV vaccination, cervical cancer vaccination* and *Gardasil*. After each of the three keywords was entered, the results were sorted by clicking the featured YouTube category, News and Politics, in order to identify the video clips in the form of news. YouTube displayed 354 videos with *HPV vaccination*. Using the same process, YouTube located 173 videos and 435 videos for *cervical cancer vaccination* and *Gardasil*, respectively. Upon finding these video clips, the number of views and comments were coded and the posted comments for each video were also saved since these features can change over time.

After these initial steps, an additional screening process was conducted in order to exclude videos that did not match the criteria for the final sample. The criteria were adopted from a prior study on YouTube videos related to the HPV vaccine (Ache et al., 2008). First, the videos in a non-English language (*n*=83) were excluded. Second, duplicate videos were excluded (*n*=351). Specifically, duplicate videos were those found across the results for each of the three keywords. In addition, different YouTube subscribers uploaded the same content but under a different title. Some videos were posted by the same YouTube subscriber multiple times. Third, videos were eliminated when they were either irrelevant to the HPV vaccination, cervical cancer vaccination, and Gardasil, or only related to the political debate (*n*=284). For instance, even though some of the videos’ titles contained “HPV vaccination”, the content did not include any specific information about the HPV vaccination. Because the YouTube search option, News and Politics, was used, the initial results displayed videos with political debates about the policies of
the HPV vaccine or general vaccines. Lastly, videos were eliminated if they were not in the form of news coverage ($n=174$). This was done by examining the authors of the content. If the videos were created by individual subscribers, a public organization, or an education oriented organization, they were eliminated from the final sample. Through this screening process, 70 videos were identified as the final sample for this study and the dates of uploading videos ranged from February 2007 to February 2011.

**Coding Categories: Video Contents**

All videos in the final sample ($n=70$) were categorized according to the scope or type of its TV news coverage: national TV news, local TV news, cable TV news, and others (e.g. satellite TV news, digital or online news, independent TV news). The length of each video (in minutes) and the number of views for each video were also coded (see Appendix A).

For the study on the content of videos in terms of message types, the recording units were based on complete and mutually exclusive idea units or themes (Kline et al., 2000). Weber specified that a “theme refers[s] to clusters of words with different meanings or connotations that taken together refer to them or issue” (as cited in Kline et al., 2000, p. 8). Since the purpose of this study is to assess the extent to which the YouTube videos in the form of news include 1) threat messages that highlight the susceptibility and severity of HPV and cervical cancer and 2) efficacy messages that describe the HPV vaccination as an efficacious prevention behavior and provide information about the effectiveness and limitations of the HPV vaccination. Thus, the recording units were words, phrases and sentences that corresponded to the thematic categories of HPV and cervical cancer severity and susceptibility, and HPV vaccination self and response efficacy.
In order to develop the coding scheme that defines coding categories and subcategories, this study followed the work of Kline et al., (2000), Brown et al. (2003), and Ngondo (2009). As shown earlier, the broad coding categories for severity and susceptibility of HPV and cervical cancer and self and the response-efficacy messages about the HPV vaccination were derived from components of Witté’s extended parallel process model: it claims the importance of balancing fear-inducing messages (threat messages) and efficacy messages to positively affect attitudes toward recommended health behaviors and actual behaviors as well.

To determine the presence and amount of severity, susceptibility, response and self-efficacy messages, this study adopted a list of themes/issues that represent each of the four constructs used in the previous studies. Brown et al. (2000) developed a component category lists for cervical cancer while Ngondo (2009) developed one for HPV. These component category lists were adapted to our current study (see Appendix B).

**Severity** The presence of severity messages was coded when video contents included messages about the seriousness of HPV when addressing numerical figures or statistics related to HPV and cervical cancer mortality at various ages or ages not specified, when addressing treatment options, and when addressing physical suffering and emotional suffering.

**Susceptibility** The presence of susceptibility messages was coded when video contents include messages about the likelihood of developing HPV and cervical cancer, when addressing morbidity rates of HPV and cervical cancer, when addressing specific risk factors, such as HPV infection associated with cervical cancer, genital warts, and sexual history, when addressing age, and when addressing other potential risk factors (e.g. genital contact and unprotected sex).

**Self-efficacy** The presence of self-efficacy messages was coded when video contents provided messages about people’s “ability” to perform the recommended behavior to control
threats. This incorporates addressing the ways people deal with nervousness associated with getting vaccinations, addressing alternative ways people can reduce the risks of HPV and cervical cancers, addressing the ways people can overcome the barrier of costs from getting vaccination, addressing the ways people can select a doctor or a clinic, and addressing vaccination procedures in either positive or neutral manners.

Response Efficacy  The presence of response-efficacy messages was coded when video contents included messages about effective and feasible ways to avoid the threat by addressing either effectiveness of the vaccination in preventing HPV and cervical cancers, addressing limitations of getting the vaccination (e.g. side effects and the protection against certain types of HPV) and suggestions to increase the effectiveness of vaccination (e.g. completion of three vaccine series and follow-up screening through pap smears), addressing the importance of early vaccination before being sexually active, and addressing when and how often people should get the vaccination and follow-up with pap smear tests.

