Who Gives a "Like" About the HPV Vaccine?
Kansan Parent/Guardian Perceptions and Social Media Representations

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Abstract

Among U.S. states, Kansas children's HPV vaccination rates remain low. Parent/guardian HPV vaccine-beliefs likely influence vaccination rates. Additionally, Facebook's popularity suggests that this forum's representation may influence parent/guardian decisions to vaccinate children. This dissertation explores how Kansan parents/guardians of HPV vaccine-eligible children perceive the vaccine in the contexts of the health belief model (Rosenstock, 1974; Rosenstock, Strecher, & Becker, 1988) and the social amplification of risk framework (R. Kasperson et al., 1988), parent/guardian engagement with HPV vaccine-related information, and Facebook representations by general users and the Centers for Disease Control and Prevention during the vaccine's first decade on the market. Results indicate HPV vaccine risk perceptions among some Kansan parents/guardians, social media as an active and passive source of information, and the HPV vaccine's representation on Facebook as increasingly negative. HPV vaccine promotion strategies should consider focusing on the vaccine's representation and risk attenuating messages.

Acknowledgments

I am very grateful to a man who wore many hats, my dissertation chair, advisor, mentor, professor, supervisor, and collaborator – Dr. Mugur Geana, for every step forward he guided and moved me in my scholarship. He helped me to be fearless in critical-thinking and in research. *Mulțumesc.*

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To the graduate advisor, Ms. Jammie Johnson, every piece of advice, kind word, hug, and assurance, thank you for helping me gain greater confidence to continue my journey.

To a host of family and friends who have seen me through to a dream turned reality, to another goal accomplished - this is the end, but also, it is another beginning.

To the faculty and staff at the William Allen White School of Journalism & Mass Communications and the University of Kansas – thank you for an incredible journey full of learning, support, and success. Rock Chalk, Jayhawk!

Dedication

This dissertation is dedicated to Tim and Debra.

Tim, you have made me better in every way:

"I would rather share one lifetime with you than face all the ages of this world alone."

– *Arwen in The Lord of the Rings: The Fellowship of the Ring*

Mommy, I did it!

(No wooden nickels were taken in the production of this dissertation.)

I love you both, to the moon and beyond.

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Chapter 1: Introduction

On a rainy weekday morning in Kansas, a doctoral student was running late to an appointment on the University campus. She had missed the bus, and proceeded to request an Uber. Fortunately, the Uber driver quickly arrived, and she was hopeful that she would make it to campus on time.

The driver was friendly.

"In school?" he asked.

"Yeah," she responded.

"What for?"

That was all the prompting she needed to start talking about how she hoped to earn a Ph.D. in Journalism and Mass Communications by writing her dissertation about low human papillomavirus (HPV) vaccination rates among Kansan children. She knew her facts. She knew that a vaccine had been available since 2006 (U.S. Food and Drug Administration, 2006), but that in 2013 Kansas held the title of being tied for last among U.S. states for HPV vaccination rates (Hart, 2015). She knew that more than 70 million U.S. Americans are infected with the HPV, and there are more than 10 million new cases each year. Also, she was aware that HPV is associated with cancer (Centers for Disease Control and Prevention, 2016n).

He knew about the cancer.

At a red light, the Uber driver faced the front passenger window, and pulled down the collar of his shirt. His neck outstretched, he asked "see that scar right there? Cancer in my neck. HPV-associated. I can't believe there's a vaccine out there for it,

and people aren't getting it; because I sure wish it was around when I was a kid."

Facts and figures were now illustrated in reality, right in front of the face of a doctoral student who now wished she could remain in the sedan a little while longer and ask him a few questions. But, she had arrived at her destination, on time. So, she thanked the driver, and walked into the drizzle. Time would pass, and she would ever so often reflect on that encounter and continue to wonder *why are HPV vaccination rates so low among Kansan children?*

The story of low HPV vaccination rates in Kansas is not new. The U.S. Food and Drug Administration (FDA), the U.S. agency responsible for assuring that vaccines for humans are safe and effective (U.S. Food & Drug Administration, 2017) approved the first HPV vaccine, brand name Gardasil®, on June 8, 2006 (U.S. Food and Drug Administration, 2006). The vaccine is recommended to children 11 or 12 years old, but is not required (Petrosky et al., 2015). In addition to tying for the lowest state HPV vaccination rates in 2013 (Hart, 2015), in 2014, it was estimated that HPV vaccination completion rates (3-dose series) ranged from 3% to 48% by Kansan county (Immunize Kansas Coalition, 2017c). Even getting children started on the vaccine was a challenge. In 2015, Kansan females and males ages, 13-17 years, ranked 48th among the 50 U.S. states for receiving at least one dose of the HPV vaccine (Centers for Disease Control and Prevention, 2016a).

The study of non-compliance to preventive health behavior is also not a new endeavor. The health belief model (HBM) was developed to study this type of phenomena (Rosenstock, 1974; Rosenstock et al., 1988). HBM posits that though

people generally want to avoid disease, people are more likely to perform or engage in disease preventive behaviors if they hold a certain set of beliefs. In the context of HPV and HPV vaccination, people will more likely get vaccinated if they think they will likely get HPV, that HPV infection could be severe, that benefits of HPV vaccination are high, that barriers to HPV vaccination are low, and that they actually believe they have access to the HPV vaccine. Also, someone telling them to get the HPV vaccine, a cue to action, would encourage them to actually get vaccinated.

Newer is the amount of research examining health beliefs and how they influence parents to get their children the HPV vaccine. A body of research is developing that applies HBM to look at parents' decision making about HPV vaccination. Studies have looked at reasons for HPV vaccine acceptance or refusal (e.g., Grandahl et al., 2017; A. Krawczyk et al., 2015) and parental health beliefs in certain geographic regions (e.g., Brewer et al., 2011; Fazekas, Brewer, & Smith, 2008), but studies are often focused on perceptions of parents regarding either their daughters (e.g., Brewer & Fazekas, 2007; Brewer et al., 2011; Fazekas et al., 2008; Grandahl et al., 2017; A. Krawczyk et al., 2015; Reiter, Brewer, Gottlieb, McRee, & Smith, 2009) or their sons (e.g., Radisic, Chapman, Flight, & Wilson, 2017), and not both. A search and review of literature found a gap concerning the study of the low HPV vaccination rates among Kansan children and the role of parent and guardian health beliefs. An effort to fill this gap, such as this dissertation, could be the first step to addressing barriers to HPV vaccination uptake, understanding non-compliance to a preventive health behavior, and improve vaccination rates.

The story behind the phenomenological and theoretical underpinnings of this dissertation does not end with the Uber ride. The same doctoral student would work on a project with several colleagues examining news coverage about the 2016 Zika outbreak. That project analyzed messages in the context of the social amplification of risk framework (SARF) (J. Kasperson, Kasperson, Pidgeon, & Slovic, 2003; R. Kasperson et al., 1988). SARF describes the amplification or attenuation of risk perceptions and associated effects being the result of interactions between several social and individual factors. These factors include, but are not limited to, risks communicated in the media (Chung & Yun, 2013; e.g., Eldridge & Reilly, 2003; J. Kasperson et al., 2003; R. Kasperson et al., 1988; Lewis & Tyshenko, 2009; Raupp, 2014; Susarla, 2003).

Before going any further, this is not going to be a story about mediated risk messages related to HPV infection or its associated diseases. HPV infection is pervasive; it is the most common sexually transmitted infection in the United States, and nearly all sexually active people will be infected in their lifetime (Centers for Disease Control and Prevention, 2016n). Instead, this is a story about risk messages of another kind: those about the HPV vaccine.

Sometime during the Zika project, the doctoral student would receive a text message from her sister that would wake up her up from a much needed night's sleep. The details are hazy, but the text message contained a link to a YouTube video. Memory has it that there was a young woman being interviewed about the HPV vaccine on what looked like a news program. The guest argued that the vaccine was

dangerous and that there are safer and more natural alternatives to preventing HPV infection.

"Anti-vaxxer," the doctoral student thought, "one of those people often believes vaccines are harmful and ineffective" (Addis, 2015). Yes, the HPV vaccine has potential side effects (U.S. Food and Drug Administration, 2009b, 2011, 2014b), but who would choose to take the chance of letting their vaccine-eligible children (ages 9-17) be exposed to a cancer-associated virus, when there is something that could prevent it? So what if the shot could cause some pain at the injection site? However, that was her perception, and perceptions are diverse and complicated.

That text message led the doctoral student to consider two (or three) things. First, what if people are assuming that the HPV vaccine is always perceived as a preventive health behavior? What if instead it is perceived by some as a risk event? Second, how many social media messages have negative, risk amplifying content about the HPV vaccine, like were in that video (and third, maybe she should silence her phone before bed)? From a search and review of literature, a gap was found in the research: risk messages about vaccines have not been greatly analyzed in-depth, and especially not in the context of SARF. It was decided at that point that this dissertation would also address parent and guardian HPV vaccine perceptions in the context of SARF, with the vaccine (and not the virus) being the risk event subject.

The aforementioned YouTube video would also inspire an interest in HPV vaccine representations on social media. Research demonstrates that social media platforms allow users to connect and communicate about many topics, including

health-related topics (Moorhead et al., 2013). A number of studies have analyzed communicated messages about the HPV vaccine on the internet or social media, or have experimented with the effects of exposure to HPV vaccine-related social media messages (e.g., Ache & Wallace, 2008; Briones, Nan, Madden, & Waks, 2012; Keelan, Pavri, Balakrishnan, & Wilson, 2010; Lai et al., 2015; McRee, Reiter, & Brewer, 2012; Nan & Madden, 2012). Some studies have even analyzed content in the context of HBM variables, though none were found in the context of SARF. Thus, this dissertation also investigates how Kansan parents and guardians perceive HPV vaccine-related social media content. Furthermore, this study analyzes actual HPV vaccine-related social media content (spoiler alert: Facebook was the most used social media platform identified by Kansan parents and guardians in a survey, and was the source of posts for the content analysis).

Though research has analyzed HPV vaccine-related messages on several social media platforms, what was most peculiar was that research has not analyzed public posts across Facebook. Facebook is the most used social media platform among U.S. adults over 18 years of age (Greenwood, Perrin, & Duggan, 2016), so it is likely the most used social media platform among parents and guardians of 9-17 year olds in Kansas. Research found that the archival of public posts across the platform was likely impossible for a researcher to do prior to 2013, because Facebook's search feature was not available until that year (Facebook, 2013). With over two trillion posts in its index, there was hope that HPV vaccine-related posts would be plentiful and available for analysis. With the availability of the search

feature and that vaccine had been on the market for a little more than a decade at the time of this study, the doctoral student decided to conduct an analysis on how HBM and SARF messages in HPV vaccine-related Facebook posts had changed over time. This longitudinal research pursuit on a highly used platform among adults is a contribution this dissertation makes to the understanding of messages communicated about the HPV vaccine.

Upon the doctoral student becoming a doctoral candidate, she would also consider one other source of HPV vaccine-related Facebook posts – the Centers for Disease Control and Prevention (CDC). The CDC is the United States' health protection agency (Centers for Disease Control and Prevention, 2014a), and advocates that eligible persons receive the HPV vaccine (e.g., Centers for Disease Control and Prevention, 2013, 2015b, 2016c, 2016m; Centers for Disease Control and Prevention, 2016n, 2016o). A search on Facebook would find that the CDC officially operates two pages where the vaccine has been mentioned: "CDC" and "CDC STD." Comparing HBM and SARF messages in HPV vaccine-related posts with posts published by the CDC would show how messages on Facebook at-large have compared with messages communicated by the United States' health protection agency. These messages, by extension, inform how the vaccine is perceived and represented. The longitudinal analysis would also show how those messages have compared over the vaccine's ten year history. Findings demonstrate how aligned the communication of Facebook public is, or is not, with the communication of the U.S.

government's initiatives. This is the final contribution that this dissertation makes to the research.

In summary, a doctoral candidate's intellectual curiosity about a regional phenomenon, a conversation with an Uber driver, a sleep-interrupting text message, and a theoretical approach used in a Zika-related project inspired this dissertation.

This dissertation investigates the HPV vaccine-related perceptions held by Kansan parents and guardians of children ages 9-17 years, their perceptions of social media representations about the HPV vaccine, what the most used social media platform by these parents actually communicates about the HPV vaccine, and how the messages compare with U.S. government messages. Following this Chapter, Chapter two discusses HPV and HPV-associated disease, the HPV vaccine, Kansas HPV vaccination information, the health belief model, and the social amplification of risk framework more in-depth. The research questions guiding the study are presented at the end of the chapter. Chapter three presents the methods employed to conduct the dissertation research. Survey development, pre-survey interviews, respondent recruitment strategies, content analysis procedure, and the data analysis process are included. Data analyses pertaining to the research questions are in Chapter four. The fifth and final chapter is a discussion of the research findings in the contexts of HBM and SARF. This chapter also discusses the limitations of the dissertation, implications for the health belief model, health communication, and healthcare providers, as well as suggestions for future research.

Chapter 2: Literature Review

The Human Papillomavirus

Discovery and research. The discovery of HPV is connected with the history of cancer research. In the early 1900's, U.S. American researcher Peyton Rous conducted an experiment. Rous extracted material from a cancerous tumor in a chicken, then injected that material into a healthy chicken (Nobelprize.org, 2014b).The healthy chicken later developed cancer, and Rous concluded that the original tumor contained a virus that transmitted cancer. This observation led to decades of research dedicated to demonstrating that in humans, cancer could also be the result of viral infections (Bakalar, 2011).

It was German scientist Harald zur Hausen, who would become renowned for leading the study in linking papillomavirus to cancer in humans (Nobelprize.org, 2014a). Zur Hausen recalled studying reports that mentioned genital warts converting into malignant carcinomas. He states, "[s]ince genital warts had been shown to contain typical papillomavirus particles, this triggered the suspicion that the genital wart virus might represent the causative agent for cervical cancer" (Nobelprize.org, 2014a, para. 10). Zur Hausen and other scientists also suspected that there were a variety of papillomavirus types. Throughout the 1970s and 1980s, scientists would isolate, clone, and link a variety of human papillomavirus types to cancer.

What is HPV? The human papillomavirus is a group of viruses named for the papillomas (genital warts) caused by some of the strains, like the one seen below (see Figure 1) (Centers for Disease Control and Prevention, 2015c). Each virus in the

group has a designated number, called a HPV type. There are at least "174 completely characterized types, with new HPV types being continuously found" (Bzhalava, Guan, Franceschi, Dillner, & Clifford, 2013, p. 224).

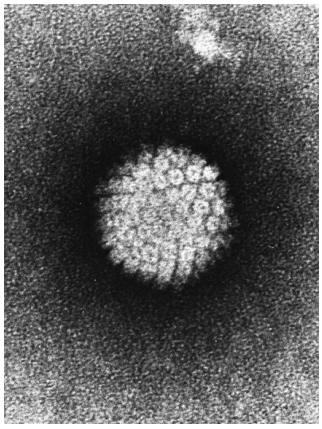

Figure 1: An electron micrograph of the human papillomavirus, a virus associated with warts and cancer (Laboratory of Tumor Virus Biology, 1986)

HPV transmission commonly occurs through contact during vaginal and anal sexual activity, but can also be transmitted during oral sex (Centers for Disease Control and Prevention, 2016n). HPV can also be spread in the absence of penetrative sex through skin-to-skin genital contact with someone who has HPV (World Health Organization, 2016). Regardless of whether an HPV infected person shows signs or symptoms of infection (e.g. genital warts) it is still possible for that person to spread the infection.

HPV prevalence, incidence, and associated disease. The Centers for Disease Control and Prevention (CDC) estimate that approximately 79 million U.S. Americans have HPV, with an incidence of 14 million new cases annually (Centers for Disease Control and Prevention, 2016n). The CDC states that HPV infection "is so common that most sexually-active men and women will get at least one type of

HPV at some point in their lives" (Centers for Disease Control and Prevention, 2016n, para. 1). While HPV infection does not cause complications in all cases, it has been linked to genital warts and several types of cancer.

HPV-associated cancers include cervical, vulvar, vaginal, penile, anal, and oropharyngeal cancers (Centers for Disease Control and Prevention, 2015d). These cancers are responsible for nearly 16,000 deaths each year (see Table 1) (American Cancer Society, 2016; Centers for Disease Control and Prevention, 2016d, 2016e; National Institutes of Health & National Cancer Institute, 2016), and more than 38,000 new cancer cases in the United States (Centers for Disease Control and Prevention, 2016g).

Table 1: HPV 2016: Associated Cancer, Probability Links, U.S. Incidence & Deaths

Cancer Type	Probability of Cancer Type Being Linked to HPV [1,7]	U.S. Average Number of Cancers. Where HPV is Often Found (Incidence per Year) [2]	Number of U.S. Deaths (Year)
Cervical	91%	11,771	4,217 [3]
Vulvar	69%	3,554	1,003 [4]
Vaginal	75%	802	437 [4]
Penile	63%	1,168	340 [5]
Anal	91%	5,010	1,080 [6]
Oropharyngeal	72%	15,738	8,850 [3]
Total		38,043	15,927

1. (Centers for Disease Control and Prevention, 2015f)
2. (Centers for Disease Control and Prevention, 2016g)
3. (Centers for Disease Control and Prevention, 2016d)
4. (Centers for Disease Control and Prevention, 2016e)
5. (American Cancer Society, 2016)
6. (National Institutes of Health & National Cancer Institute, 2016)
7. (Centers for Disease Control and Prevention, 2016h)

As of 2017, nine HPV types (6, 11, 16, 18, 31, 33, 45, 52, and 58) and their associated diseases are preventable by vaccination and subsequent immunization

(Petrosky et al., 2015). HPV types 16 and 18 are linked to nearly 64% of HPV-associated cancers (63% for males and 65% for females), and to 90% of genital warts cases. HPV types 31, 33, 45, 52, and 58 account for 10% of HPV-associated cancer cases (4% for males and 14% for females).

HPV-associated cancer: Race and gender. Cancer is arguably one of the most severe diseases associated with human papillomavirus infection. Research finds that HPV-associated cancer disproportionally affects several demographics.

Cervical cancer. From the years 2008-2012, blacks reported the highest incidence (cases per 100,000 women) of HPV-associated cervical cancer (9.2), followed by whites (7.1), American Indians/Alaska Natives (6.3), then Asians/Pacific Islanders. Furthermore, Hispanics have a higher reported incidence of cervical cancer (9.7) than non-Hispanics (7.1). It is estimated that more than 11,000 new cases of HPV-associated cervical cancer are diagnosed in the United States annually (Centers for Disease Control and Prevention, 2016c), and that HPV is responsible for 91% of HPV-associated cervical cancer cases (Centers for Disease Control and Prevention, 2016h) (see Figure 2 to see location of cervix).

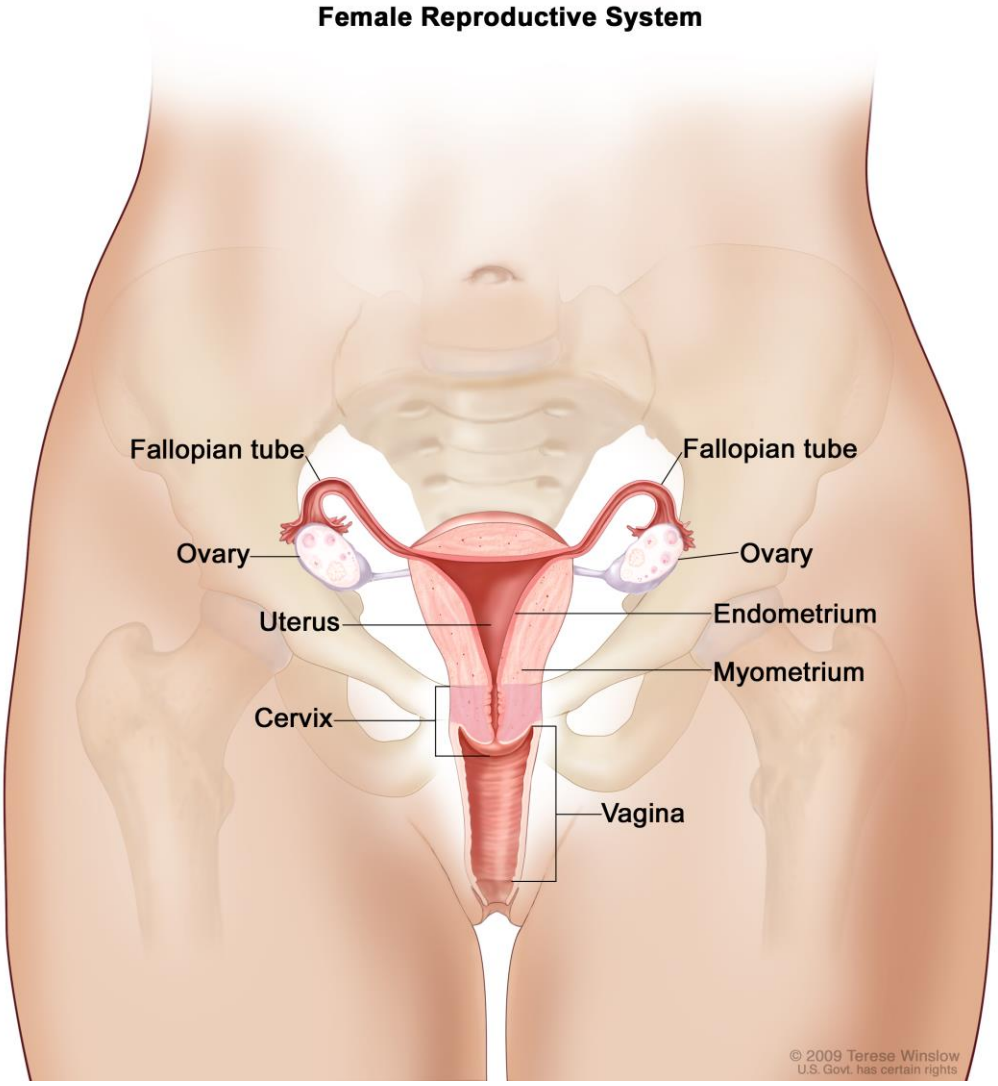

Figure 2: The female reproductive system. For the National Cancer Institute © 2009 Terese Winslow, U.S. Govt. has certain rights.

Vulvar cancer. (see From 2008-2012, whites reported the highest incidence (cases per 100,000 women) of HPV-associated cervical cancer (2.1), followed by blacks (1.5), American Indians/Alaska Natives (1.1), then Asians/Pacific Islanders (0.4) (Centers for Disease Control and Prevention, 2016l). Furthermore, Hispanics had a higher reported incidence of vulvar cancer (2.1) than non-Hispanics (1.3). It is

estimated that more than 3,500 new cases of HPV-associated vulvar cancer are diagnosed in the United States annually (Centers for Disease Control and Prevention, 2016c). HPV infection is likely responsible for 69% of HPV-associated vulvar cancers (Centers for Disease Control and Prevention, 2015f).

Vaginal cancer. From 2008-2012, blacks reported the highest incidence (cases per 100,000 women) of HPV-associated vaginal cancer (0.6), followed by whites (0.4), American Indians/Alaska Natives (0.3), then Asians/Pacific Islanders (0.2) (Centers for Disease Control and Prevention, 2016k). Furthermore, Hispanics had a slightly higher reported incidence of vaginal cancer (0.5) than non-Hispanics (0.4). Estimates report that about 800 new cases of HPV-associated vulvar cancer are diagnosed in the United States annually (Centers for Disease Control and Prevention, 2016c), and that HPV is responsible for 75% of HPV-associated vaginal cancers (Centers for Disease Control and Prevention, 2015f) (see Figure 2 to see the location of the vagina).

Penile cancer. From 2008-2012, blacks reported the highest incidence (cases per 100,000 men) of HPV-associated penile cancer (0.9), followed by whites (0.8), American Indians/Alaska Natives (0.7), then Asians/Pacific Islanders (0.4) (Centers for Disease Control and Prevention, 2016j). Furthermore, Hispanics had nearly twice the reported incidence of penile cancer (1.3) than non-Hispanics (0.7). Estimates report that more than 1,100 new cases of HPV-associated penile cancer are diagnosed in the United States annually (Centers for Disease Control and Prevention, 2016c),

and that HPV is responsible for 63% of HPV-associated penile cancers (Centers for Disease Control and Prevention, 2015f) (see Figure 3).

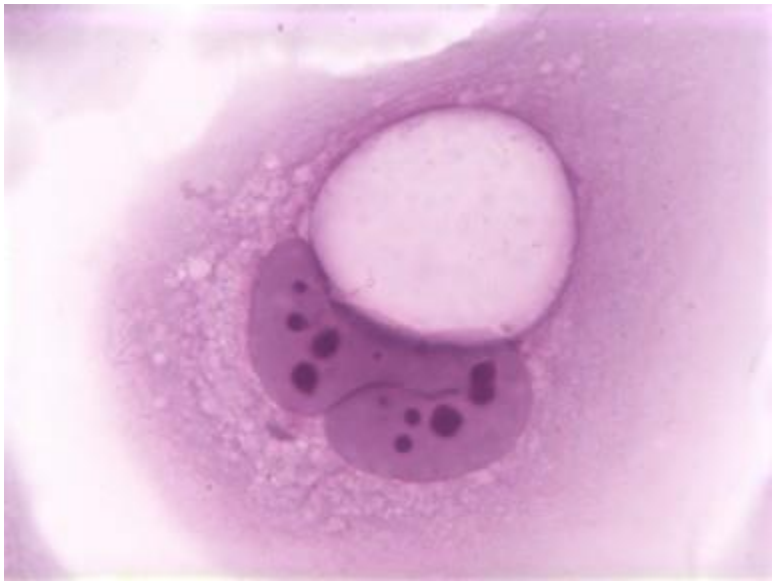

Figure 3: Image of an HPV-infected cell in the human foreskin of a penis that has experienced structural changes (E. Krawczyk, 2008).

Anal cancer. From 2008-2012, for all races and ethnicities except for blacks, women reported more cases (incidence per 100,000 people) of HPV-associated anal cancer than men (white, 1.9/1.1; black 1.4/1.5; American Indian/Alaska Native, 0.9/0.5, Asian/Pacific Islander, 0.4/0.2; non-Hispanic, 1.9/1.2; and Hispanics 1.4/1.2) (Centers for Disease Control and Prevention, 2016b). White women and non-Hispanic women reported the highest incidences (1.9) of anal cancer among women, and black men had the highest reported incidence (1.5) of all men. It is estimated that more than 5,000 new cases of HPV-associated anal cancer are diagnosed in the United States annually (Centers for Disease Control and Prevention, 2016c). It is

estimated that HPV is responsible for 91% of HPV-associated anal cancers (Centers for Disease Control and Prevention, 2015f) (see Figure 4 for the location of the anus).

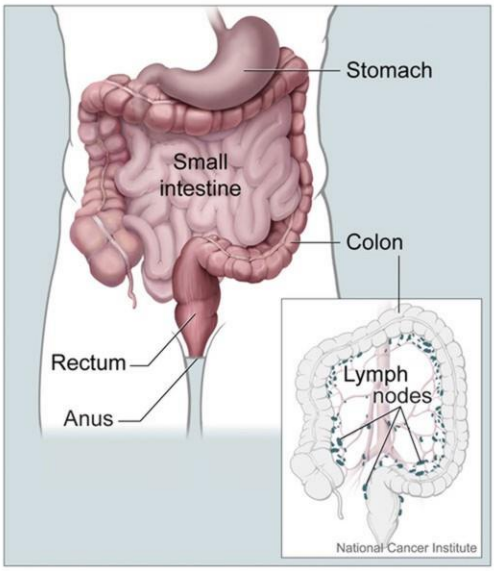

Figure 4: Representation of the colon, rectum, and surrounding organs (Hoofring, 2006).

Oropharyngeal cancer. From 2008-2012, for all races and ethnicities, women reported far fewer cases (incidence per 100,000 people) of HPV-associated oropharyngeal cancer than men (white, 1.8/8.0; black 1.5/6.9; American Indian/Alaska Native, 0.9/4.4, Asian/Pacific Islander, 0.6/2.0; non-Hispanic, 1.8/8.0; and Hispanics 0.9/4.2) (Centers for Disease Control and Prevention, 2016i). White men and non-Hispanic men reported the highest incidences (8.0) of oropharyngeal cancer among men, and white and non-Hispanic women had the highest reported incidence (1.8) of all women. Reports estimate that more than 15,700 new cases of HPV-associated oropharyngeal cancer are diagnosed in the United States annually (Centers for Disease Control and Prevention, 2016c), and that HPV is responsible for 72% of HPV-associated oropharyngeal cancers cases (Centers for Disease Control

and Prevention, 2015f). The average age for diagnosis of these cancers ranges between 49 and 68 years of age (Centers for Disease Control and Prevention, 2016f). Even though the diagnosis of these cancers happen often in the later years of the life of someone infected with HPV, it is possible to prevent nine types (6, 11, 16, 18, 31, 33, 45, 52, and 58) and their associated diseases through vaccination and subsequent immunization (Petrosky et al., 2015) (see Figure 5 for parts of the oropharynx).

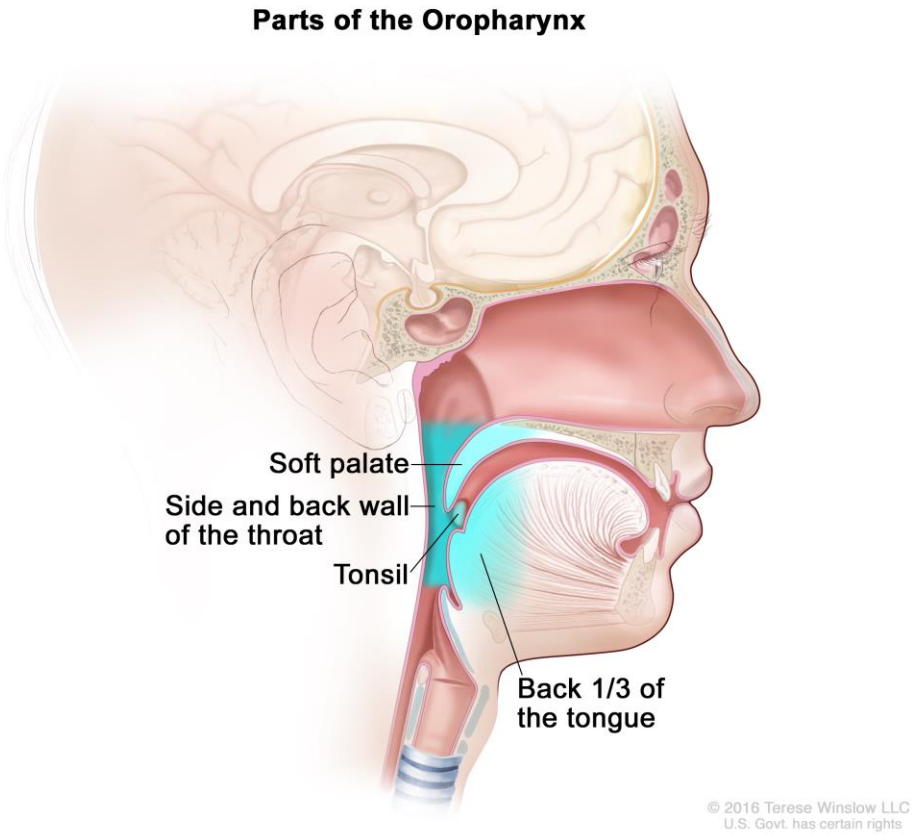

Figure 5: Parts of the oropharynx. For the National Cancer Institute © 2016 Terese Winslow LLC, U.S. Govt. has certain rights.

HPV-associated cancer in Kansas. The rates for HPV-related cancer cases in Kansas are close to the reported U.S. national rates (see Table 2) (Viens et al., 2016). The (per 100,000) rate of cervical, female anal cancer, and female oropharyngeal cancer for Kansas was lower than U.S. national rates and the rate for vulvar cancer was higher for Kansas than the nation. Vaginal and penile cancer rates in both Kansas and the United States were the same. Rates of anal cancer in men were reported to be more than triple U.S. national rates, but rates of oropharyngeal cancer in men were lower.

Table 2: HPV-Associated Cancer Rates U.S and Kansas (per 100,000)[1]

Cancer Type	Kansas (Female)	U.S. (Female)	Kansas (Male)	U.S (Male)
Cervical	6.90	7.40	-	-
Vulvar	2.20	2.00	-	-
Vaginal	0.40	0.40	-	-
Penile	-	-	0.80	0.80
Anal	1.70	1.80	0.70	0.20
Oropharyngeal	1.40	1.70	7.50	7.60

(Viens et al., 2016)

Despite the rates of cancer hovering close to U.S. national averages, there is a danger that low HPV vaccination rates among children could make them more susceptible to infection and the development of HPV-associated cancer in adulthood.

The Human Papillomavirus Vaccine

What is the HPV vaccine? The human papillomavirus vaccine is a formula developed with virus-like particles (VLPs) which are "multiprotein structures that mimic the organization and conformation of authentic native viruses but lack the viral genome, potentially yielding safer and cheaper vaccine candidates" (Roldao, Mellado,

Castilho, Carrondo, & Alves, 2010, p. 1149). Vaccines generally causes one's immune system to recognize the agent (in this case, the VLPs) as foreign, and destroy it (World Health Organization, 2017). This process, called immunity development, improves the immune system's ability to recognize the virus and destroy it with antibodies (Centers for Disease Control and Prevention, 2014b).

Gardasil®. The first HPV vaccine was approved by the U.S. Food and Drug Administration (FDA) on June 8, 2006 (U.S. Food and Drug Administration, 2006). The vaccine, "Human Papillomavirus Quadrivalent (Types 6, 11, 16, 18) Vaccine" (U.S. Food and Drug Administration, 2006), is manufactured by Merck & Co., Inc., under the brand name Gardasil®. This vaccine is also known as "quadrivalent HPV vaccine" and "4vHPV" (Centers for Disease Control and Prevention, 2016p).

Gardasil® is "a non-infectious recombinant quadrivalent vaccine prepared from the purified virus-like particles (VLPs) of the major capsid (L1) protein of HPV Types 6, 11, 16, and 18." (U.S. Food and Drug Administration, 2011, p. 12). In other words, the vaccine contains proteins that resemble the HPV types, but cannot cause HPV infection because it does not contain the actual virus. The proteins are treated in a process that involves the use of "vitamins, amino acids, mineral salts and carbohydrates" (p. 11). The final vaccine also contains aluminum, sodium chloride, L-histidine, polysorbate, sodium borate, yeast protein, and water, but no preservatives or antibiotics. According to the Gardasil® insert "[a]nimal studies with analogous papillomaviruses suggest that the efficacy of L1 VLP vaccines may involve the development of humoral immune response. Human beings develop a humoral

immune response to the vaccine, although the exact mechanism of protection is unknown" (p. 12).

The U.S. Food and Drug Administration approved the vaccine for females 9-26 years of age to prevent types 6, 11, 16, and 18 of HPV, and HPV-associated genital warts and cancers (cervical, anal, vulvar, and vaginal) (U.S. Food and Drug Administration, 2011). On October 16, 2009, a little more than three years after its initial approval, the FDA approved Gardasil® for the prevention of HPV-associated genital warts in males 9-26 years of age (U.S. Food and Drug Administration, 2009a).

At the time of approval, administration of the vaccine was recommended via three intramuscular injections at zero, two, and six months. (U.S. Food and Drug Administration, 2011). The vaccine is not recommended for anyone who has an allergy or hypersensitivity to any of the ingredients, including yeast or a previous injection of the vaccine. Concerning adverse reactions:

"Headache, fever, nausea, and dizziness; and local injection site reactions (pain, swelling, erythema, pruritus, and bruising) occurred after administration with GARDASIL. Syncope, sometimes associated with tonic-clonic movements and other seizure-like activity, has been reported following vaccination with GARDASIL and may result in falling with injury; observation for 15 minutes after administration is recommended." (U.S. Food and Drug Administration, 2011, p. 3)

According to the package insert, Gardasil® had not been clinically evaluated to see if it can cause cancer, cell mutations, or infertility in males, but was found to

not cause effects on fertility on male rats (U.S. Food and Drug Administration, 2011). Double-blind, randomized clinical studies evaluated 24,596 people (20,541 women ages 16-26 years old, and 4,055 men 16-26 years old at the time of enrollment), who received all three vaccinations within a year of their enrollment, and were unaware of HPV types (6, 11, 16, and 18) before their first dose (MerckVaccines.com, 2015). Compared to those receiving a placebo, the following efficacy rates were reported: cervical cancer 98% (95% CI [93.5, 99.8]), vulvar/vaginal cancer 100% (95% CI [55.5, 100]), anal cancer 75% (95% CI [8.8, 95.4]), genital warts (males) 89% (95% CI [65.3, 97.9]), and genital warts (females) 99% (95% CI [96.2, 99.9]). In summary the study found that the HPV vaccine was effective in preventing most cases of HPV-associated cancer and genital warts.

Cervarix®. On October 16, 2009, another human papillomavirus vaccine was approved by the FDA (2012). This vaccine, "Human Papillomavirus Bivalent (Types 16 and 18) Vaccine, Recombinant" (Centers for Disease Control and Prevention, 2016l), brand name Cervarix® is also known as "bivalent HPV vaccine" and "2vHPV" (Centers for Disease Control and Prevention, 2016p). This vaccine is manufactured by GlaxoSmithKline Biologicals (U.S. Food and Drug Administration, 2012). The FDA approved the vaccine for females 10-25 years of age, to prevent cervical cancer. Later, Cervarix® would be also be approved for females as young as age nine years (U.S. Food and Drug Administration, 2009b).

Cervarix® "is a non-infectious recombinant, AS04-adjuvanted vaccine that contains recombinant L1 protein, the major antigenic protein of capsid, of oncogenic

HPV types 16 and 18" (U.S. Food and Drug Administration, 2009b, p. 12). This vaccine is developed in a process that uses aluminum, sodium chloride, sodium dihydrogen phosphate dehydrate, and water. The final formula contains sodium chloride, sodium dihydrogen phosphate dehydrate and "may also contain residual amounts of insect cell and viral protein," and "bacterial cell protein" (p. 13), but does not contain preservatives. The Cervarix® insert states that "[a]nimal studies suggest that the efficacy of L1 VLP vaccines may be mediated by the development of IgG neutralizing antibodies directed against the HPV-L1 capsid proteins generated as a result of vaccination" (p. 13).

At the time of its approval, Cervarix® was recommended to be administered by three separate intermuscular injections, at zero, one, and six months (U.S. Food and Drug Administration, 2009b). The vaccine insert warns that people who are allergic to latex may have allergic reactions to the product, and that syncope has been reported with Cervarix® use. The most common adverse reactions include "pain redness, and swelling at the injection site," and "fatigue, headache, myalgia, gastrointestinal symptoms, and arthralgia" (p. 3). Studies found no evidence that Cervarix® harmed the fetus or impaired fertility of female rats. The insert also indicates that studies had been conducted to evaluate the vaccine for its potential to cause cancer or mutations. Controlled clinical trials that were double-blind and randomized consisting of 19,778 women ages 15-25 years, and efficacy rates for preventing cervical cancer were reported at 91.7% [95% CI: 66.6, 99.1].

Gardasil® 9. The latest HPV vaccine was approved by the FDA on

December 10, 2014 (U.S. Food and Drug Administration, 2014a). The vaccine, "Human Papillomavirus 9-valent Vaccine, Recombinant" (Centers for Disease Control and Prevention, 2016j), brand name Gardasil® 9, and also known as "9-valent HPV" and "9vHPV" (Centers for Disease Control and Prevention, 2016p), is manufactured by Merck & Sharp & Dohme Corp. This vaccine was approved for the prevention of HPV-associated cancer (cervical, vulvar, anal) caused by HPV types 16, 18, 31, 33, 45, 52, and 58, and genital warts that are caused by HPV types 6 and 11 in females 9-26 years of age. It was also approved for the prevention of HPV-associated cancer (anal) caused by HPV types 16, 18, 31, 33, 45, 52, and 58, and genital warts caused by infection from HPV types 6 and 11 in males 9-26 years of age.

Gardasil® 9 is "a non-infectious recombinant 9-valent vaccine prepared from the purified virus-like particles (VLPs) of the major capsid (L1) protein of HPV Types 6, 11, 16, 18, 31, 33, 45, 52, and 58" (U.S. Food and Drug Administration, 2014b, p. 11). The proteins are treated in a process that uses "vitamins, amino acids, mineral salts and carbohydrates" (p. 11). In addition to the VLPs, the final vaccine also contains aluminum, sodium chloride, L-histidine, polysorbate, sodium borate, yeast protein, and water. According to the Gardasil® 9, like with Gardasil®, the exact mechanism of vaccine protection is unknown, but thought to be through a humoral response.

At the time of approval, the vaccine was recommended to be administered via intramuscular injections in three doses at zero, between three and six months, and a

year (U.S. Food and Drug Administration, 2014b). The most common adverse reactions include pain, injection site swelling and redness, and headache. Gardasil® 9, according to the package information, has not been clinically evaluated to see if it can cause cancer, cell mutations, or infertility in males, but was found to not cause effects on fertility of female rats (U.S. Food and Drug Administration, 2014b). Like Gardasil® 9, the following efficacy rates were reported: cervical cancer 98% (95% CI [93.5, 99.8]), vulvar/vaginal cancer 100% (95% CI [55.5, 100]), anal cancer 75% (95% CI [8.8, 95.4]), genital warts (males) 89% (95% CI [65.3, 97.9]), and genital warts (females) 99% (95% CI [96.2, 99.9]). In another efficacy study comparing Gardasil® 9 to its predecessor, Gardasil®, Gardasil® 9 was found to be 97% effective (95% CI [80.9, 99.8]) in preventing cervical, vulvar, and vaginal cancers associated to HPV (types 31, 33, 45, 52, and 58).

