Twitter Posts, Gist, and the Perceived Harmfulness of the Human Papillomavirus Vaccine

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TWITTER POSTS, GIST, AND THE PERCEIVED HARMFULNESS OF THE HUMAN PAPILLOMA VIRUS VACCINE

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TWITTER POSTS, GIST, AND THE PERCEIVED HARMFULNESS OF THE HUMAN PAPILLOMAVIRUS VACCINE

by

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THESIS

Presented to the Faculty of the Graduate School of
The University of Texas at El Paso
in Partial Fulfillment
of the Requirements
for the Degree of

MASTER OF ARTS

Department of Psychology
THE UNIVERSITY OF TEXAS AT EL PASO
May 2022
Acknowledgements

I would like to thank my mentor, Dr. Cohn, for sharing all of his guidance and being patient with me. I’m grateful for the wisdom and learning he has provided. I acknowledge the support of my family and friends. Thank you for supporting me through the hardest moments of my academic career. Your love makes me strong. I would also like to acknowledge Kevin Guiterrez, gone too soon.
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Chapter 1: Introduction

1.1 OVERVIEW

About 13 million men and women contract the Human Papillomavirus (HPV) each year, greatly increasing their chances of developing cervical cancer, anal cancer, oropharynx (throat) cancer, as well as genital warts (CDC, 2021). Several vaccines have been developed to address this growing public health problem. Despite the safety of these vaccines, 51.1% of adolescents (13-17 years old) and an even greater number of adults in the United States have not been fully vaccinated (Walker, T.Y., et al., 2018). Many individuals who fail to get the HPV vaccine believe the vaccine leads to serious adverse outcomes such as seizures or death. The latter beliefs are often derived from exposure to a number of web-postings describing personal adverse reactions to the HPV vaccines. The current study examines one factor that influences perceived risk of the HPV vaccine: the type of information received. In particular, the proposed study examines the relative importance of anecdotal information (e.g., personal web-postings) and statistical information (e.g., base rates of adverse events) when evaluating the risk of the HPV vaccine. The study pursues the answer to the following question: “Do anecdotes describing adverse side effects of the HPV vaccine significantly affect how individuals perceive the risk of receiving the vaccine, despite scientific evidence presented in a base rate that states the risk of having an adverse side effect of the HPV vaccine is minimal?” The findings from the current study may help contribute to better risk communication regarding the Human Papillomavirus vaccine.

This paper includes a review of several topics that may affect an individual’s perception of risk and behavioral intentions regarding the HPV vaccine. A brief background on the Human Papillomavirus and the HPV vaccine is provided. The accessibility and availability of HPV
vaccine information online is also discussed. In order to better understand how individuals process health information, an understanding in risk communication, cognitive biases, and heuristics is needed. This paper addresses these topics and reviews prior research that has examined anecdotal versus statistical evidence in communicating health topics.

1.2 HUMAN PAPILLOMAVIRUS

The Human Papillomavirus (HPV) is contracted by having vaginal, anal, or oral sex with a person who has the virus. HPV is the most common sexually transmitted infection (STI). Every sexually active individual will likely be infected with at least one type of the HPV virus during their lifetime (CDC, 2021). The annual direct medical cost of treating and preventing HPV in 2010 was an estimated eight billion dollars (Chessona, Ekwueme, Saraiya, Watson, Lowy, & Markowitz, 2012). The burden of treating HPV is costly because several strains of HPV are associated with cancer.

An examination of cancer tissue in population based data revealed that approximately 34,800 diagnoses of cancer attributable to HPV occur each year (CDC, 2020). Cancers that can be attributed to HPV include over 90% of anal and cervical cancers, approximately 70% of vaginal cancers, and over 60% of penile cancers. About 70% of oropharynx (throat) cancers are related to HPV (CDC, 2020).

The burden caused by HPV associated cancer is most notable in women. In the United States, cervical cancer is the fourth most common cancer for women between 15-44 years old (ICO/IARC Information Centre on HPV and Cancer, 2021). Hispanic and black women suffer from higher cervical cancer incidence rates compared to white women. Increased rates of cancer
also occur in particular groups of men. Men who have sex with other men are seventeen times more likely to be diagnosed with anal cancer (CDC, 2014).

1.3 HUMAN PAPILLOMAVIRUS VACCINE

A vaccine is available to prevent the main cancer causing strains of HPV. The three versions of the vaccine are Gardasil, Gardasil-9, and Cervarix. All three versions of the vaccine prevent the high-risk strains of HPV that cause the majority of cervical cancers. Additionally, Gardasil and Gardasil-9 further protect against an even higher percentage of other HPV-associated cancers including throat cancer. Gardasil-9 is the only vaccine that prevents HPV strains that cause up to 90% of genital warts. The vaccine is administered in two doses, 6-12 months apart, to individuals between 9 to 14 years old. For individuals aged 15-45 or considered immunocompromised, three doses of the vaccine are administered. The second dose is given 1-2 months after the first dose. The third dose is given 6 months after the first dose (CDC, 2020).

The Centers for Disease Control and Prevention (CDC) recommend that all females and males aged 9-26 receive the vaccine. Currently, only four jurisdictions (District of Columbia, Puerto Rico, Rhode Island, and Virginia) require children to be vaccinated (National Conference of State Legislatures, 2020). Therefore, the choice to vaccinate or not to vaccinate against HPV is usually made by parents who have children within the recommended age range (9-26 yrs.) for the vaccine. The CDC (2021) recommends administering the HPV vaccine to children before they become sexually active. By vaccinating at an early age, the chance of becoming infected with high-risk HPV decreases substantially.

If an individual was not vaccinated as a child, the individual can be administered a catch-up dose. HPV catch-up doses are recommended for administration up to the age of 45 for both
men and women. The prime age range to receive catch up doses of the HPV vaccine is between the ages of 18-26. However, individuals within this age range have only a 49.1% HPV vaccination rate (Walker, T.Y., et al., 2018). As age increases, the likelihood of individuals receiving the HPV vaccine decreases (Fontenot, Fantasia, Charyk, & Sutherland, 2014). Low vaccination rates may be explained by the lack of health campaigns targeting college-aged individuals.

The HPV vaccine has been approved by the Federal Drug Administration (FDA). Both the FDA and CDC continue to monitor the safety of the HPV vaccine through three safety systems. One safety system is the Vaccine Adverse Event Reporting System (VAERS) which acts as an early warning system (CDC, 2020). Adverse reactions or symptoms related to vaccines are reported to VAERS by vaccine manufacturers (37%), health care providers (36%), state immunization programs (10%), vaccine recipients or their guardians (7%), and other sources (10%; VAERS, 2017). The second safety system is the Vaccine Safety Datalink (VSD), an organized monitoring system in which searches are regularly conducted on vaccine-related data by health organizations partnered with the CDC (CDC, 2020). The third safety system is the Clinical Immunization Safety Assessment (CISA) Project. The CISA conducts clinical research on the risks associated with the HPV vaccine in various groups of individuals in a partnership between the CDC and medical centers.

The CDC has published several reports using data provided by the three safety systems. According to the reports, the HPV vaccine is a well-tolerated and safe vaccination (CDC, 2021). A study was conducted from 2006 to 2009 in which 600,558 doses of the HPV vaccine were administered (Gee et al., 2011). Of those individuals who were administered the vaccine, 105 participants reported adverse reactions such as Guillain-Barre syndrome, appendicitis, or stroke
within forty-two days after receiving the HPV vaccine. According to this study, less than two-hundredths of one percent (i.e., 0.02%) of those who received the vaccination experienced serious adverse symptoms after receiving the vaccine. The CDC also reported that no deaths had been linked to the HPV vaccine. Based on these reports and the anticipated benefits of the vaccination, a strong case for vaccinating all children and young adults can be made.

1.4 ONLINE ACCESS TO HPV INFORMATION

The Human Papillomavirus (HPV) and the HPV vaccine have had increased coverage in the news. An increase in the number of news reports about HPV has led to greater awareness about the disease among adults. However, health researchers have expressed concerns about how HPV and the HPV vaccine are being presented by the media (Kelly, Leader, Mittermaier, Hornik, & Cappella, 2009). Negative information about the safety of the HPV vaccine was more likely to be found in political blogs (16%) or blogs posted by news outlets (12.5%) than in blogs created in health websites (5.3%) or in blogs associated with science websites (5.3%; Daily, Nan, & Briones, 2015). Additionally, the majority of news stories regarding HPV leave out important details (e.g., women should continue getting cervical exams after receiving the HPV vaccine; Kelly et al., 2009). Therefore, having a greater awareness of HPV does not guarantee accurate knowledge (Tiro, Meissner, Kobrin, & Chollette, 2007).