Viewer-Posted Comments

In addition to video contents, this study downloaded the viewer-posted comments for each video. The posted comments for each video were screened to eliminate comments that did not represent the viewer’s attitude or beliefs about the HPV vaccination. The irrelevant comments were removed when 1) the comment was not about the HPV vaccination, 2) the comment provided only general, objective information such as statistics about HPV, cervical cancer, and/or the HPV vaccination, 3) the comment was regarding disbelief in the government’s mandate policy and 4) the comment was regarding the pharmaceutical company. In addition,
comments were also removed if similar comments were repetitively posted by the same user as determined by his or her ID.

Afterwards, each of the remaining comments was coded as negative, ambiguous, and positive. This procedure of coding comments was adopted from a previous study on YouTube videos regarding immunization (Keelan et. al., 2007) and modified to fit into this study. More specifically, the comment was coded as negative if the comment described the HPV vaccination in a negative manner (e.g. emphasized the side effects or risk of HPV vaccination and claimed distrust in effects of HPV vaccine). The comment was coded as positive if the comments described the HPV vaccination in a positive manner (e.g. represented the benefits and effectiveness of HPV vaccine and directly recommended getting HPV vaccination). The comment was coded as ambiguous if the comment contained a debate and described the HPV vaccination in an ambivalent manner (e.g. discuss both benefits and failure of HPV vaccination and represented the actual experience or intention to get vaccination but countered by anxiety of side effects of HPV vaccination).

Afterwards, in order to examine the overall attributes of each posted comment on each video as negative, positive and ambivalent overall, this study used a 3 point scale from positive, ambivalent, to negative. First, each comment was classified as either 1 (negative), 2 (ambivalent), or 3 (positive). For each video, the score of each comment was added and averaged based on the number of comments. If the averaged score ranged from 1 to 1.5, the viewer-posted comments for a video were categorized as “negative overall.” If the averaged score ranged from 1.6 to 2.5, the viewer-posted comments for a video were categorized as “ambivalent overall.” If the averaged score ranged from 2.6 to 3, the viewer-posted comments for a video were categorized
as “positive overall.” This categorization aimed at looking at the overall attitude and belief about the HPV vaccination through the posted comments for each video.

**Results**

With 70 videos analyzed, the majority of videos were coverage of local TV news, \( n=28, 40\% \) followed by cable TV news, \( n=16, 22.9\% \), national TV news, \( n=15, 21.8\% \), and others \( n=11, 15.7\% \). The average length of a video clip was 3.59 minutes \( (SD=2.17) \). The number of views per video ranged from 28 to 116,881 and the average number of views was 6,337.21 \( (SD=18,859.11) \).

The first research question asked about the extent to which news videos on YouTube contained messages about the severity and susceptibility of HPV and cervical cancers, and the extent to which videos contained efficacious messages that were likely to improve self-efficacy and response efficacy encouraging the HPV vaccination as a preventive behavior. Taking the sample as a whole \( (N=70) \), response efficacy messages were addressed most often \( (n= 392, M=5.6, SD=3.02) \), and was followed by susceptibility \( (n=254, M=3.63, SD= 3.10) \), self-efficacy \( (n=155, M= 2.21, SD= 1.9) \), and finally severity \( (n= 71, M= 1.01, SD=1.5) \). This indicates that, across all videos in a sample, threat messages that might induce fear \( (n=325) \) were mentioned in only 39\% of videos, while efficacious messages, which suggest how to control and averse perceived threat \( (n=547) \), were mentioned in 63\% of videos (see Table 1).

The second research question asked about the differences in the amount of coverage of severity, susceptibility, self-efficacy, and response efficacy messages across all videos. In order to analyze such differences, paired-sample t tests were used comparing the means for all the
possible pairs of severity, susceptibility, self-efficacy, and response efficacy. Collapsed across videos, the analysis indicated statistically significant differences between the mean mentions for all the combinations of severity, susceptibility, self-efficacy and response efficacy; self-efficacy and severity ($t=4.921$, $df=69$, $p \leq .00$), self-efficacy and susceptibility ($t=-4.226$, $df=69$, $p \leq .00$), self-efficacy and response efficacy ($t=-9.749$, $df=69$, $p \leq .00$), response efficacy and severity ($t=11.676$, $df=69$, $p \leq .00$) and response efficacy and susceptibility ($t=4.436$, $df=69$, $p \leq .00$), and susceptibility and severity ($t=9.313$, $df=69$, $p \leq .00$). These results indicate that overall, the mean mentions of self-efficacy messages across videos were relatively few when compared to the means of other constructs. In addition, the analysis showed 1) statistically significant difference between the mean mentions of self-efficacy and response efficacy, and 2) statistically significant difference between mean mentions of severity and susceptibility. Videos as a whole contained more response efficacy than self-efficacy messages and more susceptibility messages than severity messages.

The third research question was regarding the viewer’s perception about the HPV vaccination. This study examined this question by analyzing the attribute of viewer-posted comments about the HPV vaccination across all 70 videos on YouTube. Collapsed across videos on YouTube, the total number of comments was 2,364 and the average number of comments per video was 34 ($SD=127.95$). The low average number of comments was attributed to 27 videos that did not have any comments. When comments were analyzed across videos, the number of irrelevant comments was 1,163 (49.19%), the number of negative comments was 754 (31.89%), the number of ambivalent comments was 236 (9.98%) and the number of positive comments was 211 (8.94%). This indicates that with the exception of the irrelevant comments, over half of the viewer-posted comments across the videos in this study sample were negative.
By screening viewer-posted comments, it was revealed that 45 of the 70 videos had at least one viewer-posted comment. However, 2 of these videos had only irrelevant viewer-posted comments. Finally, the number of videos with no comments was 27 (38.6%). Thus, the average score of viewer-posted comments for each video was examined on the remaining 43 videos. Of 43 videos, 20 videos (28.6%) had mostly negative viewer-posted comments, 17 videos (24.3%) had mostly ambivalent viewer-posted comments, and 6 videos (8.65%) had mostly positive viewer-posted comments. Similar to the result that negative viewer-posted comments were the most common across all videos, negative viewer-posted comments were the most common for each video.