Summary of recommendations. The Advisory Committee on Immunization Practice (ACIP), "a group of medical and public health experts that develop recommendations on the use of vaccines in the civilian population of the United States" (Centers for Disease Control and Prevention, 2016b, para. 1), released its recommendations for HPV vaccination on March 27, 2015 in the *Morbidity and Mortality Weekly Report (MMWR)* (Petrosky et al., 2015). The ACIP recommends HPV vaccination for females ages 11 or 12 years, with catch-up vaccines for females aged 13-26 years. For males, the ACIP recommends vaccination at ages 11 or 12 years, with catch-up vaccines at ages 13-21 years, or if immunocompromised, through age 26 years. It is also recommended that men who engage in sexual

relationships with other men (MSM) also receive catch-up vaccinations through age 26 years. Both males and females can begin receiving the HPV vaccine as early as age nine years. Recommendation of the vaccine prior to adolescence has been done with the goal of getting children vaccinated and immunized against HPV prior to potential exposure to infection (Schuchat, 2015).

Researchers have studied whether a two-dose series was sufficient to develop immunity against HPV. While the exact level of antibodies needed for protection against HPV is unknown, a Costa Rican study of the bivalent HPV vaccine found that those who received one, two, or three doses of the vaccine produced antibodies against HPV, at stable levels, four years after vaccination (Safaeian et al., 2013). Recipients of two doses had higher antibody levels than one-dose recipients, but similar levels of protection to those who received three doses. Such findings led the CDC to issue a press release on October 19, 2016 that stated that vaccine recipients 11-12 years of age need only receive just two doses of the HPV vaccine at least six months apart (Centers for Disease Control and Prevention, 2016c). The CDC also recommends that those who begin their vaccination series between ages 15-26 years receive the traditional three-series vaccination sequence. In this series, after receiving the first dose, the recipient should wait one to two months prior to receiving the second dose (Petrosky et al., 2015). The third dose should be administered at least six months after the first dose. If the vaccination schedule is interrupted, it does not need to be restarted.

As of 2016, the HPV vaccine has been available in the United States for a decade. Despite this vaccine being on the market and the CDC and ACIP advocating that people get vaccinated, vaccination rates in several parts of the nation, including Kansas, are low.

HPV vaccination in Kansas. In 2013, Kansas was tied for last among U.S. states with the lowest rate of three-series vaccination completion (Hart, 2015).Vaccination rates have varied widely across the state. Reports from 2014 estimate that by county, HPV vaccination 3-dose series completion rates among 11-18 year olds ranged from 3% (Clark County [Southwest Region]) to 48% (Graham County [Northwest Region]) (Immunize Kansas Coalition, 2017c; Kansas Adjutant General's Department, 2017). For females, the HPV vaccination rates by county range from 4% (Clark County) to 58% (Lane County [Southwest]) (Immunize Kansas Coalition, 2017a; Kansas Adjutant General's Department, 2017), and for males, 1% (Clark, Hamilton [Southwest], Harper [South Central], and Stanton County [Southwest]) to 42% (Graham County [Northwest]) (Immunize Kansas Coalition, 2017b; Kansas Adjutant General's Department, 2017).

According to the CDC's 2015 National Immunization Survey-Teen (NIS-Teen), Kansas females 13-17 years of age ranked 48th among the 50 U.S. states for receiving at least one dose, 38th for two doses of the series, and 44th for receiving three or more doses. Of those females that received at least one dose, Kansas ranked 34th in the nation for series completion (Centers for Disease Control and Prevention, 2016a) (see Table 3 and Figure 6).

Table 3: HPV Vaccination Coverage, U.S. and Kansan Females (13-17 Years of Age)[1]

Doses (at least)	U.S.	Kansas	Kansas Rank (50 U.S. states)
One dose	62.0%	50.9%	48th
Two doses	52.1%	43.6%	38th
Three or more doses	41.9%	31.7%	44th
Percent of one-dose recipients that completed (three-dose)vaccination series	70.3%	66.3%	34th

1. (Centers for Disease Control and Prevention, 2016a)

Kansas males (see Table 4 and Figure 6) 13-17 years of age ranked 48th among the U.S. 50 states for receiving one dose of the HPV vaccine as well as for two doses, and 47th for three or more doses. Of males that received at least one dose, Kansas ranked 40th in the nation for series completion.

Table 4: HPV Vaccination Rates, U.S. and Kansan Males (13-17 Years of Age)[1]

Doses (at least)	U.S.	Kansas	Kansas Rank (50 U.S. states)
One dose	50.0%	36.0%	48th
Two doses	39.1%	26.3%	48th
Three or more doses	21.8%	18.5%	47th
Percent of one-dose recipients that completed (three-dose) vaccination series	58.0%	55.6%	40th

1. (Centers for Disease Control and Prevention, 2016a)

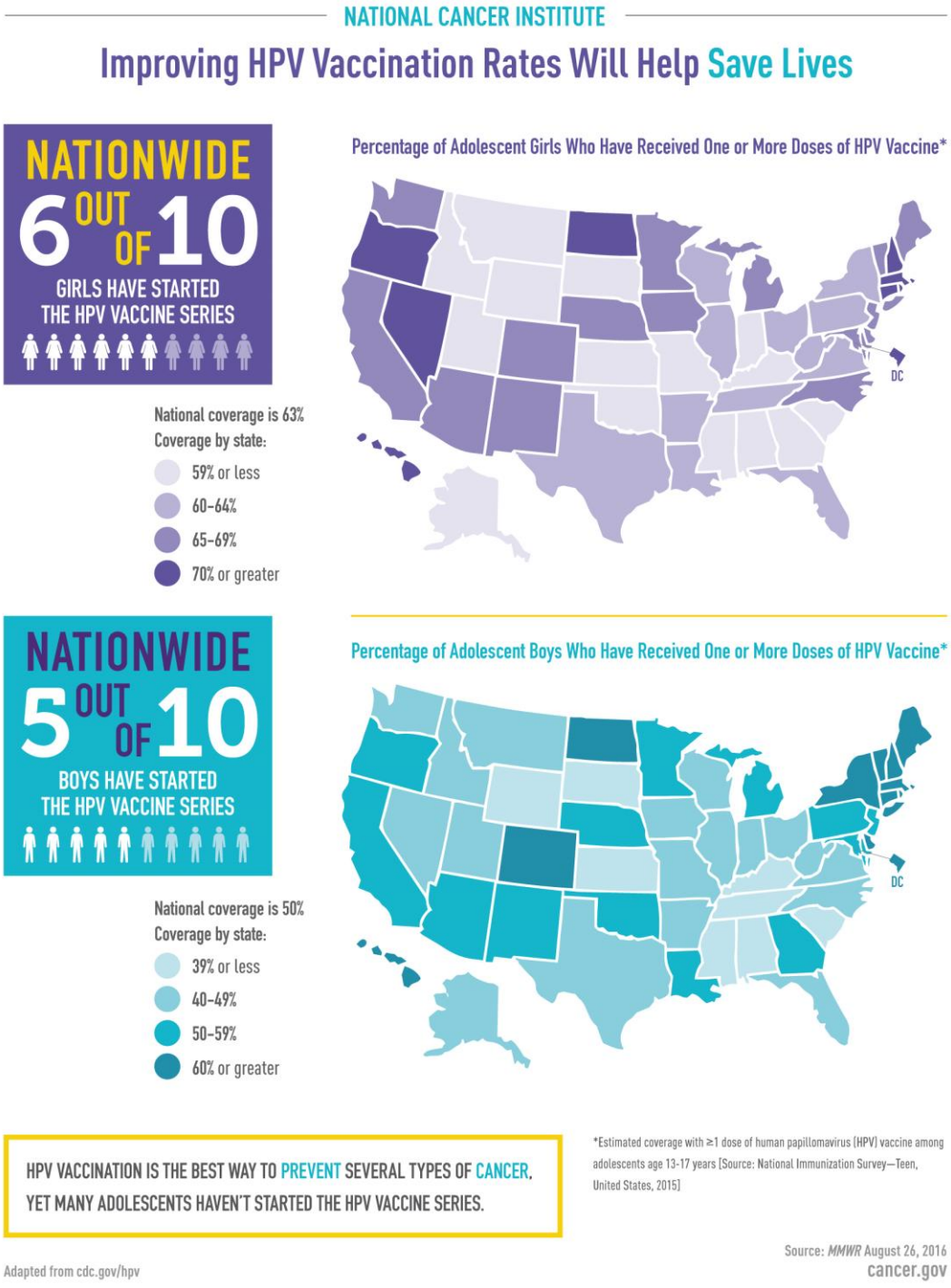

Figure 6: HPV vaccination rates of those who have received one or more doses of the HPV vaccine, by gender. For both females and males, Kansas ranks in the lowest groups (National Cancer Institute, 2016)

Concerning race and HPV vaccination rate, complete data for Kansas is not available, but national and state statistics can provide some context. Most Kansans identified as White (non-Hispanic or Latino) (76.4%), greatly outnumbering the percentage of Hispanic or Latino (11.6%), Black (6.3%), Asian (2.9%), multiracial (2.9%), American Indian and Alaska Native (1.2%), and Native Hawaiian and other Pacific Islander (0.1%) people; also, females (50.1%) slightly outnumber males (49.9%) (United States Census Bureau, 2017). The NIS-Teen survey reported that in 2015 among females 13-17 white adolescents received the HPV vaccine at a lower rate than other groups for one, two and three doses (see Table 5) (Reagan-Steiner et al., 2016).

Table 5: U.S. HPV Vaccination Rates, Race (Females 13-17 Years of Age)[1]

Doses (at least)	White*	Black*	American Indian/Alaska Native*	Hispanic	Asian*	Multiracial
≥1 dose	59.2%	66.9%	68.4%	70.5%	63.8%	62%
≥2 doses	49.4%	51.9%	57.8%	55.4%	58.1%	51.0%
≥3 doses	39.6%	40.8%	46.2%	38.7%	53.5%	42.5%

*Non-Hispanic \

1. (Reagan-Steiner et al., 2016)

Among males 13-17 years of age, like females, white adolescents received the HPV vaccine at a lower rate than other groups for one, two, and three doses (see Table 6).

Table 6: U.S. HPV Vaccination Rates, Race (Males 13-17 Years of Age)[1]

Doses (at least)	White*	Black*	American Indian/Alaska Native*	Hispanic	Asian*	Multiracial
≥1 dose	43.8%	54.0%	58.9%	58.5%	49.6%	58.8%
≥2 doses	34.9%	37.1%	47.8%	48.6%	39.8%	46.8%
≥3 doses	25.2%	26.0%	35.0%	34.6%	30.7%	30.6%

*Non-Hispanic

1. (Reagan-Steiner et al., 2016)

Between sexes, females receive the HPV vaccination at a higher rate than males. White males and females are the least HPV-vaccinated group compared with other races of the same sex.

Concerning socioeconomic status, 13.6% of Kansans live below poverty level (Kansas Health Matters, 2017). For all races and genders, and doses, people who are below the poverty level in the United States have higher reported HPV vaccination rates than those who are at or below the poverty level (see Table 7) (Reagan-Steiner et al., 2016).

Table 7: U.S. HPV Vaccination Rates, Poverty Level (13-17 Years of Age) [1]

Doses (at least)	Below poverty level	At or above poverty level
Females		
≥1 dose	70.0%	60.4%
≥2 doses	56.6%	50.5%
≥3 doses	44.4%	41.3%
Males		
≥1 dose	61.1%	46.0%
≥2 doses	46.7%	36.3%
≥3doses	31.0%	27.4%

1. (Reagan-Steiner et al., 2016)

In summary, it is likely that because most Kansans identify as a white and live above the poverty level, vaccination rates are going to be lower for a larger segment of the population. Because parents and guardians are most likely charged with the responsibility of getting their children vaccinated, and the health belief model (HBM) (Rosenstock, 1974; Rosenstock et al., 1988) suggests that their health beliefs may influence whether or not they get their children vaccinated against HPV, insight into their HPV vaccine perceptions may provide insight regarding low vaccination rates.

The Health Belief Model in Context

The health belief model (HBM) (Rosenstock, 1974; Rosenstock et al., 1988) is useful to examine the low HPV vaccine rates among Kansas children because the model was designed to examine engagement in preventive health behaviors. These are behaviors that individuals perform to avoid disease. While theories are very useful in explaining phenomena, theory-based approaches sometimes exclude social environmental factors that may influence people on an individual level (Corcoran, 2007). Models, however, "usually seek to include key elements of behavior and decision-making processes" (p. 11), and take individual differences more into account. Given the regional focus of this study, and the emphasis on parents and guardians, a model-based approach was found to be a good fit for this research.

Rosenstock (1974) credits the origin of the model to be the result of the research environment and the experiences and training of the researchers who contributed to the model's development. Considering the setting, Rosenstock states that during the 1950s (the defined starting point of HBM development), the Public

Health Service in the United States was focused mainly on preventing disease, not disease treatment. Furthermore, there was "widespread failure of people" (p. 328) to engage in disease-preventing behavior despite the various preventive measures (e.g., screening test) being free or inexpensive. Concerning the researchers, Rosenstock (1974) shares that he and colleagues were phenomenologically oriented, meaning they believed individual perceptions determines whether one will engage in a behavior. The development of HBM was not solely motivated by solving problems one by one, but with "a strong commitment toward theory building" and a commitment "toward the gradual accretion of scientific information by building on the work of others" (p. 329).

According to Rosenstock (1974) the driving assumption of the health belief model is that diseases have a negative value in a person's "life space" (p. 330), thus, people will try to move away from that "region" (p. 330), or the state of acquiring disease. In this study, the disease is HPV infection. In the context of HBM, in order for a person to engage in a preventive health behavior, Kansan parents and guardians getting their children the HPV vaccination in this study, a parent would need to believe that 1) their child is susceptible to getting HPV regardless of whether or not it is symptomatic, 2) that HPV would be, at minimum, of moderate severity, and 3) that getting their children the vaccine, would serve as a benefit by reducing the susceptibility or severity of HPV infection in their children. Furthermore, getting their children vaccinated would need to avoid having to overcome psychological barriers (e.g. economic, access, physical, social) (see Figure 7).

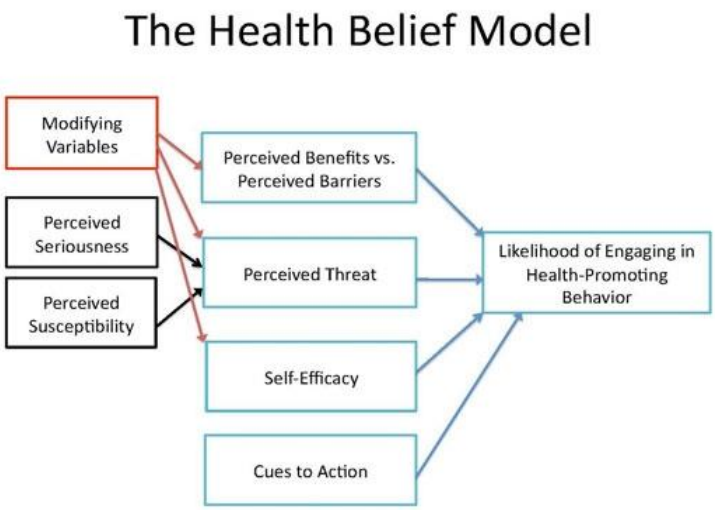

Figure 7: Representation of the health belief model (Clipartsgram.com, 2017)

Perceived susceptibility. Perceived susceptibility is the level of subjective risk that one feels that he or she has to acquiring a disease (Rosenstock, 1974). Rosenstock (1974) notes that while a person may acknowledge a statistical possibility of acquiring a disease, the same person may also feel their odds of acquiring the disease are low. For this reason, HBM focuses on personal perception of risk, and not scientific assessment of disease susceptibility.

Despite HPV being the most common sexually transmitted infection (Centers for Disease Control and Prevention, 2016n), some people perceive low personal susceptibility to infection. Cohen and Head (2013) conducted 83 in-depth interviews with women 18 to 26 years of age and found that participants who did not get the HPV vaccine "demonstrated a particular lack of understanding about their probability of susceptibility to HPV infection" (p. 1126). When women were asked about why

they did not get the vaccine, some participants responded that they did not feel it was necessary because they did not have sex a lot, or did not engage in promiscuous sexual behavior. Some participants indicated that their religious and moral beliefs, picking the right partners, and using birth control made them less at risk for infection. Regarding parents getting their children vaccinated, a study found that the two most common reasons that parents (with no intention to vaccinate during the next 12 months) gave for not getting their daughters vaccinated against HPV were that the HPV vaccine was not necessary and that their daughter was not sexually active (Centers for Disease Control and Prevention, 2013).

According to Rosenstock (1974), perceived susceptibility of a disease influences one's perception of threat from that disease, which in turn, influences the likelihood of engaging in a preventive health behavior. As this model extended to this research, it is likely that Kansas parents who perceive that their children are not susceptible to HPV infection are less likely to get their children vaccinated against HPV.

Perceived severity. Perceived severity focuses on the subjective feeling that acquiring a disease will have further negative consequences and implications on one's life. Rosenstock (1974) adds that the perception of severity could be the result of the health events caused by having a disease, or more distant events, such as social or economic consequences.

According to HBM, it is likely that the more severe a disease is perceived, the greater the likelihood of engagement in preventive health behavior (Rosenstock,

1974). Rosenstock (1974) states that "[p]erceived susceptibility and severity having a strong cognitive component are at least partly dependent on knowledge" (p. 331). An assessment of Kansan parents and guardian knowledge and awareness of HPV would provide insights into their perception of their children's level of susceptibility to HPV and how severe the consequences of HPV infection might be for those children. This could provide key insights about HPV vaccination rates among children in Kanas.

Perceived benefits and barriers. Rosenstock (1974) notes that while a person may feel susceptible to acquiring a disease, and that the disease is also severe, that the preventive health behavior may present varying levels of benefits and barriers. Benefits, perceived as efficacious steps to prevent and/or control acquisition of a disease, are factors that would encourage one to engage in a preventive health behavior. HPV vaccination's ability to protect Kansan children from infection and associated diseases would be a benefit. Research supports that the HPV vaccine can reduce the incidence of HPV-associated genital warts (Canvin, Sinka, Hughes, & Mesher, 2016). In England, researchers noted a decades-long trend of increasing incidence of genital warts. Then, following the introduction of bivalent (Types 16 and 18) HPV vaccine in 2008, there was a reduction in genital wart diagnoses of "30.6% among young women aged 15–19 years and 25.4% among same age heterosexual young men" (p. 125), demonstrating a positive outcome of HPV vaccination.

In HBM, barriers, perceived as negative factors associated with the preventive health behavior (e.g., expensive, painful), would discourage preventive health behavior engagement. An individual's demographic characteristics (e.g., age, sex,

gender, race), sociopsychological variables (e.g., socioeconomic class, social groups), and structural variables (e.g. knowledge about the disease) influence the perceptions of benefits and barriers of the preventive health behavior. Concerning the HPV vaccine, the benefits of preventing HPV infection and associated diseases may compete with barriers of cost, lack of effective initiatives, along with negative attitudes and beliefs about the vaccine.

Cost and legislation. Cost can be a barrier to engaging in preventive health behavior (Rosenstock, 1974). Without insurance, the HPV vaccine costs $130 per injection, $390 for three doses (The Henry J. Kaiser Family Foundation, 2015). However, because the HPV vaccine is recommended by the ACIP, it is covered by insurance in most cases (Centers for Disease Control and Prevention, 2016m). For parents who need assistance to pay for the HPV vaccine, the Vaccines for Children Program (VFC) provides vaccines for children 18 years of age and younger, those who are uninsured or underinsured, Medicaid eligible, or are American Indian/Alaska Native. Additionally, the Affordable Care Act (ACA) requires that new private insurance plans cover the HPV vaccine for adolescents (The Henry J. Kaiser Family Foundation, 2015). However, lack of insurance coverage or limited in-network providers in rural areas, along with grandfathered insurance plans that do not have to adhere to ACA guidelines may result in the HPV vaccine being costly (Schuchat, 2015). Recommendations have been provided to address barriers to HPV vaccination. Public financing resources such as Vaccines for Children (VFC) Program, the Immunization Grant Program, Medicaid, and the Children's Health Insurance

Program (CHIP), may help alleviate the financial burden of the HPV vaccine (Petrosky et al., 2015).

Across the United States, mandates, education, and funding programs have been implemented to increase access to the HPV vaccine, but these efforts vary. As of 2016, 29 states have no laws requiring HPV vaccination for school entry, funding to cover the cost of the vaccine, or requiring public education about the vaccine (The Henry J. Kaiser Family Foundation, 2015). Five states mandate funding for the vaccine, twelve states mandate education, two states mandate funding and education, one state and the District of Columbia mandate the vaccine for school entry, and one state mandates funding and requires the vaccine for school entry. Kansas has no laws requiring HPV vaccinations for school entry, for providing funding for the vaccine, nor for requiring public education about the vaccine (The Henry J. Kaiser Family Foundation, 2015).

Government initiatives. The Kansas Department of Health and Environment (KDHE), which "is committed to finding areas for continual improvement and working together to achieve success in preventing disease and injury, helping people manage existing health conditions and promoting healthy behaviors" (Kansas Department of Health and Environment, 2016a, p. 37), has a dedicated mission to stop the spread of sexually transmitted infections and HIV (Kansas Department of Health and Environment, 2016b). While HPV is a sexually transmitted infection, the Disease Intervention Program "focuses on gonorrhea, syphilis, and HIV, but also

provides some follow-up with chlamydia" (Kansas Department of Health and Environment, 2016b, para. 3) and does not mention HPV.

Information about Kansas' goals for addressing HPV however can be found in the *Kansas Cancer Prevention and Control Plan 2012-2016* (Kansas Department of Health and Environment, 2012). In their 2012 Plan, the KDHE outlines that one of its objectives is to increase the rates of HPV immunizations among adolescents. The agency's strategies are, first, to "[a]ssess the knowledge, attitudes, and practices of Kansas health care providers as it relates to HPV," and second, to "[d]evelop, coordinate, and disseminate tools to promote HPV vaccination based on assessment of Kansas health care providers and in partnership with key partners" (p. 21). In the Plan, KDHE states that 25.1% of females aged 13-17 years old reported being vaccinated with three or more doses of the HPV vaccine. The KDHE's five-year target goal was to increase that 25.1% to 40%. However, as the number of Kansas females who receive three or more doses of the HPV vaccine is reported to most recently be at 31.7% (Centers for Disease Control and Prevention, 2016a), the KDHE has fallen short of its objective. Concerning Kansas males 13-17 years of age, the *Kansas Cancer Prevention and Control Plan 2012-2016* reported no baseline data for Kansas males 13-17 years of age receiving three or more doses of the HPV vaccine, and had no five-year target objective.

While the *Kansas Cancer Prevention and Control Plan 2012-2016* strategies for increasing HPV vaccination rates stated that KDHE took into consideration the perspective and knowledge of Kansas healthcare providers, the agency did not report

the perspective and knowledge of Kansan parents and guardians of adolescents. Assessment of Kansas parents' attitudes, beliefs, and perception of risk surrounding HPV and the HPV vaccine may prove useful to explaining low HPV vaccination rates among adolescents in the state.

Attitudes & beliefs. Support for vaccines in the U.S. varies. In a U.S. national telephone survey, Gellin, Maibach, and Marcuse (2000) found that while the majority of parents support vaccination, about one-fourth believe that their child's immune system would be weakened if the child received too many immunizations. Slightly less than a quarter of surveyed parents (23%) felt that their children receive an excessive amount of immunizations. A more recent study found that 83% of U.S. adults think that vaccines are healthy for children (Doherty, Motel, & Weisel, 2015). The same study also found that nearly one-tenth of U.S. adults felt that vaccines were unsafe. This study gave participants the opportunity to express their opinions about vaccines in answer to open-ended questions. One participant stated that vaccinations are unsafe "[b]ecause they're injecting you with a disease to prevent a disease" (p. 3). Another participant stated that "[s]ome children cannot take the vaccines. They cause autism and other problems, muscular problems, occasionally, but not often" (p. 3) In another recent study, most Americans (82%) support requiring all school-age children being vaccinated against measles, mumps, and rubella (MMR), but 10% believe that vaccination risks outweigh the benefits (Funk, Kennedy, & Hefferon, 2017).

The opposition to vaccines can be often attributed to the anti-vaccination, or the "anti-vax," movement (Addis, 2015). Despite the immunity to disease that

vaccinations offer, and their potential to prevent illness, disability, and death, followers of the movement, (i.e., "anti-vaxxers"), often believe vaccines are harmful and ineffective. Anti-vaxxers range in their views from being completely against vaccines, to only supporting a select few vaccines, to supporting alternative vaccination schedules. Anti-vaxxers often root their stance in distrust of the government. In 2007, pediatrician Robert Sears published the book *The Vaccine Book: Making the Right Decision for your Child.* In his book, Sears suggests that the Centers for Disease Control and Prevention and pharmaceutical companies work together to create vaccines with the goal of achieving profit, even if it is at the expense of public safety (Offit & Moser, 2009; Sears, 2007). Sears also speaks at length about vaccine safety. Concerned that children receive too many vaccinations in their tender youth, Sears offers an alternative vaccination schedule, suggesting that parents can space out, delay, or even forgo various vaccinations. Sears also claims that anti-vaxxers can rely on other people getting vaccinated to protect them (herd immunity), and that some diseases, for which there are vaccines, are not harmful (Sears, 2007). Although this book has been widely criticized and has been said to contain misleading and false information, it has managed to sell an excess of 40,000 copies (Offit & Moser, 2009).

Sears is not the only successful person to influence people that vaccines can be unsafe. In 1998, former medical research and gastroenterologist Andrew Wakefield, along with his colleagues published an article in *The Lancet* that held that the measles, mumps, and rubella (MMR) vaccine was responsible for cases of autism

and bowel disease in children (Wakefield et al., 1998). More than a decade later in 2010, the article was retracted after a British medical panel found that Wakefield and colleagues had produced unethical and dishonest research (Harris, 2010). The influence of the article has and still continues to be felt, as people still fear that vaccines cause autism (Doherty et al., 2015), and even medical professionals have been found spreading anti-vaccine messages (Belluz, 2017).

In addition to parents expressing attitudes that the HPV vaccine is unnecessary for their children because they are not sexually active, some were concerned that the HPV vaccine would lead to children engaging in sexual activity (Brewer & Fazekas, 2007). In response to these concerns, Smith, Kaufman, Strumpf, and Lévesque (2014) conducted a study to investigate if there was evidence to support the fear of many parents that if girls were to receive the HPV vaccine, that it would invite them to engage more often in risky sexual behaviors. In the study, researchers collected data about 260,493 grade 8 girls in Ontario, Canada, two years before and two years after the implementation of the Ontario HPV vaccination program to see if those who received the vaccine (post program implementation) engaged in riskier sexual behavior compared to the control (before the program). To measure this, researchers looked at indicators for risky sexual behavior (incidence of pregnancy and non-HPV STIs) in grades 10-12. There was no evidence that vaccination increased risk of sexually risky behavior (RD: -0.61, RR: 0.96). Thus, research supports that this vaccine is not a license for increased sexual activity.

Cues to action and self-efficacy. Internal (e.g. psychological) or external

(e.g. a conversation with a clinician) cues to actions can prompt engagement in a preventive health behavior (Rosenstock, 1974). Recommendations for addressing attitude barriers that can prevent HPV vaccination include stronger HPV vaccine recommendations from healthcare providers, giving the vaccine to patients at the same time as T-DAP boosters and meningococcal vaccinations, giving frequent reminders, and allowing for quick vaccination visits (Centers for Disease Control and Prevention, 2015e, 2015g; Petrosky et al., 2015). It is also recommended that greater emphasis is placed on the vaccine as a cancer-preventing measure as research suggests that vaccination does not lead to increased sexually promiscuous behavior (Centers for Disease Control and Prevention, 2013; Smith et al., 2014).

The CDC has also published guides for how clinicians should talk to parents about the HPV vaccine. Some of the tips include "[r]ecommend HPV vaccination in the same way and on the same day as all adolescent vaccines," (p. 1) and guides clinicians to tell parents who are "worried my child will think that getting this vaccine makes it Ok to have sex" that "[s]tudies tell us that getting HPV vaccine doesn't make kids more likely to start having sex. I recommend we give your child her first shot today" (Centers for Disease Control and Prevention, 2016o, p. 1).

In 1988, the health belief model was updated to include the component of self-efficacy (Rosenstock et al., 1988). While a person can believe that she is susceptible to a disease, that it would be severe, and that engaging in a preventive health behavior presents more benefits than barriers, she would still have to believe that she "can successfully execute the behavior required to produce the outcomes" (p. 178).

Although this has been previously included under perceived barriers, its specific and separate categorization allow for "[g]reater advances in explanation, prediction, and control" in "reducing, not increasing, the range of dimensions included in this concept [perceived barriers]" (p. 179). Self-efficacy information can be based in performance accomplishments (e.g., going to get a child another vaccination), vicarious experiences (e.g., seeing a friend get his child vaccinated), verbal persuasion (e.g., a commercial telling a parent how to get their child vaccinated), and physiological states (e.g., anxiety about cancer causes a parent to get their child vaccinated). In the field of psychology, self-efficacy theory posits that "expectations of personal efficacy determine whether coping behavior with be initiated, how much effort will be expended, and how long it will be sustained in the face of obstacles in personal and aversive experiences" (Bandura, 1977, p. 191). Applied to HBM, Rosenstock et al. (1988) argue that the addition of self-efficacy is especially important when considering chronic illness and health issues requiring long-term changes and lifelong habits.

Self-efficacy was one of the variables analyzed by Briones et al. (2012) in their study of the representation of the HPV vaccine on YouTube. In their study, the variable was "defined as steps one could take to obtain the vaccine" (p. 481), and was present in 34.30% of videos analyzed. According to research, representations of self-efficacy could strengthen one's resolve to get the HPV vaccine, however more research is needed in this area to understand the variable's role in engaging in preventive health behavior.

The health belief model is a useful lens to approach the study of Kansan parent and guardian engagement in the preventive health behavior of getting their children vaccinated. The overview of literature highlights that previous HPV vaccine-related research focuses heavily on perceived barriers. However, it is suspected the HPV vaccine may be perceived by some Kansan parents and guardians as more than just a barrier, and possibly also a risk event.

Social Amplification of Risk Framework

In addition to health beliefs, this research also considers Kansan parent and guardian HPV vaccine-related risk perceptions. The popularity of the work done by Sears (2007) and Wakefield et al. (1998), along with studies that indicate that some people believe that vaccines are dangerous (Doherty et al., 2015; Funk et al., 2017) suggests that participants may perceive the HPV vaccine as a risk event. Thus, incorporating an additional lens of the social amplification of risk framework (SARF) is useful to analyzing perceptions of the HPV vaccine.

The social amplification of risk framework (SARF) (R. Kasperson et al., 1988) was introduced in the late 1980s, based in organizational risk communication as an:

> "[a]ttempt to overcome the fragmented nature of risk perception and risk communication research by developing an integrative theoretical framework capable for accounting for findings from a wide range of studies…to describe the various *dynamic* social processes underlying risk perceptions and response." (J. Kasperson et al., 2003, p. 13)

In the framework, a risk event occurs, defined by several characteristics (e.g. someone gets sick after receiving the HPV vaccine) (R. Kasperson et al., 1988). Information about that event is portrayed (e.g., in a social media post about someone becoming sick after receiving HPV vaccine), which in turn gives a signal about the risk event. The interpretation of the portrayal of the event could either amplify (e.g., thinking the HPV vaccine is dangerous) or attenuate the perception of risk (e.g. thinking the HPV vaccine is not dangerous). The interpretation and response to the risk event could have ripples (e.g., Kansan parents avoid getting their children the HPV vaccine), and even secondary impacts (e.g., incidences of HPV-associated genital warts increase among Kansan adolescents). While this research will look for evidence of related ripples and impacts, this dissertation is primarily concerned with the orientation of the HPV vaccination as a risk event and whether the perception of risk is amplified or attenuated through social media channels (see Figure 8).

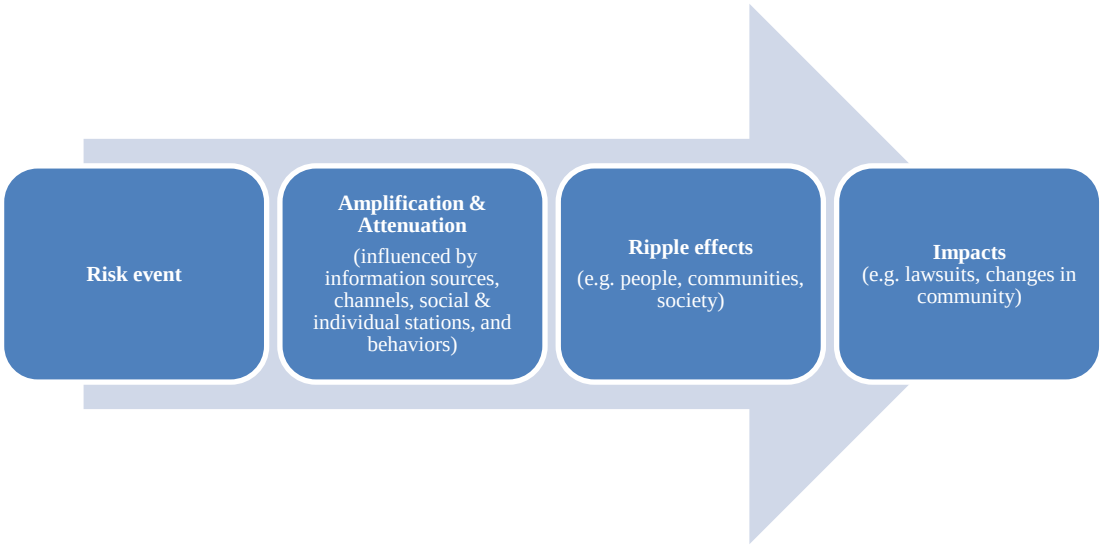

Figure 8: Redux representation of the social amplification of risk framework.

Risk amplification and media. According to SARF, risk is not only a physical experience, but also "the result of processes by which groups and individuals learn to acquire or create *interpretations of risk*" (J. Kasperson et al., 2003, p. 15). Interpretations, according to the model, are influenced by interactions between sources of information, information channels, social stations, individual stations, and institutional and social behavior. The interpretation in turn can amplify one's perception of risk, or attenuate it.

Originating in organizational risk communication, SARF has also been applied to the analysis of health-related events ranging from Bovine Spongiform Encephalopathy (BSE) and the British media (Eldridge & Reilly, 2003), to the influence of mass media and blame related to the Plague and arsenic levels in India (Susarla, 2003). In their study of BSE and the British media, Eldridge and Reilly (2003) found that the number of news stories focused on BSE did not represent the number of reported BSE cases. In fact, the number of BSE-related news articles peaked when the number of reported cases was lower, and when there was peak in reported cases in 1996, the number of news articles was on the decline, demonstrating that panic does not always mirror reality. Furthermore, media can have a role in blame. In his study of arsenic and Plague cases in India, Susarla (2003) found that there were incidences of mass media stories assigning blame for the Plague to the victims, and inferred from this that the characteristics of mass media blaming messages may matter as much as the quantity of their presence.

The HPV vaccine has potential side effects (e.g., headache, injection site reactions, nausea) (U.S. Food and Drug Administration, 2011). The CDC states that despite the potential side effects that the HPV vaccine is safe. To test their safety, the different types of HPV vaccine were tested in 74,000 volunteers, and monitoring systems are in place to oversee adverse events. Adverse events are classified as serious if they threaten one's life, result in death, lead to disability, birth defects, or prolonged hospitalization. The CDC states that from June 2006 to March 2016, nearly 79 million doses of Gardasil® have been distributed and that 33,945 adverse events have been reported in the United States. There were also 232 reported adverse cases related to Cervarix® (of 720,000 doses), and 1,447 adverse event cases related to Gardasil® 9 (of 10 million doses), nationwide. Of the reported adverse events, 7% were reported to be serious. Also, although 117 deaths were reported in people who received Gardasil® between June 2006 and September 2015, the CDC concluded that there was no evidence that Gardasil® was the cause of death.

The review of literature demonstrates that if one perceives the HPV vaccine as dangerous, that it could be a barrier to vaccination. It is then useful to examine if the portrayal of the HPV vaccine could possibly amplify Kansan parents' and guardians' risk perceptions. Going a step further, it may be useful to analyze the role of media in shaping HPV vaccine-related risk perceptions, as the studies conducted by Susarla (2003) and Eldridge and Reilly (2003) emphasize the role of media in risk messaging. Specifically, given the increase in the function and popularity of the internet, particularly social media, this study focuses on the HPV vaccination-related messages

from that channel.

Internet Use and Health Information

When the Pew Research Center began keeping record in 1995, a survey reported that 14% of U.S. American used the internet (Pew Research Center, 2017a). As of January 2016, a reported 88% of U.S. American adults use the internet (Pew Research Center, 2017b). The internet has become a source of information and influence for health. A survey found that 35% of U.S. adults have used the internet to diagnose a medical condition for themselves or someone else (Fox & Duggan, 2013). These searches would have mixed results. Nearly half (46%) of the respondents reported that their research made them think that they needed the attention of a medical professional, while 38% thought it could be handled at home, and the 11% thought it was either both or somewhere in the middle of spectrum. Less than half (41%) of people who researched and diagnosed from online information have a medical professional confirm a diagnosis(Fox & Duggan, 2013). Often times, many of those (35%) that diagnosed from online research did not get a professional opinion, and a number of those who did (18%) reported that a medical professional either offered a differing opinion or did not agree with the online-based diagnosis.

This same survey found that women are more likely than men to diagnose conditions from information found on the internet (Fox & Duggan, 2013). Additionally, younger, white, wealthier (i.e., house incomes of $75,000+, and more educated [i.e., those with college degrees or greater]), are more likely to go online to try to diagnose a condition.

The internet has facilitated the ability of health information to become more social. Twenty-six percent of U.S. adults report reading or watching someone else's health or medical issue experience within the past year and 16% report going online to find others who share in like health concerns (Fox & Duggan, 2013). Seventy-two percent of U.S. adult internet users reported looking online for health-related information in the past year (Fox & Duggan, 2013). Of those searches, 77% began on search engines (e.g. Google), 13% on a website which specializes in providing health information (e.g., Centers for Disease Control), 2% began on general websites (e.g., Wikipedia), and 1% began on a social media website (e.g., Facebook).

Although only 1% of health-related information searches begin on social media, this is certainly not where the influence of social media on health information ends. Social media influences how people now gather, communicate, and perceive health-related information, like the HPV vaccine.

Social media. Developments in technology have allowed for expression, communication, and information-seeking on digital platforms in the form of *social networking sites* (Ellison & boyd, 2013) (also known as SNS; hereafter *social media*). Ellison and boyd (2013) define social media as networked communication platforms possessing these three characteristics:

1. The ability for users, or entities, to create unique profiles (which can be done at the individual, group, or organizational level).
2. The ability for entities to publicly articulate their connections with other entities.
3. The ability for entities to consume, produce, and interact with user-generated content through their connection with other entities.

To illustrate what distinguishes a social media platform, one can look at the difference between Facebook and Netflix as an example. On Facebook, an individual can subscribe and create a profile (Facebook, 2017b) as well as add connections (*friends*) (Facebook, 2017a) which can be publicly displayed. Users create their own posts, view the posts of other users, and interact with those posts through reactions, comments, and shares (Facebook, 2017d, 2017e). In contrast, on Netflix, while a subscriber can create a profile (Netflix, 2017), users do not have the ability to connect with other members using different accounts, thus they are unable to publically articulate those connections. Additionally, there are no possibilities to produce content or interact, save the ability to rate available media. Therefore, Ellison and Boyd's (2013) definition would qualify Facebook as a social media platform, but not Netflix.

Ellison and boyd (2013) note that a challenge to defining social media is that both the characteristics and expectations for social media platforms continue to evolve. For example, the establishment of connections between entities varies from one social media platform to another. On Twitter, users can engage in *following*

(Twitter, 2017). When one user follows another, he or she subscribes to the other user's *tweets*, seeing the other user's updates, and can receive direct messages from the followed user. However, "[f]ollowing on Twitter isn't mutual. Someone who thinks you're interesting can follow you, and you don't have to approve it or follow them back" (sec. 10) However on another social media platform, Facebook, when you request to add another user as a *friend*, if the invitation is accepted "you automatically follow that person, and they automatically follow you" (Facebook, 2017a, para. 1). Thus, while connections on Facebook are mutual, connections on Twitter can be either mutual or one-way paths.