Despite the low likelihood of experiencing serious reactions to the HPV vaccine and the high likelihood of preventing multiple cancers, many individuals choose not to be vaccinated or chose not to vaccinate their children. One explanation for this vaccination hesitancy is the seemingly contradictory safety information that is available online regarding the HPV vaccine. Health information is now easily accessed by individuals online. Many websites provide health
related information such as websites with self-diagnostic tools or symptom checkers (e.g., WebMD, Mayo Clinic), websites with health information provided by the government (e.g., the Food and Drug Administration), websites created by health agencies to promote knowledge on health topics (e.g., National Institute of Health), and websites with forums where the discussion of health related issues takes place (e.g., ehealthforum.com). The increase in information may lead to greater awareness of health issues, but the available information may not increase individuals’ understanding of the information.

The internet appears to be the preferred method among lay persons for obtaining information on HPV (Hughes, Cates, Liddon, Smith, Gottlieb, & Brewer, 2009). A study conducted by Madden, Nan, Briones, and Waks (2012) explored the types of websites that publish information about the HPV vaccine. An analysis of 89 websites revealed that information about the HPV vaccine was found most frequently in websites created by academic or other nonprofit organizations (34.8%). HPV vaccine information was found the second most frequently in government agency websites (24.7%). The remaining websites with HPV vaccine information included pharmaceutical companies (15.7%), news organizations (12.4%), consumer generated (5.6%), encyclopedic medical websites (3.4%), professional organizations (2.2%), and a medical center (1.1%; Madden et al., 2012). The tone of the HPV information for each website was also analyzed. Approximately 53.7% of the information presented on the websites reflected a neutral tone. The information neither supported nor opposed the HPV vaccine (Madden et al., 2012). The websites in the study contained mostly expert information from academic or government sources. However, the use of particular search terms when conducting an online search can drastically change the results obtained (Madden et al., 2012).
The search by Madden et al. (2012) only used two words: ‘HPV’ and ‘Vaccination.’ Online search results may differ over time, even when the same search terms are used. For example, I conducted a more current informal search on October 17, 2021 using the terms ‘HPV’ and ‘Vaccination’. The first 30 citations revealed that information about the HPV vaccine was found most frequently in websites created by government agency websites (27%) and in consumer generated websites (20%). HPV vaccine information was found the second most frequently in websites for news organizations (16.7%). The remaining websites with HPV vaccine information included pharmaceutical companies (13.3%), professional organizations (13.3%), encyclopedic medical websites (10%), academic or other nonprofit organizations (3.3%), and a medical center (3.3%). The results of my search indicate that consumer generated websites appeared more frequently during the search as compared to the search by Madden et al. (2012).

Notably, individuals will also encounter different health information when alternative search terms are employed (e.g., search using the words ‘HPV vaccine safety’). I conducted an informal search on October 17, 2021 using the phrase ‘HPV Vaccine Safety’. The first 30 citations revealed that information about HPV vaccine safety was found most frequently in websites created by government agency websites (26.6%). The second category of websites where HPV vaccine safety information was found frequently was in websites for professional organizations (20%) and academic or other nonprofit organizations (20%). The remaining websites with HPV vaccine safety information included consumer generated websites (16.7%), encyclopedic medical websites (10%), and news organizations (6.7%). No citations were found for pharmaceutical companies or medical centers. The results across these three searches differed. Websites by government agencies were frequently cited across all three searches.
However, the frequency of citation of other websites including consumer generated websites differed by search term or date of the search.

1.5 AVAILABILITY OF HEALTH INFORMATION ABOUT HPV

The availability of health information has increased because public access to the internet has increased. WebMD, a public website that publishes health information globally, recorded about 127 million unique users on its site during the first quarter of 2020 (Similarweb, 2021). A national phone survey of 3,001 adults revealed that 80% of participants look for health information online (Pew Research Center, 2011). The increased access and use of online health information now causes individuals to sort through even more information and identify what they deem to be relevant when analyzing the costs and benefits associated with a health behavior.

Approximately 71% of young adults begin their search for health information with an online search engine (i.e., Google, Bing, or Yahoo; Stankova, Mihova, Andonov, & Datchev, 2020), and 72% of the health information seekers visit two or more websites during their search (Pew Research Center, 2006). About 25% of health information seekers reported feeling overwhelmed by the amount of information found online (Pew Research Center, 2006). Despite feeling overwhelmed, 53% of adults stated that the health information they found online impacted how they take care of themselves (Pew Research Center, 2006). However, 75% of adults said they do not consistently check the source and date of the information they access (Pew Research Center, 2006). Unverified sources and undetermined publishing dates may lead online health information seekers to outdated, biased, or inaccurate information.

The information available online regarding the Human Papillomavirus (HPV) vaccine may be problematic (Petts & Niemeyer, 2004). Such information is often contradictory and many
sources of information are not trustworthy (i.e., not from an expert or a peer reviewed journal). The lack of verifiable or reliable information online is increasingly important as online searches for immunization information increases (Osazuwa-Peters, Rohde, & Boakye, 2021). Consequently, health campaigns should aim to present precise risk information from the start to prevent exposure to problematic health information.

1.6 RISK COMMUNICATION OF HPV

Health campaigns are created to educate individuals about the health risks associated with specific behaviors such as intoxicated driving or refusing vaccination against contagious diseases. Absolute risk refers to the probability of an adverse outcome occurring in the population at risk (Andrade, 2015). Absolute risk is often conveyed as a percentage or as the number of persons in a population in which the adverse outcome may occur. For example, a patient may be told that women between 20-24 years old have a 19% lifetime chance of becoming infected with at least one of the main cancer causing or genital warts causing types (types 16, 18, 6, or 11) of the Human Papillomavirus (HPV; Markowitz, Liu, Hariri, Steinau, Dunne, & Unger, 2016). Thus, approximately 190 out of 1,000 women would become infected with HPV. However, if 1,000 women between 20-24 years old received the HPV vaccine, then only about 2 HPV infections would occur (De Vicenzo, Conte, Ricci, Scambia, & Capelli, 2014). In this case, the absolute risk of contracting HPV is reduced from 19% to 0.2% (i.e., a difference of 18.8%) when they receive the vaccine. Approximately 18.8% fewer women will be infected with high risk HPV if they receive the vaccine.

Although absolute risk can be an important consideration when making health related decisions, many physicians present treatment outcomes to their patients in terms of relative risk
Relative risk compares the likelihood of the adverse outcome occurring in one target population with the likelihood of the adverse outcome occurring in a second target population (Andrade, 2015). For example, a patient may be told that women between 20-24 years old have a 19% lifetime chance of becoming infected with at least one of the main cancer causing types of the Human Papillomavirus (HPV; Markowitz et al., 2016). The patient is also told that they are about 95 times (i.e., nineteen percent divided by two-tenths of a percent) more likely to become infected with HPV if they do not receive the vaccine. Presumably, the individual will be more persuaded to receive the vaccine if they were told they are 95 times more likely to become infected with HPV if they do not receive the vaccine compared to being told that their absolute risk of being infected with HPV decreases 18.8% if they receive the vaccine (Malenka et al., 1993). Thus, risk perception can be influenced by the way information is presented and, in turn, leave individuals susceptible to cognitive bias.

1.7 COGNITIVE BIASES AND PERCEIVED RISK OF HPV VACCINE

Risk perceptions are subject to several biases which impact decision-making. How frequently individuals encounter the risk, whether the risk occurs locally (e.g., flu outbreak in their city or neighborhood) or globally (e.g., threat of nuclear war), and the severity of the adverse outcomes associated with the risk can affect how risky and therefore relevant the threat is perceived (Uzzell, 2000; De Dominicis et al., 2015).

Primary and Secondary Bias. The repeated appearance of risk information may inflate risk perception when minimal risk is present. Individuals often underestimate the frequency of common causes of death but overestimate the frequency of rare causes of death. This bias is known as “primary bias” (Lichtenstein, Slovic, Fischhoff, Layman, & Combs, 1978). For
example, according to statistical data, no deaths have been linked to the Human Papillomavirus (HPV) vaccine (CDC, 2020). If individuals read anecdotal reports claiming the HPV vaccine is responsible for the death of a child, they may perceive a high frequency of deaths related to the Human Papillomavirus vaccine. These anecdotal reports are often shared by parents across social media as a warning. It does not take long for these posts to go ‘viral’ (i.e., widely spread across social media by many individuals). The repeated exposure to anecdotal reports claiming the HPV is responsible for a few deaths could lead individuals to believe the HPV vaccine is the cause of many fatalities. Regardless of the validity of such claims, a few deaths caused by the HPV vaccine should pale in comparison to the number of deaths caused by cervical cancer in women. Unfortunately, it is unlikely that individuals will read about how HPV can cause cervical cancer in the form of an anecdotal report. There were about 311,000 confirmed annual deaths worldwide from cervical cancer in 2018 (Arbyn, Weiderpass, Bruni, de Sanjosé, Saraiya, & Ferlay, et al., 2020). Individuals demonstrating a primary bias in the above example may have encountered anecdotal reports describing fatalities from the HPV vaccine but few, if any, reports of individuals dying of cervical cancer (Bruni et al., 2015). Individuals would likely conclude the HPV vaccine is deadly, but they may not perceive cervical cancer to be nearly as fatal.