In order to examine the fourth research question comparing threat and efficacious messages found in videos with mostly negative viewer-posted comments and in those with mostly positive viewer-posted comments, the sample was divided into two groups based on overall valence of comments on each individual video: the videos with mostly negative comments \( (n=20) \) and the videos with mostly positive comments \( (n=6) \). Even though there were a considerable amount of comments on videos in a study sample, nearly half of the comments (49.19%) were irrelevant to the HPV vaccine. In addition, one third of videos without any comments contributed to lowering the statistical power of analyzing the direct association between the frequency of threat and efficacious messages and the valence of comments on the HPV vaccine. In this respect, in this step of statistical analysis, the current study split the video sample into two, mostly negative viewer-posted comments and mostly positive comments, and investigated the difference between 4 EPPM messages in negative comments and positive comments sample. For the independent samples, two tailed t tests were run to access a statistically significant mean difference \( (see \ Table \ 2) \).
Based on descriptive statistics, in the videos with overall negative viewer-posted comments, the lowest average number was found of severity messages ($M=1.55$, $SD=2.16$), followed by self-efficacy ($M=1.7$, $SD=1.34$), susceptibility ($M=3.55$, $SD=3.64$), and response-efficacy ($M=5.3$, $SD=3.24$). The rank order of the amount of the 4 EPPM message constructs was still the same in a sample of 20 videos that have mostly negative comments on the HPV vaccine as in a sample of the videos as a whole. However, the combined amount of threat messages that would induce fear ($n=102$) were less than that in the sample videos as a whole and the combined amount of efficacious messages that would suggest how to control perceived threat ($n=140$) were more than that in the sample videos as a whole.

In the videos with overall positive viewer-posted comments, mean mentions of severity messages ($M=1$, $SD=0.89$) were the least, followed by susceptibility ($M=3$, $SD=2.19$), self-efficacy ($M=3.33$, $SD=2.25$), and response-efficacy ($M=3.8$, $SD=1.6$). In this case, however, the rank order of the amount of the 4 EPPM message constructs is slightly different from the rank order of the 4 EPPM messages shown in the sample of videos as a whole and the sample of the videos with mostly negative comments. The rank order of mean mentions of severity messages (the smallest amount) and response efficacy message (the largest amount) were the same, but mean mentions of self-efficacy messages were more than that of susceptibility messages. Regardless of the change in rank order, combined amount of threat messages ($n=24$) were still less than combined amount of the efficacious message ($n=43$).

The data analyses result showed no statistically significant difference ($p\geq 0.5$) between mean mentions of severity, susceptibility, and response-efficacy in the sample of videos with overall negative viewer-posted comments as well as in the sample of videos with overall positive viewer-posted comments. This indicates that there is no difference between the number of times
the video with overall negative comments addressed each of the 4 EPPM messages and the number of times the video with overall positive comments addressed each of the 4 EPPM messages. However, the analyses revealed a statistically significant difference ($t=-2.228$, $df=24$, $p\leq.05$) between mean mentions of self-efficacy in the videos with overall negative comments and the videos with overall positive comments. This indicated that the self-efficacy messages were less contained in the videos with overall negative comments compared to the videos with overall positive comments.

Aimed to further examine the fifth research question, another independent t test was run to compare differences between amounts of individual component categories for the 4 EPPM message constructs, severity, susceptibility, self-efficacy, and response efficacy in the videos with overall negative viewer-posted comments and the videos with overall positive viewer-posted comments. Regarding the component categories under severity, the analyses revealed a statistically significant difference between mean mentions of messages about physical suffering ($t=2.349$, $df=19$, $p\leq.05$), indicating that the videos with mostly negative viewer-posted comments contained more of information about physical suffering associated with HPV infection or cervical cancer significantly compared to the videos with mostly positive viewer-posted comments. Across 6 videos with mostly positive viewer-posted comments, information about physical suffering was not addressed.

Regarding the component categories under susceptibility, the analyses revealed a statistically significant difference in mean mentions of the information about HPV morbidity rates (age not specified) ($t=2.302$, $df=19$, $p\leq.05$), indicating that the videos with mostly negative viewer-posted comments contained significantly more information about HPV morbidity (age not specified) than the videos with mostly positive viewer-posted comments. In addition,
information about risk factors associated with cervical cancer \((t= 1.789, \ df= 19, \ p\leq .05)\), and risk factors associated with genital warts \((t= 2.179, \ df= 19, \ p\leq .05)\) were significantly more often mentioned in videos with mostly negative-viewer postings than in the videos with mostly positive-viewer postings. In fact, across 6 videos with mostly positive viewer-posted comments, information regarding HPV morbidity rates (age not specified) and genital warts was never provided and the risk factors associated with cervical cancer were mentioned just one time.