Internet, social media and health information. Anticipating the influence of social media, researchers have studied its relationship with health. Since near its beginnings, researchers have found that Facebook, in particular, provides an accessible channel for patients and healthcare professionals to share with one another their experiences related to disease (Farmer, Bruckner Holt, Cook, & Hearing, 2009). Looking at social media in more general terms, Moorhead et al. (2013) conducted an analysis of literature to "identify the uses, benefits, and limitations of social media for health communication among the general public, patients, and health professionals" (p. 1). From their analysis of 98 original research publications (published 2007-2012), the researchers identified the following seven uses of social media for health communication: (1) providing health information for a range of health conditions (general public, patients, health professionals); (2) providing answers to medical questions (general public, patients, health professionals); (3) facilitating patient-to-

patient and patient-health professional conversation (patients, health professionals); (4) collection of data on patients about their opinions and experiences (patients, health professionals); (5) conducting health interventions, promotions, and education (general public, patients, health professionals); (6) reducing stigma (patients, health professionals); and (7) providing consultations online (patients, health professionals).

Despite the health communication uses and benefits that social media affords, there are also limitations to its use. According to Moorhead et al. (2013), limitations included the following: diminished reliability (general public, patients, health professionals); concerns about quality (general public, patients, health professionals); diminished confidentiality and privacy (general public, patients, health professionals); lack of awareness of risk associated with disclosure of personal information on the internet (general public, patients); risk associated with using social media and communicating incorrect or harmful advice (general public, patients); information overloading (general public, patients); uncertainty in correctly applying online information to personal health issue (general public, patients); inequity in effectiveness of social media to bring about behavior change (general public); adverse health outcomes (general public); negative health behavior (general public); deterring patients from visiting healthcare providers (patients, health professionals); non-use of social media to communicate to patients (health professionals). Research has also found that online access to information can be helpful, but if not coupled with training about where and how to search for information could have negative consequences (e.g., waiting too long for appropriate healthcare) (Geana & Greiner,

2011). Concerning a particular forum, the analysis conducted by Moorhead et al. (2013) also found that Facebook was the most frequently reported social media site used, with sexual health topics being the most frequently discussed. It is likely that how these topics (e.g., the HPV vaccine) are discussed in social media could influence the perceptions of these topics.

Representations of the HPV vaccine on internet and social media. HPV vaccination is one of the many sexual health topics that have been discussed on the internet and in social media. McRee et al. (2012) examined associations between parents' information-seeking habits with their knowledge, attitudes, and beliefs about the HPV vaccine. The researchers found that information had a positive influence on parents' knowledge and attitudes. However, the study did not analyze where on the internet parents sourced their information. In another study, Battles (2010) analyzed discussions about the HPV vaccine on public internet message boards and found that members mostly had positive attitudes toward the vaccine and shared information such as opinions about when best to get the vaccine, whether or not they planned to be sexually active, and their reasons and barriers to getting the vaccine. These studies demonstrate the use of the internet as a forum for generating discussion about the HPV vaccine.

On social media, Keelan, Pavri-Garcia, Tomlinson, and Wilson (2007) conducted a content analysis of YouTube videos as a source of information about immunizations, and analyzed claims about various vaccines. Of the sample of 153 videos, the researchers found that the HPV vaccine was the most commonly

discussed vaccine (36 videos, 24% of the sample), supporting that it is popular topic of discussion. Ache and Wallace (2008) also analyzed YouTube videos, specifically about the HPV vaccine. The researchers found that most of the content was user generated, and that three-quarters of the videos in their sample portrayed the vaccine positively. In another study analyzing YouTube videos, Briones et al. (2012) found in their sample of 172 videos that most videos were negative and disapproving of the HPV vaccine. Another finding was that negative videos were found to have information about the HPV vaccine that was not factual, and had more allusions to conspiracy theories and threats to civil liberties than positive videos possessed.

On the social media website Myspace, Keelan et al. (2010) found that most posts about the HPV vaccine were positive (52%), but many were negative (43%). In this study, the researchers also studied the location of the users involved in the conversation, finding that opinions (positive/negative expression) were related to geography. Negative blogs focused more on questions of safety, cost, objected mandatory vaccination policies, collusion by companies and the government, and argued the position of abstinence and monogamy as an alternative to the HPV vaccine.

There is evidence that the presence of negative HPV vaccine-related social media post can lead to negative perceptions and responses. Dunn, Leask, Zhou, Mandl, and Coiera (2015) examined whether or not exposure to negative opinions about the HPV vaccination via Twitter communities is associated with "the subsequent expression of negative opinions" (p. 1). The researchers found that those

who were more often exposed to negative opinions were more likely to post negative opinions themselves. In another study Nan and Madden (2012) performed an experiment where they exposed college students to either a negative or positive blog post about the HPV vaccine. When compared the control group, those who were exposed to the negative blog post held more negative views toward the vaccine, perceived it being less safe, and expressed reduced intentions to get the vaccine. Exposure to the positive blog post, meanwhile, changed neither the participants' perceptions nor attitudes toward the vaccine, nor their intentions to get vaccinated. In summary negative posts about the HPV vaccine may have more an effect than positive posts in influencing perceptions.

This research recognizes the incredible value that previous studies have in providing a foundation for this dissertation research. At the time of this particular study, however, there is a gap in research related to examining the representation of the HPV vaccine on the social media site Facebook – the most used social media site among U.S. adults (Greenwood et al., 2016), a popular forum for discussions about sexual health Moorhead et al. (2013). Also absent is research about HPV vaccine-related risk messages.

Facebook. Not all social media platforms are used equally. Since the beginning of measuring social media use, the Pew Research Center has found that Facebook is consistently the most popular social media platform among U.S. adults 18 years of age and older (Greenwood et al., 2016). In 2012, a little over 60% of online U.S. adults used Facebook; this number has increased to 79% as of 2016. The

use of other social media platforms such as Instagram (32%), Pinterest (31%), LinkedIn (29%), and Twitter (24%), have much lower usage rates among U.S. adults, by comparison.

Facebook was launched in 2004 (Facebook, 2017f). Initially developed to network university and college students, Facebook launched the "Facebook Wall" which allowed people to post messages to their social connections, or "friends." Facebook reached one million active users on December 1, 2004, and the number of users would only continue to grow. In 2005, Facebook would increase their accessibility by allowing people to subscribe through high school networks, and even adding international school networks later that same year. That year also saw the addition of Facebook Photos, and the number of users growing to six million.

In 2006, Facebook for Mobile was launched, further increasing user access (Facebook, 2017f). The number of users who would be able to subscribe would increase yet again with the addition of work networks, finally expanding availability to people regardless of their network connections. At the end of 2006, Facebook reported having 12 million active users. Also Facebook introduced the News Feed, which "updates a personalized list of news stories throughout the day" (Facebook, 2006, para. 2), increasing users' ability to stay current on the activity of other users and events.

A variety of additions, such as Facebook Video (2007), and the ability to access Facebook in different languages (e.g. Spanish, 2008) would further entice more users to subscribe (Facebook, 2017f). Facebook would introduce the ability for

users to go beyond messaging and react via comments to a user's wall in 2008 (Facebook, 2008) and the "Like" button in 2009 (Facebook, 2017f). The number of users continued to grow, reaching 500 million active users by 2010. The company would unveil the latest iteration of Facebook, "Timeline," in 2011, allowing for users "an easy way to rediscover the things you shared and collect your most important moments" and "tell your story" (Facebook, 2011, para. 2-4). Additionally, users were now able to subscribe (or not) to the profiles and pages of others, allowing control of how often content from various users appears on one's News Feed (Rait, 2011). By 2012, Facebook had more than one billion active users (Facebook, 2017f). The company would introduce the "Share" button feature to mobile devices, allowing users the option to quickly share stories from other pages and profiles with their social network (Koolwal, 2012).

In 2013, Facebook introduced Like and Share buttons that allowed not only allow for exchanges of and reactions to posts inside of Facebook, but also across the internet (He, 2013). Furthermore, the company introduced Embedded Posts (Capra & He, 2013). According to Capra and He (2013) in Facebook's Newsroom, "[w]hen embedded, posts can include pictures, videos, hashtags, and other content" (para. 3). For example, if someone includes a hashtag in his or her post (a "#" followed by a single word/topic/phrase without spaces, punctuation, or special characters (Facebook, 2017c)), that hashtag is now able to be clicked, revealing similar content posted on Facebook (Capra & He, 2013).

Also in 2013, Facebook introduced “Graph Search” (for users using U.S. English) which would allow people to search for more than just other users, but also for “something specific across people photos, places, interests, and more” (Facebook, 2013). Facebook would enhance would enhance the now just known as “Search” feature (now available across the world) in 2015 (Stocky, 2015). Facebook reported that this is intended to be a long-term task, as there are more than one and a half billion daily searches, and more than two trillion posts in their index. Through this feature, users have the ability to search public posts and conversations along with posts from friends from any point in time. Users also have the ability to control the audience of posts, both past and present. This feature makes it possible to search HPV-vaccine related posts across Facebook.

In 2016, Facebook increased the way that users can interact with content through launching the “Reactions” feature globally (Facebook, 2017f; Krug, 2016). Reactions, which Facebook describes as “an extension of the Like button” (Krug, 2016) allows users to react to a post in a greater variety of ways. In addition to Like, added reactions include “Love, Haha, Wow, Sad, or Angry.” That same year, Facebook reported an average of 1.18 billion active users and 1.09 billion active mobile users each day. Facebook’s reach to such large populations also suggests that the messages on the platform, including HPV vaccine-related messages, have an audience who can engage with the content in a variety of ways.

Facebook use in the U.S. and Kansas. No reliable data about Facebook use on the state-level was found in the review of literature, and was inferred by other

statistics. It is estimated that Kansas population was 2,907,289 as of July 1, 2016 (United States Census Bureau, 2017). Slightly more than three-quarters of Kansas (75.3%) are 18 years of age or older.

Based on available data, if 75.3% of the Kansas population is 18 years of age or older (United States Census Bureau, 2017) there would be approximately 2.1 million adults in Kansas. Based on data reported that 88% of U.S. adults use the internet (Pew Research Center, 2017c), it is estimated that 1.9 million Kansas adults use the internet. Applying the U.S. national data that 79% of adult internet users use Facebook, it is estimated that 1.5 million adult Kansans would be Facebook users. This is a large audience, which if influenced by HPV vaccine-related messages, could possibly be reflected in statewide vaccination rates.

Research Questions

The review of literature suggests that the health beliefs and risk perceptions held by Kansan parents and guardians may have a role in determining HPV vaccine acceptance. Their acceptance or refusal of the HPV vaccine could in turn affect HPV vaccination rates among Kansan children. The HPV vaccine-related HBM perceptions of specifically Kansan parents and guardians are an uncharted area of research. In the context of the social amplification of risk framework, research about HPV vaccine-related perception is also uncharted. In addition to awareness of their perceptions, awareness of how Kansan parents and guardians engage with the media provides insight into who are the key stakeholders in influencing their knowledge. Information about the influence of social media provides insights of the influence of a

pervasive and ever-developing source of messages. This dissertation was designed to address these gaps in research to further knowledge about a phenomenon and theoretical application and asks these research questions:

RQ1. What are the perceptions that Kansan parents and guardians have about the human papillomavirus (HPV) vaccine as they relate to the health belief model and the social amplification of risk framework?

RQ2. Regarding information about the HPV vaccine, how do Kansan parents and guardians engage with HPV vaccine-related information on social media?

For these research questions, a survey was conducted to ascertain how the population of interest, Kansan parents and guardians of vaccine-eligible children (ages 9-17 years), perceive the HPV vaccine and engage with health information about the vaccine on social media. The review of literature demonstrates that there is a wealth of information about the reasons for low HPV vaccination rates at the national level in the United States, but that regional level, specifically in Kansas, information is absent. A survey provides a means for analyzing the factors related to this phenomenon, as a survey is "a social scientific method for gathering quantifiable information about a specific group of people by asking the group members questions about their individual attitudes, values, beliefs, behaviors, knowledge, and perceptions" (p. 214). Kansan parents and guardians are the focus population in this dissertation because they are charged with the responsibility of getting their children vaccinated, and thus affect vaccination rates, which are currently low across several demographic groups in the state. Furthermore, Kansan parents and guardians of

children ages 9-17 years are of specific interest because children in this age group are eligible to receive the vaccine, and have not reached the age of majority.

Developing the survey in the context of the health belief model is appropriate because of the model's focus on the influence of beliefs on preventive health behaviors, in this case, the respondents' children receiving the HPV vaccine. The additional focus through the perspective of the social amplification of risk framework assists the analysis by allowing research to examine held perceptions in a more dynamic way, beyond the assumption of the HPV vaccine being perceived as a preventive health behavior.

Due to the lack of previous regional-level research regarding low-HPV vaccination rates and the role of parents and their beliefs, a series of semi-structured interviews with members of the target population were conducted prior to survey distribution. Hesse-Biber and Leavy (2011) explain: "[i]nterviewees often have information or knowledge that may not have been thought of in advance by the researcher" (p. 102). Information from the interviews could reinforce or expand on concepts observed in the literature review, but also help survey development to be designed specifically for the target audience.

The research inquiry that this dissertation pursues does not end with the perception of Kansan parents and guardians. In addition to perceptions of the HPV vaccine, this dissertation also investigates messages communicated by social media in the context of the health belief model and social amplification of risk framework, and how these messages compare to messages from the nation's health agency, the CDC.

To analyze these messages, a quantitative content analysis was found to be the most appropriate methodological approach. A quantitative content analysis is a replicable method that allows one to systemically assign numeric values to communication symbols, so that statistical methods can be applied which allow the researcher to infer conclusions about communication phenomenon, all done in the context of theoretical approaches (Riffe, Lacy, & Fico, 2014). The findings from this analysis assist in answering the third and fourth research questions:

RQ3. What are the prevalent HPV vaccine-related messages in posts on the social media site Kansan parents and guardians use most often, in the context of the health belief model and social amplification of risk framework?

RQ4. How do prevalent HPV vaccine-related messages in posts on the social media site media site Kansan parents and guardian use most often, in the context of the health belief model and social amplification of risk framework, compare to HPV vaccine-related messages in posts published by Centers for Disease Control and Prevention in the decade since the HPV vaccine was approved by the U.S. Food and Drug Administration (FDA) (2006-2016)?

The review of literature found that since the HPV has been available, there have been a wealth of studies conducted focusing on its representation on the internet, and on social media in particular (Ache & Wallace, 2008; Briones et al., 2012; Keelan et al., 2010). These studies, over time, have found a variety of results, some of which may appear to contradict one another. It is suspected that the representation, and by extension the perception, of the HPV vaccine may have changed over time. As

the vaccine has been now available in the United States for ten years, this is an optimal time to conduct a longitudinal analysis on the representation of the vaccine on social media. Even more, how messages on social media in general compare to the messages from the Centers for Disease Control and Prevention – a U.S. government organization charged with the role of "[p]romoting healthy and safe behaviors, communities and environment" (Centers for Disease Control and Prevention, 2014a), is also of interest, and may provide insight into how aligned the public is, or is not, with government health interests.

While several studies have focused on blogs, Twitter, Myspace, and YouTube, the most used social media site among adults over 18 years of age in the United States, Facebook, was often not the social media of focus. Other social media sites had search capabilities (as indicated in the previous studies), but Facebook did not have search capabilities until 2013. Given this development, the use of Facebook among adults (which would the survey would support), and the high presence of discussion of sexual health topics on this platform, the findings from the survey, and that the CDC maintains pages on the platform, Facebook was the most relevant platform to use for as the source of content for analysis.

Chapter 3: Methods

Addressing the research questions required the implementation of several research methods, resulting in this dissertation being a mixed methods project. Because the first two research questions focus on perceptions and behaviors of Kansan parents of children ages 9-17 years, the researcher chose to conduct qualitative interview that informed an eventual a survey, collecting data from the target population. As the latter research questions focus on the prevalence of HBM and SARF-related characteristics in social media messages, a quantitative content analysis was conducted for data collection.

Pre-survey Interviews

Materials and methods used in the process of developing the interview and survey instruments and the process of data collection were approved by Human Research Protection Program, the research institutional review board of the University of Kansas (IRB ID: STUDY00140067), on October 4, 2016.

Kansan parents and guardians of children ages 9-17 (n = 4) were recruited via snowball sampling of personal contacts, reached through face-to-face conversation and electronic messaging. The interviewees were interviewed in December 2016 and January 2017. Three of the interviews were conducted in-person on the campus of a public university and one was conducted over the telephone. Participants were furnished with an information statement either electronically or in person. Consent to audio record the interview was required to participate.

The interviews lasted between approximately eight (8:02) and twelve (12:02) minutes. Interviews were transcribed and analyzed. The original audio recordings were destroyed upon completion of this dissertation project**.**

Protocol. The interview schedule (see Appendix 1) included questions about the participants' children (ex. "how many children do you have?), challenges about finding information related to their children's health issues, sources of that information, social media use, familiarity with HPV and the HPV vaccine, whether they had seen information about either on the internet or social media, perceptions towards vaccinations in general, the HPV vaccination status of their children, intent to get their children vaccinated against HPV, and demographic questions.

Analysis. The transcriptions (discussed in the findings chapter) were analyzed via a close reading. Themes were repeated across the four interviews and often reinforced findings from the literature. The results of the analysis were used to tailor the final survey instrument to the target population of Kansan parents of children ages 9-17 years. Findings led to the inclusion of questions about HPV and HPV vaccine awareness and their main source of information about the virus and vaccine. The interviews also prompted the researcher to ask participant about their social media and who they recall posting information about the HPV vaccine. Furthermore, interview findings influenced the inclusion of survey questions asking the HPV vaccination status of participants' children and about HPV vaccination intentions.

Survey

Recruitment. The survey was generated and administered online using Qualtrics software (Qualtrics, 2017), and survey data were collected January 31, 2017 - March 21, 2017. To recruit participants, the survey hyperlink was sent to each county health department administrator of all 105 counties in Kansas, and several directors of the Kansas Department of Health and environment. Each email was also followed up by phone call. A total of 38 county health departments (Barber, Barton, Butler, Chautauqua, Cherokee, Clark, Clay, Crawford, Douglas, Ellis, Finney, Graham, Grant, Harvey, Hodgeman, Jewell, Johnson, Logan, Marshall, Meade, Osage, Ottawa, Pawnee, Pottawatomie, Reno, Rice, Riley, Shawnee, Sheridan, Sherman, Stafford, Stanton, Stevens, Thomas, Wichita, Wilson, Washington, and Wyandotte), the Bureau of Family Health Director, and the Director of the Bureau of Disease Control agreed to assist in distributing the survey by posting a link to webpages and social media pages that they manage. The researcher also posted the survey hyperlink to personal social media accounts and sent it via email to personal contacts.

Instrument. The survey instrument (see Appendix 2) consisted of the following 13 sections: informed consent, eligibility, parent/guardian information, HPV awareness, HPV perceptions, HPV vaccine awareness, HPV vaccine perceptions, media use, social media and HPV representation perceptions, social media and HPV vaccine representation perceptions, HPV vaccination status of children, demographics and additional questions.

The informed consent section provided participants with the informed consent letter approved for the study. Respondents who did not agree to the terms of the study as defined in the informed consent letter were directed to the end of the survey. The eligibility section asked participants if they lived in Kansans, and if they were the parent or guardian of a child age 9-17 years old. If participants indicated "no" to either of these questions they were directed to the end of the survey. If they participants indicated "yes" to both of these questions, they were allowed to proceed in the survey.

The HPV awareness section asked respondents if they had ever heard about HPV (human papillomavirus). If yes, respondents were then directed to answer questions about HPV perceptions. Respondents were asked about the perceptions of HPV on a six-point Likert scale (i.e. "strongly agree," "agree," "somewhat agree," "somewhat disagree," "disagree," "strongly disagree," and "I don't know" [treated as missing responses]). Perceptions were gauged in a series of statements about HPV in the context of the health belief model (perceptions of children's susceptibility to HPV infection, and the perception of severity of HPV infection in their children) and the social amplification of risk framework (is HPV perceived as a risk to their children).

In the following HPV vaccine awareness section, respondents were asked if they had heard of the HPV vaccine (either by that term or other terms, e.g. Cervarix®, Gardasil®, or human papillomavirus vaccine). If so, they were then directed to questions about HPV vaccine perceptions. In this section, respondents were asked about their perceptions of the HPV vaccine in the context of HBM (perceived benefits

and barriers related to getting the HPV vaccine for their children) in addition to SARF (is the HPV vaccine perceived as a risk to their children).

Respondents were then directed to questions related to their media use. They were asked about their main source for learning about health information for their children, questions about social media use, and if/where they had heard about HPV and the HPV vaccine on social media. Respondents who indicated that they had seen information about HPV were then presented with questions about social media and their perception of HPV representations. Respondents were asked to evaluate their level agreement with statements about how social media represents HPV in the context of HBM (perceived susceptibility of their children, and perceived severity of HPV infection in their children) and SARF (is HPV infection in their children a risk). Once again, participants were asked to evaluate statements on a six-point Likert scale. Respondents were then asked questions about if and how social media influences their perception of HPV.

Respondents who indicated that they had seen information HPV vaccine on social media were then presented with a section of questions about their perception of HPV vaccine representations on social media. Respondents were asked to indicate their level agreement with statements about how social media represents the HPV vaccine in the context of HBM (perceived risk and barriers to getting the HPV vaccine for their children) and SARF (is HPV vaccination for their children a risk) on a six-point Likert scale. Respondents were also asked about if and how social media influences their perception about the HPV vaccine.

In the next section, parents were asked about the vaccination status of their children. Respondents who indicated that their children had not received the HPV vaccine were then asked about whether they had any intent on getting their children vaccinate before they were 18 years old. In the penultimate section of the survey, parents were asked about their demographic characteristics (e.g. sex, race, ethnicity, year of birth, county of residence, highest level of education, and household income).

In the event that respondents indicated that they did not know what HPV and/or HPV vaccine were, they were not prompted to answer questions about related personal perceptions, perceptions of social media representations, and vaccination status of their children. Instead, respondents were furnished with a short description of HPV and the HPV vaccine, and then asked if they would engage in follow-up actions after receiving the information.

Analysis. To answer the first research question regarding Kansan parents and guardians HPV vaccine-related perceptions, eligible, completed surveys were analyzed, using descriptive statistics to calculate the percentage of respondents who were and were not aware of HPV and the HPV vaccine. Descriptive statistical analyses were conducted to study and report how respondents perceived the HPV vaccine in the context of HBM: their children's susceptibility to HPV infection, perception of HPV infection severity, vaccine benefits and barriers, self-efficacy to get their children vaccinated, and receptions of cues to get their children vaccinated. These analyses were also used to measure respondents' HPV vaccine related risk perceptions in the context of social amplification of risk: amplification or attenuation.

Among those who indicated that they were not aware of HPV or the HPV vaccine, descriptive statistics were applied to analyze intended behaviors after receiving information about the virus and vaccine. Furthermore, the descriptive statistics were applied to measure the HPV vaccination status of the respondents' children, and their intent to get them the HPV vaccine prior to their eighteen birthdays.

For the second research question examining how Kansan parents engage with HPV vaccine-related from social media, descriptive statistics were calculated to report media usage among respondents who completed the survey. The same statistical procedures were applied to analyze respondents' recall of HPV vaccine-related posts on social media in the contest of HBM (susceptibility, severity, benefits, barriers, self-efficacy, and cue to action) and SARF (amplification). Also analyzed were their perceptions of how much social media has influenced their own perceptions about the HPV vaccine. Data analyses were performed using Qualtrics (Qualtrics, 2017) and SPSS version 23.

Content Analysis.

Protocol. The unit of analysis was an individual public Facebook post. This study defines a public post as the content of an individual post that can be viewed by the public and not just personal connections, as it appears in a search result feed. Searches on Facebook indicate if a post is public. The posts will be analyzed as they appear in the search results, how it appears on one's actual personal feed, and excludes text beyond the readily displayed information as shown by the Facebook software (unless one clicks "see more" or "continue reading") (see Figure 9).

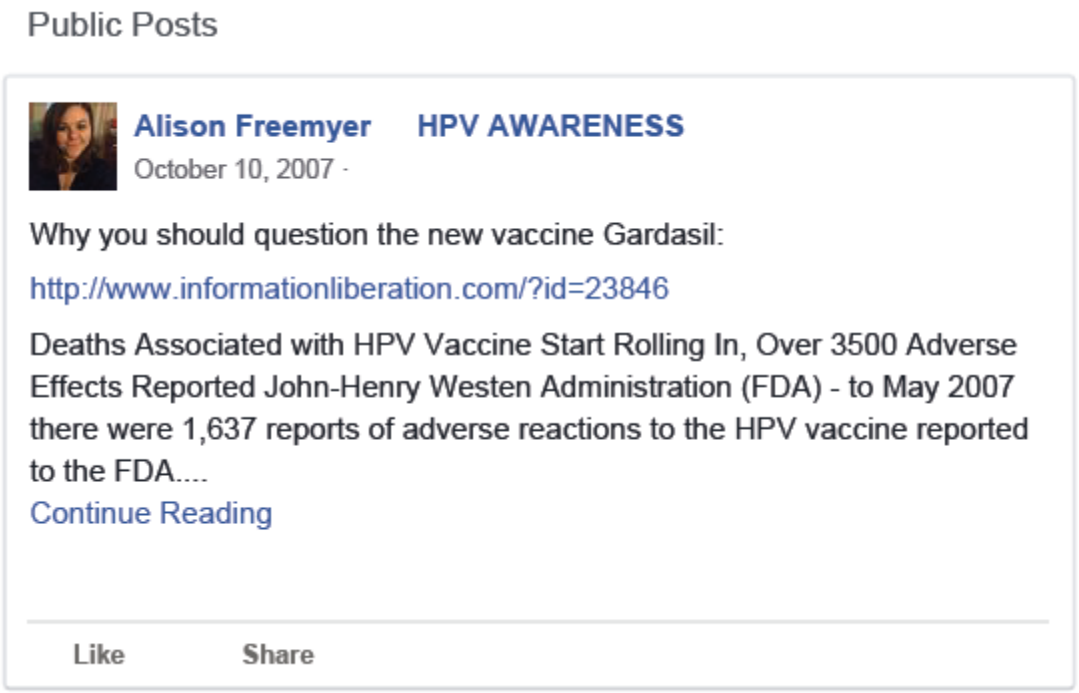

Figure 9: An example of a public post. This is the first post under the header “Public Posts.” This post was found using the search term "Gardasil."

Non-public posts were not included in the sample as they are not available to all audiences beyond the researcher, reducing the replicability of this study. Furthermore, the researcher assumed that if the post was not public that the author of the post has some expectation of the message remaining private.

The Facebook search feature was used to collect posts. Searches were conducted February 10-16, 2017. The search terms *Cervarix, Gardasil, HPV vaccine,* and *human papillomavirus vaccine,* were used to focus the search on the type and brand names of the vaccine of interest. When searching the terms, the researcher used Facebook’s filters to search at the most specific available date level (year, month).

The search was limited to Facebook posts that were published between June 2006 and June 2016, a decade-long span. The returned results could not be organized by date, but are, according to Facebook's algorithm, organized by relevance (personal context, social context, the query, and global popularity) (Wable, 2010). To gather posts from the CDC, two additional sets of searches were performed which added a filter that allowed the researcher to collect Facebook posts using the defined search terms on two Facebook pages run by the Centers for Disease Control and Prevention ("CDC", and "CDC STD"). The researcher printed the results from each search using a portable document format (PDF).

Due to limitations imposed by how Facebook displays archived public posts and the limited technological capabilities of the computers used to compile the retrieved data, the researcher was only able to save the first 40 pages of each search (a page is defined as all the unique posts displayed in the internet browser at one time). A total of 21,130 posts were collected in from the searches (see Table 8).

Table 8: Results by Search Term

Source	Cervarix	Gardasil	HPV vaccine	Human papillomavirus vaccine
All of Facebook	3,615	7,987	7,755	1,733
CDC	-	-	35	-
CDC STD	-	-	5	-
Total: 21,130	3,615	7,987	7,795	1,733

Various posts were excluded from the final sample. Because this study was concerned with analyzing posts published in the decade since the HPV vaccine's debut, posts published before June 8, 2006 and after June 8, 2016, or had no posting date available were excluded from the sample. Posts that were not public were also excluded from the sample. This sample also excluded posts that were not written in English (including those translated by Facebook), or that were deemed irrelevant (e.g., did not discuss the HPV vaccine, or only had the search term in the author or audience name, or the search term was not found in the post before clicking "continue reading").

After the preliminary exclusions, due to time constraints in conducting this study, the researcher determined that for years where a search of terms yielded more than 300 posts, only 300 randomly selected (via random sequence generator) posts from that year/search term would be included in the final sample for analysis. After exclusion, the remaining 6,537 posts (n = 6,537) constituted the final sample for the content analysis (see Table 9).

Table 9: Posts, Term and Year

	Cervarix	Gardasil	HPV vaccine	Human papillomavirus vaccine	*CDC**	*CDC* STD*
2006	1	9	29	0	0	0
2007	7	197	175	1	0	0
2008	8	245	118	1	0	0
2009	84	300	300	10	0	0
2010	213	300	300	32	2	0
2011	300	300	300	99	2	0
2012	300	300	300	135	1	0
2013	139	96	300	213	8	0
2014	57	30	41	194	5	2
2015	8	300	75	194	5	0
2016	5	300	64	126	6	0
Totals	1,122	2,377	2,002	1,005	29	2

Note. *CDC and CDC STD only used the term "HPV Vaccine"

The researcher developed the codebook (see Appendix 3) to conduct the content analysis. The codebook consisted of four sections: content characteristics, tone, HPV-associated disease, health belief model content, and social amplification of risk framework content.

The content characteristics section of the codebook focused on the characteristics of the Facebook post that were not related to the theoretical components of the study. The analysis included the year the post was published, and then the date (day/month) was also coded. Other variables coded included the author of the post (Facebook profile, Facebook Page, CDC/CDC STD), gender of the author (a page, or if a person, the name and profile picture image cues were used to attempt to determine if it should be coded as male, female, or unsure), audience (general, to Facebook page, to a Facebook profile), whether that post had a hyperlink (absent/present), and whether the post had an embedded video or picture

(absent/present). Also, the analysis would involve coding of the number of reactions, comments, and shares the post had, and the tone of the post (neutral, positive, negative) the tone of the post towards the HPV vaccine (neutral, positive, or negative).

The HPV-associated disease section asked whether or not the posts had any mention of cancer (absent/present) or any mention genital warts (absent/present).

In the health belief model content section, coding items included a record if the post had messages about HPV infection susceptibility (absent/present), severity of HPV infection (absent/present), the benefits of the HPV vaccination (absent/present), barriers to HPV vaccination (absent/present), HPV vaccine-related self-efficacy messages (absent/present), and cues to get the HPV vaccine (absent/present), cues to avoid the HPV vaccine (absent/present).

In the social amplification of risk framework section of the codebook, coding items asked if the post amplified or attenuated the perception of HPV vaccine being as risk (amplifies, attenuates, neither), whether or not the post indicated any ripples (an entity changing behavior because of the perceived risk of the HPV vaccine; absent/present), and if there were any secondary impacts as a result of ripples indicated in the post; absent/present). The codebook also contained coding instructions, examples and notes. In developing the coding sheet, the researcher ensured that each question and item in the codebook had a corresponding coding sheet item name, and coders were instructed to code accordingly.

Reliability. Two coders were trained on the codebook, definitions of sections,

coding sheet items, and relevant theoretical concepts. Before coding the entire sample, 12.3% (n = 808) of the posts were randomly selected, and coded independently by both coders to calculate intercoder reliability for the variables. After coding the reliability sample, the coders discussed all questions requiring clarification and to resolve disagreements, and went back to review their coding sheets. Prior to calculating reliability, it was decided that a Krippendorf's alpha (α) of 0.667 or greater would be an acceptable level of agreement for each variable, based on previous research that argues that $\alpha \geq 0.667$ should be the lowest limit, a limit that allows for tentative conclusions (Krippendorf, 2004a, 2004b). The alpha for each variable was calculated, and considered acceptable for reliability (0.67-1.00; see Appendix 4 for variable alphas).

Data analysis. To address the third research question, asking what messages about the HPV vaccine were on Facebook in the context of the health belief model and social amplification of risk framework, descriptive statistics were calculated to report the presence of coding items as related to the theoretical concepts. To address the fourth research question, examining how messages about the HPV vaccine on Facebook (in the context of the health belief model and social amplification of risk framework) have changed over a decade and how they compare to Centers for Disease Control and Prevention messages about the HPV vaccine, the researcher performed statistical analyses to examine trends of the annual average appearance of HBM and SARF variables in Facebook posts. These findings were compared to the findings from the content analysis of Facebook posts from CDC-operated Facebook

pages (CDC and CDC STD), alone. These analyses were conducted using SPSS version 22.

Chapter 4: Results

This study investigated Kansan parent and guardian perceptions about the HPV vaccine, their engagement with HPV vaccine-related information on social media, how the HPV vaccine is represented on social media, and how representations compare to the CDC's representation in the decade since its first FDA approval. This chapter presents results from the analysis of semi-structured interviews and their application to the survey development, along with the results from the statistical analyses of data collected from the survey and content analysis.

Semi-Structured Interviews and Application

Along with HBM and SARF, findings from a series of interviews contributed to the design of the survey instrument used in this study. Recruiting interview participants was a notable challenge. Because a portion of the study was dedicated to examining perceptions of Kansan parents of children ages 9-17 years, the same group was the population of interest for the interviews. Finding such parents was a challenge, given the specific population and the sensitive nature of the topic. The same challenge would present itself again during the surveying portion of the study, and may account for part of the reason that some of the parents and guardians who began the survey chose not to complete it.

Four semi-structured interviews were conducted with Kansan parents of children ages 9-17 years (see

Table 10). Participants were from Douglas, Rice and Shawnee counties. They were white (non-Latino) and ranged 31-49 years of age. Three of the participants

were female, and all identified as mothers. Their annual household income ranged between less than $10,000 and $60,000, and each had at least some college education, with the highest degree obtained being a master's. Participants had either one or two children between ages 9-17 years, and none of the children had received the HPV vaccine at the time of the interview.

Table 10: Demographics, Semi-Structured Interview Participants

Sex	Female	Male	Female	Female
Parent/Guardian Identity	Mother	Father	Mother	Mother
Race/Ethnicity	White, non-Latino	White, non-Latino	White, non-Latino	White, non-Latino
Age (Years)	44	49	32	31
Children 9-17 (sex, age [years], HPV vaccination status)	- male, 9, unvaccinated	- female, 9, unvaccinated - female 16, unvaccinated	- male, 9, unvaccinated	- ?, 9, unvaccinated - ?, 11, unvaccinated
County of Residence	Douglas	Douglas	Shawnee	Rice
Annual Household Income	$40,001-$60,000	$20,001-$40,000	$40,001-$60,000	Less than $10,000
Highest Level of Education	Bachelor's Degree	Master's Degree	Some College	Some College

When asked where they looking for information about their children's health, all participants mentioned healthcare providers, and two mentioned the internet, WebMD in particular. Speaking on vaccines in general, one participant, despite recalling that a vaccination led to the development of a high fever, subsequent brain damages and seizures, indicated that vaccines are important to prevent "any kind of epidemic." However, she added that she believes there is such thing as too much

vaccination, and does not want to expose her son to a virus as “his immunize system is not at all compromised.” Two others supported vaccines, saying they are a “very important thing” and “I’m all for it.” However another participant mentioned that she was “iffy” about vaccines.

Participants were also asked if they knew what HPV and the HPV vaccine were and all but one were aware; though the aware parents did not know much about either. This finding suggested that while likely a greater number of participants were aware about the virus and vaccine, that a population of unware parents and guardians exists. This led the inclusion of questions asking about HPV and HPV vaccine awareness (e.g., “Have you heard of HPV [also known as the human papillomavirus]”), so that only aware parents and guardians would be asked their perceptions.

Parents and guardians were asked about their plans to get their children the HPV vaccine, as none of the children were vaccinated at the time of the interview. One participant felt that her child did not need the vaccine yet, while one was concerned, stating: “it’s a little scary; um my son is old enough to receive it. He has not received it yet, mostly because of side effects that I’ve heard from people.” The mother recalled hearing about her friends’ children experiencing symptoms such as dizziness and fainting. Her opinion was that age 17 or 18 years would be an appropriate time for vaccination. The vaccine being “new” was also a concern. These findings highlighted the value of not only asking about children’s HPV vaccination status, but also asking if parents and guardians of unvaccinated children intended on

getting their children vaccinated before their eighteenth birthday; thus, this was factored into the survey instrument ("…Do you intent on getting this child the HPV vaccine before the child is 18 years of age?").

The one parent who had not heard of the HPV vaccine mentioned that he intended on finding out more information about HPV and the HPV vaccine after the interview. This led to an interest in behavioral intentions following exposure to information to parents and guardians who had no previous awareness of the vaccine. Because the survey design would separate those who were and were not aware, it was decided that the survey instrument should also include prompts about HPV and the HPV vaccine for those with no awareness. These prompts would also be followed by behavioral intention questions related to HPV vaccination of their children ("Based on the information that you have just read about HPV and the HPV vaccine, would you consider…").

None of the participants recalled seeing anything about the HPV vaccine on social media. Still, three of the participants identified as social media users. This finding led to the inclusion of questions that asked parents and guardians if they had seen information about the HPV vaccine on social media before asking them their perceptions about the representation of the HPV vaccine on social media ("Have you ever seen information about the HPV vaccine on social media? This also includes if you've only see the information that you have posted, if any."). Additionally, one participant claimed that social media "tend to lie about a lot of things." Another however thought that social media is an important tool to inform about disease and

children's health issues. Thus, survey questions about their perception about how much the information from social media influences their perceptions of the HPV vaccine were included in the survey instrument (e.g., "I believe that what I read on social media ____ my fear about getting the HPV vaccine for my child" [increases, decreases, neither increases nor decreases]).

Participants were not asked about their social media use during the interview. The researcher decided that in order to perform a relevant content analysis, that is, an analysis on a social media platform relevant to the target population, that survey questions would need to be included to ask parents which social media the use, and use primarily (e.g. "Please rank your three most used social media accounts…").

Kansan Parents and Guardians, Perceptions of the HPV Vaccine

Data from the survey were analyzed and used to address the first research question ("How do Kansan parents and guardians perceive the human papillomavirus (HPV) vaccination [in the context of the health belief model and the social amplification of risk framework]?). Before the HPV vaccine perception questions, parents and guardians were asked if they had heard of HPV and the HPV vaccine. Aware parents and guardians were then presented with statements, and agreement was measured on a six-point Likert scale (recoded for data analysis: 1 = "strongly disagree," 2 = "disagree," 3 = "somewhat disagree," 4 = "somewhat agree," 5 = "agree," and 6 = "strongly agree,"), with a higher number indicated greater agreement with the statement. The scale also included an "I do not know" response (treated as a missing response item) (see

Table 11). These parents were also asked about their children's HPV vaccination status and intent to vaccinate if their children were unvaccinated.

Parents and guardians who had not heard of HPV or the HPV vaccine were not asked about perceptions, nor were they asked about their children's HPV vaccination status, as they would likely not know. Instead, these respondents were provided with information and then asked about their intent to engage in follow-up behaviors.

Demographics. The survey was started by 233 individuals. Of those, one disagreed to take part in the study after being presented with the information statement and three more exited the survey. Of the remaining 229 respondents, 16 did not live in Kansas, and three more discontinued the survey. The 160 individuals who indicated they were parents of children ages 9-17 years were eligible to continue the survey.

Of the 160 eligible parents and guardians, 63 ended their participation at various points, resulting in 97 completed surveys by eligible respondents. Most of the data analysis presented in this section is based on the responses from those 97 respondents; however, some additional information is provided that includes responses of all the participants that completed the survey up to that question.

Respondent demographic questions were placed at the end of the survey, and results were only available for 97 parents and guardians. Most of the respondents were female (n = 83, 87.4%; males n = 12, 12.6%), and all female respondents identified as mothers (see Figure 10). Eleven of the male respondents indicated that

they were fathers; the other two reported different guardian identities ("grandfather" and "step dad"). Respondents were from 30 of the 105 Kansas counties, and mostly from counties in the Kansas City Metro (Johnson and Wyandotte), followed by South Central (Barton, Butler, Kingman, Reno, Rice, and Sedgewick), Northeast (Douglas, Jackson, Jefferson, Miami, Shawnee, Wabaunsee, and Washington), Southeast (Allen, Cherokee, and Crawford) and Southwest (Finney, Seward, and Stevens), Northwest (Ellis, Graham, Harvey, Riley, Rush, and Thomas), and North Central (Clay, Republic, and Saline) (see Figure 11). The majority of the respondents identified as white (n = 86; 90.5%) and non-Latino (n = 91, 95.8%) (see Figure 12). Reported birth years ranged from 1957 to 1986 (M = 1975, SD = 6.2) (see Figure 13), making respondents approximately between 30 and 60 years of age at the time of this study. Most of the respondents had earned a four-year or bachelor's degree (n = 29; 29.9%) (see Figure 14), and reported that their annual household income was greater than $100,000 ($n$ = 29; 29.9%) (see Figure 15).