In the above example, individuals may also be subject to a secondary bias: individuals overestimate the frequency of deaths that have been sensationalized by the media and underestimate the frequency of common deaths not widely reported by the media (Lichtenstein et al., 1978). The media tends to focus on potential catastrophic events because ‘fear sells’ which can increase the likelihood that secondary bias may occur. In the previous example, the media would have reported one rare adverse outcome that seemed to be associated with the HPV vaccine. This may have been reported in an interview with a family member who claims the
HPV vaccine caused the death of a loved one. However, the statistical data shows no link between the HPV vaccine and death (CDC, 2020). During this report, it’s likely the media would have failed to report the frequent deaths associated with cervical cancer; deaths that may have been prevented by the HPV vaccine. Overall, primary and secondary biases occur when the expectations of individuals are influenced by factors such as media coverage of the target risk which causes them to form biased expectations about the anticipated outcomes of a behavior. The occurrence of these biases underlines the importance of how health information is presented and reiterates the importance of the present study.

1.8 HEURISTICS AND PERCEIVED RISK OF HPV VACCINE

Individuals often form judgments about a behavior and its outcomes by relying on heuristics. As individuals encounter and solve problems during their lifetime, they make connections between similar problems they encounter. These connections strengthen with repeated exposure to similar problems and increase an individual’s efficiency to solve the problems. Increased efficiency in problem-solving may lead to greater reliance on cognitive short cuts, known as heuristics, in order to identify relevant risk information quickly (Koehler, 1996). By relying on heuristics, individuals solve problems or make judgments about a risk more quickly than if they considered each problem-solving step or weighed each cost and benefit associated with the risk before forming their judgment. Heuristics, therefore, can reduce the cognitive energy in making choices that have been successful in the past when faced with similar problems. However, heuristics are susceptible to error. Individuals may identify risk information they deem relevant, but individuals may also ignore risk information needed to form accurate judgments. Since individuals make decisions using cognitive short cuts, they no longer weigh
each piece of information when reaching their decisions. Key pieces of risk information may go unnoticed or may be given less importance because individuals are relying on heuristics to make their decision.

*Availability Heuristic.* One heuristic that may be relied upon to form a judgment is the availability heuristic. The availability heuristic refers to the tendency for individuals to estimate the probability of an adverse outcome on how easily it can be recovered from memory (Tversky & Kahneman, 1974). Because heuristics are prone to error, reliance on the availability heuristic may cause the individual to commit an error in judgment. Tversky and Kahneman (1973) examined the influence of the availability heuristic on estimates of probabilities.

The availability heuristic may cause individuals to make inaccurate health related judgments. For example, individuals will likely perceive a greater risk of having a heart attack during middle age if they have known individuals who have experienced a heart attack under these circumstances (Tversky & Kahneman, 1974). Prior probabilities, such as those included in a base rate, tend to be ignored when the availability heuristic is relied upon. For the present study, it is important to consider whether an individual or an acquaintance of the individual have received the vaccine and experienced any negative side effects. The exposure to direct or indirect adverse outcomes of the HPV vaccine may indicate the presence of the availability heuristic.

**1.9 BASE RATE NEGLECT AND PERCEIVED RISK OF HPV VACCINE**

The previous discussion suggests that individuals may ignore base rate information when judging the likelihood of a health threatening outcome and instead rely on other less informative and less accurate information when judging the likelihood of a health threatening outcome. This tendency to ignore base rates is known as base rate neglect or the base rate fallacy (Koehler, 1996). The neglect of base rate information has been attributed to individuals constructing their
judgments using heuristics, which are susceptible to error. Thus, an error in judgment occurs when the representative heuristic is relied upon and base rates are ignored.

Several investigators have challenged the claim that individuals typically fall prey to base rate neglect. Empirical evidence suggests that base rates are not completely ignored and do impact decision-making (Koehler, 1996). Many replications of Tversky’s and Kahneman’s (1974) two-part study indicate that base rate information does influence participants’ judgments. A review of eight studies, including the two studies by Tversky and Kahneman (1974), partially support this conclusion. Four of the eight studies included in the review indicated that subjects relied on base rates when making decisions (Koehler, 1996). Between-study differences may explain the result of these findings (Koehler, 1996). The remaining four studies include Tversky’s and Kahneman’s (1974) two-part study supporting base rate neglect and two other studies that included descriptive information in their decision making problems (Koehler, 1996). Reliance on base rate information may be reduced when descriptive information is present. Studies that presented descriptive (individuating) information (e.g., gender or ethnicity of an individual) may lead participants to focus on individuating information and, consequently, ignore the base rate information (Koehler, 1996).

Base rates that are calculated based on experimental data are viewed as ‘fact.’ The assumption is that the base rate conveys the actual truth, with little variation. Outside of a controlled setting, individual experience may not align to the experimental base rate (Koehler, 1996). For example, an individual may not know anyone who has the Human Papillomavirus (HPV), but the experimental base rate suggests one in two people have contracted HPV. This contradiction in experience versus experimental evidence can lead to mistrust or confusion when making decisions about HPV and the HPV vaccine.
1.10 DENOMINATOR NEGLECT AND PERCEIVED RISK OF HPV VACCINE

The news media tends to report catastrophic events without including other relevant details. This type of reporting is an extreme version of ratio bias called denominator neglect. Denominator neglect occurs when an individual solely focuses on the numerator of a ratio (Spiegelhalter & Gage, 2015). For example, a news story reports a single death arising from an adverse reaction to the HPV vaccine. The media fails to report the thousands of individuals who did not die from the vaccine nor experience adverse effects from the vaccine.

1.11 IMPACT OF ANECDOTAL AND STATISTICAL INFORMATION

When individuals search the internet for health related information, they are likely to visit more than one website (Pew Research Center, 2006). Academic websites, government websites, and websites associated with health organizations often provide base rate information detailing the likelihood of adverse outcomes associated with a range of health related behaviors (e.g., smoking, vaccination). This information is based on the outcomes of scientific studies, involving large samples. An example of a base rate for HPV is as follows: four out of five women will be infected with the Human Papillomavirus (HPV) by the age of fifty (CDC, 2012).

Anecdotal information is another important type of information that individuals may encounter during online searches for health related information. Anecdotal reports are usually found in the comments section of a website, distributed on social media, posted on blogs, or shared in consumer generated websites. Anecdotal reports regarding the benefits and dangers of vaccines such as the HPV vaccine can be compelling and commonly provide opinions about the safety of the vaccine or describe experiences with particular adverse outcomes. However, each
anecdote describes a singular experience from a subjective viewpoint. The reports have not been verified or tested, and they usually involve a ‘sample’ of one person.

**Persuasiveness of Anecdotal and Statistical Information.** Studies of the relative persuasiveness of anecdotal information and statistical information have yielded mixed findings: some studies suggest statistical information is more convincing than anecdotal information, while other studies suggest that anecdotal information is more convincing than statistical information (Hornikx, 2005). Hornikx (2005) reviewed 12 studies examining the relative persuasiveness of anecdotal and statistical information. Six of the studies suggest statistical information is more persuasive than anecdotal information. Five of the studies in Hornikx’s (2005) review reported no difference in persuasiveness between anecdotal and statistical information. Only one study in Hornikx’s (2005) review found anecdotal information to be more persuasive than statistical information. Based on these results, Hornikx (2005) determined statistical information is likely to be more persuasive than anecdotal information.

A recent meta-analysis by Freling et al. (2020) supports this conclusion. The meta-analysis included 61 studies that examined how evidence type impacted persuasion on a variety of topics (e.g., technology such as refrigerators, sexual risk behavior, global warming, etc.). The results of the meta-analysis revealed a small, significant effect that suggests individuals are more persuaded by statistical evidence than anecdotal evidence when making decisions, overall (Freling et al., 2020). However, Freling and colleagues (2020) discovered that anecdotal evidence is more persuasive than statistical evidence in three types of decisions: the decision is health related, the decision is personally relevant, or the decision may entail serious consequences. Based on the evidence published by Freling et al. (2020), the decision to be vaccinated against HPV would be a prime example of a health related, personal, decision with
serious consequences. One would anticipate anecdotal information to be more persuasive than statistical (i.e., base rate) information when making decisions about receiving the HPV vaccine. However, it is unclear if participants in each of the above studies received both types of information simultaneously.