Regarding the component categories under self-efficacy, the analyses showed a statistically significant difference in mean mentions of information about the costs associated with having the HPV vaccination in both positive and negative manners \((t= -1.406, \ df=19, \ p\leq .05)\). This indicates that the information about the cost related to the HPV vaccination was significantly more addressed in the videos with mostly positive viewer-posted comments than in the videos with mostly-negative comments. However, the number of times that the positive viewers-posted comments described the cost in a positive manner was not different from the number of times costs was discussed in a negative manner. Also, the videos with mostly positive comments included significantly more description of the procedure of the HPV vaccination in either a neutral or positive way than videos with mostly negative viewer posted comments \((t= -2.195, \ df=19, \ p\leq .05)\) did.

Regarding the component categories under response-efficacy, the videos with mostly positive viewer-posted comments contained information about how early and often a woman should get the vaccination significantly more than the videos with mostly negative viewer posted comments \((t=2.431, \ df=19, \ p\leq .05)\) did.
Discussion

The purposes of the study were to investigate the prevalence of threat and efficacious messages in the videos on the topic of the HPV vaccine on YouTube and to examine the viewer’s perception of the HPV vaccine by observing the viewer-posted comments on the videos, and lastly to compare differences between amounts of the 4 EPPM messages in two divided sample groups, namely the videos with mostly negative viewer-posted comments and videos with mostly positive viewer-posted comments.

As a whole, the analyses of the sample showed that, across all videos in the sample, efficacious messages about the HPV vaccination were more frequently mentioned than threat messages about the HPV infection and cervical cancer. Specifically, the efficacious messages comprised over 60% of the total number of threat messages and efficacious messages across videos in a sample. In other words, according to the EPPM, news videos related to the HPV vaccine were more likely to provide information that would increase the perceived efficacy of considering the HPV vaccine as an effective preventive behavior; on the other hand, they were less likely to present information that would increase the perceived threats of HPV infection or development of cervical cancer. This means that the information presented in the news videos on YouTube was not balanced enough to give viewers a positive perception of the HPV vaccination as a preventive behavior against the HPV infection and cervical cancer; regardless of receiving a lot of efficacy messages, people were less likely to recognize the threats as being serious because the lack of threat messages could fail in leading people to realize the seriousness of HPV and cervical cancer and to be fearful of exposure to HPV and cervical cancer.

In order to understand the greater frequency of efficacious messages in the sample videos, it is necessary to examine how frequently each of the threat and efficacious messages was
addressed across the videos in a sample, and whether the differences in the amount of the 4 EPPM message variables are significant. The severity messages were least addressed while the response efficacy messages were most addressed. The mentions of response efficacy messages were on average five times the mention of the severity messages. Even though susceptibility messages were significantly more mentioned on average than self-efficacy messages, the combined amount of self-efficacy and response-efficacy messages were still more than the combined amount of severity and susceptibility messages across videos in a sample.

In addition, to gain insight into the significant difference in mean mention of threat messages and efficacy messages, post examination was conducted by running a paired sample t test. As a whole across videos, the mean mentions of efficacy messages were significantly more than those of threat messages (t=-5.901, df=69, p≤.00), indicating that little balance between threat and efficacy messages existed across news videos on YouTube. This suggests that the four EPPM messages delivered in news videos on YouTube are less likely to lead viewers to positively perceive the need for the HPV vaccine despite the considerable number of efficacy-implying messages.

To obtain a better explanation for the large amount of response efficacy messages across videos, specific component categories were examined. An investigation of component categories revealed that, among components of response efficacy messages, messages about the effectiveness of the HPV vaccine and ineffectiveness of the HPV vaccine consisted of nearly 80% of the total amount of response efficacy messages across videos. Of this total, 43% were messages about the effectiveness of the vaccine in preventing the HPV infection as well as the development of subsequent diseases such as genital warts and cervical cancer; 40% were messages about the ineffectiveness of the vaccine, described limitations of the HPV vaccine in
preventing an HPV infection and the subsequent diseases (e.g. side effects and inability to prevent all HPV types). Based on analysis of the combination of messages about effectiveness and ineffectiveness of the HPV vaccine in each individual video, only three videos, or 4% of the sample, exclusively portray ineffectiveness of the vaccine without any messages about the effectiveness of the HPV vaccine. Though few videos were completely devoted to delivering information about the ineffectiveness of the HPV vaccine, 54 videos, or 77% of the sample, contained some information about the vaccine’s ineffectiveness. These 54 videos did, however, address the effectiveness of the HPV vaccine as well. Such data imply that most of the videos in this sample have information about both the effectiveness and the ineffectiveness of the HPV vaccine.