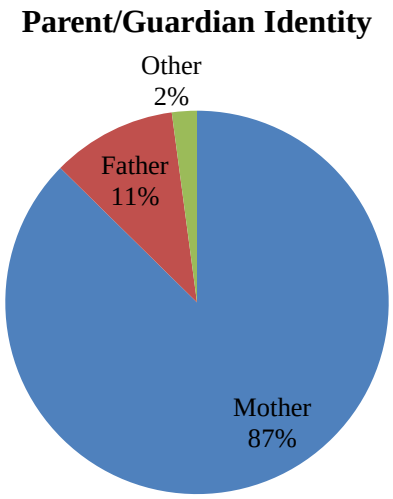

Figure 10: The parent identity of survey respondents. Demographic information was only available from eligible participants who completed the survey (n = 97).

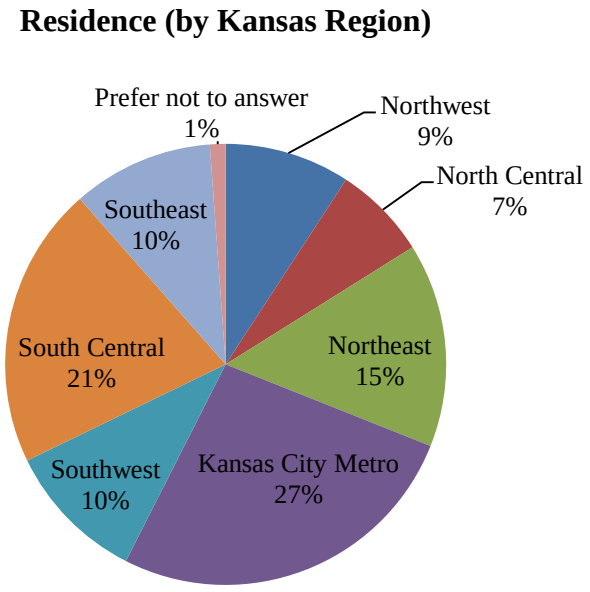

Figure 11: Respondent region of residence. Demographic information was only available from eligible participants who completed the survey (n = 97).

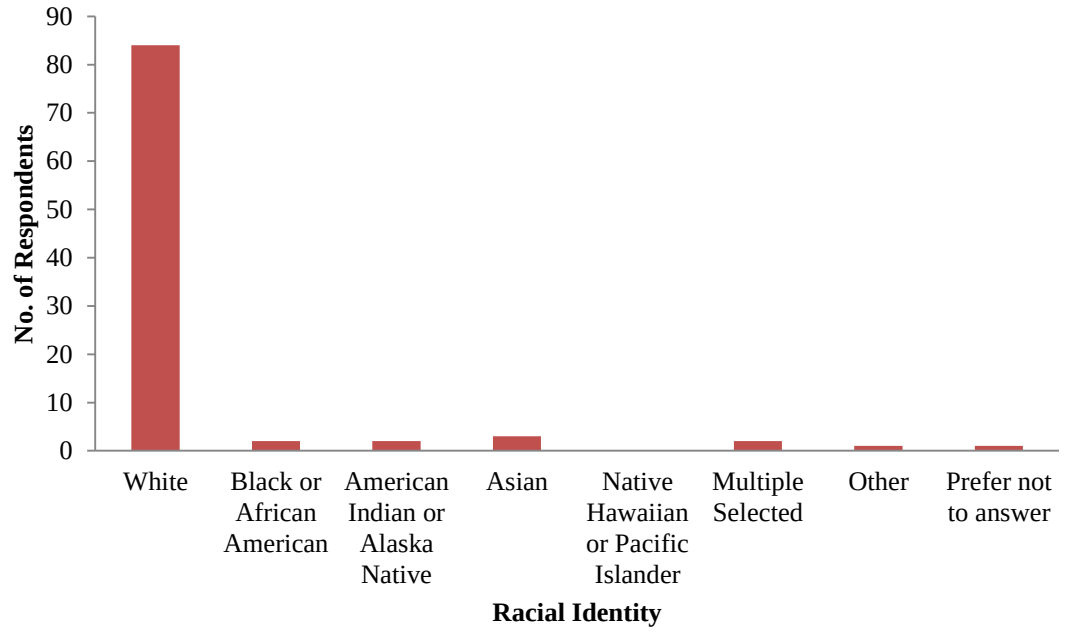

Figure 12: Racial identity of survey respondents. Demographic information was only available from eligible participants who completed the survey (n = 97).

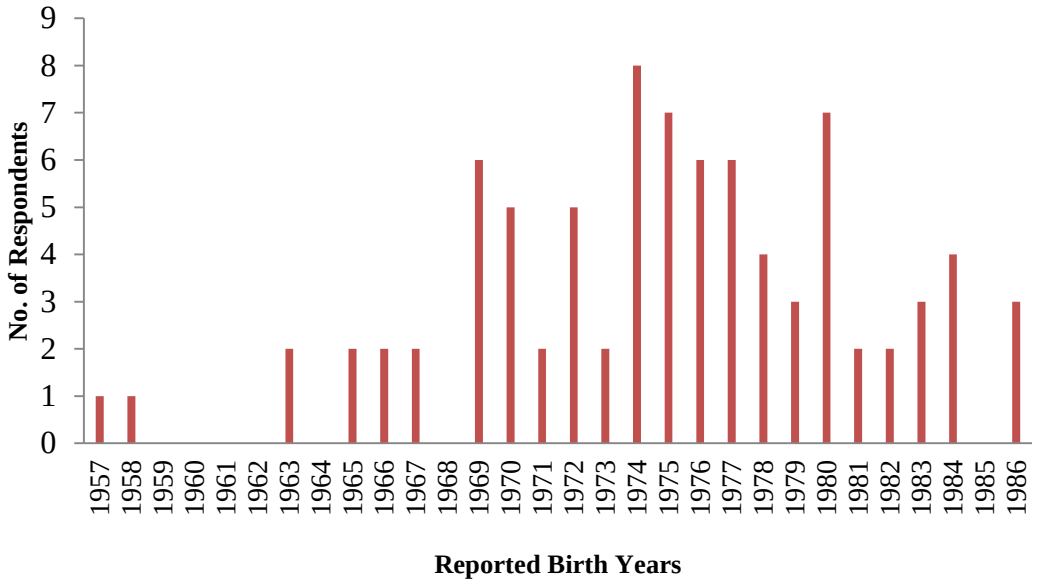

Figure 13: Birth years of survey respondents. Demographic information was only available from eligible participants who completed the survey (n = 97).

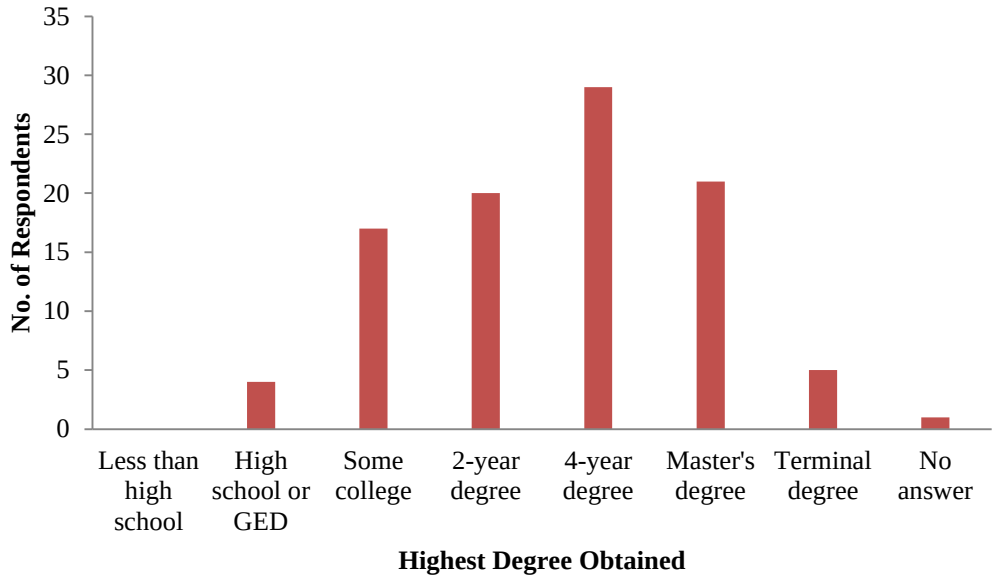

Figure 14: Survey respondent education. Demographic information was only available from eligible participants who completed the survey (n = 97).

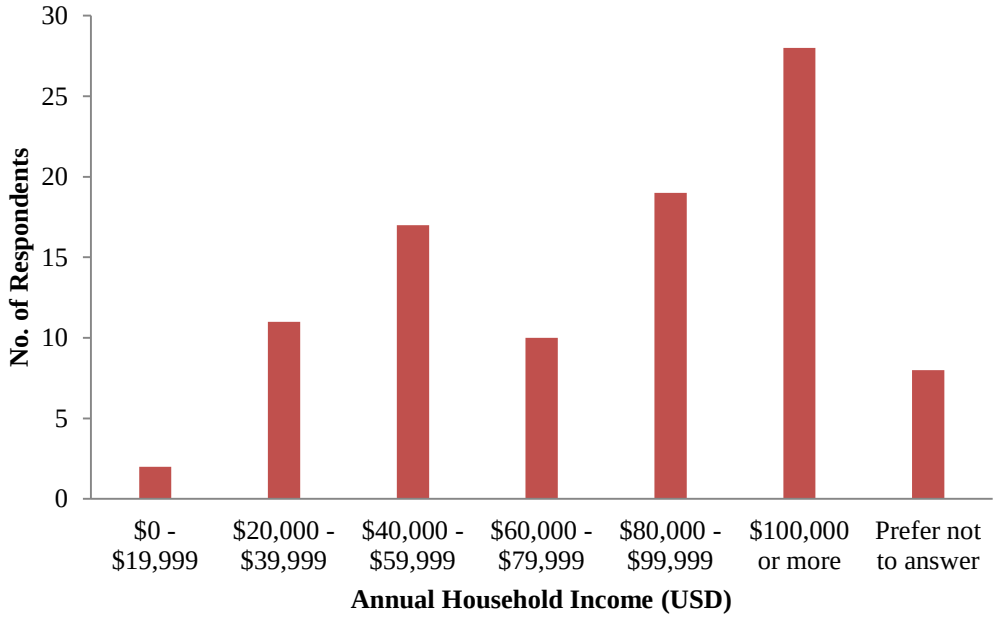

Figure 15: Survey respondent annual household income. Demographic information was only available from eligible participants who completed the survey (n = 97).

Children. There were 155 participants who answered questions about how many children 9-17 years of age they had. Among them, they had 270 children (*M* = 1.74, *SD* = 1.13), with a range of one to ten children. The 97 respondents who were eligible and completed the survey were parents or guardians of 163 children. Of those, there were 160 children between the 95 parents who were aware of HPV and the HPV vaccine. These 95 respondents had a range of one to four children (*M* = 1.7, *SD* = 0.7) who were 9-17 years of age. Demographic information questions about the respondent's children were placed at the end of the survey, and age and sex information was only available for the children of 97 parents (eligible, completed surveys). The average age of the 160 children of aware parents was 12.8 years (*M* = 12.8, *SD* = 2.5) (see Figure 16), and most were female (*n* = 102, 63.8%; males *n* = 56, 35.0%).

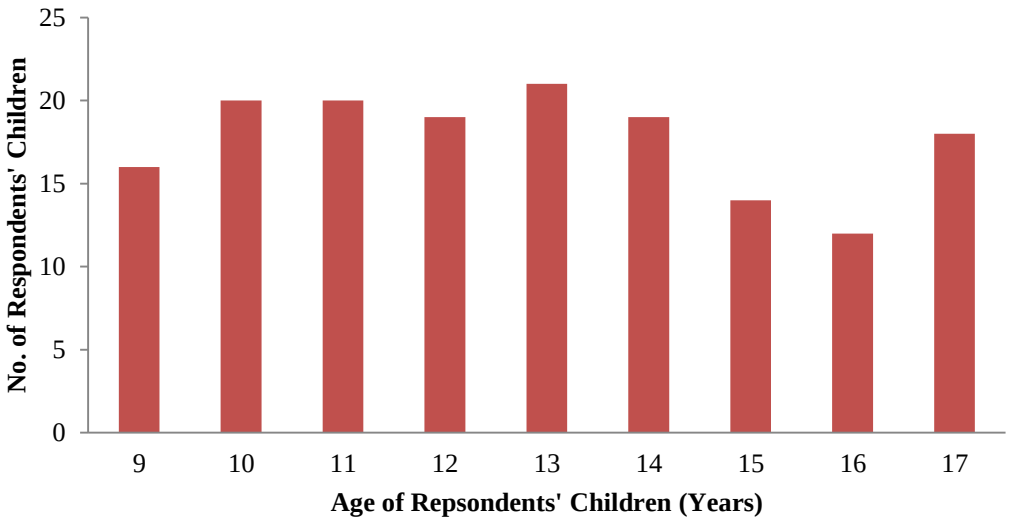

Figure 16: Age of Respondents' Children. Age information was only available for the children of 97 respondents. Here are the ages of the 160 children of participants who had awareness of HPV and the HPV vaccine (*n* = 95).

Most of the 160 children had not received the HPV vaccine at the time of the study (n = 93, 58.1%) (see Figure 17). Unvaccinated children ranged from 10-17 years of age (M =13.85, SD = 1.99) and vaccinated children ranged from 9-17 years of age (M = 12.11, SD = 2.60) (see Figure 18). Vaccinations rates were the same among female (n = 40, 39.2%) and male (n = 22, 39.2%) children (see Figure 19). The HPV vaccination rates were 41.2% among children of white respondents, 25.0% among children of black respondents, 66.7% among children of American Indian or Alaska Natives, 25.0% among children of Asians, 50.0% among children whose parent selected multiple races, and 0% for children of parents who indicated they belonged to other racial groups, or who preferred not to answer the racial demographic question (see Figure 20 and Figure 21). The cluster of children with parents and guardians earning an annual household income of more than $100,000 was the only income cluster that had more vaccinated than unvaccinated children (see Figure 22). Concerning education, those with a two-year degree or associate's degree was the only income cluster that had more vaccinated than unvaccinated children (see Figure 23 **Error! Reference source not found.**).

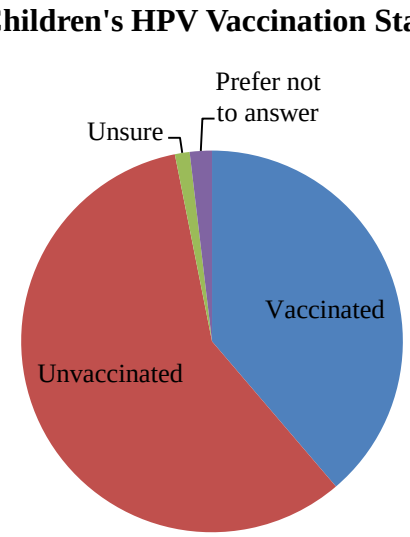

Figure 17: HPV vaccination status of children. The survey only asked parents who were aware of the HPV about their children's vaccination status. Information was only available for the 160 children of the 95 respondents (n = 95).

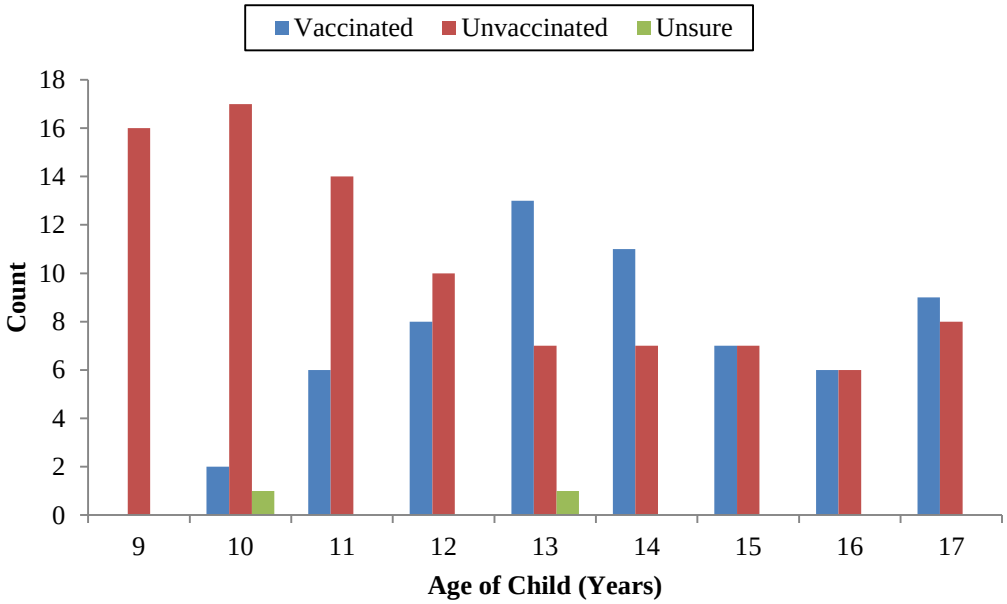

Figure 18: HPV vaccination status of children by age. Vaccination and age information was provided for 160 children. Prefer not to answer responses are not shown for visual clarity (n = 95).

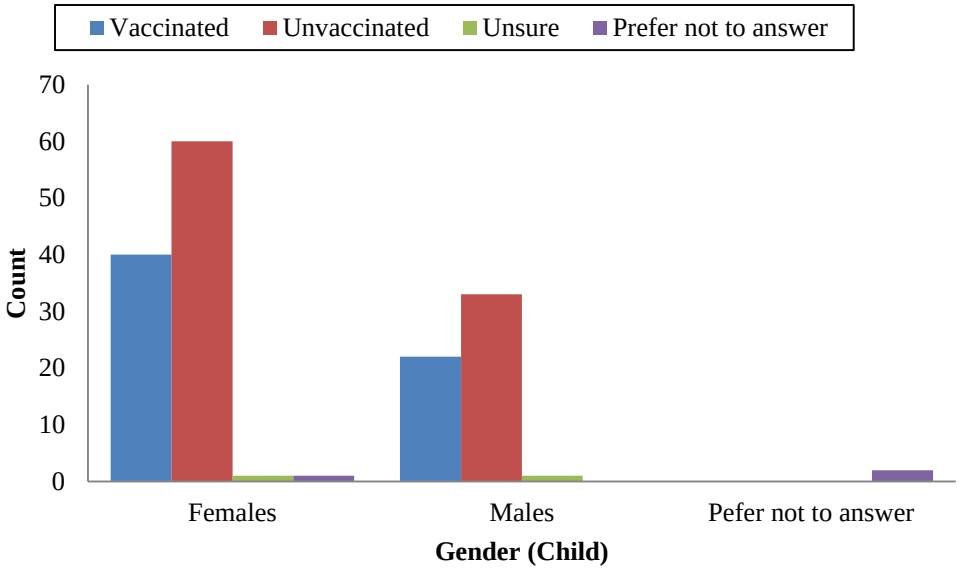

Figure 19: HPV vaccination status of 160 children of parents (*n* = 95), by children's gender

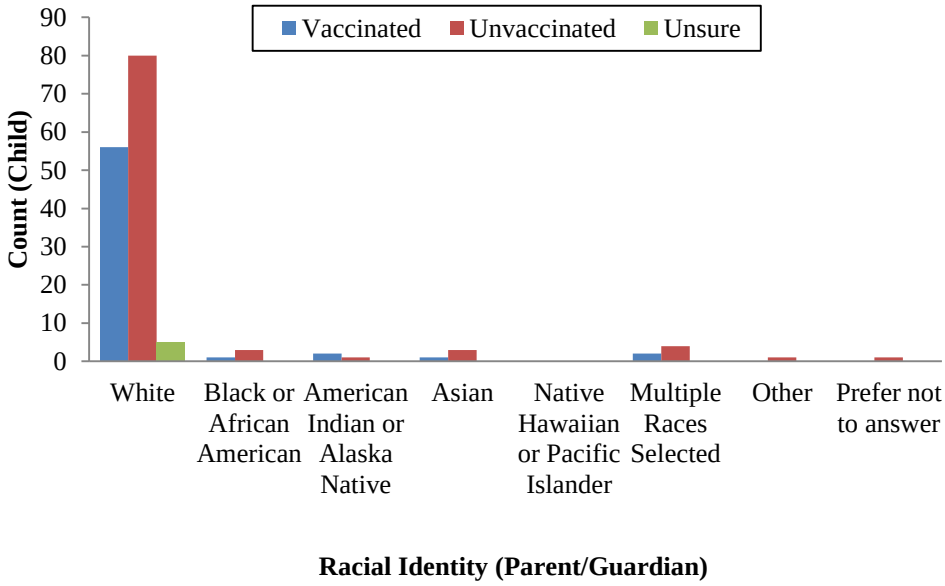

Figure 20: HPV vaccination status of 160 children of parents (*n* = 95), by parent's race

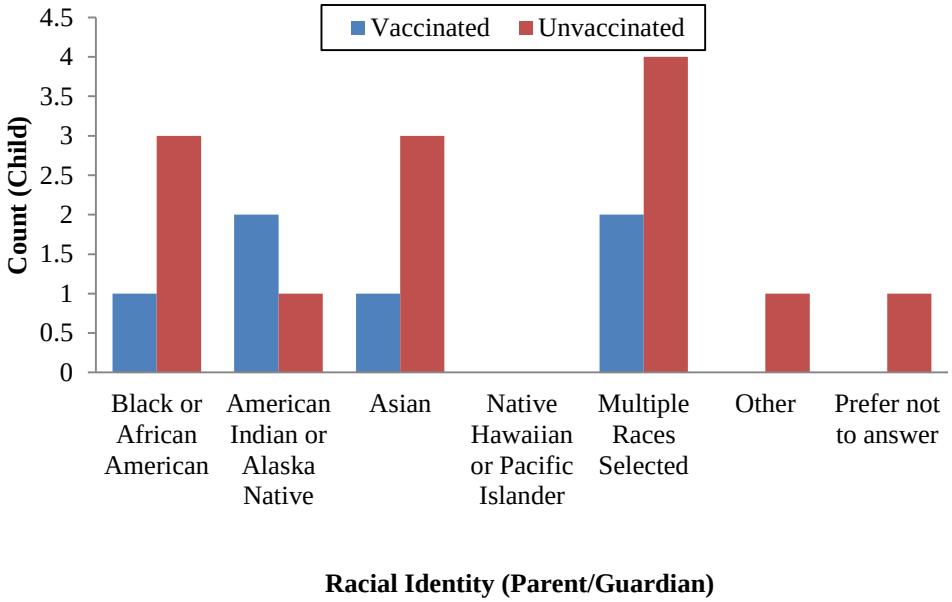

Figure 21: HPV vaccination status of 160 children of parents, by parent's race, non-white (n = 12).

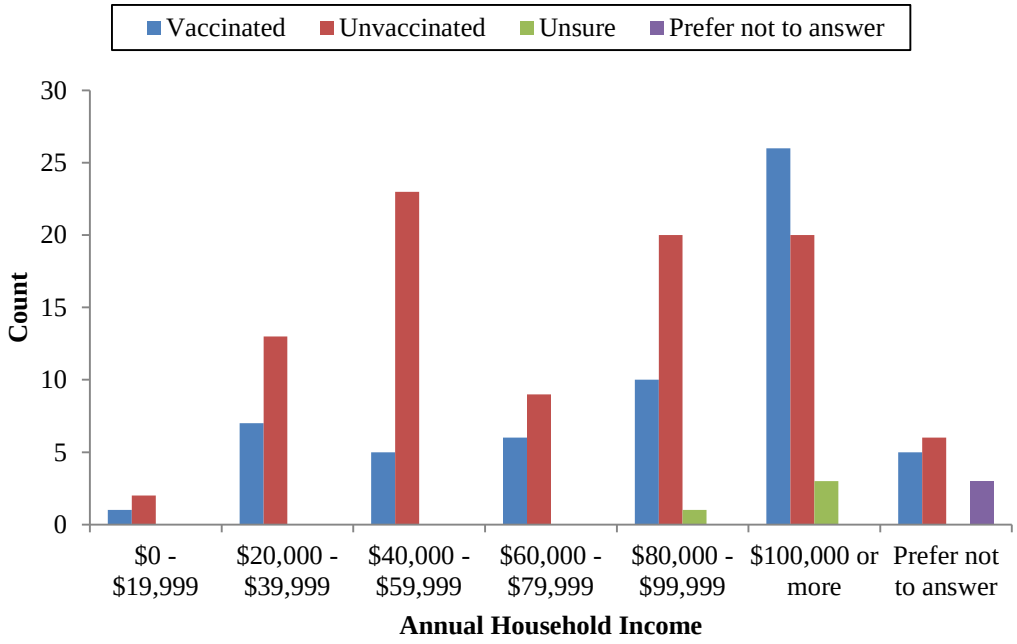

Figure 22: This figure shows the breakdown of the 160 children's HPV vaccination status by their parent or guardian's indicated annual household income (n = 95).

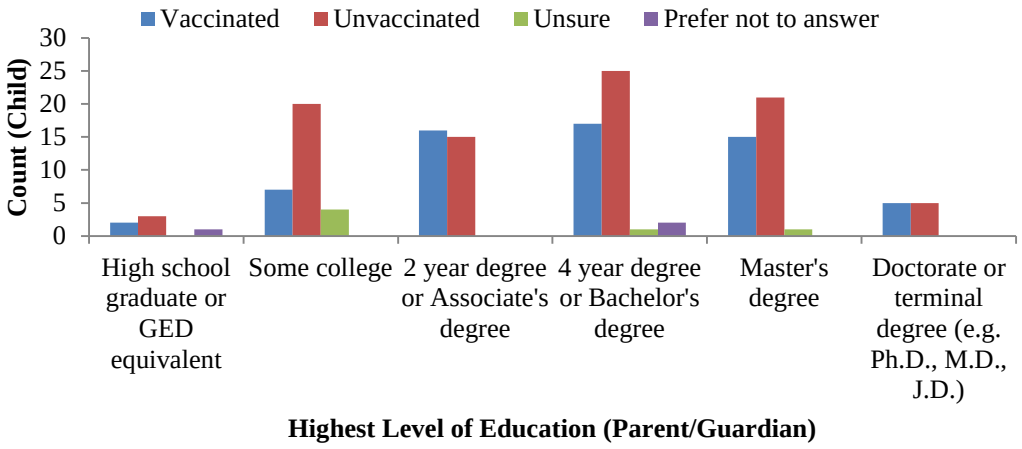

Figure 23: The breakdown of the 160 children's HPV vaccination status by their parent or guardian's highest level of education (n = 95)

Of the 62 children who had received the HPV vaccine it was reported that four children had received all of their HPV vaccine shots or have completed the vaccination series. Most children who had received the vaccine received three injections (see Figure 24). Parents leaned slightly towards having the intent to get unvaccinated children the HPV vaccine prior to their eighteenth birthday (see Figure 25).

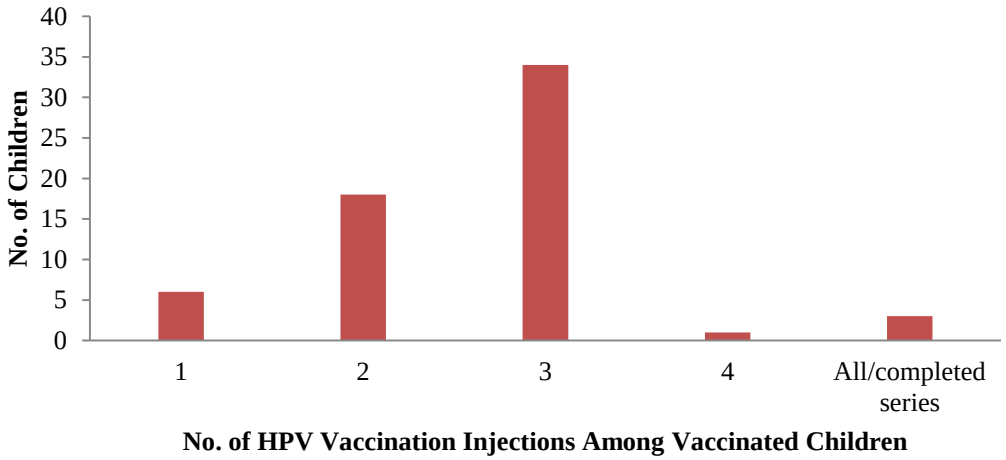

Figure 24: Number of HPV vaccination shots that children have received. Among HPV vaccinated children, this is the number of injections parents recalled their children receiving (n = 62).

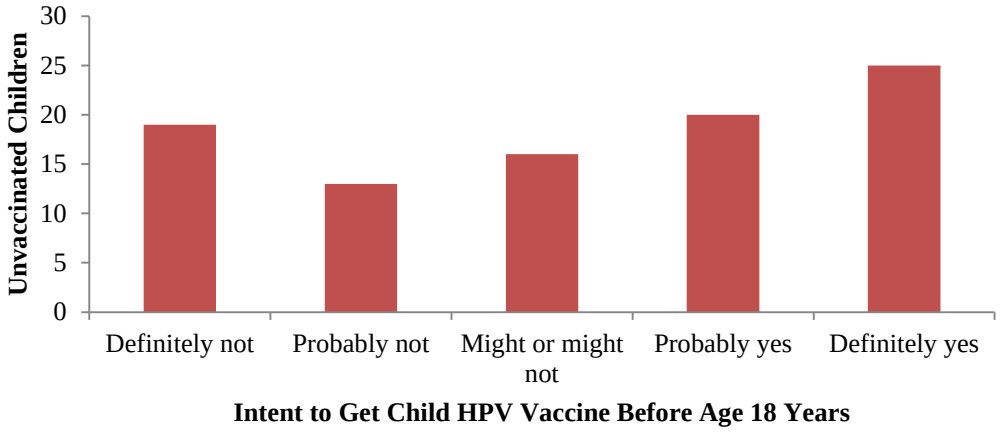

Figure 25: Parent and guardian intent to get children the HPV vaccine before children are age 18 years (n = 93).

Awareness. To assess their HPV vaccination perceptions, respondents were first asked if they had ever heard of the human papillomavirus and the vaccine. There were 154 responses regarding the virus, and 98% (n = 151) had heard of it. Concerning the vaccine, there were 142 responses, and 139 (97.9%) indicated

awareness. These findings were reflected in the completed sample of eligible, completed surveys (n = 97), as 95 parents and guardians (97.9%) reported that they had heard of both, and two (2.1%) had not heard of either. This section will discuss the results from the eligible 95 surveys, but a complete outline of findings from all eligible surveys can be found in Table 11.

Perceived susceptibility. Kansan parents' and guardians' perception of their children' susceptibility to HPV infection was assessed by their agreement with statements about the risk of their child getting HPV and the likelihood that their child will be infected. Overall, respondents somewhat agreed that their children were at risk to get HPV (M = 4.30, SD = 1.48), and somewhat disagreed with the statement that it was unlikely that their child would ever been infected with HPV (M = 2.84, SD = 1.51).

Perceived severity. Perceived severity of HPV infection was assessed by asking respondents to evaluate statements about HPV causing genital warts, cancer, and death. Most of the respondents agreed that HPV could cause genital warts (M = 4.86, SD = 1.21), and agreement with the statement HPV could cause cancer was stronger (M = 5.21, SD = 0.95). There was less agreement with the statement that HPV could kill their child (M = 4.17, SD = 1.42), than there was with HPV causing genital warts or cancer.

Perceived benefits and barriers. Answers to statements about the HPV vaccine's effectiveness, affordability, convenience, and consequences were analyzed to assess perceived benefits and risks. There was an overall agreement that the HPV

vaccine could prevent HPV (*M* = 4.42, *SD* = 1.37), genital warts (*M* = 4.36, *SD* = 1.49), and cancer (*M* = 4.40, *SD* = 1.39). Most somewhat disagreed that getting the HPV vaccine was inconvenient (*M* = 2.70, *SD* = 1.51), and leaned towards somewhat agreeing that the HPV vaccine was financially affordable (*M* = 3.78, *SD* = 1.55). Overall, respondents disagreed with the statement that the HPV vaccine would encourage their child to be more sexually active (*M* = 1.82, *SD* = 1.07). The parents and guardians also indicated that they generally had not been discouraged to get their children the HPV vaccine (*M* = 2.70, *SD* = 1.56), and somewhat agreed that the people closest to them would respect them if they got their child the HPV vaccine (*M* = 4.07, *SD* = 1.47). There was disagreement with the statement that the HPV vaccine has more consequences than benefits for their children (*M* = 2.93, *SD* = 1.79).

Cues to action and self-efficacy. Cues to actions were assessed by asking respondents if they had been encouraged to get their child vaccinated for HPV. There was a leaning towards agreement that they had been encouraged (*M* = 4.33, *SD* = 1.34). Self-efficacy was assessed by asking parents and guardians if they felt able to protect their children from HPV infection, and most parents indicated that they felt that they could (*M* = 4.86, *SD* = 1.23).

Perceived risk. This research was also interested in the risk perceptions that Kansan parents and guardians have toward the HPV vaccine. Respondents were asked to indicate their agreement with additional statements about side effects and the comparative risk of the HPV vaccine to HPV infection. Parents and guardians indicated they mostly somewhat disagree that their child will experience harmful side

effects if she or he receives the HPV vaccine (*M* = 2.98, *SD* = 1.46), and disagree even more so with the statement that the HPV vaccine could kill their child (*M* = 2.51, *SD* = 1.50). Overall, there was a slight level of disagreement with the statement that the HPV vaccine was risky for their child to receive (*M* = 3.08, *SD* = 1.66), and even greater disagreement with the HPV vaccine being more risky than the infection (*M* = 2.56, *SD* = 1.65).

Table 11: Perceptions of HPV Vaccine, Six-Point Scale

Variable	Statement	Respondents *n* [n]	Agreement *M* [*M*]	Standard Deviation *SD*/[*SD*]
Perceived Susceptibility*				
	My child is at risk to get HPV.	94 [138]	4.30 [4.24]	1.48 [1.52]
	It is unlikely that my child will ever be infected with HPV.	91 [133]	2.84 [2.77]	1.51 [1.17]
Perceived Severity*				
	HPV can cause genital warts.	79 [118]	4.86 [5.09]	1.21 [1.17]
	HPV can cause cancer.	91 [138]	5.21 [5.46]	0.95 [0.66]
	HPV could kill my child.	90 [136]	4.17 [4.33]	1.42 [1.45]
Perceived Benefits of/Barriers*				
	The HPV vaccine can prevent HPV.	91 [119]	4.42 [4.57]	1.37 [1.33]
	The HPV vaccine can prevent genital warts.	72 [89]	4.36 [4.46]	1.49 [1.59]

	The HPV vaccine can prevent cancer.	88 [115]	4.40 [4.63]	1.39 [1.35]
	The HPV vaccine is not convenient to get for my child.	87 [114]	2.70 [2.39]	1.51 [1.44]
	The HPV vaccine is financially affordable.	60 [79]	3.78 [4.16]	1.55 [1.59]
	The HPV vaccine will encourage my child to be more sexually active.	94 [121]	1.82 [1.44]	1.07 [0.72]
	I have been discouraged from getting my child vaccinated against HPV.	92 [121]	2.70 [2.41]	1.56 [1.50]
	The people closest to me would respect me if I got my child the HPV vaccine.	68 [90]	4.07 [4.16]	1.47 [1.55]
	The HPV vaccine has more consequences than benefits for my child.	85 [111]	2.93 [2.71]	1.79 [1.76]
Cues to action*				
	I have been encouraged to get my child vaccinated against HPV.	92 [120]	4.33 [4.54]	1.34 [1.30]
Self-efficacy				
	I can protect my child from HPV.	95 [141]	4.86 [4.98]	1.23 [1.17]
Perceived Risk**				
	My child will experience harmful side effects if they	81 [108]	2.98 [2.70]	1.46 [1.50]

receive the HPV vaccine.			
The HPV vaccine could kill my child.	86 [109]	2.51 [2.32]	1.50 [1.45]
It is risky for my child to receive the HPV vaccine.	89 [115]	3.08 [2.88]	1.66 [1.67]
There are more risks for my child getting the HPV vaccine than having HPV.	85 [112]	2.56 [2.47]	1.65 [1.62]

*Health belief model variables
**Social amplification of risks variables

Note. The information presented in the table first shows the results from the responses of the 95 HPV and HPV vaccine aware adults, followed by brackets ([ ]) where results from all survey responses are recorded. For perceived susceptibility, severity, and self-efficacy there were 95[142] respondents. Other variables had 95 [124] respondents. Missing cases resulted from respondents answering "I do not know" to the statements.

Perception following awareness. Two of the survey respondents indicated that they had never heard of neither HPV nor the HPV vaccine prior to taking this survey. One of these participants (male, Asian, born in 1980, Douglas County resident, Master's degree completed, income between $20,000 and $40,000) was a father of two children (a 12-year old female and an 11-year old male). After being shown prompts discussing HPV and the HPV vaccine (see Appendices 2, questions 42-44) he indicated that he would consider talking to a doctor or a health care provider about HPV. The other respondent (female, white, born in 1986, Thomas County resident, 2-year degree completed, income of $100,000 or more), a mother of one child (a 15-year old female), indicated that she would consider getting her child vaccinated against HPV.

Engagement with Health Information on Social Media

The second research question of this study asked how Kansan parents and guardians engaged with health information from social media regarding the HPV vaccine. Respondents were asked their main source for information about the HPV vaccine, social media use, if they had seen information about the HPV vaccine on social media, and their perceptions on how the HPV vaccine was portrayed on social media in the context of the health belief model and social amplification of risk framework.

Sources. There were 138 respondents who reported their main source for learning about the HPV vaccine. A healthcare provider was the modal source (n =79, 57.2%), and social media was only identified by 6 respondents (4.3%) as their primary information source. Similarly, healthcare providers were identified most often as their main source of information about HPV vaccine (n = 51, 53.7%) for the 95 eligible and aware respondents; and 4.2% percent of the sample (n = 4) indicated that social media was their main source (n = 4, 4.2%) (see Figure 26). Of all 123 survey responses, 117 (95.1%) parents and guardians indicated that use social media. Of the aware and eligible parents and guardians 91 (91, 95.8%) indicated they use social media.

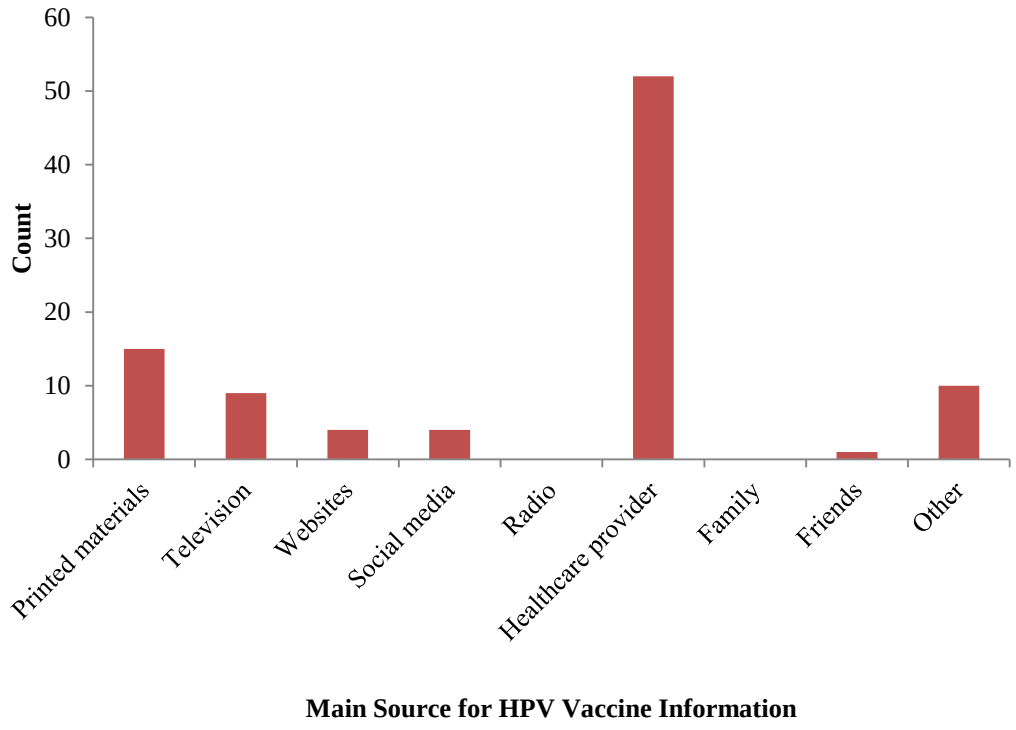

Figure 26: Main source for information about the HPV vaccine among HPV and HPV vaccine aware parents that completed the survey (n = 95).

The vast majority of all remaining respondents who indicated that they use social media (n = 113) indicated that they use Facebook (n = 109, 96.5%), similar to the sample of 95 aware and eligible respondents who completed the survey. Of the entire sample of respondents, 101 (n = 90.2%) indicated that Facebook their most used social media platform, which was also the most used social media platform among the 95 complete surveys of aware parents and guardians (n = 79, 87.8%).

A total of 98 survey respondents answered if they had ever seen information about the HPV vaccine on social media, most indicated that they had (n = 65, 66.3%). Almost all of these respondents reported having Facebook accounts (n = 63, 96.9%),

and 59 (93.6%) of those respondents recalled Facebook being their most used social media platform. Of the 95 completed surveys by aware parents and guardians, 56 (62.9%) reported that they had seen information about the HPV vaccine on social media. From the 56, 50 (89.2%) indicated that Facebook was their most used social media account.