Research on the persuasiveness of anecdotal and statistical information has primarily been conducted using between-subjects designs. Individuals only encounter one type of information (statistical or anecdotal). Yet, in non-lab settings, individuals most likely encounter both types of information when evaluating the risk of health related procedures, the risk of taking drugs, and the risk of adhering to a health expert’s recommendation (e.g., wearing a mask at the gym). Individuals visit two to five websites during online searches, increasing their chance of exposure to multiple types of health information (i.e., statistical and anecdotal; Pew Research Center, 2002). When individuals visit more than one website, they can read both statistical information outlining the risk of a health related behavior as well as anecdotal information (i.e., web postings) describing opinions of or experiences with the health related behavior posted by individuals. Therefore in a real world context, individuals seeking health information will likely encounter both statistical information and anecdotal information simultaneously.

**Contradictory Anecdotal and Statistical Information.** Parents and other individuals who seek out safety information regarding the HPV vaccine must weigh both statistical and anecdotal information found online when evaluating the risk of receiving the vaccination and deciding to have themselves or their child vaccinated. However, anecdotal reports and stories regarding the safety of the HPV vaccine often contradict safety estimates derived from empirical research and base rate data regarding a vaccine’s safety. Base rate information regarding the occurrence of adverse reactions to the HPV vaccine support claims that the HPV vaccine is safe. However,
personal anecdotal web postings typically describe the HPV vaccine as dangerous and describe severe adverse reactions. For example, on its HPV vaccine safety webpage, the CDC (2021) states, “there is no diagnosis that would suggest Gardasil [has] caused [any] deaths.” Yet, an article on healthnutnews.com details the death of a 14-year-old boy that was allegedly caused by the Gardasil vaccine. The article states, “Again, how many more kids need to die… Our hearts go out to all the parents and families who have had loved ones die or who have been seriously harmed by this vaccine, or any other” (Elizabeth, 2016).

Only a few studies have investigated how individuals weigh contradictory statistical and anecdotal information when individuals are presented with both types of information. In one such study, participants were asked to imagine a scenario in which they made need bypass heart surgery (Ubel, Jepson, & Baron, 2001). All participants were provided statistical information indicating that 75% of patients benefit from this surgery. Group 1 received the statistical information as well as three anecdotes from patients who benefited from the surgery and one anecdote from a patient who did not benefit from the surgery. Group 2 received the same statistical information as the other groups and also received one anecdote from a patient describing the benefit of the surgery and one anecdote from a patient who did not benefit from the surgery.

The number of positive and negative anecdotes received by Group 1 (i.e., three out of four anecdotes are positive) is congruent to the ratio of the statistical information provided; both information types provided suggested beneficial outcomes for 75% of participants. The ratio of anecdotal information received by Group 2 (i.e., one positive and one negative anecdote) is not proportional to the statistical information and instead suggests a beneficial outcome for 50% of participants. Participants who received anecdotal information that was congruent with the
statistical information were more likely to choose bypass surgery (44%) compared to the participants who received anecdotal information that was incongruent with the statistical information (30%; Ubel et al., 2001). Therefore, anecdotal information that was congruent with the base rate may have exaggerated the benefits of receiving bypass heart surgery.

Bestch et al. (2011) also investigated the impact of anecdotal and statistical information on health related decision making. Parents in the study were asked to imagine that they were searching for information on an illness that may affect their child. The parents read statistical information that stated there was a 20% likelihood of their child experiencing an adverse reaction to a vaccine for the illness. Group 1 only read this statistical information. Group 2 read the same statistical information as well as one anecdote describing a negative experience after receiving the vaccine and nine positive anecdotes about receiving the vaccine. Group 3 read the statistical information and also received two negative anecdotes and eight positive anecdotes describing experiences after receiving the vaccine. Group 4 read the statistical information in addition to receiving four negative anecdotes and six positive anecdotes about receiving the vaccine.

Participants in Group 2 were provided with anecdotal information conveying a lower ratio (i.e., 1 out of 10 or 10%) of negative reactions to the vaccine than provided in the statistical information (20%). Parents in Group 3 read two negative anecdotes which was consistent (i.e., 2 out of 10 or 20%) with the statistical information (20%). Parents in Group 4 who read four negative anecdotes were provided with anecdotal information conveying a bigger ratio (i.e., 4 out of 10 or 40%) of negative accounts than provided in the statistical information (20%).

All participants then rated the severity of expected side effects following administration of the vaccine using a 7-point scale with seven indicating greater severity. Participants in Group 1 reported an average perceived severity (APS) of 3.89. Participants in Group 2 reported an APS
of 4.50. Participants in Group 3 reported an APS of 4.89, and participants in Group 4 reported an APS of 5.37. As the number of negative anecdotes increased, the perceived risk of serious side effects increased, despite being provided the same base rate that stated a 20% likelihood of experiencing an adverse event after receiving the vaccine (Bestch et al., 2011). Similar to Ubel et al. (2001), the presence of anecdotal information impacted perceived risk and behavioral intentions.

Gutierrez (2015) extended the research of Bestch et al. (2011) by examining the impact of statistical and anecdotal information on the perceived risk of recreational drug use. Gutierrez (2015) studied how the type of information (i.e., anecdotal vs. statistical) impacts an individual’s perception of harm if they were to use recreational drugs, Spice (i.e., synthetic marijuana) and Kratom (i.e., a hallucinogenic/sedative). Participants were placed into 12 groups (Guiterrez, 2015). Groups 1-4 received only base rate information stating the likelihood of having an adverse reaction to Spice and to Kratom. Groups 5-8 received base rate information plus four positive anecdotes describing enjoyable experiences using the drugs and one negative anecdote describing a bad experience using the drugs. Groups 9-12 received base rate information plus four negative anecdotes describing bad experiences when using these drugs and one positive anecdote describing an enjoyable experience while using the drug (Guiterrez, 2015).

Within these groups, the base rates varied for the drugs. Groups 1, 4, 5, 8, 9, and 12 received base rate information indicating an 80% likelihood of experiencing an adverse reaction to Spice and a 50% likelihood of having an adverse reaction when using Kratom. Groups 2, 3, 6, 7, 10, and 11 received base rate information with reversed likelihoods for the drugs: a 50% likelihood of experiencing an adverse reaction when using Spice and an 80% likelihood of having an adverse reaction to the use of Kratom (Guiterrez, 2015).
After reading the information, all subjects reported the likelihood of harm that would occur if they were to use Spice and if they were to use Kratom experimentally (i.e., just once or twice; Gutierrez, 2015; Gutierrez & Cohn, 2018). The results of the study suggest that the presence of four negative anecdotes in addition to the base rate information (Groups 5-8) magnified the perceived likelihood of harm compared to individuals who received only base rate information (Groups 1-4) and compared to individuals who received four positive anecdotes (Groups 8-12). The findings were the same for both Spice and Kratom (Guiterrez, 2015; Gutierrez & Cohn, 2018). No significant differences were found between the groups who received only base rate information and the groups who received the four positive anecdotes (Guiterrez, 2015; Gutierrez & Cohn, 2018). Results from Gutierrez’s (2015) study suggest negative anecdotes have a greater impact on health decision making than positive anecdotes do. These findings are consistent with those suggested by Bestch et al.’s (2011) study.

Coffman (2015) conducted a similar study examining the relative impact of anecdotal and statistical information on health related decisions when both types of information are encountered simultaneously. Participants were assigned to one of four groups. Group I participants were presented with base rate information depicting a 95% chance of experiencing a positive outcome after using a legal but novel recreational drug. Group II participants were presented with the same base rate information as well as five brief anecdotes describing positive reactions to the drug and one additional anecdote describing a negative reaction to the drug. Group III participants were presented with the same base rate information as well as three positive anecdotes and three negative anecdotes. Group IV participants were presented with the same base rate information as well as five negative anecdotes and one positive anecdote. All subjects then estimated the perceived harmfulness of using the novel drug once or twice.
Participants also created a twitter post to ‘tell their friends about the drug’ (Coffman, 2015). Because twitter posts are limited to 140 characters, participants were indirectly forced to include information that each participant deemed most salient about the drug or its potential effects. Twitter posts were coded for their valence, either positive or negative, using a scale ranging from 1 (very negative) to 5 (very positive). Each Twitter post was coded by two coders.

Participants in Group IV, who read mostly negative personal anecdotes about the effects of the drug, wrote significantly more negatively valenced twitter posts ($M = 1.83$) compared to participants in the remaining three experimental groups. Group III participants, who read an equal number of positive and negative anecdotes, wrote significantly more negatively valenced twitter posts ($M = 2.2$) compared to subjects who read mostly positive anecdotes ($M = 3.31$) and compared to participants who only read positive base rate information ($M = 3.45$). There were no significant differences in valence of twitter posts between participants who read mostly positive anecdotes and participants who only read positive base rate information.