However, since few messages about the HPV vaccine’s ineffectiveness contained messages about overcoming such effectiveness, it can be a potential hindrance to providing balanced response-efficacy messages. More specifically, as one of component categories of response efficacy, messages about the ineffectiveness of the HPV vaccine were counted by combining the number of messages about ineffectiveness and the number of messages about suggestions to improve such limitations of ineffectiveness (e.g. complete three series of shots and early vaccination before being sexually active). Videos in a sample addressed messages about the ineffectiveness of the HPV vaccine in one of three ways: only ineffectiveness, both ineffectiveness and suggestion, and only suggestion. 54 videos, or 77% of the sample, contained messages about the ineffectiveness of the HPV vaccine at least once. However, of 54 videos only seven videos mentioned both the ineffectiveness of the HPV vaccine and a suggestion to remove limitations from such ineffectiveness; 52 videos contained only messages about the ineffectiveness of the HPV vaccine.
From the perspective of the EPPM, the balance of specific components of a response-efficacy messages in one video is also critical because a potential vaccine recipient should decide whether to receive a vaccine or not by considering both the limitations of the vaccine and ways to overcome such limitations. Even though news videos are not necessary to promote the HPV vaccination as a preventive behavior, such an unbalanced presentation of information about the effectiveness of the HPV vaccine in a sample imply that such news videos could have the potential to negatively impact the viewers’ perceptions of the HPV vaccine. In addition, such an impact can be expected especially given that the sample was videos mostly created by news media of which credibility is relatively high, and the sample consisted of videos distributed on YouTube, a media platform with the power to reach a large number of people simultaneously.

Following the examination of the overall difference in amount among the 4 EPPM messages across videos, the next step of analysis was to investigate the perception of the HPV vaccination among viewers of the videos in a study sample. There were more than 2,000 comments posted, yet, nearly a half of the comments were not relevant to representing favorability of the HPV vaccination. Most of these irrelevant comments contained opinions about the HPV vaccination mandate legislation and distrust in Merck Company, the manufacturer of Gardasil. Among the sample, after excluding irrelevant comments, over half of the comments described the HPV vaccine in a negative manner and the remaining comments described the HPV vaccine in an either positive or ambivalent manner. Many of the negative comments included concerns about the effectiveness of the HPV vaccine as the vaccine has not been tested long enough to ensure safety. In addition, it should be noted that some comments frequently illustrated personal experiences with side effects of the HPV vaccine, including minor and serious conditions, and other victimized people. Although few in number, some negative
comments highlighted the HPV vaccine’s failures in preventing an HPV infection and the development of cervical cancer from their own and others’ experiences.

Regarding these ambivalent comments, posters discussed both the benefits and limitations of the HPV vaccine and sometimes advised for further research on the HPV vaccine before getting vaccination. In addition, one distinct feature of the ambivalent comments was that posters expressed their worries about side-effects after viewing videos, even after having initiated the process of getting vaccinated or having finished their vaccination.

It was shown that few of the videos included suggestions to overcome the HPV vaccine’s limitations when describing the ineffectiveness of the HPV vaccine. Given that, it was interesting to find that the unbalanced coverage of messages could possibly affect the perceived response-efficacy of message recipients in a negative way despite containing messages about the effectiveness of the HPV vaccine. In the sample of posted comments as a whole, most of the negative and ambivalent comments expressed concerns about the possibility of exposure to the HPV vaccine’s limitations (e.g. side effects, failure to prevent HPV infection and cervical cancer) which can lead to a detrimental disease in the future. This suggested that reflecting on the ineffectiveness of the HPV vaccine without suggestions of improvement, viewers could be more likely to perceive the vaccine as ineffective and thus, describe the HPV vaccine in either a negative or ambivalent manner.

With regard to the positive comments, some of the posters refuted the opposition to the HPV vaccination because it was solely based on the side-effects of the vaccine. They usually supported the HPV vaccine as a means to prevent cervical cancer and highlighted that the benefits outweighed minor side-effects since the HPV vaccine could significantly decrease the mortality rate of cervical cancer as well as the HPV infection morbidity rate. In addition, they
also claimed that no scientific evidence has proven that the HPV vaccination directly caused side-effects, either minor or serious. In addition, some posters provided information that could relieve unreasonable anxiety by describing their actual experiences with the vaccination in a positive manner. For instance, they often illustrated that they safely received the vaccination without any of the expected side-effects or detrimental symptoms. In general, it seems that the positive comment posters provided information that seemed to increase perceived self-efficacy and response-efficacy among those who had not yet experienced the vaccination, but worried about its ineffectiveness.

An interesting finding was that the videos as a whole addressed response-efficacy messages most, mainly incorporating messages about the effectiveness and the ineffectiveness of the HPV vaccine. Accordingly, the discussion among the viewer-posted comments on these videos also focused on the effectiveness and ineffectiveness of the HPV vaccine. However, there were significantly fewer susceptibility messages in videos than response-efficacy messages even though they were the second most mentioned messages in videos. The viewer-posted comments seemed to reflect such frequency of messages in new coverage; the viewers did not largely mention whether they were vulnerable to HPV infection and cervical cancer. This suggests that the most frequently covered messages on videos on YouTube could constrain topics or issues in viewers’ discussion about the HPV vaccine and thus, can sometimes affect the perceptions and attitudes about the vaccination among viewers. Given that YouTube is a platform in which people can interactively communicate with one another, it could be assumed that not only the messages in videos but also the comments that are posted by the viewers can affect other viewers’ perceptions of the HPV vaccine. Considering that many of the comments were based on
anecdotal stories or personal experiences, viewers’ identification with other posters or subjects in stories could influence the perceived efficacy of the HPV vaccination.