Because almost all of the survey respondents had a Facebook account, and for many it was their most used, the researcher decided to conduct the analysis of perceptions about how the HPV vaccine is represented on social media from the perspective of those who had 1) seen information about the HPV vaccine on social media and 2) had indicated that Facebook was their most used social media platform.

Of the 50 parents and guardians, about a quarter (n = 14, 28.0%) reported that they had searched for information about the HPV vaccine on social media, and reported posting or sharing something about the HPV vaccine on social media (n = 14, 28.0%). The most frequently reported sources for HPV vaccine-related content were distant friends and from government health organizations (see Figure 27).

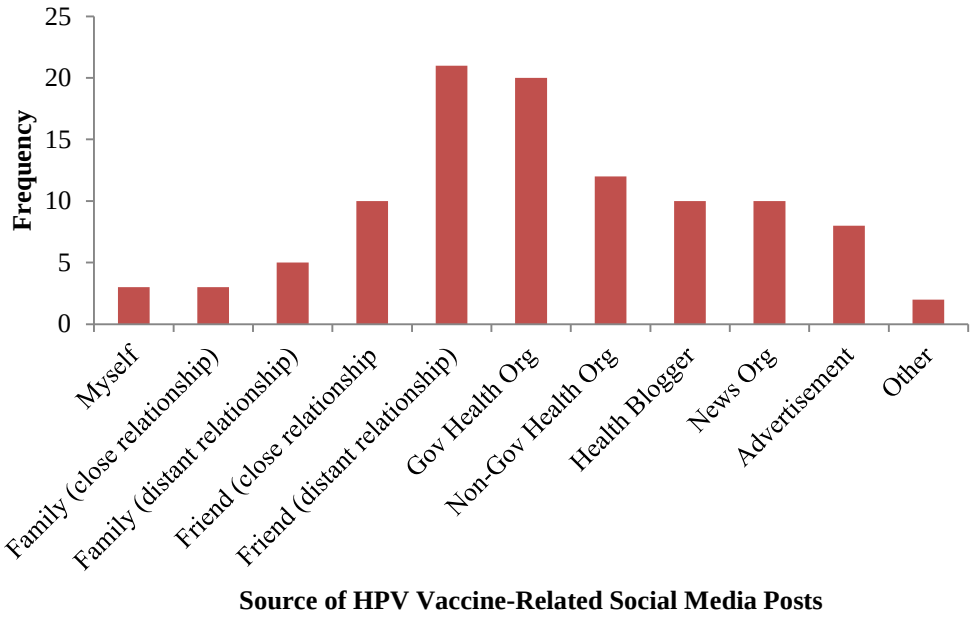

Figure 27: The sources of HPV vaccine-related social media posts. For those who had seen information about the HPV vaccine posted to social media, these are the sources they see posting the information.

Like their personal perceptions, parent and guardian perceptions of HPV vaccine representation on social media vaccine representation on social media were analyzed in the context of the health belief model and the social belief model and the social amplification of risk framework. Respondents were asked to indicated their level of to indicated their level of agreement with a series of statements on a six-point Likert scale (recoded for data scale (recoded for data analysis:1 = “strongly disagree,” 2 = “disagree,” 3 = “somewhat disagree,” 4 = “somewhat “somewhat disagree,” 4 = “somewhat agree,” 5 = “agree,” and 6 = “strongly agree,”) with a response of “I do not with a response of “I do not know” treated as a missing response item (see

Table 12). Results from all eligible responses are included. A higher number indicated greater agreement with the statement.

Perceived susceptibility. The respondents tended to agree that social media messages say that their child is at risk to get HPV (*M* = 4.31, *SD* = 1.39), and slightly disagreed that social media messages say that it is unlikely that their child will ever get HPV (*M* = 2.78, *SD* = 1.55).

Perceived severity. Respondents mostly agreed that social media says that HPV can cause genital warts (*M* = 4.54, *SD* = 1.35) and cancer (*M* = 4.87, *SD* = 1.33), and mostly somewhat agree that it could kill their child (*M* = 4.02, *SD* = 1.75).

Perceived benefits and barriers. When recalling how social media portrays the benefits and barriers of getting the HPV vaccine for their children, the Kansan parents and guardians leaned toward slightly agreeing that social media messages say that the HPV vaccine can prevent HPV (*M* = 4.31, *SD* = 1.46), genital warts (*M* = 4.31, *SD* = 1.41), and cancer (*M* = 4.36, *SD* = 1.43). They also leaned toward slightly disagreeing that social media represent the HPV vaccine as inconvenient to get for their child (*M* = 2.79, *SD* = 1.53), and slightly agreed that vaccine is represented as affordable (*M* = 4.04, *SD* = 1.49). There was agreement that social media sends the message that the HPV vaccine will not make your children more sexually active (*M* = 4.02, *SD* = 1.81). The respondents appeared to be more divided on whether or not social media say that society discourages them from getting their children vaccinated against HPV (*M* = 3.78, *SD* = 1.71), that the people closest to them would respect them for getting their children the HPV vaccine (*M* = 3.58, *SD* = 1.45), and that the vaccine has more consequences than benefits for their children (*M* = 3.61, *SD* = 1.77).

Cues to action and self-efficacy. When asked if social media say that society encourages them to get their children vaccinated against HPV, the respondents were also quite divided (*M* = 3.70, *SD* = 1.68), but agreed that there was a message that they could protect their children from HPV (*M* = 4.70, *SD* = 1.27).

Perceived risk. The respondents appeared to also be divided about social media messages about representing the HPV vaccine as a risk. Opinions did not lean strongly in either direction when asked if social media say the HPV vaccine could cause their children harmful side effects (*M* = 3.61, *SD* = 1.69), could kill their children (*M* = 3.44, *SD* = 1.74), is risky for their children to receive (*M* = 3.67, *SD* = 1.73), and whether or not the HPV vaccine was riskier than HPV infection (*M* = 3.33, *SD* = 1.76).

Table 12: Perceptions of HPV Vaccine Representations on Social Media, Six-Point Scale

Variable	Statement	Respondents *n* [*n*]	Agreement *M* [*M*]	Standard Deviation *SD* [*SD*]
Perceived Susceptibility*				
	Your child is at risk to get HPV.	48 [63]	4.31 [4.68]	1.39 [1.23]
	It is unlikely that your child will ever be infected with HPV.	45 [59]	2.78 [2.73]	1.55 [1.48]
Perceived Severity*				
	HPV can cause genital warts.	39 [51]	4.54 [4.49]	1.35 [1.32]
	HPV can cause cancer.	46 [60]	4.87 [4.75]	1.33 [1.36]
			4.02 [3.85]	1.75 [1.75]

	HPV could kill your child.	43 [55]		
Perceived Benefits /Barriers*				
	The HPV vaccine can prevent HPV.	42 [47]	4.31 [4.40]	1.46 [1.42]
	The HPV vaccine can prevent genital warts.	36 [40]	4.31 [4.33]	1.41 [1.42]
	The HPV vaccine can prevent cancer.	42 [47]	4.36 [4.32]	1.43 [1.46]
	The HPV vaccine is not convenient to get for your child.	38 [44]	2.79 [2.75]	1.53 [1.50]
	The HPV vaccine is financially affordable.	22 [36]	4.04 [4.22]	1.49 [1.48]
	The HPV vaccine will not encourage your child to be more sexually active.	46 [52]	4.02 [4.10]	1.81 [1.77]
	Society discourages you from getting your child vaccinated against HPV.	46 [51]	3.78 [3.73]	1.71 [1.74]
	The people closest to you would respect you if you got my child the HPV vaccine.	31 [37]	3.61 [3.68]	1.77 [1.51]
	The HPV vaccine has more consequences than benefits for you child.	46 [52]	3.58 [3.54]	1.45 [1.80]
Cues to action*				
	Society encourages you to get your child vaccinated against	43 [48]	3.61 [3.54]	1.77 [1.46]

	HPV.			
Self-efficacy				
	You can protect your child from HPV.	48 [62]	4.70 [4.56]	1.68 [1.34]
Perceived Risk**				
	Your child will experience harmful side effects if they receive the HPV vaccine.	46 [52]	3.61 [3.54]	1.69 [1.73]
	The HPV vaccine could kill your child.	45 [51]	3.44 [3.35]	1.74 [1.73]
	It is risky for your child to receive the HPV vaccine.	46 [52]	3.67 [3.63]	1.73 [1.74]
	There are more risks for your child getting the HPV vaccine than having HPV.	46 [52]	3.33 [3.38]	1.76 [1.75]

Note. The information presented in the table first shows the results from the responses of the 50 HPV and HPV vaccine aware adults who have seen information about the HPV vaccine on social media, and Facebook is their most used social media platform. The information followed by brackets ([ ]) where results from all survey responses are recorded. For perceived susceptibility, severity, and self-efficacy there were 50[66] respondents. Other variables had 95 [56] respondents. Missing cases resulted from respondents answering "I do not know" to the statements.

Risk amplification. Parents and guardians were also asked to report their perception of how social media's representation of the HPV vaccine had influenced their perception of the vaccine as a risk hazard. The respondents were asked on a five-point Likert scale how they perceived social media support for the HPV vaccine (recoded: 1 = "always against," 2 = "mostly against," 3 = "equally in favor and against," 4 = "mostly in favor," and 5 = "always in favor"). The parents and guardians were divided. When looking at the results from all 64 respondents who

answered the question, they leaned very slightly towards perceiving posts being mostly in favor of the vaccine (*M* = 3.05, *SD* = 1.20), but the 50 participants who completed the survey and primarily use Facebook leaned slightly towards perceiving the posts being mostly against the HPV vaccine (*M* = 2.94, *SD* = 1.20) (see Figure 28). When asked if social media increases or decreases their fear about getting their children the HPV vaccine (recoded; -1= "decreases," 0 = neither increases nor increases," and 1 = increases), both the sample of all 56 respondents (*M* = 0.11, *S*D = 0.49) and the 50 participants (*M* = 0.14, *SD* = 0.49; see
Figure 29) leaned slightly towards perceiving that social media increases their fear. The respondents were also asked if social media influences their risk perception about their children being the harmed by HPV vaccine (recoded; -1 = "lesser," 0 = neither greater, nor lesser," and 1= "greater"). The group of 56 (all that answered) parents and guardians mostly that social media neither increased nor decreased their fear (*M* = 0.00, *SD* = 0.50), but the group of 50 leaned toward perceiving that their children were at greater risk of being harmed by the HPV vaccine (*M* = 0.04, *SD* = .49; see Figure 30).

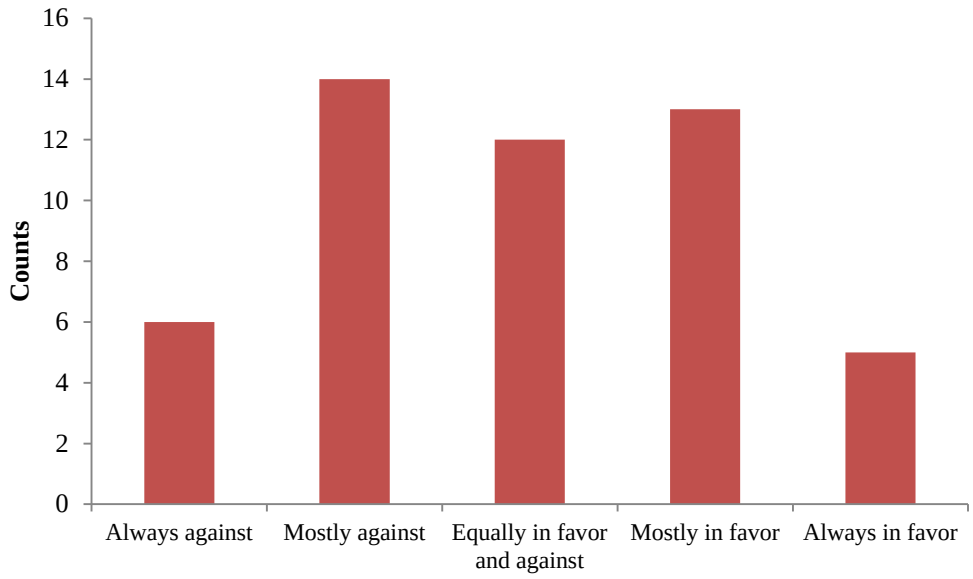

Figure 28: Perception of social media support of the HPV vaccine. The parents and guardians were asked if social media is in favor of the HPV vaccine. This graph is from the responses of parents and guardians who have seen information about the HPV vaccine on social media and primarily use Facebook (n = 50).

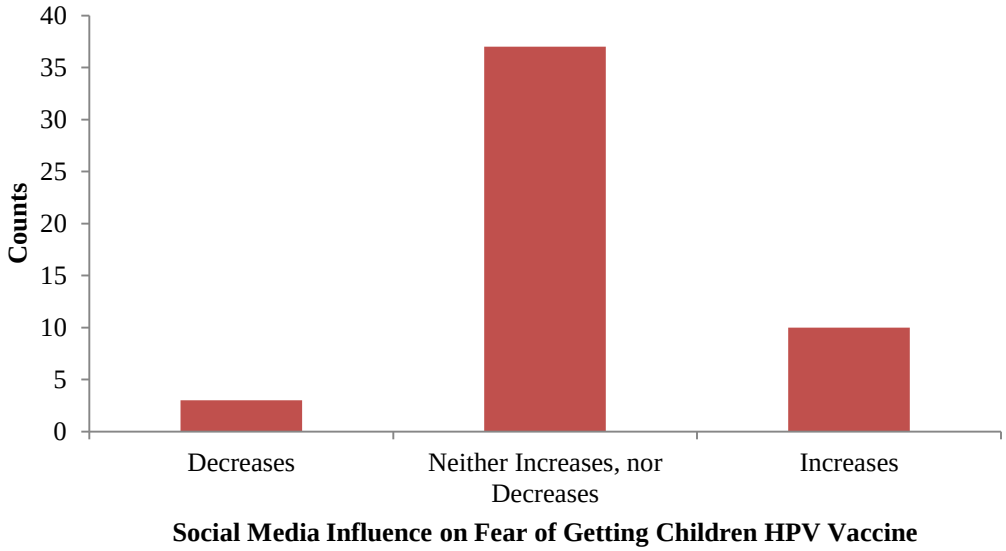

Figure 29: Perception of social media influence on HPV vaccine fear. The parents and guardians were asked if social media has influenced how much fear they have about getting their children HPV vaccine. This graph is from the responses of parents and guardians who have seen information about the HPV vaccine on social media and primarily use Facebook (n = 50).

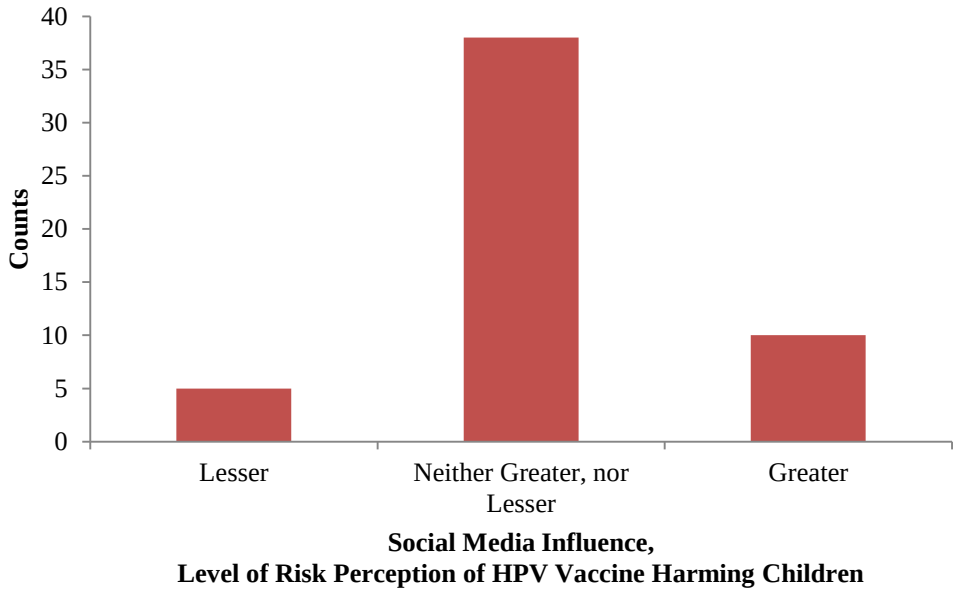

Figure 30: Social media influence on risk perception of HPV vaccine and its potential to harm children. The parents and guardians were asked if social media has influenced risk for harm they felt their children would face in relation to the HPV vaccine. This graph is from the responses of parents and guardians who have seen information about the HPV vaccine on social media and primarily use Facebook (n = 50).

Prevalent HPV Vaccine HBM and SARF Messages on Social Media

The third research question of this study looked at the prevalent messages about the HPV vaccine on social media in the context of the health belief model (HBM) and social amplification of risk framework (SARF). A content analysis was performed on 6,537 Facebook posts. Of the 6,537 posts, 6,506 were from a search of all public Facebook posts (not containing CDC posts) and the remaining 31 were from Centers for Disease Control official pages ("CDC" and "CDC STD"). The researcher analyzed the sample of public Facebook frames and coded various content characteristics, and for prevalent HBM concepts (susceptibility, severity, benefits, barriers, cues to action [get/do not get vaccinated], and self-efficacy [instructions on

how to access the HPV vaccine]) and the social amplification of risk framework (amplification, ripple, impacts).

Content characteristics. Posts (*n* = 6,506) were published between June 11, 2006 and June 8, 2016. From the sample, the fewest number of posts were published in 2006 (*n* = 39) and the most in 2012 (*n* = 1,035) (see Table 8). More than half of the posts were published on individual profiles (*n* = 3,795, 58.3%; Facebook pages *n* = 2,711, 41.7%), and nearly seventy percent (*n* = 2,649; 69.8%) of profile posts published by individuals were authored by females (males: *n* = 1,002, 26.4%; unsure: *n* = 144, 3.8%). Concerning the audience, most posts were posted to the general public (*n* = 4,918, 75.6%), while fewer were directed to a page (*n* = 1,549, 23.8%) or profile (*n* = 30, 0.6%). Nearly sixty percent of the posts had an external hyperlink embedded in the post (*n* = 3,763, 57.8%), but fewer than ten percent had embedded picture or video content (*n* =579, 8.9%).

The posts had between zero and 11,000 reactions (*M* = 30.24, *Mdn* = 0, *SD* = 305.19); however, more than half had none (*n* = 3,559, 51.6%). Concerning comments (*M* = 7.42, *Mdn* = 0, *SD* = 136.45), most posts also did not have any (*n* = 4,043, 62.1%), but those that did ranged from having between one and 6,100. Regarding shares (*M* = 184.89, *Mdn* = 0, *SD* = 7086.64), the majority of posts were also unshared (*n* = 5,439, 83.6%), but those that were had between one and 329,000 shares.

Given the potential complications of the HPV vaccine, the researcher also analyzed the presence of the terms “warts” and “cancer.” Only a few posts (*n* = 208,

3.2%) mentioned warts, but approximately a quarter mentioned cancer (*n* = 1,646, 25.3%).

Additionally, the tone of the posts and the tone of toward the HPV vaccine were coded. Most of the posts had a negative tone (*n* = 3,501, 53.8%), followed by a neutral tone (*n* = 1,527, 23.5%), and then a positive tone (*n* = 1,478, 22.7%). Concerning the tone towards the HPV vaccine, slightly fewer than half had a negative tone (*n* = 2,928, 45.0%), followed by a positive tone (*n* = 1,932, 29.7%), and neutral tone (*n* = 1,646, 25.3%).

Health belief model content. In a large majority of posts, content that suggested HPV infection susceptibility was absent (*n* = 6,236, 95.8%) (see Figure 31 for example), as was content suggesting that HPV infection would be severe (*n* = 5,487, 84.3%). Barriers to getting the vaccine were mentioned in more posts (*n* = 3,056, 47.0%) than benefits (*n* = 1,281, 19.7%). Concerning cues to action, most posts did not tell people either way to get or avoid the HPV vaccine; but a few did explicitly tell people to get vaccinated (*n* = 208, 3.2), and fewer told people explicitly to avoid the HPV vaccine (*n* = 119, 1.8%). Very few self-efficacy messages were largely were present in the sample (*n* = 287, 4.4%).

Figure 31: This is an example of a Facebook post retrieved from the search using the term "Gardasil." Because this was the first result populated, this screenshot also includes the results' header "Public Posts" – which indicates that posts under this header are available to be searched to all Facebook users (with the exception of blocked users). This post was coded as a page (author), with a general audience. It has 36 reactions, 3 comments, and 14 shares. "Cancer" is mentioned, but not "warts." The post does not suggest susceptibility to HPV infection, or that HPV infection is severe. HPV vaccine benefits are unmentioned, as are self-efficacy messages. However, as Gardasil may be causing cancer (according to the post), the presence of a barrier is coded. Furthermore, it is coded as risk amplifying, but there are no indications for the presence of ripples or impacts.

Social amplification of risk framework content. More than half of posts (*n* = 3,752, 57.7%) neither amplified nor attenuated the perception of risk to one's health that the HPV vaccine could cause. However, nearly forty percent of the posts amplified HPV vaccine risk (*n* = 2,568, 39.5%) and only a very few attenuated risks (*n* = 186, 2.9%). The vast majority of posts did not discuss ripples (*n* = 6,110, 93.9%) or impacts (*n* = 6,312, 97%) from the perceived risks of the HPV vaccine.

HPV Vaccine Representation and the CDC's Facebook posts: 2006-2006

For the final research question of this study, the researcher compared the general representation and the CDC's representation of the HPV vaccine on Facebook over the decade since the vaccine's first FDA approval. A separate content analysis of

CDC page Facebook posts (n = 31) was performed, analyzing them in the context of HBM and SARF variables.

CDC Facebook posts: Content characteristics, HBM and SARF content. Thirty-one posts were published from February 5, 2010 to April 28, 2016 (M = 4.43, SD = 2.76) (see Figure 32for example). The fewest posts were published in 2012 (n = 1) and the most were published in 2013 (n = 8) (refer to Table 2). All of the posts were posted to the general audience. Nearly all of the posts had an embedded external hyperlink (n = 30, 96.8%), and approximately a quarter had embedded picture or video content (n =8, 25.8%). Reactions ranged from zero to 1,701 (M = 364.32, Mdn = 129, SD = 451.19), the range of comments was between zero and 132 (M = 39.77, Mdn = 33, SD = 33.94), and shares ranged between zero and one thousand (M = 220.61, Mdn = 84, SD = 288.25).

The researcher also analyzed the CDC Facebook posts for presence of the terms “warts” and “cancer.” Only one post (3.2%) mentioned warts, but more than three-quarters mentioned cancer (n = 24, 77.4%). Additionally, the tone of the posts and the tone toward the HPV vaccine were coded. Most of the posts had a positive tone (n = 20, 64.5%), followed by a neutral tone (n = 10, 32.2%), and then a negative tone (n = 1, 3.2%). Concerning the tone towards the HPV vaccine, the tone was mostly positive (n = 30, 96.8%), and one post was neutral (3.3%).

The posts were also coded for health belief model variables. One post made allusions to susceptibility to HPV infection (3.2%) and more than half discussed aspects of HPV infection’s severity (n = 20, 64.5%). Barriers to HPV vaccination

were unmentioned and most of the posts discussed benefits (*n* = 27, 87.1%). Self-efficacy messages were present in about one-fifth of the posts (*n* = 19.3%) and cues to vaccinate were present in more than twenty percent of the posts (*n* = 7, 22.6%). None of the posts had cues to avoid the HPV vaccine.

CDC posts were also coded for social amplification of risk framework variables. Posts neither amplified nor attenuated HPV vaccine-related risk perceptions. Ripples and subsequent impact messages were not in the sample.

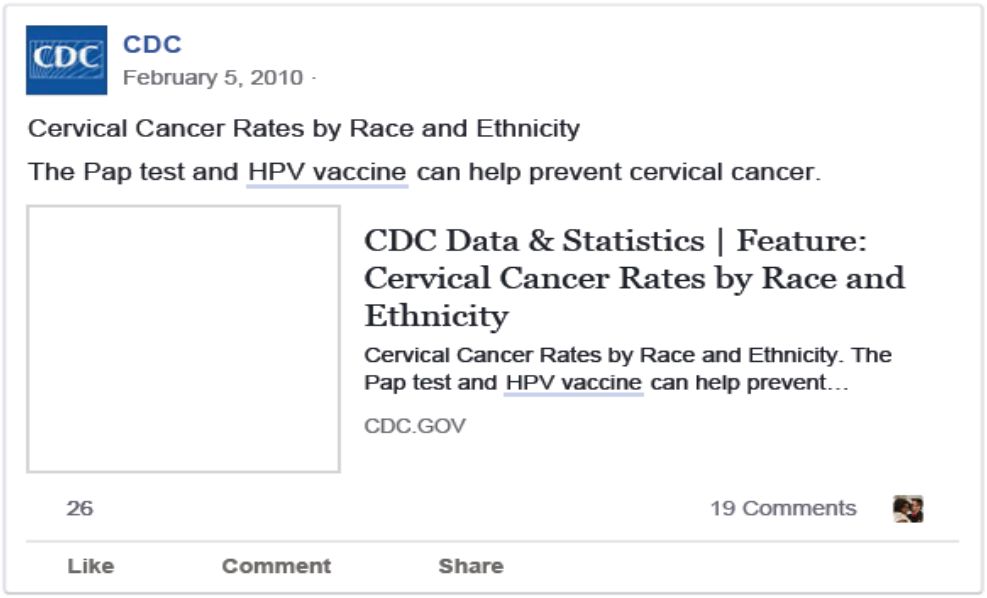

Figure 32: A Facebook post retrieved from the search using the term "HPV vaccine" on the Centers for Disease Control and Prevention's Facebook page. This is their first HPV-vaccine related post. This post was coded as a page (author), with a general audience. It has 26 reactions, 19 comments, and no shares. "Cancer" is mentioned, but not "warts." The post does not suggest susceptibility to HPV infection, but it does suggest that HPV infection is severe, as it can cause cancer. HPV vaccine benefits are mentioned (preventing cancer), while barriers and self-efficacy messages are not mentioned. This post does not contain messages that either amplify or attenuate risk perception, and there are no ripples or impacts mentioned.

Comparing over a decade. When looking at reactions, since their first post in 2010, the CDC Facebook posts have had a higher average number of reactions (see Figure 33) and comments than Facebook posts (see Figure 34). Most years, with the

exception of 2014, CDC Facebook posts have had a higher average of shares than the sample of Facebook posts (see Figure 35).

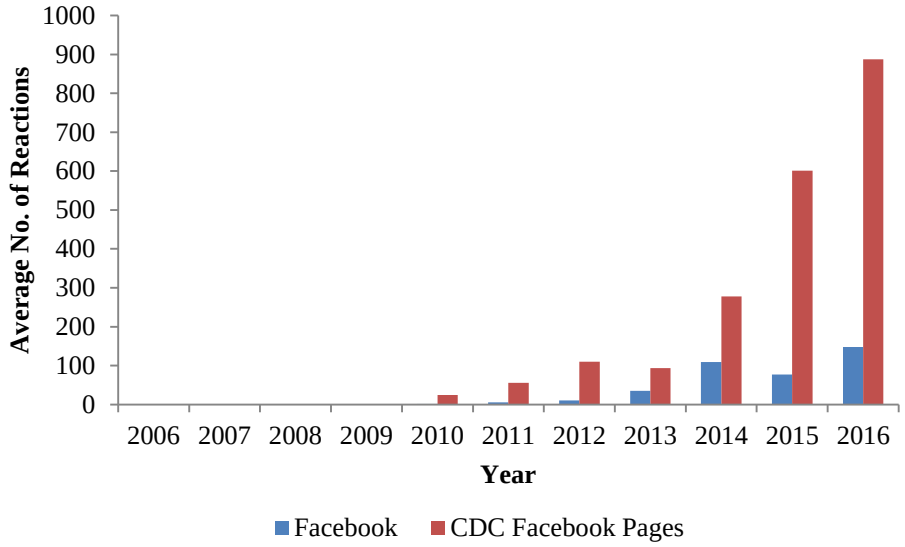

Figure 33: Average number of reactions to HPV-vaccine related Facebook posts. This graph shows the average number of reactions that HPV vaccine-related Facebook posts received each year. One trend line represents reactions to posts from across Facebook and the other from the CDC (CDC and CDC STD) Facebook pages.

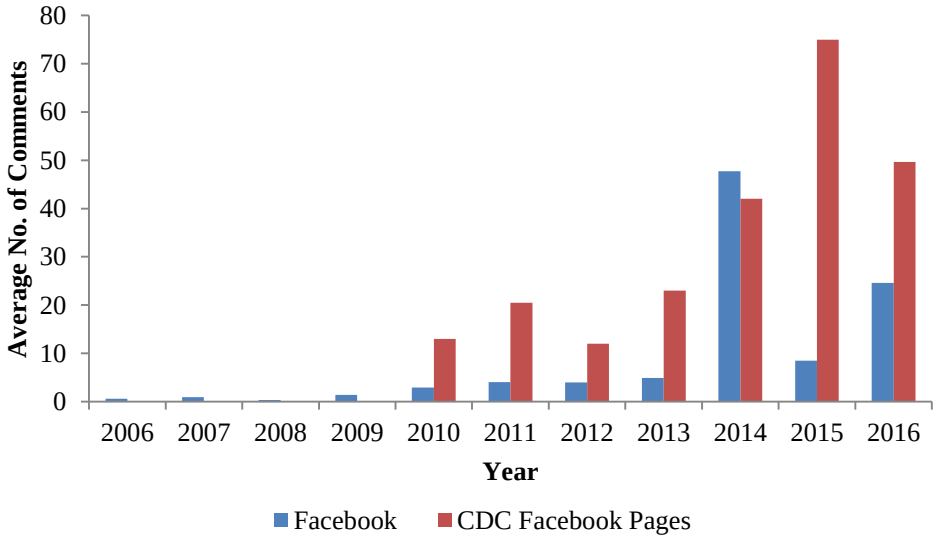

Figure 34: Average number of comments to HPV-vaccine related Facebook posts. This graph shows the average number of comments that HPV vaccine-related Facebook posts received each year. One trend represents comments to posts from across Facebook and the other from the CDC (CDC and CDC STD) Facebook pages.

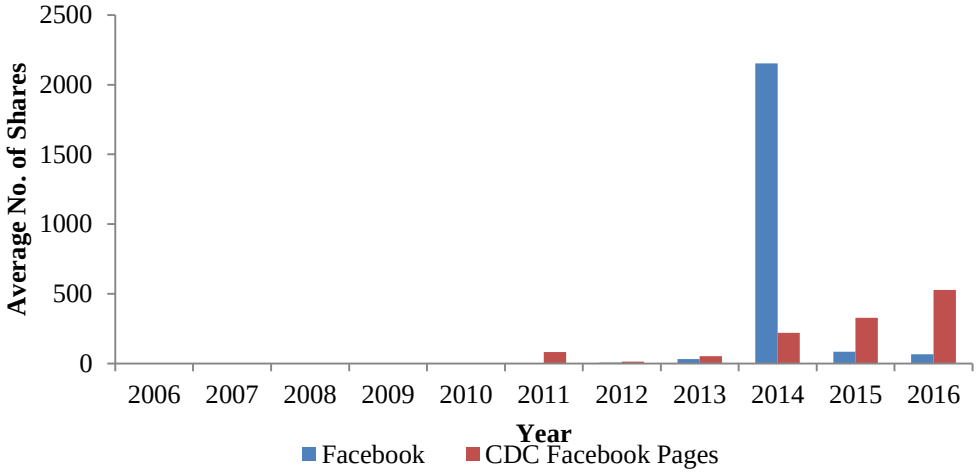

Figure 35: Average number of shares HPV-vaccine related Facebook posts receive. This graph shows the average number of shares that Facebook posts about the HPV vaccine had each year, one trend represents shares of posts from across Facebook and the other of posts from CDC (CDC and CDC STD) Facebook pages.

The CDC only mentioned "warts" in one instance in 2016 (M = 16.67), however warts have been mentioned in Facebook posts over the decade (see Figure 36). Concerning cancer mentions, the CDC has had a higher percentage of posts mentioning cancer than posts across Facebook (see Figure 37).

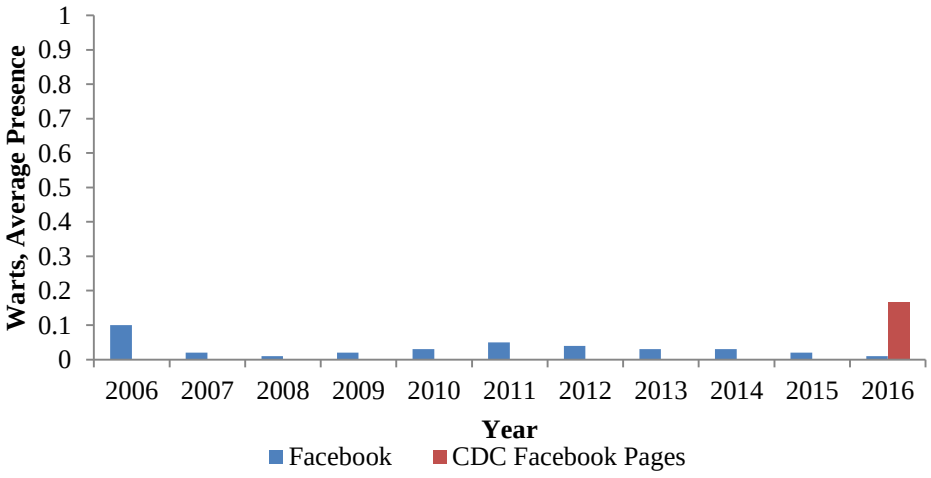

Figure 36: Average percent of HPV vaccine-related posts that mention warts. The CDC only mentions warts once in 2016.

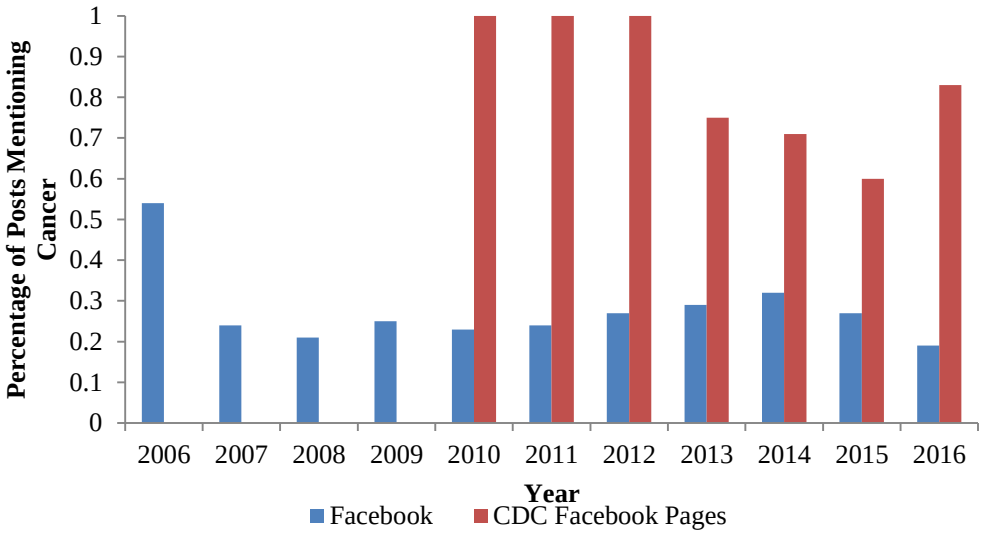

Figure 37: Average percent of HPV vaccine-related posts that mention cancer.

The tone of the posts was recoded (-1 = "negative," 0 = "neutral," 1 = "positive") and averaged by year. Compared to the CDC pages, posts from the Facebook sample had a tone that had on average remained negative after 2006, moved towards neutral until 2014, and then became more increasingly negative thereafter. The tone of the CDC posts has remained neutral or positive on average (see Figure 38).

The tone towards the HPV vaccine was also recoded (-1 = "negative," 0 = "neutral," 1 = "positive") and averaged by year. Compared to the CDC pages, posts from the Facebook sample became increasingly negative over the decade, while the tone of the CDC posts towards the HPV vaccine has always been very positive on average (see Figure 39).

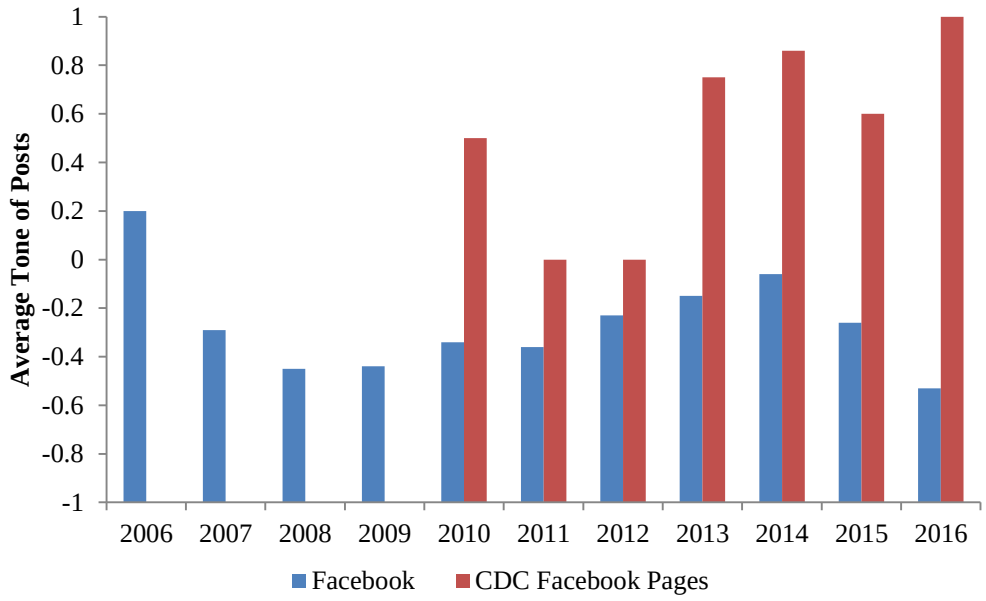

Figure 38: Average tone of HPV vaccine-related posts. The "0" marker represents neutrality, "1" is "always positive," and "-1" is "always negative."

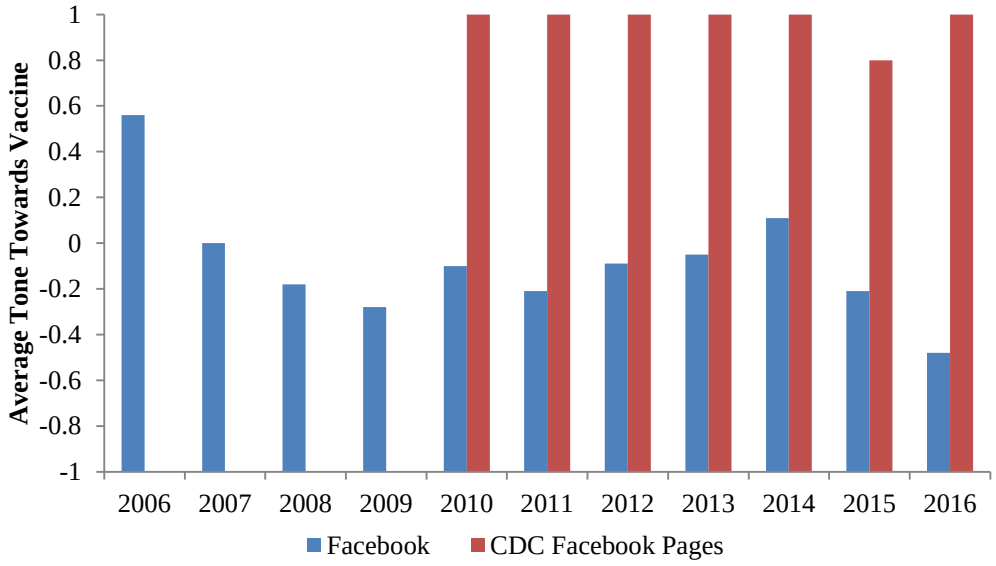

Figure 39: Average tone of HPV vaccine-related posts toward the HPV vaccine. The "0" marker represents neutrality, "1" is "positive," and "-1" is "negative."

Health belief model variables. This study compared the messages in HPV vaccine-related posts on Facebook in general to the messages in posts from CDC Facebook pages in the context of the health belief model (see Table 13 for summary). Concerning perceived susceptibility (see Figure 40), after 2006, there was a decline in the average number of messages in Facebook posts from 23% to 4% that would never rise again above 6% percent during the decade. Perceived susceptibility messages did not appear in CDC posts until 2016. Severity messages (see Figure 41) in Facebook posts had a greater average presence in 2006, but would later decline. Meanwhile the CDC posts varied, but would ultimately increase. The average presence of posts that mentioned benefits of the HPV vaccine (see Figure 42) also peaked in 2006, while the average presence in CDC posts was always above 70%, peaking in several years. Concerning barriers (see Figure 43), there was an overall increase in the average presence of Facebook posts over the decade mentioning barriers to HPV vaccination. Meanwhile, the CDC posts never mentioned barriers. Self-efficacy messages (see Figure 44) were consistently low in Facebook posts over the decade, never rising above ten percent. Among CDC posts, self-efficacy messages did not appear until 2013 and peaked in 2015. The average presence of cues to vaccinate (see Figure 45) dropped by 20% over the decade in Facebook posts. Cues to vaccinate did not have a presence in CDC posts until 2013, and the average peaked in 2015. Cues to not vaccinate messages were low (see Figure 46), but experienced an increasing average presence in Facebook posts. Cues not to vaccinate were never present in CDC posts.