Participants also estimated the harmfulness of using the drug just once or twice. Perceived harm was evaluated using a scale ranging from 0% likelihood of experiencing harm when using the drug to 100% likelihood of experiencing harm when using the drug. Participants who read mostly negative anecdotes about using the drug rated the drug as significantly more harmful ($M = 70.45\%$ likelihood of harm) than did participants in all other conditions, despite all having read base rate information depicting positive drug outcomes. Participants who read an equal number of positive and negative anecdotes rated the drug as significantly more harmful ($M = 50.6\%$ likelihood of harm) than did participants who read mostly positive anecdotes and participants who only read base rate information ($M = 40.2\%$ likelihood of harm). There were no significant differences in perceived harmfulness between participants who read mostly positive
anecdotes and who only read the base rate. These findings suggest negative anecdotal evidence weighed more heavily in the assessment of risk than justified by base rate evidence. In contrast, positive anecdotal evidence had no impact on risk assessments.

Overall, the findings of Coffman (2015), Gutierrez (2015), Bestch et al. (2011), and Ubel et al. (2001) suggest anecdotal information impacts the perceived risk of a health related behavior (e.g., drug use, vaccinations, surgery) even when empirical base rate data contradicts anecdotal information. The impact of anecdotal information on health related decisions may depend upon the specific health topic or its associated behavior. For example, positive anecdotes may magnify the benefits of surgery despite the high level of risk described in statistical information. However, when deciding whether to use a drug, negative anecdotes may amplify the perceived risk of using the drug despite statistical evidence that suggests the effects are generally positive. Therefore, investigating how individuals weigh positive and negative statistical information against positive and negative anecdotal information should be assessed in a variety of health related contexts. Obtaining a better understanding of what information individuals center their decisions on may increase the efficacy of health campaigns.

1.12 THE PRESENT STUDY

The present study extends prior research by investigating the presentation of anecdotal information versus statistical information in the evaluation of potential harm caused by the Human Papillomavirus (HPV) vaccine. The HPV vaccine provides protection against many cancers while rarely causing serious adverse side effects. Despite the health benefits of the HPV vaccination and the low risk of adverse reactions, online users continue to post personal accounts of shocking adverse reactions to the HPV vaccine (e.g., chronic migraines, seizures, death). As
individuals increasingly rely on the internet for health related information, understanding how much importance individuals attribute to both anecdotal information and statistical information becomes increasingly important. The present study addresses this issue.

In the current study, all participants were presented with base rate information regarding the likelihood of experiencing adverse side effects following HPV vaccination. In addition, subsets of participants were also presented with five real web postings describing either positive or negative experiences following HPV vaccination. All participants then estimated their likelihood of experiencing adverse reactions to the vaccine if they, themselves, were vaccinated in the future. It was hypothesized that exposure to negative personal web postings would increase the perceived likelihood of harm despite simultaneous exposure to base rate information indicating that severe adverse reactions were rare. Specifically, the hypotheses listed below were proposed.

1.13 HYPOTHESES
(H1): Exposure to anecdotal information, in addition to base rate information, will impact the perceived effectiveness of the HPV vaccine despite having read statistical information stating its effectiveness;

   Specifically, it was predicted that participants who were exposed to negative anecdotes, in addition to base rate information, would report less effectiveness of the HPV vaccine as compared to participants who were only exposed to base rate information. In addition, participants who were exposed to positive anecdotes, in addition to base rate information, would report greater effectiveness of the HPV vaccine as compared to participants who were only exposed to base rate information.
(H2): Exposure to anecdotal information, in addition to base rate information, will impact the reported likelihood that a peer may experience an adverse side effect from the HPV vaccine despite having read statistical information stating a low likelihood of an adverse outcome occurring;

Specifically, it was predicted that participants who were exposed to negative anecdotes, in addition to base rate information, would report a greater likelihood of a peer experiencing an adverse outcome after receiving the HPV vaccine as compared to participants who were only exposed to base rate information. In addition, participants who were exposed to positive anecdotes, in addition to base rate information, would report a lesser likelihood of a peer experiencing an adverse outcome after receiving the HPV vaccine as compared to participants who were only exposed to base rate information.

(H3): Exposure to anecdotal information, in addition to base rate information, will impact the reported likelihood of personally having an adverse side effect from the HPV vaccine despite having read statistical information stating a low likelihood of an adverse outcome occurring;

Specifically, participants exposed to negative anecdotes, in addition to base rate information, would report a greater likelihood of personally experiencing an adverse outcome after receiving the HPV vaccine as compared to participants who were only exposed to base rate information. In addition, participants exposed to positive anecdotes, in addition to base rate information, would report a lesser likelihood of personally
experiencing an adverse outcome after receiving the HPV vaccine as compared to participants who were only exposed to base rate information.

(H4): Exposure to anecdotal information, in addition to base rate information, will impact the reported likelihood of personally receiving the HPV vaccine despite having read statistical information stating the safety and benefits of receiving the vaccine;

   Specifically, participants exposed to negative anecdotes, in addition to base rate information, would report a lesser likelihood of personally receiving the HPV vaccine as compared to participants who were only exposed to base rate information. Additionally, participants who were exposed to positive anecdotes, in addition to base rate information, would report a greater likelihood of personally receiving the HPV vaccine as compared to participants who were only exposed to base rate information.
Chapter 2: Methods

2.1 PARTICIPANTS

Participants between the ages of 18 and 26 were recruited from the University of Texas at El Paso (UTEP) via Sona Systems. Sona Systems is an online recruitment website that provides students with opportunities to enroll in various studies conducted on campus. A description of the study was posted online, and undergraduate students selected a day and time to participate in the study. If students were participating in the research study as part of a course requirement, they were awarded a one hour research credit hour on Sona Systems for each part of the study. Every participant who completed both parts of the study were entered into a raffle. Eight names were randomly selected, and the individuals were awarded one $100 VISA gift card.

One hundred and eighty-eight undergraduate students between the ages of 18-26 (63% female; \( M_{age} = 20, SD = 1.93 \)) were included in this study. The sample primarily identified as Hispanic/Latino (87.7%). The remainder of participants identified as the following ethnicities: White (2.1%), Black (5.3%), Asian (1.6%), and Other (3.2%). The individuals who identified as ‘other’ reported a mixed racial identity including Black/White and Mexican/Persian.

A power analysis was conducted by using an estimated population effect size derived from three studies investigating the relative impact of anecdotal and base rate information on health related decisions. One sample effect size \( (d = 0.57) \) was calculated for the study by Betsch et al. (2007). Two sample effect sizes \( (d_1 = 0.33; d_2 = 0.07) \) were calculated for the study by Ubel et al. (2001). One additional sample effect size \( (d = 1.24) \) was calculated from data presented by Coffman (2015). The weighted average of these effect sizes was \( d = 0.34 \). The latter estimate is based on data derived from 1,548 participants and is considered a small-to-medium
effect. G*Power version 3.1.9.7 was used to determine the sample size required to detect a small-to-medium size effect \((f = 0.17)\) at 80\% power for each of the planned ANOVAs, described in the Approach to Analysis section. The required sample size was approximately 229 participants, with 57 participants assigned to each of four groups (Faul et al., 2009).

2.2 MEASURES

Demographic Survey. A demographic survey was administered to assess each participant’s age, gender, ethnicity, sexual orientation, marital status, academic level, and academic major at UTEP (Appendix B).

Language Proficiency. Lemmon’s and Goggin’s (1989) 8-item bilingualism measure was used to assess language proficiency in both English and Spanish (Appendix C). Participants evaluated their language ability in Spanish and English in the following four areas: (1) reading; (2) writing; (3) speaking; and (4) listening (Lemmon & Goggin, 1989). Participants rated their language ability on a 5-point scale ranging from (1) very poor or no ability to (5) excellent ability. Sample item: “Rate your ability to read in Spanish.” Ratings of less than ‘3’ for each item indicated that participants had below average language ability. Participants who rated their English ability as below average on reading and writing in English were excluded from analyses \((N = 9)\).

HPV Knowledge. Participants completed a 7-item measure of their knowledge about HPV and the HPV vaccine (Appendix D, Appendix U, & Appendix FF). The 7-item measure is comprised of four yes or no questions and three true or false questions detailing facts about HPV and the HPV vaccine. Items were selected and adapted from the Caregiver Survey (2007) administered as part of the Carolina HPV Immunization Measurement and Evaluation (CHIME)
Project (Reiter, Brewer, Gottlieb, McRee, & Smith, 2009; McRee et al., 2010). Sample item: “Do you think a Human Papillomavirus (HPV) infection can go away without treatment?” Participants chose yes, no, or not sure in response to the question. No estimates of reliability or validity were provided for these seven items. Responses were collected during the pre-test (Appendix D), post-test (Appendix U), and at time 2 (Appendix FF).