The last step of data analyses was to examine the differences between the amount of the 4 EPPM messages and their component categories in the two video sample groups, videos with mostly negative viewer-posted comments and videos with mostly positive viewer-posted comments. It was expected that the total amount of each of the 4 EPPM message constructs would be significantly different in videos with mostly negative comments and videos with mostly positive comments. Both group of videos with negative comments and positive comments contained fewer threat message than efficacious messages. This is similar to the video sample as a whole as it contained more efficacious messages than threat messages. However, videos with mostly negative comments and videos with mostly positive comments showed a different rank order of the 4 EPPM message constructs. Similar to the whole video sample, videos that received mostly negative comments on the HPV vaccine addressed severity messages the least, followed by self-efficacy, susceptibility and response-efficacy messages. Videos that received mostly positive comments on the HPV vaccine addressed severity messages the least, followed by susceptibility, self-efficacy, and response-efficacy messages.

Change of self-efficacy into a higher rank order was also reflected in the result that mean mentions of self-efficacy messages were significantly greater in the video sample of positive comments than that of the negative comments videos. Such a finding suggests that among the 4 EPPM message variables, only the self-efficacy messages can account for a critical difference between the composition of messages in the videos that mostly received negative comments and the videos that mostly received positive comments; the amount of references to self-efficacy in
videos might have significant explanatory power on different viewer’s response to the HPV vaccine.

In the same manner, data analyses results have examined detailed component categories constituting severity, susceptibility, self-efficacy, and response-efficacy and found some of them could also attribute to the difference between negative comment videos and positive comment videos. Given that the component categories for severity and susceptibility were considered, the videos with mostly negative comments on the HPV vaccine made greater reference to the physical suffering related to cervical cancer, HPV morbidity rates (age not specified), and risk factors associated with cervical cancer and genital warts. From a statistical perspective, such a significant difference in referencing physical suffering might exist because there was no mention of physical suffering, morbidity rates, and factors associated with genital warts in videos with mostly positive comments. On the other hand, based on the assumption of the EPPM, messages with a high level of threat messages and a low level of efficacy messages are less likely to encourage people to respond to recommended behaviors since a relatively low level of efficacy messages could discourage people to avert threats with low perceived efficacy. Despite the comparable amount of response efficacy messages, videos with mostly negative comments have less self-efficacy messages than the videos with mostly positive comments. This suggests that the balance of threat and efficacy information would be critical in affecting perception of the HPV vaccine.

Among the component categories for self-efficacy, the costs regarding the HPV vaccine were significantly mentioned more often in the videos with mostly positive comments on the HPV vaccine. Even though there was no significant difference in the amount of messages about the cost of the HPV vaccine in either a positive or negative light, the mean mentions of cost in a
positive way were higher in the videos with positive comments on the vaccine. This suggests that the costs could be critical in explaining the difference in perceptions of the HPV vaccine since high costs could be barriers to the vaccination. In addition, videos with mostly positive comments on the HPV vaccine contained significantly greater description of the HPV vaccination procedure in either a positive or neutral way compared to videos with mostly negative comments on the HPV vaccine. Based on the EPPM assumption, the description of HPV vaccination procedure in either a positive or neutral manner could improve self-efficacy since people would perceive that they are able to successfully receive the HPV vaccination since a relatively positive description of the vaccination procedure might relieve apprehension related to vaccination (e.g. subsequent pains and possible side effects). Interestingly, the positive discussion among posters seems to reflect this assumption in that the commenters described the HPV vaccine by sharing their positive, personal experiences with the vaccination which imply self-efficacy to others. This suggests that the way of representing certain efficacy information would be critical in the perception of message about the HPV vaccination.

Regarding the component categories under response-efficacy, information about how early and often a woman should get the vaccination is more often mentioned in the videos with mostly positive comments. Even though the amount of this component category was relatively fewer compared to that of other component categories for response-efficacy in the videos as a whole, this result suggested that the messages with information about each of the three doses and the appropriate ages for the greatest effectiveness from that vaccination could be critical in explaining the difference in individual perception of the HPV vaccine because this information would be helpful in suggesting a way to overcome the limitations of the vaccine.
Limitations and Future Research

This study tried to examine the types of messages that possibly play a critical role in affecting the perception of the HPV vaccine among message recipients by applying EPPM message variables to content analysis of messages in news videos on YouTube. This study could complement the lack of theoretical explanation on message characteristics in previous studies on the HPV vaccine information. In addition, this study also extended the content analysis of messages by adding examination on the audience’s response to messages based on viewer-posted comments on YouTube. This study assumed that YouTube is a meaningful new media platform which provides opportunities for health communicators to investigate message recipients’ perception and attitude about health related issues.

However, several limitations of this study need to be addressed. First, the sample was small and thus, may have lower statistical power to account for the difference of messages in the sample. This small sample would be attributed to the selection of videos just in the form of news. However, in reality, YouTube users are also exposed to and seek out videos in other forms (e.g. PSA, educational organization, and individual generated contents, etc.) Future research should examine a larger sample by including such various types of videos on YouTube. Second, this study could not explain inter-coder reliability to confirm that the coding results were unbiased. Even though the coded results were repetitively checked by one person, future projects should ensure the accuracy of coding results and objectivity. Third, the application of a theoretical model of persuading a specific target audience to studying the messages delivered with a general purpose of informing or educating can be another limitation. Future research could extend the study to a form of experimental study on the YouTube website with hypothetical news videos interventions about the HPV vaccine to a specific audience and assess the perception of
messages in videos based on certain surveys that re administered with specific questions to accurately measure perceptions of the HPV vaccination.