Table 13: Yearly averages of Health Belief Model Variables

	Suscept.		Severity		Benefits		Barriers		Self-Efficacy		Cues to Vaccinate		Cues to Not Vaccinate	
	FB	*CDC*	*FB*	*CDC*	*FB*	*CDC*	*FB*	*CDC*	*FB*	*CDC*	*FB*	*CDC*	*FB*	*CDC*
2006	0.23	-	0.44	-	0.51	-	0.31	-	0.10	-	0.23	-	0.00	-
2007	0.04	-	0.16	-	0.20	-	0.39	-	0.03	-	0.04	-	0.01	-
2008	0.05	-	0.09	-	0.16	-	0.52	-	0.02	-	0.05	-	0.02	-
2009	0.03	-	0.08	-	0.08	-	0.50	-	0.02	-	0.02	-	0.01	-
2010	0.04	0.00	0.14	0.50	0.15	1.00	0.50	0.00	0.05	0.00	0.02	0.00	0.01	0.00
2011	0.06	0.00	0.14	0.50	0.17	1.00	0.48	0.00	0.04	0.00	0.03	0.00	0.02	0.00
2012	0.06	0.00	0.15	0.00	0.21	1.00	0.43	0.00	0.07	0.00	0.03	0.00	0.02	0.00
2013	0.02	0.00	0.21	0.37	0.30	0.87	0.42	0.00	0.03	0.12	0.03	0.12	0.00	0.00
2014	0.05	0.00	0.23	0.71	0.32	0.71	0.37	0.00	0.09	0.28	0.05	0.28	0.00	0.00
2015	0.04	0.00	0.22	0.80	0.24	0.80	0.46	0.00	0.04	0.40	0.04	0.40	0.02	0.00
2016	0.03	0.17	0.16	1.00	0.17	1.00	0.63	0.00	0.04	0.17	0.03	0.33	0.05	0.00

Note. This table shows the average presence of health belief model variables in post on Facebook (*FB*) and posts from CDC's pages (*CDC*).

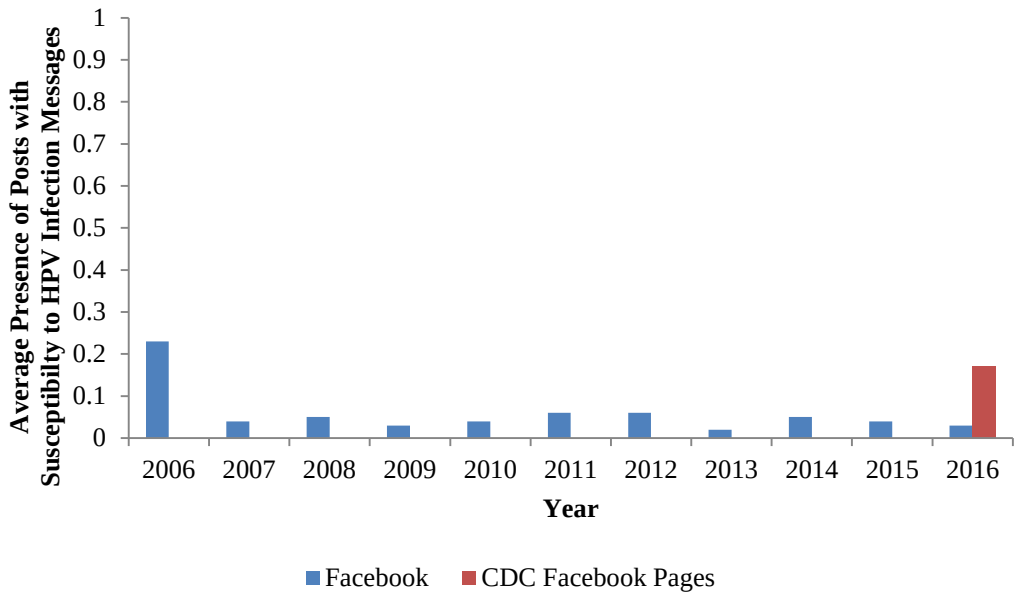

Figure 40: Trends of posts with susceptibility to HPV infection messages from Facebook and CDC Facebook pages, by year.

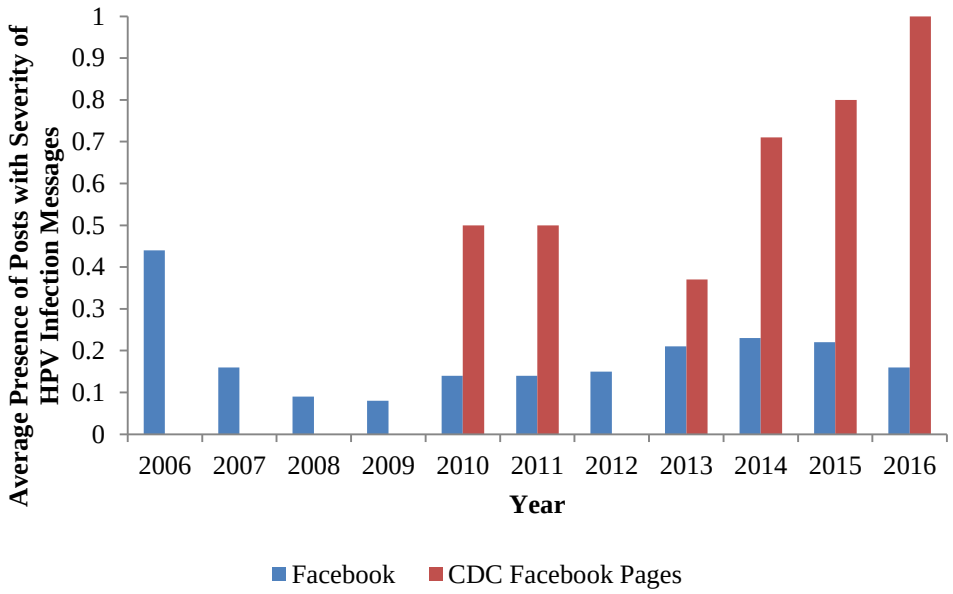

Figure 41: Average presence of posts with HPV infection severity messages from Facebook and CDC Facebook pages, by year.

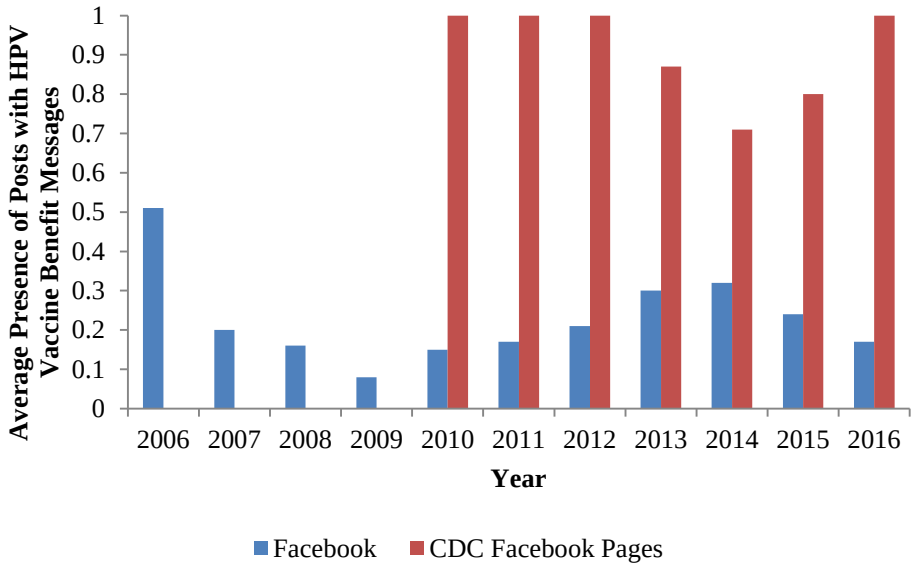

Figure 42: Average presence of posts that mention HPV vaccine benefits from Facebook and CDC Facebook pages, by year.

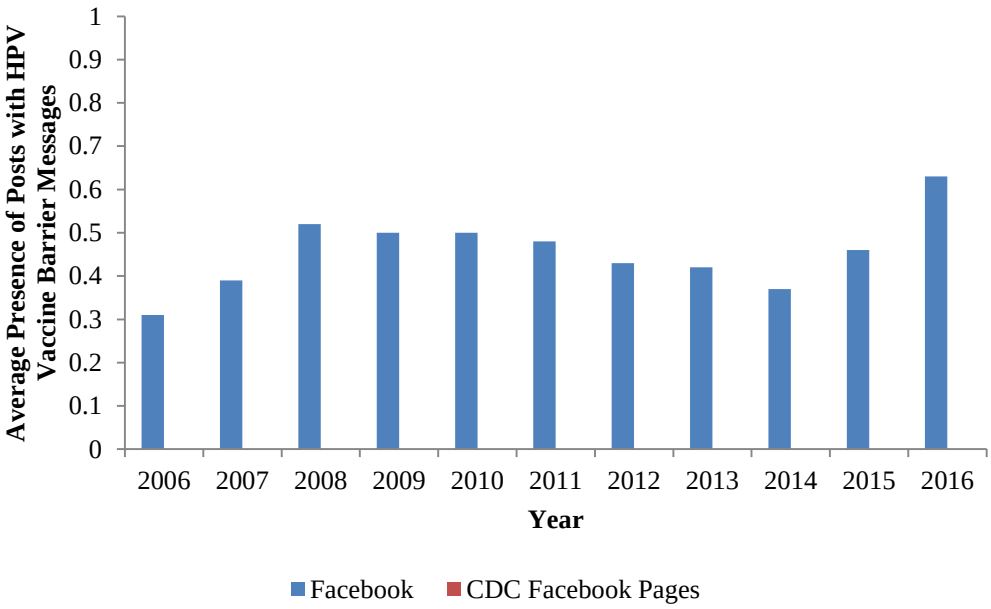

Figure 43: Average presence of messages about barriers to HPV vaccination in posts from Facebook and CDC Facebook pages, by year.

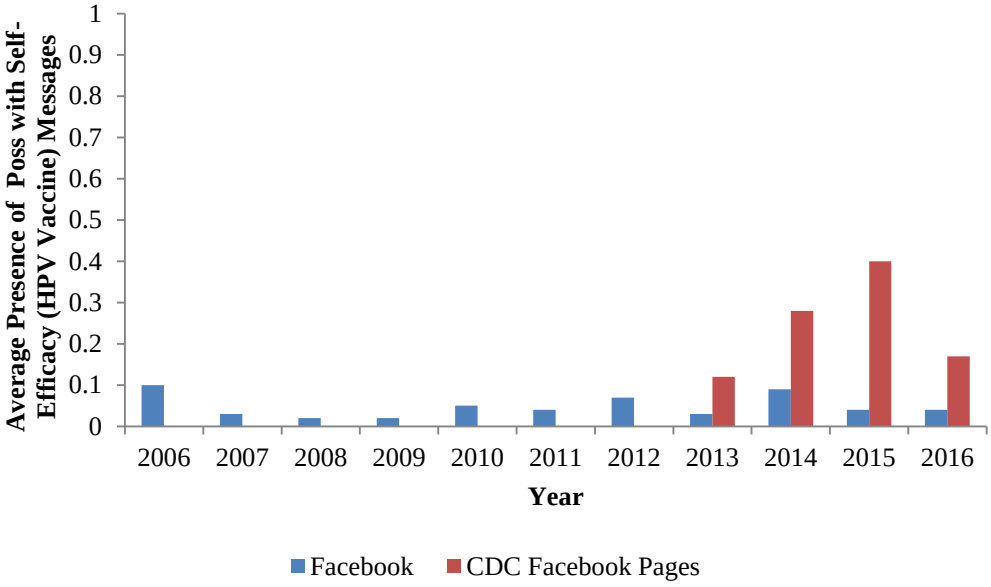

Figure 44: Average presence of HPV vaccine-related self-efficacy messages in posts from Facebook and CDC Facebook pages, by year.

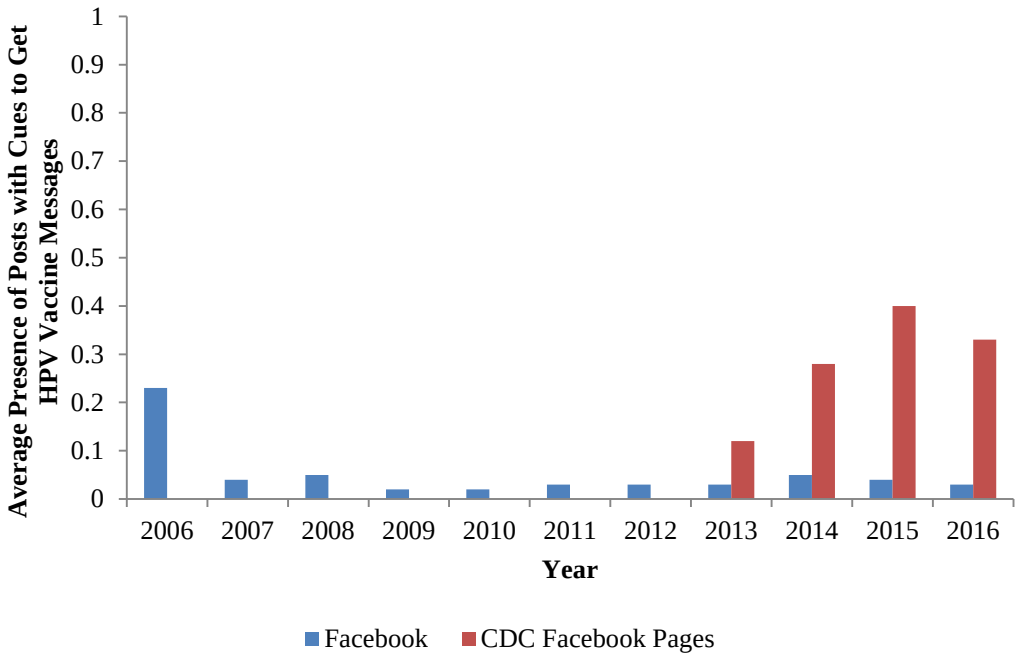

Figure 45: Average presence of cue to get the HPV vaccine messages in posts from Facebook and CDC Facebook pages, by year.

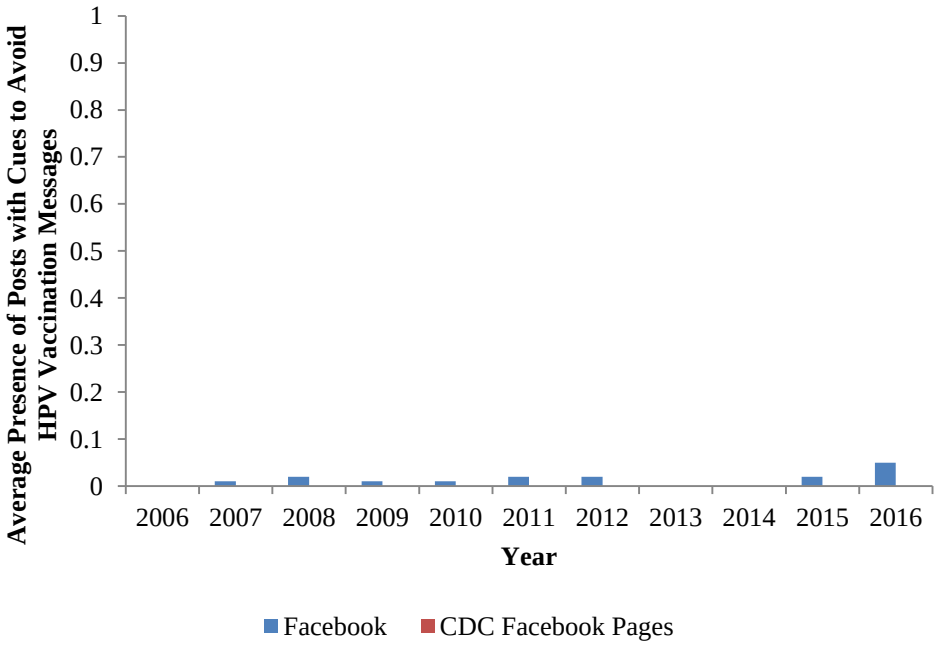

Figure 46: Average presence of cue to not get the HPV vaccine messages in posts from Facebook and CDC Facebook pages, by year.

Social amplification of risk variables. This study also compared Facebook's representation of the HPV vaccine with the CDC Facebook pages' representation in the context of the social amplification of risk framework (see Table 14 for summary). Risk amplification was recoded on a scale (-1 = "attenuating risk," 0 = "neither amplifies nor attenuates risk," and 1 = "amplifies risk") to measure the average level of risk amplification throughout the decade. While in 2006 Facebook there was a higher average of posts with risk attenuating messages, the presence of posts with risk amplification messages would increase over the decade (see Figure 47), as would the presence of ripples and impacts. CDC posts did not have posts with messages that amplified or attenuated HPV vaccine-related risks, that mentioned ripples, or mentioned impacts (see Figure 48).

Table 14: Average Presence of Social Amplification of Risk Messages

	Risk Level		Ripples		Impacts	
	FB	*CDC*	*FB*	*CDC*	*FB*	*CDC*
2006	-0.02	-	0.00	-	0.00	-
2007	0.22	-	0.02	-	0.02	-
2008	0.36	-	0.04	-	0.00	-
2009	0.37	-	0.07	-	0.01	-
2010	0.37	0.00	0.06	0.00	0.00	0.00
2011	0.40	0.00	0.07	0.00	0.02	0.00
2012	0.31	0.00	0.02	0.00	0.01	0.00
2013	0.32	0.00	0.09	0.00	0.05	0.00
2014	0.24	0.00	0.06	0.00	0.03	0.00
2015	0.44	0.00	0.08	0.00	0.10	0.00
2016	0.59	0.00	0.10	0.00	0.10	0.00

Note. This table shows the average presence of social amplification of risk variables in post on Facebook (*FB*) and posts from CDC's pages (*CDC*).

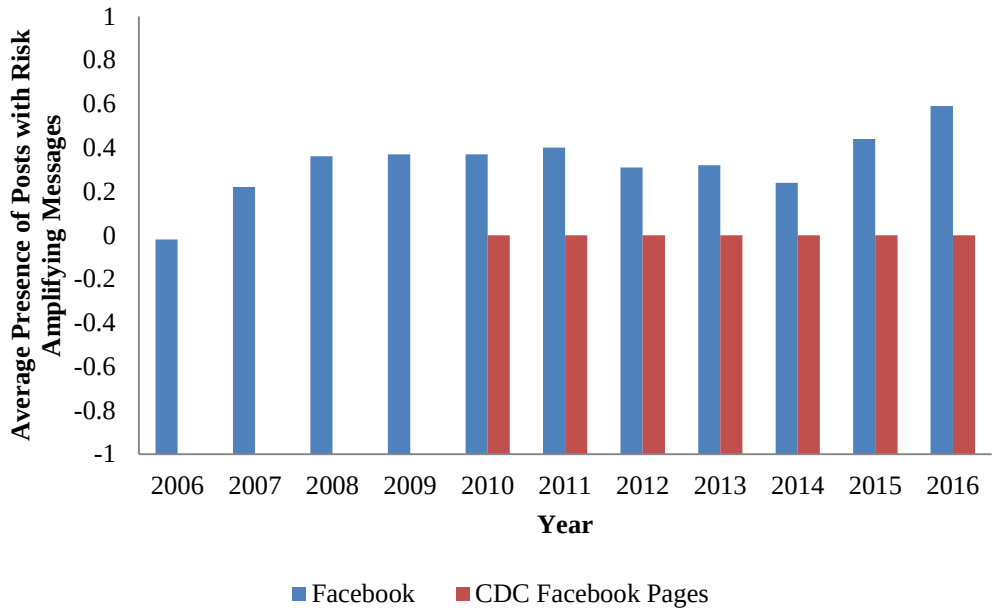

Figure 47: Average presence of posts with risk amplifying messages. The "0" marker represents neutrality, "1" is amplifies, and "-1" is attenuation.

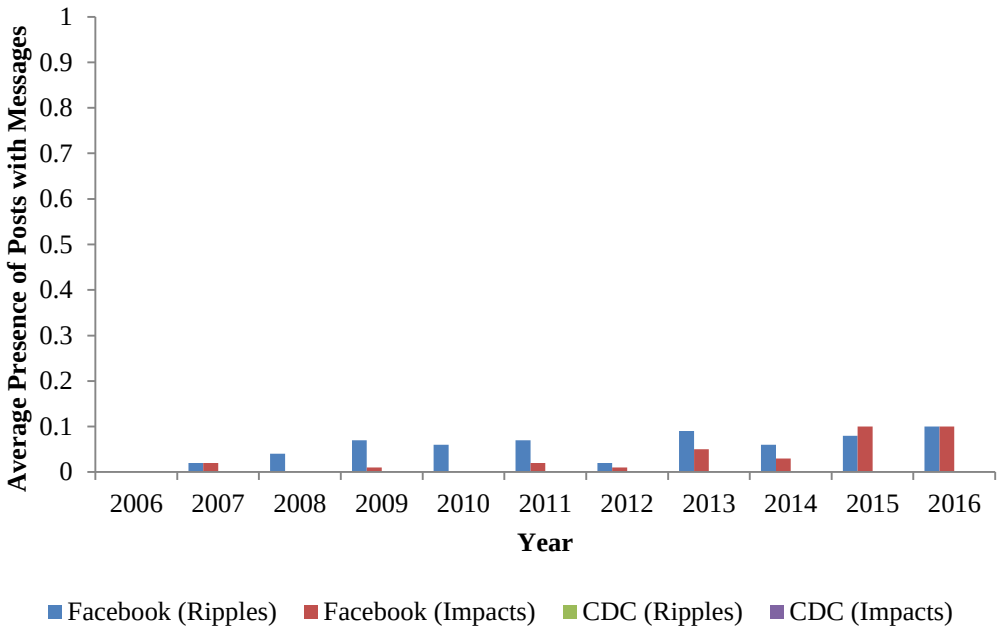

Figure 48: Average presence of HPV vaccine risk-related ripple and impact messages in posts from Facebook and CDC Facebook pages, by year.

Chapter 5: Discussion

This dissertation had several aims. First, this study was designed to examine HPV vaccine-related perceptions held by Kansan parents and guardians in the context of the health belief model and social amplification of risk framework. Second, this study was designed to investigate how Kansan parents and guardians engage with HPV vaccine-related information on social media. Third, this research sought to study how the HPV vaccine is represented in social media messages through the lenses of the health belief model and social amplification of risk framework. Last, this study looked to analyze how the representation of the HPV vaccine has changed over ten years and compares with messages from the Centers from Disease Control and Prevention. The goal was that the findings from this study would provide insight into why HPV vaccination rates are low among Kansan children.

Kansan parents and guardian of children ages 9-17 years were specifically targeted for study because while HPV vaccination in adults is also important and has been a subject of study (e.g., Cohen & Head, 2013), HPV vaccination and subsequent immunization earlier in age puts Kansan children at a lower risk for exposure to HPV and infection. It reduces their risks of experiencing HPV-associated genital warts and cancer; it reduces their risk of death. Understanding HPV vaccine perceptions and social media representations provides insight into some of the factors influencing low HPV vaccination rates. The findings can inform strategies to improve vaccination rates in Kansas. By extension, future research may help improve HPV vaccination rates nationwide.

This study finds that low HPV vaccination rates are likely not due to a lack of awareness of the virus or the vaccine. The majority of interview participants and survey respondents had heard of both HPV and the HPV vaccine, yet their children had not received the HPV vaccine, consistent with state vaccination data (Centers for Disease Control and Prevention, 2016a). It is more likely that low vaccination rates are a matter of HPV vaccine-related perceptions held by Kansan parents and guardians.

HPV Vaccine Perceptions (HBM and SARF)

Most of the surveyed Kansan parents and guardians agreed that their children are susceptible to HPV infection, but some did not feel their children were susceptible. The finding that some parents and guardians believe that their children are not susceptible supports the findings of Cohen and Head (2013) that low HPV infection susceptibility perceptions exist. Concerning HPV infection severity, the respondents to the dissertation survey also mostly agreed that HPV infection could cause genital warts and cancer. There was a lower level of agreement with the statement that HPV infection could kill their children. It is possible that while many agree that HPV infection is inevitable in their children and that infection has some associated health complications, that the threat of HPV infection does not generate enough motivation to get their children vaccinated.

Survey respondents overall agreed that the HPV vaccine prevents HPV, genital warts, and cancer. These agreement levels were not as high as they were with susceptibility and severity statements. It is possible that the HPV vaccine may not be

perceived as beneficial enough to motivate parents and guardians to get their children vaccinated. Barriers to the vaccine may also aggravate the perception of the HPV vaccine's benefits.

The survey respondents overall did not feel that the HPV vaccine was inconvenient and slightly leaned towards perceiving the vaccine to be affordable. Also, they did not feel that HPV vaccination would encourage their children to become more sexually active, aligning with the findings in the Smith et al. (2014) study. The parents and guardians had mostly not been discouraged from getting their child vaccinated, and felt that they would be respected by people closest to them if they chose to do so. Furthermore, they slightly leaned toward disagreeing that the HPV vaccine has more consequences than benefits for their children. While the perception of HPV vaccine-related barriers may not be prevalent among the majority of parents and guardians, they may be prevalent enough to influence low vaccination rates.

Concerning self-efficacy, respondents mostly agreed that they could protect their children from HPV. To a lesser extent, parents agreed that they had been encouraged to vaccinate their children. It is possible that more frequent, stronger recommendations would be useful to increase HPV vaccination rates, which was a recommendation, put forth by the CDC and ACIP (Centers for Disease Control and Prevention, 2015e, 2015g; Petrosky et al., 2015).

The health belief model was a useful framework for analyzing Kansan parent and guardian perceptions of the HPV vaccine. HBM (Rosenstock, 1974) posits that

there are several factors that influence one's decision to perform a preventive health behavior. This study suggests, in alignment with HBM, that just because the HPV vaccination is a health behavior that can prevent HPV infection and associated disease, does not mean that parents will accept it for their children. An ad hoc analysis reviewed one of the survey questions that asked if participants support the HPV vaccine. Of the eligible 124 respondents that answered, 26 disagreed on various levels and 6 did not know. Of the 95 eligible respondents that completed the survey, 20 of the 95 disagreed on various levels, and 4 did not know. In both samples of all respondents and the respondents who completed the survey, a quarter of participants did not indicate support for the HPV vaccine. If this is mirrored in the population, this could suggest that this vaccine in particular does not have a lot of support. Still, that means that some support the vaccine, but even supporters may experience barriers.

The barriers also may extend from the regional environment and social influences. Ad hoc research found that the Kansas vaccination rates for children 13-17 years for the tetanus toxoid, reduced diphtheria toxoid (also known as Td); tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis (also known as Tdap); and the meningococcal conjugate (also known as MenACWY) vaccine are all below U.S. national averages (Centers for Disease Control and Prevention, 2015a). Ultimately, low HPV vaccination rates may not just be solely a problem regarding the Kansan parent and guardian perceptions of the HPV vaccine, but may also have to do with socially shared perceptions about vaccines in general.

This study also examined if the HPV vaccine is perceived as a risk event, despite it being a preventive health measure. One could consider HPV vaccine-related risk perceptions as an extension of barriers. However, by looking at the HPV vaccine in the context of SARF, and not collapsing it into barriers, it is possible to develop research to see how this variable interacts with behavior intentions.

The respondents overall did not feel that the HPV vaccine would cause harmful side effects or death in their children. They also did not feel that there are more risks related to the HPV vaccine than HPV infection. However, the level of disagreement with the HPV vaccine being risky for their children was not as high as it was with the other statements. All of the averages for these statements leaned towards "somewhat disagreeing." This suggests that while most of the respondents likely believe that the HPV vaccine is not a risk, there are some respondents who do, which also may be an explanation for low HPV vaccination rates.

The interviews provide some clues as to why the HPV vaccine may be perceived as risky. Two of the participants indicated that they believed that part of the virus is present in the vaccine, and exposure to the vaccine could compromise their children's immune systems. This supports the findings of the Doherty et al. (2015) that there is a population of people who are concerned about vaccine ingredients, specifically that vaccination means exposure to the virus that the vaccine is designed to immunize against. It also supports in part the Gellin et al. (2000) study that found that parents believed that immunizations can weaken the immune system. Though the HPV vaccine does not contain the actual virus and likely would not weaken a

recipient's immune system (U.S. Food and Drug Administration, 2009b, 2011, 2014b), the perception exists. This also suggest that while there is awareness about of HPV and the HPV vaccine, that knowledge about the HPV vaccine may be lacking, and education efforts may need to be directed towards the vaccine, and not just the virus.

Furthermore, while the findings from the interview and the survey show that many are aware of the HPV vaccine, it does not mean that everyone knows about it, as four people did not know there was a HPV vaccine. Two of the survey participants, when exposed to information about the HPV indicated that they either planned to talk to a healthcare provider, or get their children vaccinated. This suggests that there may be an opportunity to encourage HPV vaccination among those who are unaware of the vaccine if they are first exposed to accurate and factual information about the disease and the vaccine from certain sources (e.g., the CDC).

In summary, while there is a general acceptance that children are susceptible to HPV infection, the perception of severity and HPV vaccine benefits may just not be strong enough to motivate higher rates of HPV vaccination. If there is awareness about HPV infection susceptibility and severity, then it is also likely that discussion of the virus itself is not motivating vaccination. The conversation may need to be focused more on the HPV vaccine. The HPV vaccine is perceived by survey respondents to have fewer barriers than benefits, but the influence that those barriers possess is unknown. It is possible that the barriers, and perhaps a larger social

phenomenon, may have an influence on HPV vaccination rates among Kansan children.

Perceptions of Social Media HPV Vaccine-Related Messages (HBM and SARF)

Given the pervasiveness of social media use, this study was also interested in what Kansan parents and guardians are seeing on public posts on social media about the HPV vaccine. While the main source for HPV vaccine information is still healthcare providers, a few participants did mention that social media was their main source. The ad hoc analysis even found that more than 15% of all eligible respondents who completed the survey had searched social media for information about the HPV vaccine. Also, the majority of survey respondents reported that they had seen information about the HPV vaccine online. These results are in alignment with the findings of Fox and Duggan (2013) and with the Moorhead et al. (2013), that while social media is not the primary source of health information, it is still a prominent source, even if it's just by passive exposure, and might be a stakeholder in influencing perceptions.

When looking at how Kansan parents and guardians perceived HPV vaccine-related social media messages in the context of HBM, some of their perceptions of social media messages reflect their own personal perceptions. The respondents reported that social media messages generally say that their children are susceptible to HPV infection. They also agreed, but to a lesser extent, that social media message suggest that HPV infection is severe (causing genital warts, cancer, and death). Concerning the benefits, the respondents agreed that social media messages state that

the HPV vaccine can prevent HPV, genital warts, and cancer. While the perception of benefit messages on social media was minimized when compared to their personal perceptions, barriers were mostly maximized. The findings suggest that respondents perceived that social media messages portray the HPV vaccine overall more negatively – more inconvenient, more likely to make their children more sexually active, and that the people closest to them would not be as likely to respect their decision to vaccinate their children, when compared to their personal perceptions (the exception being affordability). These findings suggest that social media is perceived to have a more negative, anti-HPV vaccine slant than their own personal perceptions.

The perception of social media's negative slant was also present in the analysis of SARF variables. The findings suggest that respondents perceive that social media messages relay that it is risky for their children to receive the HPV vaccine, that children will experience harmful side effects or death if vaccinated, and that there are more risks for their children being vaccinated than having HPV infection, at a higher level than their own personal perceptions. However, respondents appeared to be divided on whether social media messages are overall mostly in favor or against the HPV vaccine. These findings suggest that though perceptions of the HPV vaccine's representation on social media may be more divided, there is the perception that HPV vaccine-related social media messages magnify the negative aspects of the HPV vaccine while minimizing benefits. It may also suggest that negative HPV vaccine-related messages generate more recall than positive HPV vaccine-related messages.

Concerning the influence of HPV vaccine-related social media messages, most of the participants indicated that social media neither increased nor decreased their HPV vaccine risk perceptions. However, the results report that there were more respondents who reported that social media more often amplified than attenuated their HPV vaccine risk perceptions. These findings, in part, support the Nan and Madden (2012) and the Dunn et al. (2015) studies, which found that exposure to negative HPV vaccine messages have a greater influence on HPV vaccine perceptions than positive messages. This suggests the possibility that social media may in fact be negatively influencing Kansan parents to avoid getting their children the HPV vaccine.

HPV Vaccine Representations on Facebook (HBM and SARF)

This study looked at HPV vaccine representations on Facebook because it is the most used social media site in the United States among adults 18 years of age and older (Greenwood et al., 2016). Also, Facebook is a popular platform for discussions about sexual health (Moorhead et al., 2013). As the survey results show that most of the respondents had seen HPV vaccine-related information on social media, have Facebook accounts, and that most Facebook users reported that Facebook is their most used social media site, this study posits that Facebook content was the most relevant social media platform, thus the obvious choice on which to perform a content analysis.

In the context of HBM, the vast majority of the HPV vaccine-related Facebook post over the decade since the first vaccine's FDA approval did not contain messages about susceptibility to HPV infection or associated severity. Barriers to

getting the vaccine were present in more posts than benefits. Also, very few posts had HPV vaccine-related self-efficacy messages or cues directing people to get vaccinated. Overall, the tone of most of the posts was against the HPV vaccine. These findings are contrary to what Ache and Wallace (2008) found about the vaccine's representation on YouTube, to the findings that Battles (2010) found about HPV vaccine representations on internet message boards, and to the findings on Myspace presented by Keelan et al. (2010). However, the results of this study support the findings of what Briones et al. (2012) found in their study of the representation of the HPV vaccine on YouTube, and aligns with the survey findings of this dissertation's study. This study's finding suggests that social media messages lean more towards discussion of barriers to HPV vaccination, and that are becoming increasingly negative over time.

Concerning risks, most of the posts had neither HPV vaccine risk amplifying nor attenuating messages. However nearly 40% of posts had risk amplifying messages and only 2% had risk attenuating messages. An ad hoc analysis found that across Facebook, posts that had a negative tone towards the HPV vaccine received a higher average number of reactions, comments, and shares than posts with a positive or neutral tone (see Figure 49).

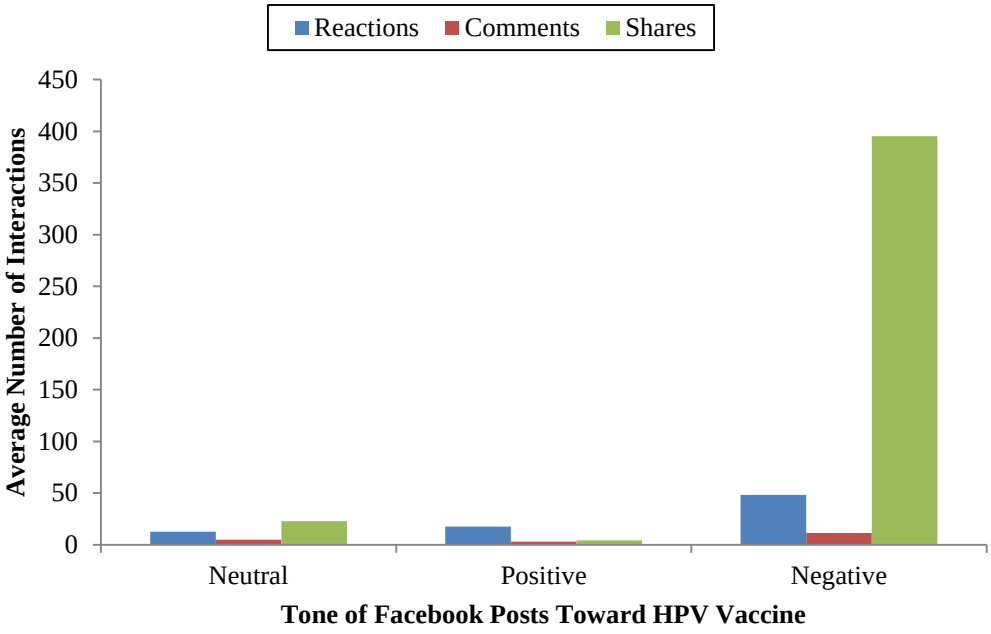

Figure 49: HPV vaccine-related Facebook post, average interactions

Such findings suggest that risk amplifying messages may have a greater reach and generate more engagement across Facebook audiences. Provided that the findings of Nan and Madden (2012) and Dunn et al. (2015) can be generalized, it is possible that social media users, particularly Facebook users who have been exposed to HPV vaccine-related posts, are more often exposed to negative HPV vaccine-related messages. Additionally, these negative posts may have negatively influenced audience perceptions of the HPV vaccine, and made them more inclined to share the negative information, further magnifying risk perceptions. Exposure to the current Facebook environment may ultimately not be conducive to increasing HPV vaccination rates. That is not to say that internet use or using social media to find information should be discouraged. It may just mean, as research suggests (Geana &

Greiner, 2011), that users need training to understand how and where to search online for information about the HPV vaccine.

A Decade of HPV Vaccine Representations on Facebook (HBM and SARF)

The last research question of this study was interested in trends related to HPV vaccine representation in posts across Facebook, and how these trends compared with CDC Facebook posts over ten years since the first HPV vaccine received FDA approval. The CDC did not begin posting content about the HPV vaccine on Facebook until 2010. Furthermore, the sheer volume of posts was very different across Facebook and the CDC-specific Facebook pages. Before constructing the final sample of approximately 6,500 Facebook posts, searches found over 20,000 non-CDC HPV vaccine-related Facebook posts, and were it not for technological limitations, more could have been collected. However, since 2010, only 31 HPV vaccine-related posts were published across two CDC Facebook pages. Ultimately, the CDC has not been a frequent contributor to the HPV vaccine conversation on Facebook.

While the CDC is not a frequent contributor on the subject of the HPV vaccine on Facebook, it has prompted social media users' engagement. On average, since 2010, the CDC posts have received more reactions, comments and shares than HPV vaccine-related posts across Facebook. The exception being for comments and shares in 2014, where one particular Facebook post would receive an exceedingly high amount of attention: more than 11,000 reactions, 6,100 comments, and 329,000 shares (see Figure 50).

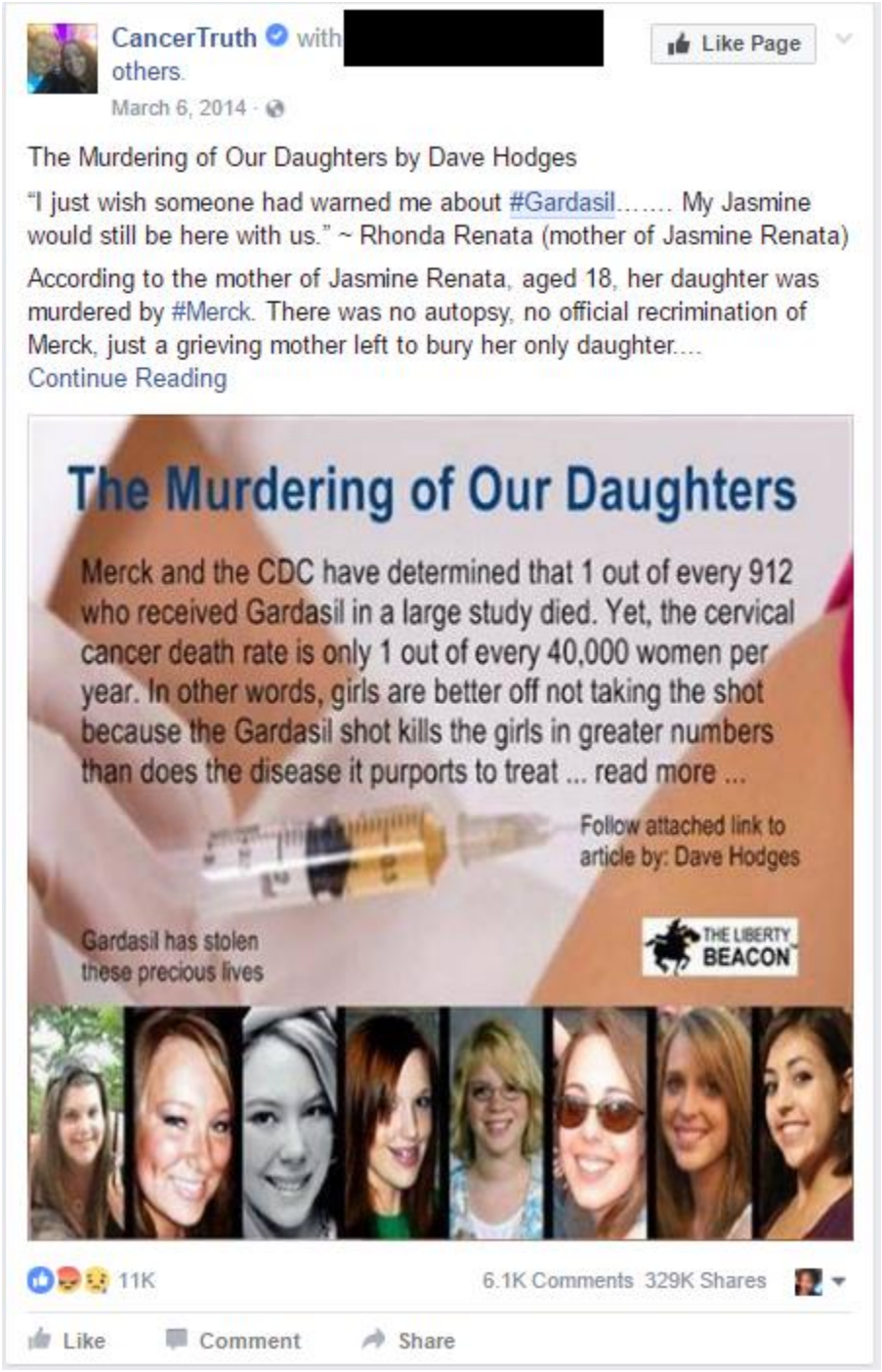

Figure 50: The most engaging HPV vaccine-related Facebook post. This post appeared three different times in the sample: twice in 2014, and once in 2016. Of the posts in the sample analyzed, it received to most reactions, comments and shares.