**HPV Vaccine Intentions.** Participants completed a 1-item measure assessing their behavioral intentions to be vaccinated against HPV, if the vaccine were free (Appendix E & Appendix N). The item was adapted from the Caregiver Survey (2007) administered as part of the Carolina HPV Immunization Measurement and Evaluation (CHIME) Project (Reiter et al., 2009; McRee et al., 2010). Sample item: “If the vaccine were completely free, how likely would you be to get the HPV vaccine in the next year if you were receiving it for the first time?” Likelihood ratings were completed using a 101-point scale ranging from 0% likely to 100% likely. Participants completed these items during the pre-test (Appendix E) and post-test (Appendix N).

**Perceived Likelihood of Personal Risk.** Participants completed a 2-item measure created to assess the perceived likelihood of personal risk associated with the HPV vaccine (Appendix F, Appendix O, & Appendix AA). Participants rated the likelihood of having a bad reaction and the likelihood of having a normal reaction if they were administered the HPV vaccine. The order of the two items was counterbalanced. That is, half of the participants were presented with the item assessing the likelihood of having a good reaction first while the remaining participants were presented with the item assessing the likelihood of having a bad reaction first. Sample item: “Imagine you are receiving the Human Papillomavirus (HPV) vaccine for the first time… In your opinion, how likely are you to have a bad reaction to the Human Papillomavirus (HPV)
vaccine if you received it during the next month?” Likelihood ratings were completed using a 101-point scale ranging from 0% likely to 100% likely. Participants completed these items during the pre-test (Appendix F), post-test (Appendix O), and time 2 administration of the protocol (Appendix AA).

*Perceived Likelihood of HPV and HPV Related Cancer.* Two items were administered to assess the perceived likelihood of being diagnosed with HPV in the future and being diagnosed with cancer associated with HPV in the future (Appendix G, Appendix Q, & Appendix CC). The order of the two items was counterbalanced. Items were adapted from the Caregiver Survey (2007) administered as part of the Carolina HPV Immunization Measurement and Evaluation (CHIME) Project (Reiter et al., 2009; McRee et al., 2010). Sample item: “If you decide not to get vaccinated, what is your likelihood of getting HPV in the future?” Likelihood ratings were completed using a 101-point scale ranging from 0% likely to 100% likely. No estimates of reliability or validity were previously reported for these items. Participants completed the items during pre-test (Appendix G), post-test (Appendix Q), and at time 2 (Appendix CC).

*Perceived Seriousness of HPV Related Cancer.* One question was provided to assess the perceived seriousness of being diagnosed with HPV related cancer (Appendix H, Appendix Q, & Appendix CC). The item was adapted from the Caregiver Survey (2007) administered as part of the Carolina HPV Immunization Measurement and Evaluation (CHIME) Project (Reiter et al., 2009; McRee et al., 2010). Sample item: “In your opinion, how serious would it be if you got HPV related cancer?” The seriousness was rated on a 7-point scale ranging from (1) not serious to (7) extremely serious. No estimates of reliability or validity were previously reported for this item. Participants completed the item during pre-test (Appendix H), post-test (Appendix Q), and at time 2 (Appendix CC).
Perceived Effectiveness of the HPV Vaccine. Participants completed two items assessing the perceived effectiveness of the HPV vaccine in preventing genital warts and in preventing cervical cancer (Appendix I, Appendix S, & Appendix EE; Reiter et al., 2009; McRee et al., 2010). The order of the two items was counterbalanced. Sample item: “In your opinion, do you think the HPV vaccine is effective in preventing genital warts?” The responses for the two items were assessed on a 7-point scale from (1) completely ineffective to (7) extremely effective. Previous research has revealed adequate internal reliability for this measure (α = 0.69; McRee et al., 2010). Responses were collected during pre-test (Appendix I), post-test (Appendix S), and at time 2 (Appendix EE).

Twitter Post (Gist). All participants were asked to create a twitter post after reading the information about the HPV vaccine (Appendix M). The instructions read as follows: “You have just read information about the vaccine for the Human Papillomavirus (HPV). Now, create a tweet to your friends about the vaccine. Use the space below to create the tweet.” The instructions for the twitter post were intentionally vague. Twitter posts are limited to 140 characters in length. By leaving the directions vague and limiting the response length of the twitter post, participants were forced to enter the key information they have extracted from the HPV vaccine information they were presented.

This twitter post task was used in a previous study conducted by the author (C.C.) and no problems with data collection or assessment occurred (Coffman, 2015). Nevertheless, this measure was pilot tested in the current study to ensure that participants understood the task and instructions. During pilot testing, participants described their understanding of the character limit of twitter posts, their ability to stay within this character limit, and their comments and concerns
with creating a twitter post (Appendix M). For example, one participant commented, “Yes they would, most of my friends, and some organizations have twitter accounts and use them daily.”

**Perceived Likelihood of Peer Risk.** Participants completed a 3-item measure assessing their perceived likelihood of their peer experiencing adverse outcomes after receiving the HPV vaccine (Appendix R & Appendix DD). The items were adapted from the Caregiver Survey (2007) administered as part of the Carolina HPV Immunization Measurement and Evaluation (CHIME) Project (Reiter et al., 2009; McRee et al., 2010). One item assessed the perceived likelihood that the vaccine would cause minor problems such as fever. One item assessed the perceived likelihood that the vaccine would cause serious negative side effects such as seizures. One item assessed the perceived likelihood that the vaccine would cause lasting health problems such as infertility. Sample item: “In your opinion, what is the likelihood that a male or female who is your age would experience minor problems, like fever, discomfort, or pain if they were administered the vaccine for the Human Papillomavirus (HPV)?” Likelihood ratings were completed using a 101-point scale ranging from 0% likely to 100% likely. Participants completed the items after exposure to the experimental manipulation (Appendix R); the items were also completed at time 2 (Appendix DD).

**Health History.** Participants completed a 16-item survey regarding their own health history (Appendix U). The survey was created to assess participants’ previous vaccinations, diagnosis and testing of sexually transmitted infections (STIs), and where a participant would seek information regarding HPV and the HPV vaccine.

**Exposure to Vaccinated Individuals.** Nine questions were created to assess if participants know anyone who has received the HPV vaccination and/or have experienced any adverse reactions to the vaccine (Appendix V). This information was gathered to provide a more detailed
description of the sample and identify participants whose prior experience could bias their responses. Participants indicated if a friend, friend of friend, family member, spouse/significant other, their child, friend of their child, or other person has received the HPV vaccine or has experienced adverse reactions to the vaccine.

*Prior Knowledge of the Current Study.* Four questions were created to assess if participants have had exposure to the study before participation (Appendix W). Participants reported whether someone they know had completed the study ($n = 15$) and if they had discussed the study with someone prior to participation ($n = 2$). Participants also indicated whether they have ever heard of a twitter post (98% indicated yes) and have ever created their own twitter post (78% indicated yes) prior to the study.

*Self-Generated ID Number.* Participants were instructed to generate their own unique ID number to help ensure confidentiality and increase the validity of responses. These self-generated ID numbers were used to link participants’ responses from the first session and second session (Appendix X & Appendix HH). The 7-item questionnaire assessed participants’ favorite color, favorite subject in high school, favorite type of television show, favorite type of car or truck, favorite type of food, favorite type of music, and the month the participant was born (Llanes, Amastae, & Cohn, 2014). Each option was assigned a number. For example, participants chose their favorite color from the following options: (1) blue, (2) green, (3) black, etc. Each question offers eight response options except for the final question assessing the month in which the participant was born, which provides 12 options. Responses for the seven items were used to create a unique 7-digit identification code for each participant. Participants completed the task during the first session and again during the second session. Responses between the two surveys will be linked by this code.
Recall Task. Participants completed a recall task three days after the first survey session (Appendix Z). The instructions for the recall task were as follows: “Three days ago, you read a fact sheet and 6 web postings regarding the Human Papillomavirus (HPV) and the HPV vaccine. Please type everything you remember reading from the fact sheet and web postings in the space below.” Participants typed their answers in a free response text box.

Time 2 Information Seeking. Four questions were administered to assess HPV-related information seeking that individuals may have completed between session one and session two of the study (Appendix GG). Participants reported if they talked with anyone about HPV or the HPV vaccine before the second session of the study. Participants also reported if they read any information about HPV or the HPV vaccine online or from other sources.