Conclusions

The findings in this content analysis have revealed that, in general, YouTube news viewers might receive unbalanced information; the viewers were exposed to fewer threat messages that induce the feelings of the risks of the HPV infection and cervical cancer. The lack of threat messages will hinder a positive change in perception and attitudes about the HPV vaccination despite the large number of messages on the vaccination’s efficacy. This combination of messages in the news videos on YouTube as a whole could fail to positively affect the viewers’ beliefs and attitudes about the HPV vaccination in that the threat information is too weak to lead information recipients to recognize the need to seek out more information on averting the perceived threat with a vaccination.

Among the four EPPM message variables, response efficacy messages need to balance out the messages about the ineffectiveness of the HPV vaccine by discussing the overcoming of the vaccine’s shortcomings. This is so because most of the information about the effectiveness and ineffectiveness consisted mostly of response-efficacy messages and response-efficacy messages ranked higher than the other 3 EPPM message variables. In addition, comments on the HPV vaccine highly focused on the effectiveness and ineffectiveness of the HPV vaccine, which possibly reflect a high volume of messages about response-efficacy. Such a fact suggested that the balance of information about HPV and the HPV vaccine is significant in making people better informed and more likely to perceive the need to engage in vaccination.
Even though news does not have to persuade people to engage in certain behaviors, the information delivered in news holds the potential to influence a person’s perceived need for the HPV vaccine as people consider news a reliable source for health-related information. In this respect, if health journalists in news media pay more attention to achieving a balance in relaying HPV vaccine messages, the media can reduce the public’s biased perception of the HPV vaccination itself as seen in the negative impact of media attention on discourse and beliefs about the HPV vaccination.

In addition, news videos on the YouTube channel not only reach a large number of people at once but also provide opportunities to share ideas with other viewers. In this respect, news distributed through YouTube holds the power to disseminate certain messages as well as allow viewers to engage in interactive communication with other viewers; thus, the information presented through such an accessible and interactive platform can affect the users’ perceptions and attitudes based on both contents and discussion about the contents. In this respect, health communicators should not only monitor the messages contained in video contents but also further consider how discussion amongst the viewers can affect the individuals’ perception of health related issues. Furthermore, the balance of threat and efficacious messages in other new media channels, such as the internet news and blogs about HPV vaccination, should be continuously considered in that people have been increasingly dependent on the online sources for reliable information.
Table 1

Results Assessing the Amount of Severity, Susceptibility, Self-efficacy, and Response-efficacy Messages in Videos as a Whole

<table>
<thead>
<tr>
<th></th>
<th>Severity</th>
<th>Susceptibility</th>
<th>Self-efficacy</th>
<th>Response-efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Videos as a Whole (n=70)</td>
<td>1.01 (1.5)</td>
<td>3.63 (3.10)</td>
<td>2.21 (1.9)</td>
<td>5.6 (3.02)</td>
</tr>
</tbody>
</table>

Note. Numbers outside the parentheses represent mean number of mentions of each of 4 EPPM message constructs. Numbers inside the parentheses represent standard deviations. Sample size n represents the number of analyzed videos.
Table 2

Results Assessing the Amount of Severity, Susceptibility, Self-efficacy, and Response-efficacy Messages in Videos with Overall Negative Comments and in Videos with Overall Positive Comments

<table>
<thead>
<tr>
<th></th>
<th>Severity</th>
<th>Susceptibility</th>
<th>Self-efficacy</th>
<th>Response-efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative Comments Videos (n=20)</td>
<td>1.55 (2.16)</td>
<td>3.55 (3.64)</td>
<td>1.7 (1.34)*</td>
<td>5.3 (3.24)</td>
</tr>
<tr>
<td>Positive Comments Videos (n=6)</td>
<td>1 (0.89)</td>
<td>3 (2.19)</td>
<td>3.33 (2.25)*</td>
<td>3.8 (1.6)</td>
</tr>
</tbody>
</table>

*Means between negative comments videos and positive comments videos are significantly different at the p≤.05 level.

Note. Numbers outside the parentheses represent mean number of mentions of each of 4EPPM message constructs. Numbers inside the parentheses represent standard deviations. Sample size n represents the number of analyzed videos.
Appendix A

Coding Categories of News Videos on YouTube

1. Types of TV news coverage
2. The length of a video
3. The number of views
4. The number of viewer-posted comments
5. Viewer-posted comments
Appendix B

Component Categories: List with Exemplar Words for Each Construct

**Severity**

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seriousness of disease</td>
<td>Die, died, dying, death, deadly, serious, warning, grim, terrible disease, chronic, leads to/cause cervical cancer</td>
</tr>
<tr>
<td>Cervical cancer (caused by HPV) death rates age not specified</td>
<td>(any statistics dealing with death rates with no age specified)</td>
</tr>
<tr>
<td>Cervical cancer (caused by HPV) death rates girls under 18</td>
<td>(any statistics dealing with death rates for women under age 18)</td>
</tr>
<tr>
<td>Cervical cancer (caused by HPV) death rates women over 18</td>
<td>(any statistics dealing with death rates for women age over 18)</td>
</tr>
<tr>
<td>Emotional suffering</td>
<td>Sad, angry, afraid, terror, depression, depressed, busts into tears, scared, heart-wrenching agony, psychological toll, torment</td>
</tr>
<tr>
<td>Physical suffering/symptoms</td>
<td>Pain, painful, bleeding, hemorrhaging, suffering, lesions, persistent infection, abnormal pap smears</td>
</tr>
<tr>
<td>Treatment for HPV and invasive cervical cancer</td>
<td>Radiation, chemotherapy, sterilizing treatments, surgery, drastic treatments, hysterectomy, freezing</td>
</tr>
</tbody>
</table>