Because this post occurred three different times in the sample, the researcher felt that it was important to keep all three instances in the analysis, as it represents the trend of the tone of HPV vaccine and the spread of negative HPV vaccine-related messages. The attention that this negative post received is enormous. It is also a demonstration of the power that anti-HPV vaccine messages have in generation attention, which may also generate negative sentiment, and influence HPV vaccination rates to be lower.

When looking at the tone, the CDC's posts have been neutral or positive on average, while the tone across Facebook has been mostly negative. Toward the HPV vaccine, the CDC has published HPV vaccine positive messages, while there have been an increasing number of HPV vaccine-negative messages across Facebook, with the largest proportion occurring in 2016, according to our data.

Looking at HBM-related messages, the average presence of susceptibility to HPV infection messages have been low in both CDC Facebook posts and posts across Facebook. Severity messages are generally more present in CDC posts. Also, while CDC posts have a high average presence of HPV vaccine benefits, the presence of benefits in posts across Facebook has been decreasing. Barriers to HPV vaccination are absent in CDC posts, but are present and increasing across Facebook. Self-efficacy messages for both the CDC posts and posts across Facebook are low, but are more present in CDC posts since 2013. Regarding cues to get the HPV vaccine, the CDC posts would not have these messages until 2013. For posts across Facebook, these messages would peak in 2006, but would be lower thereafter. Cues to not

vaccinate were absent from CDC posts, and low across Facebook, but were on the rise, peaking in 2016. The findings from the content analysis suggest that HPV vaccine-related posts on Facebook overall emphasize barriers to vaccination more than other HBM variables, and that this emphasis has only increased over the decade since the first HPV vaccine was approved by the FDA. This is contrary to CDC posts, where the average presence of benefits is much higher. In both sets of data, the presence of susceptibility messages was low. This may be likely due to susceptibility being common knowledge. However, the presence of severity messages across Facebook posts being generally lower than in CDC posts suggests that, based on the interpretations of the data, that the sets of posts may have different foci. That is, the CDC may be more focused on discussing the benefits of the HPV vaccine, orienting it as a preventive health behavior, whereas posts across Facebook may suggest more often that the HPV vaccine is a risk event.

In the context of SARF, there was an absence of HPV vaccine-related risk amplifying messages in CDC Facebook posts. This was not the case across Facebook. In fact, the analysis found that on average, Facebook posts contain more risk amplifying messages, and that trend was on the rise. This finding suggests that, at least on Facebook, the HPV vaccine may be oriented, and thus perceived, more as a risk than a preventive health behavior. This would line up with the findings that barrier messages are also increasing on Facebook.

Concerning ripples and impacts, most of the HPV vaccine-related posts across Facebook did not contain messages related to these variables, and the CDC did not

have any. This suggests that Facebook messages may not be as concerned with the consequences of HPV vaccination when it is oriented as a risk event. It also suggests that the majority of authors of public HPV vaccine-related posts across Facebook do not share the perspectives of the CDC about the HPV vaccine. Instead, the messages are focused on how the HPV vaccine is perceived: a tool to protect public health, a harmful formula, or something in between. The varied representation of the HPV vaccine on social media suggests varied opinions by society. Thus, it is not enough for the CDC to keep advocating the HPV vaccine as a preventive health behavior because not all of the public, and certainly not all of Kansan parents and guardians, are buying into the messages the CDC wants to sell.

Implications and Recommendations

Though this study targeted parents, both male and female, the majority of the survey respondents who completed the survey were female (n = 83, 87.4%). Also, the content analysis found that Facebook posts published by owners of individual profiles were mostly female (n = 2,649; 69.8%). These findings are not necessarily a surprise, given that research demonstrates that in the United States, women are more often the managers of their children's health (Ranji & Salganifcoff, 2014). Research shows that females are vaccinated with the HPV vaccine at a greater rate than men (Reagan-Steiner et al., 2016). Though HPV can infect males and females, these findings support that this is a female-centric issue. Though the HPV vaccine was not made available to males before 2009 (U.S. Food and Drug Administration, 2009a), years have passed and it is important to emphasize to include males – fathers and sons, in

the conversation about HPV vaccination so that they can protect themselves and their possible future intimate partners.

Since many Kansan parents and guardians are aware of HPV and its associated diseases and are aware of the HPV vaccine and its benefits, a different approach to promote vaccination may be needed. This is because in spite of awareness about the infection, disease, and the vaccine, there are concerns about HPV vaccine-related risk and barriers. Healthcare professionals and health communication researchers might consider focusing the conversation on HPV vaccine-related concerns instead of focusing on HPV prevention. By minimizing the perception of barriers and attenuating the perception of risks, it is likely that there will be a positive effect on intent to get children the HPV vaccine.

Facebook has a large and captive audience and many of the posts do not contain pro-HPV vaccine messages. While the survey participants mostly believe that what they see on social media does not influence their fears about getting their children the HPV vaccine, research supports otherwise. Thus, it is important for healthcare providers to remain aware and take into account that social media may influence patient perceptions of the HPV vaccine. Addressing these concerns, not just about HPV, but also the vaccine, may make the difference in convincing a parent, in Kansas or elsewhere, to comply with getting their child the HPV vaccine.

As the CDC has the capability to be a stakeholder, they and other organizations might consider increasing their efforts to produce more pro-HPV vaccination messages. Though the majority of HPV vaccine-related Facebook posts

go without any reactions, comments, or shares, it does not mean that they have not been seen, they could have been witnessed. The over 21,000 initial Facebook posts are only a piece of what is out there about the HPV vaccine. That sheer volume compared to CDC's only 31 posts over ten years demonstrates that they do not have a sizeable role in the conversation. Their ability to reach people is also likely diminished by another characteristic – that their posts are likely only seen if someone follows their pages, or actively searches for the information they contain. This means that promotion of the HPV vaccine by the CDC alone will likely not move HPV vaccination rates higher. It will take connecting with other stakeholders (the larger the network, the better) to influence and increase in HPV vaccination of children. It will take time and a lot of pro-HPV vaccine messages to change the trends, as the negative tone towards the HPV vaccine, the mentions of barriers, and HPV vaccine-risk related messages have continued to increase over the last few years.

Concerning theory, it is recommended that health communication practitioners consider testing risk perceptions as a distinct variable in the health belief model. When Rosenstock et al. (1988) updated the health belief model to include the component of self-efficacy, they did so with the belief that one must actually believe that she or he could actually perform the preventive health behavior. This study posits that one must also believe that desired preventive health behavior is not a risk event, or else the model is diminished from an epistemological standpoint. The performer must believe that behavior will be of use to preventing a disease, not believe it to possibly cause harm.

With a change in approach to promoting HPV vaccination and addressing barriers to HPV vaccination and HPV-vaccine risk perceptions, there may be some improvement in HPV vaccination rates among Kansan children. It is important to continue to research and disseminate information about HPV to the public, but also important as this study finds, is addressing concerns about the HPV vaccine itself.

Limitations

This study is snapshot representing part of what is going on with Kansan parents and guardians perceptions about the HPV vaccine. Future research, with larger and more representative participant samples, could provide a more comprehensive understanding of the role of Kansan parent and guardian perceptions, and the influence of these perceptions on low HPV vaccination rates in Kansas. Still, this research contributes to addressing low HPV vaccination rates among Kansan children eligible for vaccination, and contributes to the understanding a regional phenomenon. Recruitment of such a specific population was a challenge, likely given the nature of the subject. This study would likely have had even fewer respondents were it not for the efforts of the state and several county health departments who agreed to post a link to the survey on web and social media pages they manage. In most cases, non-participation by county health departments was the result of unreturned calls and un-replied emails. Other times, it was because county health departments declined to participate. Additional research with more collaborators would likely result in higher rates of survey participation.

While more than 150 eligible respondents began the survey, almost 40% did not complete the survey. The survey, in an effort to measure HPV vaccine perceptions in the contexts of both HBM and SARF, perceptions of social media representation of the HPV vaccine, and collect information about their children's vaccination status, ended up being extensive, and perhaps a bit lengthy. Though many surveys ended up being incomplete, the data for many of the variables was still useful and informed that even when samples were larger it did not change the interpretations of the findings.

The survey respondents were mostly white and female which aligns with Kansas' demographics (United States Census Bureau, 2017). However, the respondents in the survey were on average more educated and wealthier than Kansans overall. Based on research showing that minorities and those below the poverty line are out-vaccinating white and wealthier people (Reagan-Steiner et al., 2016), it is possible that the survey research found HPV vaccine perceptions that are more negative among the sample than would be for the population of Kansas. Future research of HPV vaccine perceptions held by Kansas across various demographics (e.g., racial, education level, and socioeconomic) could contribute to a greater understanding of factors contributing to low vaccination rates.

With regard to the content analysis, there were a few technological limitations. First, the Facebook search feature does not allow users to organize results by date or engagement. This limits flexibility in data collection, however the search feature did allow for the collection of thousands of posts for analysis since the

vaccine debuted. Technology also limited the ability to archive Facebook posts. When loading the search results, one would have to scroll down to make the area printable. Scrolling down too far would cause internet browsers to crash; it would be near impossible at this point in time to archive the entire population of HPV vaccine-related Facebook posts unless one possesses a computer with large memory capabilities.

Also, this study only collected public Facebook content in an effort to only analyze content that would be available to any Facebook user, because access to private social media feeds is not possible without specific participant consent. It is likely that collection from personal profiles may be met with more difficulty in the future. An ad hoc analysis found that after since 2012, the number of posts collected from Facebook profiles was fewer than those from Facebook pages (see Figure 51).

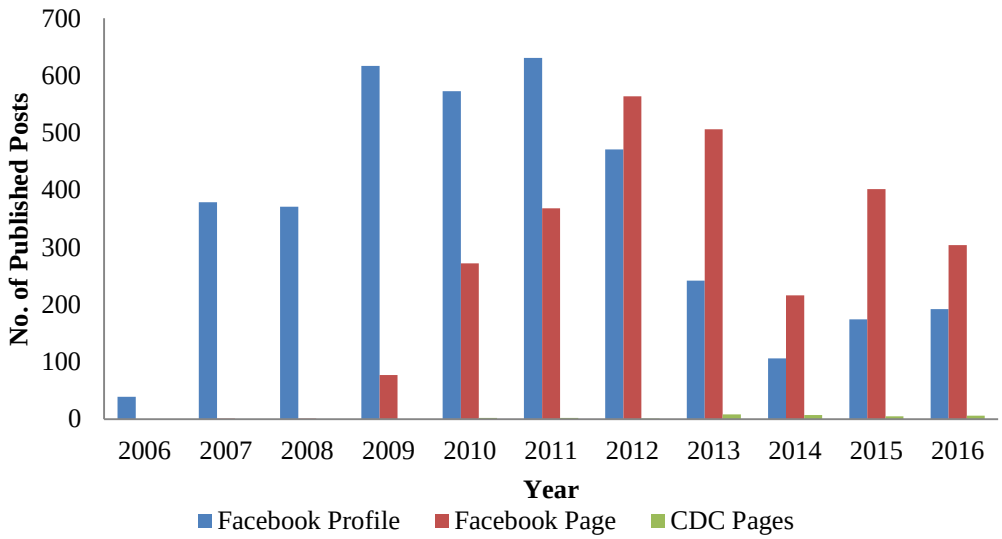

Figure 51: The number of published public Facebook posts used in the content analysis, by source and year.

This suggests that Facebook users are increasingly limiting the access of the public to their posts, as the number of Facebook users has only increased since its debut in 2004, and has over a billion active users as of 2016 (Facebook, 2017f). The use of non-public posts may have added more in terms of post quantity to the analysis, however as the researcher had fewer than 600 mutual connections at the time of the study, the ability to access non-public HPV vaccine-related posts was limited (Facebook, 2017a).

Directions for Future Research

This study serves a stepping stone to analyzing future research about low HPV vaccination rates among children in Kansas, and by extension, other places where HPV vaccination rates are low among children. This study has more data about white respondents more than any other racial group. Because nationwide statistic show that adolescents (13-17) belonging to other racial groups are receiving the HPV vaccine at higher rates (Reagan-Steiner et al., 2016) than whites, future studies should analyze if there is a similar phenonmenon taking place in Kansas, which may further explain low immunization rates through this demographic indicator. In the same vein, future studies should also analyze socioeconomic and sex identity in relation to vaccination rates in Kansas to see if they reflect the national trends, as this study found that there may be a difference.

While the content analysis portion of this study focused on the presence of certain types of messages that were in Facebook posts, it did not analyze the qualitative content of those messages. The intersection of mass media and the cases of

arsenic-related illness and Plague in India, Susarla (2003) inferred that the characteristics of mass media blaming messages may matter as much as message volume. Similarly, there is certainly a gap that future research could address in analyzing the qualitative characteristics of HPV vaccine-related messages more in-depth. Specifically, it would be of great use to understand what types of risks and barriers to HPV vaccination are mentioned in Facebook posts so that interventions are able to target these concerns. This information would allow researchers to conduct more experiments similar to the works of Nan and Madden (2012) and Dunn et al. (2015), and also test the effectiveness of interventions. Interventions could also test the efficacy of HPV-focused messages and compare these with the HPV vaccine-focused messages to see if which messages influence a greater intent of parents to get their children vaccinate. Furthermore, it may also be useful to apply additional theoretical models expand on the representation of the HPV vaccine on social media.

Additionally, as this study only analyzed HPV vaccine-related Facebook posts, there is an opportunity to research Facebook posts from a variety of collection and analytical methods. Looking at Facebook pages that have a great number of followers could provide information about how the HPV vaccine is represented in a variety of contexts. Also post comment analysis could provide more detailed information about how Facebook users engage with posts containing certain types of messages beyond the analysis of the number of reactions, comments and shares that a posts receives. In the future, it also may be worthwhile to investigate how Facebook

users react to HPV vaccine-related posts with, as reactions have become more dynamic, having more options since 2016 (Facebook, 2017f; Krug, 2016).

In the interest to not make the survey any longer, the survey did not ask questions about the ripples and impacts that occurred as a result of the respondent's perception of HPV vaccine-related risk. The content analysis found that the presence of ripple and impact messages was low. Future research should also consider investigating the secondary impacts, whether it is the recall of individuals or message presence in other media, so that the consequences of HPV vaccine-related risk perceptions can be traced and targeted to improve vaccination rates.

Conclusions

The health belief model has been applied to analysis of intentions to engage in preventive health behaviors and the analysis of communicated messages about preventive health behaviors. Application of this model to the analysis of how Kansan parents and guardians perceive the vaccination is useful, and focusing on a geographic region provides acknowledges the diversity of what may be happening in different geographic areas. As Kansas is underperforming in the context of the HPV vaccination rates, this research, while does not give a complete picture, is the start to a greater understanding of a regional phenomenon and the influence of health beliefs.

This study suggests that the HPV vaccine being communicated by various government organizations as a preventive health behavior is not enough to motivate vaccination alone. This study posits that there may be several factors discouraging Kansan parents and guardians from vaccinating their children, which may be

contributing to low vaccination rates. Specifically, the perceptions of barriers and risks may have a substantial influence.

It may seem unconventional to research the HPV vaccine as a risk event, but even the HPV vaccine inserts indicate the possibility of side effects, which one may perceive as risks (U.S. Food and Drug Administration, 2009b, 2011, 2014b). HBM (Rosenstock, 1974; Rosenstock et al., 1988) holds the perspective that people want to avoid disease and engagement in preventive health behavior depends on how several variables interact. However, the model appears to assume that certain actions are universally perceived as preventive health behaviors in the first place. If an individual, perhaps a Kansan parent, does not perceive the HPV vaccine as a preventive health behavior, it can be argued that this is more than just a barrier to HPV vaccination. Again, the model in essence appears to collapse from an epistemological standpoint when applied to the perspectives of that individual. It is curious, then, if people should take the HPV vaccine for granted to be perceived as a preventive health behavior, when a population exists that appears to perceive the contrary. Thus, it may be useful and even necessary, to analyze the HPV vaccine, along with other such labeled preventive health behaviors, in multiple contexts to better understand non-compliance.

There may be even more complex factors to consider if a particular Kansan perceives the HPV vaccine as a risk event. If such is the perception, SARF suggests that there is an opportunity, especially for media, to amplify or attenuate risk perceptions (Eldridge & Reilly, 2003; J. Kasperson et al., 2003; R. Kasperson et al.,

1988; Susarla, 2003). Social media use is increasing. For now, Facebook is a dominant platform. So, for now, there is an opportunity to use this platform to communicate risk attenuating messages about the HPV vaccine. These messages, if tailored and effective, may minimize or even reverse the trend of the social media environment negatively portraying the HPV vaccine, as once upon a time, research found that the portrayal of the HPV vaccine was more positive than negative. In turn, there may be an effect, and among Facebook users, HPV vaccination perceptions may become more positive, and vaccination rates might increase.

On the surface, HPV vaccination rates among Kansas children are comparatively lower when compared with national vaccination rates. Deeper, there are a variety of interacting variables that are influencing the perceptions that Kansan parents and guardians have toward the HPV vaccine, which likely have a role on the comparatively low vaccination rates among their children. These perceptions ultimately determine whether or not the HPV vaccine is perceived more as a preventive health behavior, as a risk event potentially harmful to their children, or something in between. Media representations also have a role in communicating and influencing HPV vaccine-related perceptions.

Exploration and understanding of the dynamic confluence of these factors may be more complex than the process of developing a vaccine that can prevent cancer, but is necessary to addressing things such as anti-HPV vaccine messages shared between sisters. It is necessary for getting the vaccine out of a vial and into bodies of children who will one day, like a certain Uber driver, be adults. But,

hopefully unlike the Uber drive that a doctoral student (now graduate) met on a rainy morning, will not have to experience the burden of HPV and HPV-associated disease.

References

Ache, K. A., & Wallace, L. S. (2008). Human papillomavirus vaccination coverage on YouTube. *American Journal of Preventive Medicine, 35*(4), 389-392. doi:10.1016/j.amepre.2008.06.029

Addis, N. (2015). Don't call them dumb: Experts on fighting the anti-vaccine movement. Retrieved from http://www.nbcnews.com/storyline/measles-outbreak/dont-call-them-dumb-experts-fighting-anti-vaccine-movement-n298956

American Cancer Society. (2016). Penile cancer: What are the key statistics about penile cancer? Retrieved from http://www.cancer.org/cancer/penilecancer/detailedguide/penile-cancer-key-statistics

Bakalar, N. (2011, September 6). Human papillomavirus, 1985. *The New York Times,* p. D7. Retrieved from http://www.nytimes.com/2011/09/06/health/06first.html

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychology Review, 84*(2), 191-215.

Battles, H. T. (2010). Exploring ethical and methodological issues in internet-based research with adolescents. *International Journal of Qualitative Methods, 9*(1), 27-39.

Belluz, J. (2017). A Cleveland clinic doctor spread anti-vaccine views. He's not alone among MDs. *Vox.com.* Retrieved from http://www.vox.com/2017/1/8/14206106/cleveland-clinic-doctor-anti-vaccine-neides

Brewer, N. T., & Fazekas, K. I. (2007). Predictors of HPV vaccine acceptability: A theory-informed, systematic review. *Preventive Medicine, 45*(2-3), 107-114.

Brewer, N. T., Gottlieb, S. L., Reiter, P. L., McRee, A.-L., Liddon, N., Markowitz, L., & Smith, J. S. (2011). Longitudinal predictors of human papillomavirus vaccine initiation among adolescent girls in a high-risk geographic area. *Sexually Transmitted Diseases, 38*(3), 197-204. doi:10.1097/OLQ.0b013e3181f12dbf

Briones, R., Nan, X., Madden, K., & Waks, L. (2012). When vaccines go viral: An analysis of HPV vaccine coverage on YouTube. *Health Communication, 27*(5), 478-485. doi:10.1080/10410236.2011.610258

Bzhalava, D., Guan, P., Franceschi, S., Dillner, J., & Clifford, G. (2013). A systematic review of the prevalence of mucosal and cutaneous human papillomavirus types. *Virology, 445*(1–2), 224-231. doi:http://dx.doi.org/10.1016/j.virol.2013.07.015

Canvin, M., Sinka, K., Hughes, G., & Mesher, D. (2016). Decline in genital warts diagnoses among young women and young men since the introduction of the bivalent HPV (16/18) vaccination programme in England: An ecological analysis. *Sexually Transmitted Infections*.

Capra, D., & He, R. C. (2013). Newsroom: Introducing embedded posts. Retrieved from https://newsroom.fb.com/news/2013/07/introducing-embedded-posts/

Centers for Disease Control and Prevention. (2013). *Reducing the burden of HPV-associated cancer and disease through vaccination in the US*. Retrieved from http://www.cdc.gov/cdcgrandrounds/archives/2013/february2013.htm

Centers for Disease Control and Prevention. (2014a). About the CDC 24-7: Mission, role and pledge. Retrieved from https://www.cdc.gov/about/organization/mission.htm

Centers for Disease Control and Prevention. (2014b). Vaccines & immunizations: Immunity types. Retrieved from https://www.cdc.gov/vaccines/vac-gen/immunity-types.htm

Centers for Disease Control and Prevention. (2015a). 2014 NIS-teen vaccination coverage table data: By state and selected area, vaccines routinely recommended for adolescents. Retrieved from http://www.cdc.gov/vaccines/imz-managers/coverage/nis/teen/data/tables-2014.html

Centers for Disease Control and Prevention. (2015b). For parents: Vaccines for your children: HPV vaccine for preteens and teens. Retrieved from http://www.cdc.gov/vaccines/parents/diseases/teen/hpv.html

Centers for Disease Control and Prevention. (2015c). Human papillomavirus (HPV). Retrieved from http://www.cdc.gov/hpv/parents/whatishpv.html

Centers for Disease Control and Prevention. (2015d). Human papillomavirus (HPV): HPV and cancer. Retrieved from http://www.cdc.gov/hpv/cancer.html

Centers for Disease Control and Prevention. (2015e). Human papillomavirus (HPV): Questions and answers. Retrieved from http://www.cdc.gov/hpv/parents/questions-answers.html

Centers for Disease Control and Prevention. (2015f). The link between HPV and cancer. Retrieved from http://www.cdc.gov/hpv/parents/cancer.html

Centers for Disease Control and Prevention. (2015g). Vaccine safety: Diphtheria, tetanus, and pertussis safety. Retrieved from http://www.cdc.gov/vaccinesafety/vaccines/dtap-tdap-vaccine.html

Centers for Disease Control and Prevention. (2016a). 2015 adolescent human papillomavirus (HPV) vaccination coverage report. Retrieved from http://www.cdc.gov/vaccines/imz-managers/coverage/teenvaxview/data-reports/hpv/reports/2015.html

Centers for Disease Control and Prevention. (2016b). Advisory Committee on Immunization Practices (ACIP). Retrieved from https://www.cdc.gov/vaccines/acip/

Centers for Disease Control and Prevention. (2016c). CDC recommends only two HPV shots for younger adolescents. Retrieved from https://www.cdc.gov/media/releases/2016/p1020-hpv-shots.html

Centers for Disease Control and Prevention. (2016d). Gynecological cancers. Retrieved from http://www.cdc.gov/cancer/cervical/statistics/index.htm

Centers for Disease Control and Prevention. (2016e). Gynecological cancers: Vaginal and vulvar cancers statistics. Retrieved from http://www.cdc.gov/cancer/vagvulv/statistics/index.htm

Centers for Disease Control and Prevention. (2016f). HPV-associated cancer diagnosis by age. Retrieved from https://www.cdc.gov/cancer/hpv/statistics/age.htm

Centers for Disease Control and Prevention. (2016g). HPV and cancer. Retrieved from http://www.cdc.gov/cancer/hpv/statistics/cases.htm

Centers for Disease Control and Prevention. (2016h). HPV and cancer: HPV-associated cervical cancer rates by race and ethnicity. Retrieved from https://www.cdc.gov/cancer/hpv/statistics/cervical.htm

Centers for Disease Control and Prevention. (2016i). HPV and cancer: HPV-associated oropharyngeal cancer rates by race and ethnicity. Retrieved from https://www.cdc.gov/cancer/hpv/statistics/headneck.htm

Centers for Disease Control and Prevention. (2016j). HPV and cancer: HPV-associated penile cancer rates by race and ethnicity. Retrieved from https://www.cdc.gov/cancer/hpv/statistics/penile.htm

Centers for Disease Control and Prevention. (2016k). HPV and cancer: HPV-associated vaginal cancer rates by race and ethnicity. Retrieved from https://www.cdc.gov/cancer/hpv/statistics/vaginal.htm

Centers for Disease Control and Prevention. (2016l). HPV and cancer: HPV-associated vulvar cancer rates by race and ethnicity. Retrieved from https://www.cdc.gov/cancer/hpv/statistics/vulvar.htm

Centers for Disease Control and Prevention. (2016m). HPV vaccine information for clinicians. Retrieved from https://www.cdc.gov/hpv/hcp/need-to-know.pdf

Centers for Disease Control and Prevention. (2016n). Human papillomavirus (HPV): Genital HPV infection - fact sheet. Retrieved from http://www.cdc.gov/std/HPV/STDFact-HPV.htm

Centers for Disease Control and Prevention. (2016o). Talking to parents about HPV vaccine. Retrieved from https://www.cdc.gov/vaccines/who/teens/for-hcp-tipsheet-hpv.pdf

Centers for Disease Control and Prevention. (2016p). Vaccines and immunizations. Retrieved from https://www.cdc.gov/vaccines/terms/vacc-abbrev.html

Chung, J. B., & Yun, G. W. (2013). Media and social amplification of risk: BSE and H1N1 cases in South Korea. *Disaster Prevention & Management, 22*(2), 148-159. doi:10.1108/09653561311325299

Clipartsgram.com. (2017). The health belief model. Retrieved from https://www.clipartsgram.com/image/919029998-health-belief-model.jpg

Cohen, E. L., & Head, K. J. (2013). Identifying knowledge-attitude-practice gaves to enhance HPV vaccine diffusion. *Journal of Health Communication, 18*, 1221-1234. doi:10.1080/10810730.2013.778357

Corcoran, N. (2007). *Communicating health. Strategies for health promotio.* London: SAGE Publications.

Doherty, C., Motel, S., & Weisel, R. (2015). 83% say measles vaccine is safe for healthy children. Retrieved from http://www.people-press.org/2015/02/09/83-percent-say-measles-vaccine-is-safe-for-healthy-children/

Dunn, A. G., Leask, J., Zhou, X., Mandl, K. D., & Coiera, E. (2015). Associations between exposure to and expression of negative opinions about human papillomavirus vaccines on social media: An observational study. *Journal Of Medical Internet Research, 17*(6), e144-e144. doi:10.2196/jmir.4343

Eldridge, J., & Reilly, J. (2003). Risk and relativity: BSE and the British media. In N. Pidgeon, R. E. Kasperson, & P. Slovic (Eds.), *The Social Amplification of Risk* (pp. 138-155). United Kingdom: Cambridge University Press.

Ellison, N. B., & boyd, D. M. (2013). Sociality through social network sites. In W. Dutton (Ed.), *The Oxford handbook of internet studies* (pp. 151-172). Oxford, United Kingdom: Oxford Univeristy Press.

Facebook. (2006). Facebook gets a facelift. Retrieved from https://www.facebook.com/notes/facebook/facebook-gets-a-facelift/2207967130

Facebook. (2008). Newsroom: Facebook unveils next evolution in site design. Retrieved from https://newsroom.fb.com/news/2008/07/facebook-unveils-next-evolution-of-site-design/

Facebook. (2011). Newsroom: Timeline: Now available worldwide. Retrieved from http://newsroom.fb.com/news/2011/12/timeline-now-available-worldwide/

Facebook. (2013). Newsroom: Graph search now fully launched in US English. Retrieved from https://newsroom.fb.com/news/2013/08/graph-search-now-fully-launched-in-us-english/

Facebook. (2017a). Help center: About: Friending. Retrieved from https://www.facebook.com/help/1540345696275090/?helpref=hc_fnav

Facebook. (2017b). Help center: Creating an account. Retrieved from https://www.facebook.com/help/570785306433644/?helpref=hc_fnav

Facebook. (2017c). Help center: How do I use hashtags? Retrieved from https://www.facebook.com/help/587836257914341

Facebook. (2017d). Help center: Like and react to posts. Retrieved from https://www.facebook.com/help/1624177224568554/?helpref=hc_fnav

Facebook. (2017e). Help Center: Share and manage posts on your Timeline. Retrieved from https://www.facebook.com/help/1640261589632787?helpref=about_content

Facebook. (2017f). Newsroom: Company info. Retrieved from http://newsroom.fb.com/company-info/

Farmer, A. D., Bruckner Holt, C. E., Cook, M. J., & Hearing, S. D. (2009). Social networking sites: A novel portal for communication. *Postgraduate medical journal, 85*(1007), 455-459. doi:10.1136/pgmj.2008.074674

Fazekas, K. I., Brewer, N. T., & Smith, J. S. (2008). HPV vaccine acceptability in a rural southern area. *Journal Of Women's Health (15409996), 17*(4), 539-548. doi:10.1089/jwh.2007.0489

Fox, S., & Duggan, M. (2013). Health online 2013. Retrieved from http://www.pewinternet.org/2013/01/15/health-online-2013/

Funk, C., Kennedy, B., & Hefferon, M. (2017). Vast majority of Americans say benefits of childhood vaccines outweight risk. Retrieved from http://www.pewinternet.org/2017/02/02/vast-majority-of-americans-say-benefits-of-childhood-vaccines-outweigh-risks/?utm_source=Pew+Research+Center&utm_campaign=1a7e588b5f-EMAIL_CAMPAIGN_2017_02_02&utm_medium=email&utm_term=0_3e953b9b70-1a7e588b5f-400213625

Geana, M. V., & Greiner, K. A. (2011). Health information and the digital divide. *Journal of Management & Marketing in Healthcare, 4*(2), 108-112. doi:10.1179/175330311X12943314049538

Gellin, B. G., Maibach, E. W., & Marcuse, E. K. (2000). Do parents understand immunizations? A national telephone survey. *Pediatrics, 106*(5), 1097.

Grandahl, M., Tydén, T., Westerling, R., Nevéus, T., Rosenblad, A., Hedin, E., & Oscarsson, M. (2017). To consent or decline HPV vaccination: A pilot study at the start of the national school-based vaccination program in Sweden. *Journal of School Health, 87*(1), 62-70.

Greenwood, S., Perrin, A., & Duggan, M. (2016). Social media update 2016. Retrieved from http://www.pewinternet.org/2016/11/11/social-media-update-2016/#fn-17239-1

Harris, G. (2010, February 2, 2010). Journal retracts 1998 paper linking autism to vaccines. *The New York Times*. Retrieved from http://www.nytimes.com/2010/02/03/health/research/03lancet.html?_r=0#

Hart, M. (2015). Kansas tied for lowest rate of teen HPV vaccination. *CJonline.com*. Retrieved from http://cjonline.com/news/business/2015-08-02/kansas-tied-lowest-rate-teen-hpv-vaccination

He, R. C. (2013). Developer news: Introducing new Like and Share buttons. Retrieved from https://developers.facebook.com/blog/post/2013/11/06/introducing-new-like-and-share-buttons/

Hesse-Biber, S. N., & Leavy, P. (2011). *The practice of qualitative research* (2nd ed.). Thousand Oaks, CA: SAGE Publications, Inc.

Hoofring, A. (2006). Colon and rectum.

Immunize Kansas Coalition. (2017a). Kansas HPV vaccination rates: 11-18 year old females receiving three HPV vaccinations. Retrieved from http://www.immunizekansascoalition.org/images/hpv/3dose_female_final4.jpg

Immunize Kansas Coalition. (2017b). Kansas HPV vaccination rates: 11-18 year old males receiving three HPV vaccinations. Retrieved from http://www.immunizekansascoalition.org/images/hpv/3dose_male_final4.jpg

Immunize Kansas Coalition. (2017c). Kansas HPV vaccination rates: 11-18 year olds receiving three HPV vaccinations. Retrieved from http://www.immunizekansascoalition.org/images/hpv/3dose_all_final4.jpg

Kansas Adjutant General's Department. (2017). Regional Councils. Retrieved from http://www.kansastag.gov/KSHLS.asp?PageID=303

Kansas Department of Health and Environment. (2012). *Kansas cancer prevention and control plan 2012-2016*. Retrieved from Kansas: http://www.cancerkansas.org/download/2012-2016_Cancer_Plan/KDHE_Cancer_Plan_Full_Download.pdf

Kansas Department of Health and Environment. (2016a). About KDHE: KDHE's mission. Retrieved from http://www.kdheks.gov/mission.html

Kansas Department of Health and Environment. (2016b). STI/HIV home. Retrieved from http://www.kdheks.gov/sti_hiv/

Kansas Health Matters. (2017). People living below poverty level. Retrieved from http://www.kansashealthmatters.org/index.php?module=indicators&controller=index&action=view&indicatorId=347&localeId=19

Kasperson, J., Kasperson, R., Pidgeon, N., & Slovic, P. (2003). The social amplification of risk: Assessing fifteen years of research and theory. In N. Pidgeon, R. E. Kasperson, & P. Slovic (Eds.), *The social amplification of risk* (pp. 13-46). United Kingdom: Cambridge University Press.

Kasperson, R., Renn, O., Slovic, P., Brown, H. S., Emel, J., Goble, R., . . . Ratick, S. (1988). The social amplification of risk: A conceptual framework. *Risk Analysis, 8*(2), 177-187.

Keelan, J., Pavri-Garcia, V., Tomlinson, G., & Wilson, K. (2007). YouTube as a source of information on immunization: a content analysis. *JAMA, 298*(21), 2482-2484.

Keelan, J., Pavri, V., Balakrishnan, R., & Wilson, K. (2010). An analysis of the human papilloma Virus vaccine debate on MySpace blogs. *Vaccine, 28*(6), 1535-1540. doi:10.1016/j.vaccine.2009.11.060

Koolwal, A. (2012). Newsroom: Sharing on mobile just got easier. Retrieved from https://newsroom.fb.com/news/2012/11/sharing-on-mobile-just-got-easier/

Krawczyk, A., Perez, S., King, L., Vivion, M., Dubé, E., & Rosberger, Z. (2015). Parents' decision-making about the human papillomavirus vaccine for their daughters: II. Qualitative results. *Human Vaccines & Immunotherapeutics, 11*(2), 330-336. doi:10.4161/21645515.2014.980708

Krawczyk, E. (2008). Human foreskin koliocytes.

Krippendorf, K. (2004a). *Content analysis: An intorduction to its methodology*. Thousand Oaks, CA: Sage.

Krippendorf, K. (2004b). Reliability in content analysis: Some common misconceptions and recommendation. *Human Communication Research, 30*(3), 411-433.

Krug, S. (2016). Newsroom: Reactions now available globally. Retrieved from https://newsroom.fb.com/news/2016/02/reactions-now-available-globally/

Lai, C.-Y., Wu, W.-W., Tsai, S.-Y., Cheng, S.-F., Lin, K.-C., & Liang, S.-Y. (2015). The effectiveness of a Facebook-assisted teaching method on knowledge and attitudes about cervical cancer prevention and HPV vaccination intention

among female adolescent students in Taiwan. *Health Education & Behavior, 42*(3), 352-360. doi:10.1177/1090198114558591

Lewis, R. E., & Tyshenko, M. G. (2009). The impact of social amplification and attenuation of risk and the public reaction to mad cow disease in Canada. *Risk Analysis: An International Journal, 29*(5), 714-728.

McRee, A.-L., Reiter, P. L., & Brewer, N. T. (2012). Parents' Internet use for information about HPV vaccine. *Vaccine, 30*(25), 3757-3762. doi:10.1016/j.vaccine.2011.11.113

MerckVaccines.com. (2015). Efficacy of Gardasil 9. Retrieved from https://www.merckvaccines.com/Products/Gardasil9/efficacy/5-types

Moorhead, S. A., Hazlett, D. E., Harrison, L., Carroll, J. K., Irwin, A., & Hoving, C. (2013). A new dimension of health care: Systematic review of the uses, benefits, and limitations of social media for health communication. *Journal Of Medical Internet Research, 15*(4), 1-19. doi:10.2196/jmir.1933

Nan, X., & Madden, K. (2012). HPV vaccine information in the blogosphere: How positive and negative bloggs influence vaccine-related risk perceptions, attitudes, and behavioral intentions. *Health Communication, 27*, 829-836. doi:10.1080/10410236.2012.661348

National Cancer Institute. (2016). Improving HPV vaccination rates will help save lives.

National Institutes of Health, & National Cancer Institute. (2016). SEER stat fact sheets: Anal cancer. Retrieved from http://seer.cancer.gov/statfacts/html/anus.html

Netflix. (2017). Help center: How do profiles work on my account? Retrieved from https://help.netflix.com/en/node/10421?ui_action=kb-article-popular-categories

Nobelprize.org. (2014a). Harald zur Hausen - biographical. Retrieved from http://www.nobelprize.org/nobel_prizes/medicine/laureates/2008/hausen-bio.html

Nobelprize.org. (2014b). Peyton Rous - facts. Retrieved from http://www.nobelprize.org/nobel_prizes/medicine/laureates/1966/rous-facts.html

Offit, P. A., & Moser, C. A. (2009). The problem with Dr. Bob's alternative vaccine schedule. *Pediatrics, 123*(1), e164-e169. doi:10.1542/peds.2008-2189

Petrosky, E., Bocchini Jr, J. A., Hariri, S., Chesson, H., Curtis, C. R., Saraiya, M., . . . Markowitz, L. E. (2015). Use of 9-Valent human papillomavirus (HPV) vaccine: Updated HPV vaccination recommendations of the advisory committee on immunization practices. *MMWR: Morbidity & Mortality Weekly Report, 64*(11), 300-304.

Pew Research Center. (2017a). Internet use over time. Retrieved from http://www.pewinternet.org/data-trend/internet-use/internet-use-over-time/

Pew Research Center. (2017b). Internet/broadband fact sheet. Retrieved from http://www.pewinternet.org/fact-sheet/internet-broadband/

Pew Research Center. (2017c). Social media use over time. Retrieved from http://www.pewinternet.org/data-trend/social-media/social-media-use-all-users/

Radisic, G., Chapman, J., Flight, I., & Wilson, C. (2017). Factors associated with parents' attitudes to the HPV vaccination of their adolescent sons : A systematic review. *Preventive Medicine, 95*, 26-37. doi:10.1016/j.ypmed.2016.11.019

Rait, Z. (2011). Newsroom: Introducing the suscribe button. Retrieved from https://newsroom.fb.com/news/2011/09/introducing-the-subscribe-button/

Ranji, U., & Salganifcoff, A. (2014). *Balancing on shaky ground: Women, work, and family health*. Retrieved from http://files.kff.org/attachment/balancing-on-shaky-ground-women-work-and-family-health-data-note

Raupp, J. (2014). Social agents and news media as risk amplifiers: a case study on the public debate about the E. coli outbreak in Germany 2011. *Health, Risk & Society, 16*(6), 565-579. doi:10.1080/13698575.2014.950203

Reagan-Steiner, S., Yankey, D., Jeyarajah, J., Elam-Evans, L. D., Curtis, R., MacNeil, J., . . . Singleton, J. A. (2016). National, regional, state, and selected local area vaccination coverage among adolescents aged 13-17 years - United States, 2015. *Morbidity And Mortality Weekly Report. (MMWR), 65*(33), 850-858.

Reiter, P. L., Brewer, N. T., Gottlieb, S. L., McRee, A.-L., & Smith, J. S. (2009). Parents' health beliefs and HPV vaccination of their adolescent daughters. *Social Science & Medicine, 69*(3), 475-480. doi:10.1016/j.socscimed.2009.05.024

Riffe, D., Lacy, S., & Fico, F. (2014). *Analyzing media messages: Using quantitative conten analysis in research* (3rd ed.). New York, NY: Rourtledge.