2.3 SELECTION OF HEALTH INFORMATION

Base Rate Associated with the HPV Vaccine. Participants in Groups 1, II, and III read the same base rate information regarding adverse reactions to the HPV vaccine (Appendix J). The base rate for experiencing adverse reactions was determined using facts reported by the Centers for Disease Control and Prevention (CDC) and existing literature on the HPV vaccine. The absolute risk of having a minor, common reaction (e.g., headache) and a serious, adverse reaction (e.g., stroke) to the HPV vaccine were presented as base rates. The base rate for experiencing minor side effects following HPV vaccination was 12% (Chessona et al., 2012). The base rate for experiencing a serious adverse reaction to the HPV vaccine was less than two-hundredths of one percent (0.02%) (Chessona et al., 2012).

The brief narrative describing the base rate for experiencing adverse reactions to the HPV vaccine contained 221 words. This brief narrative was written at an 8\textsuperscript{th} grade reading level (see Table 2). All additional information regarding the HPV vaccine was also written at or below an
8th grade reading comprehension level. The ease of reading software used to compute these scores also identified a list of words that were considered ‘hard’ (My Byline Media, n.d.). These words were replaced with more common terms when possible. During pilot testing, participants were also asked to identify words they found difficult to understand. When possible, the latter words were also replaced words that were more easily understood.

Anecdotes Regarding the HPV Vaccine. Approximately 30 positive and negative anecdotes (personal web postings) were located during an online search for information about the HPV vaccine. Search terms included “HPV vaccine safety,” “HPV vaccine dangerous,” and “Benefits of HPV vaccine.” Each search term was entered into the following search engines: Google, Yahoo, and Bing. Anecdotes were selected for use in the current study based on three criteria: (1) appropriateness of content about the HPV vaccine (i.e., directly related to the HPV vaccine’s effects); (2) length of the anecdote (i.e., the web posting could not be more than one page in length); and (3) affect (i.e., each web posting had to convey a like or dislike for HPV vaccination). Ten anecdotes were selected for use in the study. Five anecdotes depicted positive experiences with the HPV vaccine, and five anecdotes depicted negative experiences with the HPV vaccine. When necessary, the anecdotes were edited to maintain their positive focus or negative focus. For example, the following statement was removed from a positively focused anecdote: “I had heard the vaccine had side effects.”

The anecdotes were 46 to 184 words in length (M = 134.2; Appendix L). The anecdotes were assessed for their ease of reading using free online software (My Byline Media, n.d.). Reading level scores were determined for anecdotes presented to each group of participants (i.e., Groups II, III, and IV). The following scores were computed for each set of narratives and anecdotes presented to participants: the Flesch Reading Ease formula (0-100 scale with higher
scores indicating easier reading); the Flesch-Kincaid Grade Level, which estimates the grade level of an average student that can read the text; the Fog Scale, which compares syllables and sentence lengths (higher scores indicating increased difficulty); the SMOG Index, which estimates school grade level; the Colemn-Liau Index, which uses characters per word and sentence length to compute grade level; the Automated Readability Index, which determines the grade level needed to understand text; and Linsear Write Formula, which uses sentence length and number of words with three or more syllables to estimate grade level readability. A readability consensus score was computed for material presented to participants in each of the four groups. The latter score estimated overall grade level, reading level, and reader age. Table 2 provides these scores.

Web postings that were presented to participants in Group II were estimated to be written at the sixth grade reading level. Web postings that were presented to participants in Group III were estimated to be written at the seventh grade reading level. Web postings that were presented to participants in Group IV were estimated to be written at the fifth grade reading level. The ease of reading software also provided a list of words that were considered ‘hard’. These words were replaced with more common terms when possible. During pilot testing, participants were asked to indicate any words they found difficult to understand, and the words were replaced when possible.

_EnglightenValence of Information._ Each set of information was analyzed using the Linguistic Inquiry Word Count to identify how positively and how negatively valenced the information is altogether (LIWC; Pennebaker, 2001). That is, the base rate (given to all groups), set of five positive and one negative anecdotes (given to Group II), set of five negative and one positive anecdotes (given to Group III), and set of five positive anecdotes (given to Group IV)
were processed separately. The proportion of positively valenced words and negatively valenced words in each set of information is consistent with the presence of more positive anecdotes or more negative anecdotes in their respective groups (see Table 3).

2.4 PROCEDURE

All participants completed the study online via Qualtrics. Participants signed-up for a designated time to complete the study in our laboratory under the supervision of a research assistant. Participants read and signed the Institutional Review Board approved consent form (Appendix A). The participants then completed the demographic questionnaire (Appendix B) and the language proficiency questionnaire (Appendix C). Next, participants completed the pre-test questions regarding their HPV knowledge (Appendix D), perceived vaccine intentions (Appendix E), perceived likelihood of personal risk (Appendix F), perceived likelihood of contracting HPV and HPV related cancer (Appendix G), perceived seriousness of developing HPV related cancer (Appendix H), and perceived effectiveness of the HPV vaccine (Appendix I). Participants were randomly assigned to one of the four experimental groups (Table 1) where they were provided with instructions (Appendix J).

Participants in Group I were only provided with base rate information about HPV vaccine side effects (Appendix K). Group I participants then completed the twitter post task and remainder of the protocol. Participants in Group II, Group III, and Group IV read their assigned web postings (see Table 1 and Appendix L), in addition to reading the identical base rate information provided to participants in Group I (Appendix K). Participants then completed the twitter post task (Appendix M). Next, participants completed assessments of vaccine intentions (Appendix N), perceived likelihood of personal risk (Appendix O), perceived likelihood of contracting HPV and HPV related cancer (Appendix P), and perceived seriousness of developing
HPV related cancer (Appendix Q). Participants then completed the perceived likelihood of peer risk questionnaire (Appendix R). Perceived effectiveness of the HPV vaccine (Appendix S) and HPV Knowledge (Appendix T) were subsequently administered to the participants again after exposure to their assigned information (i.e., base rate and/or web postings). Participants then completed a health history survey (Appendix U), completed questions assessing their previous exposure to vaccinated individuals (Appendix V), and completed questions assessing their prior knowledge of the study (Appendix W). Finally, participants created a self-generated ID number (Appendix X). Upon completion of the experimental protocol, participants were presented a debriefing sheet that also described their next steps and requirements for session 2 (Appendix Y).

Completion of the first session of the study took an average of 26 minutes. Participants received one hour of research credit for their respective courses. Participants were asked to return in three days to complete the second part of the study. An appointment was made with a research assistant before leaving session one.

Three days after completing the first session, participants attended the second session of the study. Students completed the second session via Qualtrics in our laboratory under the supervision of a research assistant. The participants completed a recall task assessing their memory of the information presented in the first session of the study (Appendix Z). The participants then completed assessments of their perceived likelihood of personal risk in having an adverse reaction to the HPV vaccine (Appendix AA), perceived likelihood of contracting HPV and HPV related cancer (Appendix BB), perceived seriousness of developing HPV related cancer (Appendix CC), perceived likelihood of risk of a peer having an adverse reaction to the HPV vaccine (Appendix DD), perceived effectiveness of the HPV vaccine (Appendix EE), and HPV knowledge (Appendix FF). Next, participants reported if they sought information on HPV
or the HPV vaccine between session 1 and session 2 of the study (Appendix GG). The participants then completed the questionnaire of their various preferences/likes (e.g., color) to verify their identification number (Appendix HH). Participants were provided with a second debriefing sheet (Appendix II). Participants entered their first name, email, and phone number into a form for the raffle (Appendix JJ). Completion of the second session took participants approximately 20 minutes. Participants who completed the second session of the study were entered into a raffle. Eight names were randomly selected, and the individuals were awarded one $100 VISA gift card. Although individuals participated in two study sessions, only the data collected from the first study session will be discussed in the remaining sections of this paper.

2.5 DESIGN

The experiment used a between-subjects design. The information regarding the HPV vaccine read by the participant varied across four groups (Table 1). Participants were randomly assigned to one of the four groups using a randomization generator via Qualtrics. Participants assigned to Group I only read base rate information regarding HPV and the HPV vaccine’s side effects. Participants assigned to Group II read the same base rate information as well as five web postings (anecdotes) describing positive HPV vaccine side effects and one negative web posting (anecdote) describing HPV vaccine side effects. Participants assigned to Group III read the same base rate information as well as five negative web postings and one positive web posting about the HPV vaccine and its side effects. Participants assigned to Group IV read the same base rate information as well as five positive web postings about the HPV vaccine.

2.6 APPROACH TO ANALYSIS

Basic descriptive statistics were performed to review characteristics of the sample (see Table 4). Chi-square analyses were conducted on the following variables: gender, HPV personal
vaccination status, personal side effects from HPV vaccine, child’s HPV vaccination status, child’s moderate side effects from HPV vaccine, and child’s severe side effects from HPV vaccine (see Table 5).