**Susceptibility**

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical cancer morbidity (rate of incident, prevalence) rates-ages not specified</td>
<td>(any statistics dealing with morbidity rates for women under 18) 1 in 3 women will get HPV-related cervical cancer, X number of cervical cancer cases each year</td>
</tr>
<tr>
<td>Cervical cancer morbidity rates-for girls under the age of 18</td>
<td>(any statistics dealing with morbidity rates for women under 18) 1 in 3 women over 18 will get HPV-related cervical cancer, X number of cervical cancer rates in women over 18</td>
</tr>
<tr>
<td>Cervical cancer morbidity for women over the</td>
<td>(any statistics dealing with morbidity rates for</td>
</tr>
</tbody>
</table>
| age of 18 | women over age 18)  
1 in 3 women over 18 will get HPV-related cervical cancer, X number of cervical cancer rates in women under 18 |
|---|---|
| HPV morbidity rates for girls under 18 | (any statistics dealing with morbidity rates for women under age 18)  
1 in 4 women under 18 will get HPV, % of girl who get HPV, new infections |
| HPV morbidity rates for women over 18 | (any statistics dealing with morbidity rates for women over age 18)  
1 in 4 women over 18 will get HPV, new infections, % of women who get HPV |
| HPV morbidity rate-age not specified | (any statistics dealing with morbidity rates for women at any age)  
Some women will get HPV, 80% of people infected with HPV |
| Risk factors of cervical cancer | HPV carriers are at a greater risk, HPV is linked with cervical cancer, HPV may lead to cervical cancer, may cause cervical cancer |
| Risk factor genital warts and related disease | HPV carriers are at a greater risk of getting genital warts, HPV causes 90% of genital warts cases, leads to genital warts, HPV leads to other diseases |
| Risk factor: sexual activity transmitted disease etc | (in congruence with increased HPV risk)  
Multiple partners, early onset sexuality, number of partners partner one has had |
| Risk associated with age (girls 9-17) | Abnormal cells, girls are at risk for |
| Risk associated with age (women 18 and over) | Invasive cancer, women are at risk for |
| Other risk factors | Unprotected sex, if you haven’t been vaccinated, because you are a woman, virus has no symptoms, easily spread, genital contact (no sexual intercourse required) |

**Self-efficacy**

<table>
<thead>
<tr>
<th>Ways to deal with nervousness/anxiety associated with getting the injection/vaccination</th>
<th>Relaxation techniques, visualization techniques, talking to other women, talking to other mothers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ways to personally reduce/avoid risk of HPV and cervical cancer (presides vaccination)</td>
<td>Protected sex, correct condom usage, abstinence, continue regular pap smear</td>
</tr>
<tr>
<td>Ways to increase knowledge about HPV</td>
<td>Request more information, visit certain</td>
</tr>
<tr>
<td><strong>Addresses costs associated with vaccination</strong> (positive; is covered)</td>
<td>website, talk to your doctor, getting facts</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Addresses costs associated with vaccination</strong> (negative; is not covered)</td>
<td>Insurance covers costs, inexpensive, easy to afford, direct toward free or reduced programs for yearly paps, Medicaid will cover</td>
</tr>
<tr>
<td><strong>Selecting a clinic, a doctor, following through with appt</strong></td>
<td>Expensive, insurance does not cover, costs extra to have best test</td>
</tr>
<tr>
<td><strong>Positive or neutral description of the vaccination procedure</strong></td>
<td>Ways to choose a doctor you’ll be comfortable with, what to look for in a good doctor, ways to make sure you go to your appointment</td>
</tr>
<tr>
<td><strong>Efficacy for target audience</strong></td>
<td>Simple, nearly/mostly painless, standard procedure, doctor quickly gives shot, the procedure is quick</td>
</tr>
<tr>
<td><strong>Empowerment messages</strong></td>
<td>Vaccination is for girls 9-26</td>
</tr>
<tr>
<td>****</td>
<td>You’ll be able to, something you can do, have the power, you are smart, now you can</td>
</tr>
</tbody>
</table>

**Response-efficacy**

| **Effectiveness of vaccination** | Can prevent other disease such as genital warts, reducing infection toll, 3 does vaccination does the job, continued pap smear testing, best way to prevent HPV, best vaccination available, only vaccination available, prevents other disease, you may still benefit from vaccination |
| **Limitations (ineffectiveness) of vaccination** | Problems with lab, error rate, doesn’t treat all types of cervical cancer, doesn’t protect against all HPV types, may not fully protect everyone, not for pregnant women, not for people with allergies |
| **Suggestions to increase effectiveness of vaccination** | Get the vaccination before you are sexually active, complete vaccination series |
| **Effectiveness of early vaccination as the key to prevention and survival** | Highly avoidable if one gets the vaccination before they are sexually active, If one is sexually active already but has never had HPV |
| **How early should a woman get the vaccination? And how often should a woman get the vaccination?** | Before you are sexually active, pre-teens, as soon as possible/ Once, yearly, every x number of years |

Adopted from Brown and Lewis (2003) and Ngondo (2009)
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