Roldao, A., Mellado, M. C., Castilho, L. R., Carrondo, M. J., & Alves, P. M. (2010). Virus-like particles in vaccine development. *Expert Rev Vaccines, 9*(10), 1149-1176. doi:10.1586/erv.10.115

Rosenstock, I. (1974). Historical origins of the health belief model. *Health Education Monograph, 2*.

Rosenstock, I., Strecher, V. J., & Becker, M. H. (1988). Social learning theory and the health belief model. *Health Education & Behavior, 15*(2), 175-183.

Safaeian, M., Porras, C., Pan, Y., Kreimer, A., Schiller, J. T., Gonzalez, P., . . . Pinto, L. A. (2013). Durable antibody responses following one dose of the bivalent human papillomavirus L1 virus-like particle vaccine in the Costa Rica Vaccine Trial. *Cancer Prev Res (Phila), 6*(11), 1242-1250. doi:10.1158/1940-6207.capr-13-0203

Schuchat, A. (2015). HPV "coverage". *The New England Journal of Medicine, 372*(8), 775-776.

Sears, R. W. (2007). *The vaccine book: Making the right decision for your child* (Vol. 1). Boston, MA: Little, Brown and Company.

Smith, L. M., Kaufman, J. S., Strumpf, E., C., & Lévesque, L. E. (2014). Effect of human papillomavirus (HPV) vaccination on clinical indicators of sexual

behaviour among adolescent girls: the Ontario grade 8 HPV vaccine cohort study. *Canadian Medical Association Journal, 187*(2), 74-81. doi:10.1503/cmaj.140900

Stocky, T. (2015). Newsroom: Search FYI: Find what the world is saying with Facebook search. Retrieved from https://newsroom.fb.com/news/2015/10/search-fyi-find-what-the-world-is-saying-with-facebook-search/

Susarla, A. (2003). Plague and arsenic: Assignment of blame in the mass media and the social amplification and attenuation of risk. In N. Pidgeon, R. E. Kasperson, & P. Slovic (Eds.), *The Social Amplification of Risk* (pp. 179-208). United Kingdom: Oxford University Press.

The Henry J. Kaiser Family Foundation. (2015). The HPV vaccine: Access and use in the U.S. Retrieved from http://kff.org/womens-health-policy/fact-sheet/the-hpv-vaccine-access-and-use-in/#footnote-162377-44

Twitter. (2017). FAQs about following. Retrieved from https://support.twitter.com/articles/14019

U.S. Food & Drug Administration. (2017). What does FDA do? Retrieved from https://www.fda.gov/AboutFDA/Transparency/Basics/ucm194877.htm

U.S. Food and Drug Administration. (2006). *June 8, 2006 approval letter - human papillomavirus quadrivalent (types 6, 11, 16, 18) vaccine, recombinant*. Retrieved from Rockville, MD: http://www.fda.gov/BiologicsBloodVaccines/Vaccines/ApprovedProducts/ucm111283.htm

U.S. Food and Drug Administration. (2009a). FDA approves new indication for Gardasil to prevent genital warts in men and boys. Retrieved from http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm187003.htm

U.S. Food and Drug Administration. (2009b). Highlights of prescribing information. Cervarix [human papillomavrius bilavlent (types 16, 18) vaccine, recombinant]. Retrieved from http://www.fda.gov/downloads/BiologicsBloodVaccines/Vaccines/ApprovedProducts/UCM186981.pdf

U.S. Food and Drug Administration. (2011). Highlights of prescribing information. Gardasil (human papillmonavirus quadrivalent vaccine, recombinant). Retrieved from http://www.fda.gov/downloads/BiologicsBloodVaccines/Vaccines/ApprovedProducts/UCM426457.pdf

U.S. Food and Drug Administration. (2012). October 16, 2009 approval letter - Cervarix. Retrieved from http://www.fda.gov/biologicsbloodvaccines/vaccines/approvedproducts/ucm186959.htm

U.S. Food and Drug Administration. (2014a). December 10, 2014 approval letter - GARDASIL 9. Retrieved from

http://www.fda.gov/BiologicsBloodVaccines/Vaccines/ApprovedProducts/ucm426520.htm

U.S. Food and Drug Administration. (2014b). Highlights of prescribing information. Gardasil 9 (human papillmonavirus 9-valent vaccine, recombbinant). Retrieved from http://www.fda.gov/downloads/BiologicsBloodVaccines/Vaccines/ApprovedProducts/UCM426457.pdf

United States Census Bureau. (2017). QuickFacts: Kansas. Retrieved from http://www.census.gov/quickfacts/table/PST045215/20

Viens, L. J., Henley, S. J., Watson, M., Markowitz, L. E., Thomas, C., C.,, Thompson, T. D., . . . Saraiya, M. (2016). Human papillomavirus-associated cancers - United States, 2008-2016. *Morbidity And Mortality Weekly Report. (MMWR), 65*(26), 661-666.

Wable, A. (2010). Intro to Facebook search. Retrieved from https://www.facebook.com/notes/facebook-engineering/intro-to-facebook-search/365915113919/

Wakefield, A. J., Murch, S. H., Anthony, A., Linnell, J., Casson, D. M., Malik, M., . . . Walker-Smith, J. A. (1998). Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children. *The Lancet, 351*(9103), 637-641.

World Health Organization. (2016). Human papillomavirus (HPV) and cervical cancer. Retrieved from http://www.who.int/mediacentre/factsheets/fs380/en/

World Health Organization. (2017). Health topics: Vaccines. Retrieved from http://www.who.int/topics/vaccines/en/

Appendices

Appendix 1: Pre-Survey Interview Schedule

Interview Schedule

Topical Questions

1) How many children do you have?
2) How many of them are girls? Boys?
3) How old are your children?
4) When thinking about your children's health, what are some of your greatest challenges?
5) Where do you turn to for information about health issues related to your children?
6) Have you heard of HPV, also known as the human papillomavirus?
7) What do you know about HPV?
8) Where did you learn about HPV?
9) What have you seen about HPV on the internet? Social media?
10) What have you seen about HPV on social media?
11) How do you feel about vaccinations?
12) Did you know there is a vaccine for HPV (also known as Cervarix® or Gardasil®)?
13) What do you know about HPV vaccine?
14) What have you seen about the HPV vaccine on the internet? Social media?

15) Has what you seen on social media influence how you feel about HPV and the HPV vaccine?
16) Have your children gotten the HPV vaccine?
17) Why did/didn't get your children the HPV vaccine? (probe about risks, benefits, barriers, if they could be convinced if they did not)
18) What advice would you give to someone considering whether or not to get their child the HPV vaccine?

Demographic Questions

19) What is your race?
20) Are you Hispanic or Latino?
21) How older are you?
22) What county do you live in?
23) I am going to read some income intervals. Can you please stop me when I read the one that is closer to your current family income?
    a. Less than $5,000 per year
    b. Between $5001 and $10,000 per year
    c. Between $10,001 and $20,000 per year
    d. Between $20,001 and $40,000 per year
    e. Between $40,001 and $60,000 per year
    f. Over $60,001 per year

24) I am going to read some education levels. Can you please stop me when I read the one that is closer to yours?

    a. Primary/Junior High
    b. High School Diploma/GED
    c. Some college
    d. Associate's Degree
    e. Bachelor's Degree
    f. Master's Degree
    g. Doctoral Degree
    h. Professional Degree (e.g., JD, MD).

25) I am going to read some education levels. Can you please stop me when I read the one that is closer to yours?

    a. Primary/Junior High
    b. High School Diploma/GED
    c. Some college
    d. Associate's Degree
    e. Bachelor's Degree
    f. Master's Degree
    g. Doctoral Degree
    h. Professional Degree (e.g., JD, MD).

Appendix 2: Survey Instrument

Information Statement

The School of Journalism and Mass Communications at the University of Kansas supports the practice of protection for human subjects participating in research. The following information is provided for you to decide whether you wish to participate in the present study. You should be aware that even if you agree to participate, you are free to withdraw at any time without penalty.

I am conducting this study to better understand the influence of social media on deciding whether to vaccinate children against human papillomavirus (HPV). This will entail your participation in a survey. Your participation is expected to take approximately 30 minutes to complete. The content of the survey questions should cause no more discomfort than you would experience in your everyday life.

Although participation may not benefit you directly, we believe that the information obtained from this study will help us gain a better understanding of how social media influences decision making about getting children vaccinated against HPV. Your participation is solicited, although strictly voluntary. You may stop the survey and withdraw from participating at any time. Your name will not be associated in any way with the research findings. Your identifiable information will not be shared unless (a) it is required by law or university policy, or (b) you give written permission. It is possible, however, with internet communications, that through intent or accident someone other than the intended recipient may see your responses.

If you would like additional information concerning this study before or after it is completed, please feel free to contact us by phone or mail.

Participation in the interview indicates your willingness to take part in this study and that you are at least 18 years old. If you have any additional questions about your rights as a research participant, you may call (785) 864-7429 or write the Human Subjects Committee Lawrence Campus (HSCL), University of Kansas, 2385 Irving Hill Road, Lawrence, Kansas 66045-7563, email irb@ku.edu.

Sincerely,

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KU Lawrence IRB # STUDY00140067 | Approval Period 10/4/2016

2 I agree to take part in this study and am 18 years of age or older.
- ❍ Agree
- ❍ Disagree

3 Do you live in Kansas?
- ❍ Yes
- ❍ No

4 Are you the parent or guardian of a child, 9-17 years of age?
- ❍ Yes
- ❍ No

5 Please indicate your guardian identity.
- ❍ Mother
- ❍ Father
- ❍ Other (please explain) _____

6 How many children do you have that are 9-17 years of age?

7 Have you heard of HPV (also known as the human papillomavirus)?
- ❍ Yes
- ❍ No

8 Which is your main source for learning about HPV (human papillomavirus)?
- ❍ Printed materials (books, magazines, brochures, pamphlets, etc.)
- ❍ Television (such as "The Doctor Oz Show")
- ❍ Websites (such as WedMD.com)
- ❍ Social media (such as Facebook, YouTube, etc.)
- ❍ Radio
- ❍ A healthcare provider (such as a doctor or nurse)
- ❍ Family members
- ❍ Friends
- ❍ Other (please explain): _____

9 Please indicate how much you either agree or disagree with the following statements about HPV (human papillomavirus). There are no right or wrong answers.

	Strongly agree	Agree	Somewhat agree	Somewhat disagree	Disagree	Strongly disagree	I do not know
HPV can cause cancer.	❍	❍	❍	❍	❍	❍	❍
HPV can cause genital warts.	❍	❍	❍	❍	❍	❍	❍
It is unlikely that my child will ever be infected with HPV.	❍	❍	❍	❍	❍	❍	❍
If my child contracted HPV, he or she would experience health issues.	❍	❍	❍	❍	❍	❍	❍
HPV could kill my child.	❍	❍	❍	❍	❍	❍	❍
I can protect my child from HPV.	❍	❍	❍	❍	❍	❍	❍
My child is at risk to get HPV.	❍	❍	❍	❍	❍	❍	❍

10 <p><span style="font-variant-numeric: normal; font-stretch: normal; font-size: 7pt; line-height: normal; font-family: "Times New Roman";"> Have you heard of the HPV vaccine or ANY of the following terms, that the HPV vaccine goes

by:

 - Cervarix®, Bivalent HPV vaccine, HPV2, or 2vHPV? - Gardasil®, Quadrivalent HPV vaccine, HPV4, or 4vHPV?
- Gardasil® 9, 9-valent HPV vaccine, or 9vHPV?
 - genital warts vaccine? - human papillomavirus (HPV) vaccine/immunization? - human papillomavirus (HPV) shot? - cervical cancer vaccine
<o:p></o:p>

- ❍ Yes
- ❍ No

11 Which is your main source for learning about the HPV vaccine?

- ❍ Printed materials (books, magazines, brochures, pamphlets, etc.)
- ❍ Television (such as "The Doctor Oz Show")
- ❍ Websites (such as WedMD.com)
- ❍ Social media (such as Facebook, YouTube, etc.)
- ❍ Radio
- ❍ A healthcare provider (such as a doctor or nurse)
- ❍ Family members
- ❍ Friends
- ❍ Other (please explain): _____

12 Please indicate how much you either agree or disagree with the following statements about the HPV vaccine. We value your opinion.

	Strongly agree	Agree	Somewhat agree	Somewhat disagree	Disagree	Strongly disagree	I do not know
The HPV vaccine can prevent HPV.	❍	❍	❍	❍	❍	❍	❍
The HPV vaccine can prevent cancer.	❍	❍	❍	❍	❍	❍	❍
The HPV vaccine can prevent genital warts.	❍	❍	❍	❍	❍	❍	❍
My child will experience harmful side effects if they receive the HPV vaccine.	❍	❍	❍	❍	❍	❍	❍
My child is more likely to be harmed by the HPV vaccine than by having HPV.	❍	❍	❍	❍	❍	❍	❍
The HPV vaccine could kill my child	❍	❍	❍	❍	❍	❍	❍
The HPV vaccine is financially affordable.	❍	❍	❍	❍	❍	❍	❍
The HPV	❍	❍	❍	❍	❍	❍	❍

vaccine is not convenient to get for my child.							
The HPV vaccine should be available at my child's school.	❍	❍	❍	❍	❍	❍	❍
The HPV vaccine should be available to all children 9-17 years of age.	❍	❍	❍	❍	❍	❍	❍
The HPV vaccine should be mandatory for all children 9-17 years of age.	❍	❍	❍	❍	❍	❍	❍
The HPV vaccine should only be available to those 18 years of age and older.	❍	❍	❍	❍	❍	❍	❍
There should not be an HPV vaccine.	❍	❍	❍	❍	❍	❍	❍
The HPV vaccine will encourage my child to be more sexually active.	❍	❍	❍	❍	❍	❍	❍
I should get	❍	❍	❍	❍	❍	❍	❍

my MALE child vaccinated against HPV.							
I should get my FEMALE child vaccinated against HPV.	❍	❍	❍	❍	❍	❍	❍
The HPV vaccine is not necessary for my child.	❍	❍	❍	❍	❍	❍	❍
I have been encouraged to get my child vaccinated against HPV.	❍	❍	❍	❍	❍	❍	❍
I have been discouraged from getting my child vaccinated against HPV.	❍	❍	❍	❍	❍	❍	❍
I support the HPV vaccine being giving to children 9-17 years of age.	❍	❍	❍	❍	❍	❍	❍
It is risky for my child to receive the HPV vaccine.	❍	❍	❍	❍	❍	❍	❍
The HPV vaccine has more	❍	❍	❍	❍	❍	❍	❍

consequence than benefits for my child.							
I am a good parent if I get my child the HPV vaccine.	❍	❍	❍	❍	❍	❍	❍
There are more risks for my child getting the HPV vaccine than having HPV.	❍	❍	❍	❍	❍	❍	❍
The people closest to me would respect me if I got my child the HPV vaccine.	❍	❍	❍	❍	❍	❍	❍
The people closest to me would have a negative attitude toward my child if my child received the HPV vaccine.	❍	❍	❍	❍	❍	❍	❍

13 Which is your main source for learning about health information for your child?

- ❍ Printed materials (books, magazines, brochures, pamphlets, etc.)
- ❍ Television (such as "The Doctor Oz Show")
- ❍ Websites (such as WedMD.com)
- ❍ Social media (such as Facebook, YouTube, etc.)
- ❍ Radio
- ❍ A healthcare provider (such as a doctor or nurse)
- ❍ Family members
- ❍ Friends
- ❍ Other (please explain): _____

14 Do you have any social media accounts?

- ❍ Yes
- ❍ No

15 Which social media websites do you have accounts with? Please check all that apply.

- ❑ Facebook
- ❑ YouTube
- ❑ Twitter
- ❑ LinkedIn
- ❑ Pinterest
- ❑ Google Plus
- ❑ Tumblr
- ❑ Instagram
- ❑ Reddit
- ❑ Vine
- ❑ Snapchat
- ❑ Other, please identify: _____

16 Please rank your three most used social media accounts, 1 being your most used, 2 being your second most used, and 3 for your third most used account.
_____ Facebook
_____ YouTube
_____ Twitter
_____ LinkedIn
_____ Pinterest
_____ Google Plus
_____ Tumblr
_____ Instagram
_____ Reddit
_____ Vine
_____ Snapchat
_____ Other, please identify:

17 Do you follow any health-related social media pages (such as "CDC Cancer" or "WebMd")?
❍ Yes
❍ No
❍ Unsure

18 Have you ever seen information about HPV (human papillomavirus) on social media? This also includes if you've only seen the information that you have posted, if any.
❍ Yes
❍ No

19 Have you ever searched for information about HPV (human papillomavirus) on social media?
❍ Yes
❍ No

20 Have you ever posted or shared anything about HPV (human papillomavirus) on social media?
❍ Yes
❍ No

21 Think about HPV (human papillomavirus) on social media. On which social media site do you recall

seeing the most information about HPV lately?

- ❍ Facebook
- ❍ YouTube
- ❍ Twitter
- ❍ LinkedIn
- ❍ Pinterest
- ❍ Google Plus
- ❍ Tumblr
- ❍ Instagram
- ❍ Reddit
- ❍ Vine
- ❍ Snapchat
- ❍ Other, please identify: _____

22 Who posts or shares the information that you see about HPV (human papillomavirus) on social media? Please check all that apply.

- ❑ Myself
- ❑ Family member(s) - with whom I have a close relationship
- ❑ Family member(s) - with whom I have a distant relationship
- ❑ Friend(s) - with whom I have a close relationship
- ❑ Friend(s) - with whom I have a distant relationship
- ❑ Health organization(s) (government, such as the Centers for Disease Control and Prevention [CDC])
- ❑ Health organization(s) (non-government)
- ❑ Health blogger(s)
- ❑ Celebrity
- ❑ News organization(s)
- ❑ Advertisement(s)
- ❑ Other, please identify: _____

23 Now think about HPV (human papillomavirus) and social media. Please indicate if the messages on social media, in general, agree with the following statements about HPV. There are no right or wrong answers - we want to know what you see on social media.

	Strongly agree	Agree	Somewhat agree	Somewhat disagree	Disagree	Strongly disagree	I do not know
HPV can cause cancer.	❍	❍	❍	❍	❍	❍	❍
HPV can cause genital warts.	❍	❍	❍	❍	❍	❍	❍
It is unlikely that your child will ever be infected with HPV.	❍	❍	❍	❍	❍	❍	❍
If your child contracted HPV, they would experience health issues.	❍	❍	❍	❍	❍	❍	❍
HPV could kill your child.	❍	❍	❍	❍	❍	❍	❍
You can protect your child from HPV.	❍	❍	❍	❍	❍	❍	❍
Your child is at risk to get HPV.	❍	❍	❍	❍	❍	❍	❍

24 Please complete the following sentence: I believe that what I read on social media _____ my fear about HPV (also known as the human papillomavirus) for my children.

- ❍ Increases
- ❍ Decreases
- ❍ Neither increases, nor decreases

25 Please complete the following sentence: I believe that what I read on social media makes me feel that my child is at a _____ risk to get HPV (also known as the human papillomavirus).

- ❍ Greater
- ❍ Lesser
- ❍ Neither greater, nor lesser

26 Have you ever seen information about the HPV vaccine on social media? This also includes if you've only seen the information that you have posted, if any.

- ❍ Yes
- ❍ No

27 Have you ever searched for information about the HPV vaccine on social media?

- ❍ Yes
- ❍ No

28 Have you ever posted or shared anything about the HPV vaccine on social media?

- ❍ Yes
- ❍ No

29 Think about the HPV vaccine. On which social media site do you recall seeing the most information about the HPV vaccine lately?

- ❍ Facebook
- ❍ YouTube
- ❍ Twitter
- ❍ LinkedIn
- ❍ Pinterest
- ❍ Google Plus
- ❍ Tumblr
- ❍ Instagram
- ❍ Reddit
- ❍ Vine
- ❍ Snapchat
- ❍ Other, please identify: _____

30 In general, would you say that posts you have seen on social media about the HPV vaccine are:

- ❍ Always in favor of HPV vaccine
- ❍ Mostly in favor of the HPV vaccine
- ❍ Equally in favor and against the HPV vaccine
- ❍ Mostly against the HPV vaccine
- ❍ Always against the HPV vaccine

31 Who posts or shares the information that you see about the HPV vaccine on social media? Please check all that apply.

- ❑ Myself
- ❑ Family member(s) - with whom I have a close relationship
- ❑ Family member(s) - with whom I have a distant relationship
- ❑ Friend(s) - with whom I have a close relationship
- ❑ Friend(s) - with whom I have a distant relationship
- ❑ Health organization(s) (government, such as the Centers for Disease Control and Prevention [CDC])
- ❑ Health organization(s) (non-government)
- ❑ Health blogger(s)
- ❑ Celebrity
- ❑ News organization(s)
- ❑ Advertisement(s)
- ❑ Other, please identify: _____

32 Now think about the HPV vaccine. Please indicate if the messages on social media, in general, agree with the following statements about HPV vaccine. Again, there are no right or wrong answers - we want to know what you see on social media.

	Strongly agree	Agree	Somewhat agree	Somewhat disagree	Disagree	Strongly disagree	I do not know
The HPV vaccine can prevent HPV.	❍	❍	❍	❍	❍	❍	❍
The HPV vaccine can prevent cancer.	❍	❍	❍	❍	❍	❍	❍
The HPV vaccine can prevent genital warts.	❍	❍	❍	❍	❍	❍	❍
Your child will experience harmful side effects if they receive the HPV vaccine.	❍	❍	❍	❍	❍	❍	❍
Your child is more likely to be harmed by the HPV vaccine than by having HPV.	❍	❍	❍	❍	❍	❍	❍
The HPV vaccine could kill your child	❍	❍	❍	❍	❍	❍	❍
The HPV vaccine is financially	❍	❍	❍	❍	❍	❍	❍

affordable.							
The HPV vaccine is not convenient to get for your child.	❍	❍	❍	❍	❍	❍	❍
The HPV vaccine should be available at your child's school.	❍	❍	❍	❍	❍	❍	❍
The HPV vaccine should be available to all children 9-17 years of age.	❍	❍	❍	❍	❍	❍	❍
The HPV vaccine should be mandatory for all children 9-17 years of age.	❍	❍	❍	❍	❍	❍	❍
The HPV vaccine should only be available to those 18 years of age and older.	❍	❍	❍	❍	❍	❍	❍
There should not be an HPV vaccine.	❍	❍	❍	❍	❍	❍	❍
The HPV vaccine will not encourage your child to be more	❍	❍	❍	❍	❍	❍	❍

sexually active.							
You should get your MALE child vaccinated against HPV.	❍	❍	❍	❍	❍	❍	❍
You should get your FEMALE child vaccinated against HPV.	❍	❍	❍	❍	❍	❍	❍
The HPV vaccine is not necessary for your child.	❍	❍	❍	❍	❍	❍	❍
Society encourages you to get your child vaccinated against HPV.	❍	❍	❍	❍	❍	❍	❍
Society discourages you from getting your child vaccinated against HPV.	❍	❍	❍	❍	❍	❍	❍
Society supports the HPV vaccine being giving to children 9-17 years of age.	❍	❍	❍	❍	❍	❍	❍
It is risky for	❍	❍	❍	❍	❍	❍	❍

your child to receive the HPV vaccine.							
The HPV vaccine has more consequence than benefits for you child.	❍	❍	❍	❍	❍	❍	❍
You are a good parent if you get your child the HPV vaccine.	❍	❍	❍	❍	❍	❍	❍
There are more risks for your child getting the HPV vaccine than having HPV.	❍	❍	❍	❍	❍	❍	❍
The people closest to you would respect you if you got your child the HPV vaccine.	❍	❍	❍	❍	❍	❍	❍
The people closest to you would have a negative attitude toward your child if your child received the HPV vaccine.	❍	❍	❍	❍	❍	❍	❍

33 Please complete the following sentence: I believe that what I read on social media _____ my fear about getting the HPV vaccine for my child.

- ❍ Increases
- ❍ Decreases
- ❍ Neither increases, nor decreases

34 Please complete the following sentence: I believe that what I read on social media makes me feel that my child is at a _____ risk to be harmed by the HPV vaccine.

- ❍ Greater
- ❍ Lesser
- ❍ Neither greater, nor lesser

35 For your ${lm://Field/1}${lm://Field/2} child, 9-17 years of age:
 What is their sex?

- ❍ Male
- ❍ Female
- ❍ Prefer not to answer

36 For your ${lm://Field/1}${lm://Field/2} child, 9-17 years of age:
What is their age (in years)?

- ❍ 9
- ❍ 10
- ❍ 11
- ❍ 12
- ❍ 13
- ❍ 14
- ❍ 15
- ❍ 16
- ❍ 17
- ❍ prefer not to answer

37 For your ${lm://Field/1}${lm://Field/2} child, 9-17 years of age:
Has this child received the HPV vaccine?

- ❍ Yes, how many shots? _____
- ❍ No
- ❍ Unsure
- ❍ Prefer not to answer

38 For your ${lm://Field/1}${lm://Field/2} child, 9-17 years of age:
How long ago did this child receive their last HPV vaccine shot?
- ❍ less than a month ago
- ❍ 1 month ago
- ❍ 2 months ago
- ❍ 3 months ago
- ❍ 4 months ago
- ❍ 5 months ago
- ❍ 6 months ago
- ❍ more than 6 months ago

39 For your ${lm://Field/1}${lm://Field/2} child, 9-17 years of age:
Do you intend on getting this child the HPV vaccine before the child is 18 years of age?
- ❍ Definitely yes
- ❍ Probably yes
- ❍ Might or might not
- ❍ Probably not
- ❍ Definitely not
- ❍ Prefer not to answer

40 For your ${lm://Field/1}${lm://Field/2} child, 9-17 years of age:
Have you ever talked to this child about the HPV vaccine?
- ❍ Yes
- ❍ No
- ❍ Unsure
- ❍ Prefer not to answer

41 For your ${lm://Field/1}${lm://Field/2} child, 9-17 years of age:
Has a doctor or any other health care provider talked to you about getting the HPV vaccine for this child?
- ❍ Yes
- ❍ No
- ❍ Unsure
- ❍ Prefer not to answer

42 About the human papillomavirus (HPV)<o:p></o:p> The human papillomavirus (HPV) is a group of 150 viruses HPV types, of which more than 40 can infect humans [1]. HPV is spread through skin-to-skin contact with someone who is infected [2], most commonly the result of contact during vaginal and anal sexual activity, but also can be contracted during oral sex. Whether or not a person infected with HPV is symptomatic, it is still possible for that person to spread the infection. Many individuals with HPV infection do not show signs of infection, but

some people do experience symptoms. <o:p></o:p> Symptoms and complications attributed to HPV infection include genital warts and cancer [3]. HPV-associated cancers include cervical, vulvar, vaginal, penile, anal, and oropharyngeal (back of the throat). Each year in the United States of America, there is average of more than 38,000 of new cases of these forms of cancer [4], and each year these forms of cancer are responsible for nearly 16,000 deaths [5-8].<o:p></o:p>

43 About the human papillomavirus (HPV) vaccine<o:p></o:p> The human papillomavirus (HPV) vaccine is a series of injections that immunize recipients against many HPV types, and consequently prevents HPV-associated disease [9]. It has been approved for use in females since 2006 [10] and for males since 2009 [11].<o:p></o:p> The vaccine is also known by several other brands and names, including [12]:<o:p></o:p> -<span style="font-variant-numeric: normal; font-stretch: normal; font-size: 7pt; line-height: normal; font-family: "Times New Roman";"> Cervarix®, Bivalent HPV vaccine, HPV2, 2vHPV<o:p></o:p> -<span style="font-variant-numeric: normal; font-stretch: normal; font-size: 7pt; line-height: normal; font-family: "Times New Roman";"> Gardasil®, Quadrivalent HPV vaccine, HPV4, or 4vHPV<o:p></o:p> -<span style="font-variant-numeric: normal; font-stretch: normal; font-size: 7pt; line-height: normal; font-family: "Times New Roman";"> Gardasil® 9, 9-valent HPV vaccine, or 9vHPV<o:p></o:p> -<span style="font-variant-numeric: normal; font-stretch: normal; font-size: 7pt; line-height: normal; font-family: "Times New Roman";"> the genital warts vaccine<o:p></o:p> -<span style="font-variant-numeric: normal; font-stretch: normal; font-size: 7pt; line-height: normal; font-family: "Times New Roman";"> the human papillomavirus (HPV) vaccine/immunization , human papillomavirus (HPV) shot<o:p></o:p> The Advisory Committee on Immunization Practice (ACIP), “a group of medical and public health experts that develop recommendations on the use of vaccines in the civilian population of the United States” [13], recommends HPV vaccination for females ages 11 or 12 years, with catch-up vaccines for females age 13-26 years. For males, the ACIP recommends vaccination at ages 11 or 12 years, with catch-up vaccines at ages 13-21 years, or if immunocompromised, through age 26 years. It is also recommended that men who engage in sexual relationships with other men (MSM) also receive catch-up vaccinations through age 26 years. Children can begin vaccination as early as age 9 years [14], and recommendation of HPV vaccination prior to adolescence has been done with the goal of getting children vaccinated and immunized against HPV prior to potential exposure to infection [15].<o:p></o:p>

44 If you would like more information about HPV or the HPV vaccine, please speak to a healthcare provider. Also, you may refer to the sources

below.

<o:p></o:p> Sources<o:p></o:p>
1. Centers for Disease Control and Prevention. Human papillomavirus (HPV). 2015 [cited 2015 September 30]; Available from: http://www.cdc.gov/hpv/parents/whatishpv.html.<o:p></o:p> 2. Centers for Disease Control and Prevention. Human papillomavirus (HPV): Genital HPV infection - fact sheet. 2016 [cited 2015 September 30]; Available from: http://www.cdc.gov/std/HPV/STDFact-HPV.htm.<o:p></o:p>
3. Centers for Disease Control and Prevention. Human papillomavirus (HPV): HPV and cancer. 2015 [cited 2015 September 30]; Available from: http://www.cdc.gov/hpv/cancer.html.<o:p></o:p> 4. Centers for Disease Control and Prevention. HPV and cancer. 2016 [cited 2016 July 12]; Available from: http://www.cdc.gov/cancer/hpv/statistics/cases.htm.<o:p></o:p>
5. Centers for Disease Control and Prevention. Gynecological cancers. 2016 [cited 2016 July 12]; Available from: http://www.cdc.gov/cancer/cervical/statistics/index.htm.<o:p></o:p>
6. Centers for Disease Control and Prevention. Gynecological cancers: Vaginal and vulvar cancers statistics. 2016 [cited 2016 July 12]; Available from: http://www.cdc.gov/cancer/vagvulv/statistics/index.htm.<o:p></o:p>
7. American Cancer Society. Penile cancer: What ae the key statistics about penile cancer? 2016 [cited 2016 July 12]; Available from: http://www.cancer.org/cancer/penilecancer/detailedguide/penile-cancer-key-statistics.<o:p></o:p> 8. National Institutes of Health and National Cancer Institute. SEER stat fact sheets: Anal cancer. 2016 [cited 2016 July 12]; Available from: http://seer.cancer.gov/statfacts/html/anus.html.<o:p></o:p> 9. Centers for Disease Control and Prevention. For parents: Vaccines for your children: HPV vaccine for preteens and teens. 2015 [cited 2016 July 13]; Available from: http://www.cdc.gov/vaccines/parents/diseases/teen/hpv.html.<o:p></o:p>
10. U.S. Food and Drug Administration, June 8, 2006 approval letter - human papillomavirus quadrivalent (types 6, 11, 16, 18) vaccine, recombinant. 2006, Departement of Health and Human Services: Rockville, MD.<o:p></o:p>
11. U.S. Food and Drug Administration. FDA approves new indication for Gardasil to prevent genital warts in men and boys. 2009 [cited 2016 June 19]; Available from: http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm187003.htm.<o:p></o:p> 12. Centers for Disease Control and Prevention. Vaccines and immunizations. 2016 [cited 2016 December 15]; Available from: https://www.cdc.gov/vaccines/terms/vacc-abbrev.html.<o:p></o:p>
13. Centers for Disease Control and Prevention. Advisory Committee on Immunization Practices (ACIP). 2016 [cited 2016 December 4]; Available

from: https://www.cdc.gov/vaccines/acip/.<o:p></o:p> 14. Petrosky, E., et al., Use of 9-Valent human papillomavirus (HPV) vaccine: Updated HPV vaccination recommendations of the advisory committee on immunization practices. MMWR: Morbidity & Mortality Weekly Report, 2015. 64(11): p. 300-304.<o:p></o:p> 15. Schuchat, A., HPV "coverage". The New England Journal of Medicine, 2015. 372(8): p. 775-776.<o:p></o:p>

45 Based on the information that you have just read about HPV and the HPV vaccine, would you consider (please check all that apply):

- ❑ Getting the HPV vaccine for your child?
- ❑ Talking to a doctor or health care provider about HPV?
- ❑ Talk to a doctor or health care provider about the HPV vaccine?
- ❑ Talking to a family member about HPV?
- ❑ Talking to a family member about the HPV vaccine?
- ❑ Talking to a friend about HPV?
- ❑ Talking to a friend about the HPV vaccine?
- ❑ Doing more research about HPV?
- ❑ Doing more research about the HPV vaccine?
- ❑ None of the above.

46 What is your sex?

- ❍ Male
- ❍ Female
- ❍ Prefer not to answer

47 What is your race? Check all that apply.

- ❑ White
- ❑ Black or African American
- ❑ American Indian or Alaska Native
- ❑ Asian
- ❑ Native Hawaiian or Pacific Islander
- ❑ Other
- ❑ Prefer not to answer

48 Are you Hispanic or Latino?
- ❍ Yes
- ❍ No
- ❍ Prefer not to answer

49 What is your birth year? (Enter "0" if you prefer not to answer. Enter "1234" if you do not know)

50 What is your county of residence?
- ❍ Allen
- ❍ Anderson
- ❍ Atchison
- ❍ Barber
- ❍ Barton
- ❍ Bourbon
- ❍ Brown
- ❍ Butler
- ❍ Chase
- ❍ Chautaqua
- ❍ Cherokee
- ❍ Cheyenne
- ❍ Clark
- ❍ Clay
- ❍ Cloud
- ❍ Coffey
- ❍ Comanche
- ❍ Cowley
- ❍ Crawford
- ❍ Decatur
- ❍ Dickinson
- ❍ Doniphan
- ❍ Douglas
- ❍ Edwards
- ❍ Elk
- ❍ Ellis
- ❍ Ellsworth
- ❍ Finney
- ❍ Ford
- ❍ Franklin
- ❍ Geary
- ❍ Gove
- ❍ Graham

- Grant
- Gray
- Greeley
- Greenwood
- Hamilton
- Harper
- Harvey
- Haskell
- Hodgeman
- Jackson
- Jefferson
- Jewell
- Johnson
- Kearny
- Kingman
- Kiowa
- Labette
- Lane
- Leavenworth
- Lincoln
- Linn
- Logan
- Lyon
- Marion
- Marshall
- McPherson
- Meade
- Miami
- Mitchell
- Montgomery
- Morris
- Morton
- Nemaha
- Neosho
- Ness
- Norton
- Osage
- Osborne
- Ottawa
- Pawnee
- Phillips
- Pottawatomie

- Pratt
- Rawlins
- Reno
- Republic
- Rice
- Riley
- Rooks
- Rush
- Russell
- Saline
- Scott
- Sedgwick
- Seward
- Shawnee
- Sheridan
- Sherman
- Smith
- Stafford
- Stanton
- Stevens
- Sumner
- Thomas
- Trego
- Wabaunsee
- Wallace
- Washington
- Wichita
- Wilson
- Woodson
- Wyandotte
- Prefer not to answer

51 What is your highest level of education?

- Less than high school
- High school graduate or GED equivalent
- Some college
- 2 year degree or Associate's degree
- 4 year degree or Bachelor's degree
- Master's degree
- Doctorate or terminal degree (e.g. Ph.D., M.D., J.D.)
- Prefer not to answer

52 What is your current yearly household income?

- ❍ Less than $10,000
- ❍ $10,000 - $19,999
- ❍ $20,000 - $29,999
- ❍ $30,000 - $39,999
- ❍ $40,000 - $49,999
- ❍ $50,000 - $59,999
- ❍ $60,000 - $69,999
- ❍ $70,000 - $79,999
- ❍ $80,000 - $89,999
- ❍ $90,000 - $99,999
- ❍ $100,000 or more
- ❍ Prefer not to answer

Appendix 3: Content Analysis Codebook

CODEBOOK

Parameters:

- Posted between June 8, 2006 – June 8, 2016 (dates inclusive)
- Search terms: "Cervarix," "Gardasil," "HPV vaccine," and "human papillomavirus vaccine"

Exclusion Criteria

- Non-public post
- Non-English
- No dates available
- Irrelevant

Question/Item	**Codesheet Item**	**Coding Instructions**	**Notes**
Content Characteristics			
What year was the Facebook post published?	Year	Code the year that the post was published	
What day was the Facebook post published?	Date	List the month and day	
Who authored this post?	Author	1 – Facebook profile 2 – Facebook page or group	You generally have the ability to add a profile as a friend, whereas a page, you can only like and follow. If you aren't sure, hover over the name to see options
What is the gender of the author?	Gender	0 – author is the a page 1 – Female 2 – Male 3 – Unsure 4 – CDC	If the author is a Facebook profile, then attempt to code the gender
Who is the audience for this post?	Audience	0 – general 1 – to a Facebook page 2 – to Facebook profile	If a post is a general post, it will just have the author. If there's an expressed audience, it will

			have the author, then a space followed by the name of the audience
Does the post have hyperlinks?	Link	0 – absent 1 – present	These are clickable items. Hyperlinks may be typed out or converted to clickable items above the reaction (like, comment, share) section
Does the post have picture or videos embedded?	Picvid	0 – absent 1 – present	Pictures may be in the original post or in the link, they however should not be attached to the embedment. Pictures take up the post window.
How many reactions	Reactions	Record the number of reactions	Located above the word "Like"
How many comments does this post have?	Comments	Record the number	Located on lower right of post, if any
How many shares does this post have?	Shares	Record the number	Located on lower right of post, if any
What is the tone of this post?	PostTone	0 – neutral 1 – positive 2 – negative	
What is the tone of this post toward the HPV vaccine?	PostTone	0 – neutral 1 – positive 2 – negative	
HPV-Associated Disease			
Does the post mention	Warts	0 – absent	

genital warts?		1 – present	
Does this post mention cancer?	Cancer	0 – absent 1 – present	
Health Belief Model Content			
Does this post suggest that people are susceptible HPV infection?	Sus	0 – absent 1 – present	
Does this post suggest that HPV has severe side effects?	Sev	0 – absent 1 – present	
Are benefits of the HPV vaccine mentioned in the post?	Benefit	0 – absent 1 – present	
Are barriers of the HPV vaccine mentioned in the post?	Barriers	0 – absent 1 – present	
Does this post mention self-efficacious messages related to getting the HPV vaccine?	Selfef	0 – absent 1 – present	
Does the post tell the audience to get the HPV vaccine?	CueYes	0 – absent 1 – present	
Does the post tell the audience to avoid HPV vaccine?	CueNo	0 – absent 1 – present	
Social Amplification of Risk Framework Content			
Does this post amplify or attenuate the perception of the risk of the HPV vaccine being dangerous?	RiskAmp	0 – absent 1 – amplifies 2 - attenuates	
Does this post indicate that at least one individual has changed his or her behavior as a result of the risk of the HPV vaccine?	Ripple	0 – absent 1 – present	
Does this post indicate that there are results from the change in behavior that occurred because of the threat of the HPV vaccine?	Impact	0 – absent 1 - present	

Appendix 4: Reliability Table

Question/Item	Codesheet Item	Krippendorf's alpha (α)
Content Characteristics		
What year was the Facebook post published?	Year	1.00
What day was the Facebook post published?	Date	1.00
Who authored this post?	Author	0.96
What is the gender of the author?	Gender	0.93
Who is the audience for this post?	Audience	0.91
Does the post have hyperlinks?	Link	0.90
Does the post have picture or videos embedded?	Picvid	0.81
How many reactions	Reactions	0.96
How many comments does this post have?	Comments	0.96
How many shares does this post have?	Shares	0.95
What is the tone of this post?	PostTone	0.81
What is the tone of this post toward the HPV vaccine?	PostTone	0.86
HPV-Associated Disease		
Does the post mention genital warts?	Warts	0.96
Does this post mention cancer?	Cancer	0.88
Health Belief Model Content		
Does this post suggest that people are susceptible to HPV infection?	Sus	0.71
Does this post suggest HPV has severe side effects?	Sev	0.81
Benefits of the HPV vaccine mentioned in the post?	Benefit	0.85
Barriers to the HPV vaccine mentioned in the post?	Barriers	0.84
Does this post mention self-efficacious messages related to getting the HPV vaccine?	Selfef	0.88
Does the post tell the audience to get the HPV vaccine?	CueYes	0.89
Does the post tell the audience to avoid the HPV vaccine?	CueNo	0.90
Social Amplification of Risk Framework Content		
Does this post amplify or attenuate the perception of the risk of the HPV vaccine being dangerous?	RiskAmp	0.85
Does this post indicate that at least one individual has changed his or her behavior as a result of the risk of the HPV vaccine?	Ripple	0.77
Does this post indicate that there are results from the change in behavior that occurred because of the threat of the HPV vaccine?	Impact	0.67