2.7 APPROACH TO PRIMARY ANALYSES

Four between-subjects ANOVAs were conducted in order to identify the presence of group differences (base rate only, base rate plus mostly positive anecdotes, base rate plus mostly negative anecdotes, base rate plus only positive anecdotes) on the following dependent variables: (1) perceived likelihood of risk if personally receiving the HPV vaccine, (2) perceived likelihood of risk if peer received the HPV vaccine, (3) HPV vaccination intentions, and (4) perceived effectiveness of the HPV vaccine. The ANOVAs that indicated statistically significant group differences (i.e., yielded p-values less than 0.05) were followed by sixteen two-tailed post-hoc tests (i.e., Tukey’s HSD) to identify the specific group differences.

2.8 APPROACH TO TESTING ASSUMPTIONS IN PRIMARY ANALYSES

Potential violations in assumptions of ANOVA were investigated. Chi-square analyses revealed males and females were not evenly distributed across condition, $\chi^2(3, N = 188) = 9.41$, $p = 0.024$. However, participants who had received the HPV vaccine, had experienced any side effects from the HPV vaccine, or have children who received the HPV vaccine were evenly distributed across conditions ($p$’s > 0.05; see Table 5).

Kolmogorov-Smirnov (K-S) tests were conducted to test for normality in the dependent variables. K-S tests reached statistical significance for all dependent measures, indicating violations of normality. Quantile-Quantile (Q-Q) plots were also examined for these violations. Visually, the violations did not appear as obviously.
Levene’s tests were conducted to indicate whether violations in the equality of variances occurred between conditions for the dependent variables. Violations in the homogeneity of variances was found for three of the dependent variables: 1) perceived vaccine intentions \(F(3, 174) = 5.14, p = 0.002\), 2) likelihood of personal risk \(F(3, 165) = 2.693, p = 0.048\), and 3) perceived likelihood of peer risk: a) for males having a severe reaction \(F(3, 64) = 3.074, p = 0.034\), b) perceived likelihood of peer risk for males having long-lasting problems \(F(3, 63) = 4.353, p = 0.008\), and c) perceived likelihood of peer risk for females having long-lasting problems \(F(3, 109) = 3.961, p = 0.01\).

2.9 APPROACH TO SECONDARY ANALYSES

A Bonferroni correction was used in order to reduce the chance of Type I family-wise error for the following dependent variables in which no explicit hypotheses were made: (1) perceived likelihood of obtaining HPV, (2) the perceived likelihood of obtaining HPV related cancer, (3) perceived severity of obtaining HPV related cancer, (4) HPV knowledge test scores. A total of four comparisons were made; therefore, the Bonferroni correction was set with the \(p\)-value at 0.0125.
Chapter 3: Results

3.1 PARTICIPANT CHARACTERISTICS

The majority of participants were Freshman (36.2%), although every academic level was represented in the sample. Most of the sample (63.3%) reported English as their strongest language, reported being single/never married (71.8%), and reported being heterosexual (88.3%). Notably, most of the sample (85.1%) had heard of the Human Papillomavirus and of the Human Papillomavirus (HPV) vaccine (73.9%). Thirty-seven percent of the sample reported having received the HPV vaccine. All participant characteristics can be found in Table 2.

More than half of the participants reported being vaccinated for the following: Chickenpox, Diphtheria/Tetanus/Pertussis, Flu, Hepatitis A, Hepatitis B, Measles/Mumps/Rubella, and Meningitis. A small percentage (2.7%) of individuals reported being vaccinated for a fake illness that was included as an attention check and as an indication of vaccination name recognition. Only 1.6% of the sample \( (n = 3) \) reported ever being diagnosed with HPV. This percentage is low for a sample of sexually active college students. However, individuals within the sample may have HPV, but they have not been diagnosed by a medical professional. For all other sexually transmitted diseases/infections, less than five percent of the participants reported ever being diagnosed. The percentage of the sample who had talked to a doctor or health care provider in the past year about receiving the vaccine was low (13.8%). A healthcare provider had recommended the HPV vaccine to 28.7% of the participants.

3.2 PRIMARY ANALYSES: EFFECT OF EXPERIMENTAL MANIPULATION

Four between-subjects ANOVAs were conducted in order identify the presence of group differences (base rate only, base rate plus mostly positive anecdotes, base rate plus mostly
negative anecdotes, base rate plus only positive anecdotes) on the following dependent variables: (1) perceived likelihood of risk if personally receiving the HPV vaccine, (2) perceived likelihood of risk if peer received the HPV vaccine, (3) HPV vaccination intentions, and (4) perceived effectiveness of the HPV vaccine. ANOVAs indicated significant differences between experimental conditions for only one primary dependent variable, vaccination intentions, $F(3, 174) = 6.13, p = 0.001$ (see Table 7 and Table 8).

Follow-up analyses (i.e., t-tests using Tukey’s HSD) were performed to examine the statistical differences found in the ANOVA (see Table 7 and 8). It was predicted that participants who read anecdotal information that contradicted base rate information regarding HPV vaccine safety will amplify the perceived harmfulness of receiving the HPV vaccine. The results of this study support this prediction. Individuals who read base rate safety information plus five negative anecdotes, and one positive anecdote, reported being significantly less likely to get the HPV vaccine in the next year, if it were completely free, ($M = 64\%$ likely) compared to: (1) those who read only the base rate information ($M = 81\%$), (2) individuals who read the base rate, five positive anecdotes, and one negative anecdote ($M = 82\%$), (3) individuals who read the base rate and just five positive anecdotes ($M = 87\%$; see Table 8).

3.3 SECONDARY ANALYSES

A Bonferroni correction was used on a series of post hoc ANOVAs in order to reduce the chance of Type I family-wise error for the following dependent variables in which no explicit hypotheses were made: (1) perceived likelihood of obtaining HPV, (2) the perceived likelihood of obtaining HPV related cancer, (3) perceived severity of obtaining HPV related cancer, (4) HPV knowledge test scores. A total of four comparisons were made; therefore, the Bonferroni correction was set with the $p$-value at 0.0125.
The perceived likelihood of developing HPV related cancers if the individual remained unvaccinated was significantly influenced by experimental condition \((F = 8.41, p > 0.01)\). Specifically, a Tukey’s post hoc analysis revealed that participants who were only provided with base rate information about HPV related cancers perceived a significantly less likelihood of developing HPV related cancers compared to participants who were exposed to base rate information plus five positive anecdotal reports; there was no statistical difference between those who received only the base rate information and those who received five negative anecdotal reports (Means = 28.77, 43.74, 33.09, 52.31, respectively; Table 9). However, individuals who received five negative anecdotal reports in addition to base rate information perceived a significantly less likelihood of developing HPV related cancers compared to participants who were exposed to base rate information and five positive anecdotal reports (Table 9). These findings suggest two types of influence: (1) the inclusion of positive anecdotes with the base rate information maximized the risk perception of developing HPV related cancers, and (2) exposure to negative anecdotes minimized the risk associated with developing HPV related cancer.
Chapter 4: Discussion

The present study contributes to an ongoing investigation into why some individuals may or may not choose to receive a vaccination. Despite the risks associated with an illness, certain factors deter individuals from taking preventative measure (National Cancer Institute, 2021). In the case of the present study, the type of information that individuals receive may impact their decision to receive the Human Papillomavirus (HPV) vaccine.

The use of the internet has made access to information easy and affordable. When we once had to commute to a library or buy a paper to get the latest information, we can easily receive answers to our questions from an assortment of sources. This convenience has contributed positively in many ways. However, how does one make an informed decision when receiving conflicting information from various sources?

4.1 IMPACT OF ANECDOTAL VERSUS STATISTICAL EVIDENCE

The present study supports prior research regarding the relative impact of anecdotal and statistical information on health related decision making. The presence of anecdotes, in addition to base rate information, does appear to impact an individual’s perceived risk and health related intentions (Ubel et al., 2001; Bestch et al., 2011; Gutierrez, 2015; Coffman, 2015). Individuals who received five negative anecdotes along with base rate information regarding HPV vaccine safety reported being less likely to initiate HPV vaccination. Notably, the perceived harmfulness of the HPV vaccine was not significantly different between experimental groups. Individuals who read mostly negative anecdotes did not perceive the vaccine to be any more harmful than individuals who read only positive anecdotes. However, the participants who read mostly negative anecdotes were still unwilling to be vaccinated against HPV. One explanation for these contradictory findings is emotionality. Individuals may weigh base rate information in somewhat
equal proportions as the anecdotal information. Therefore, they are logically deducing that the vaccine is not harmful. Fear, however, is not always logical. The emotional value of the negative anecdotes may be invoking enough fear that they are unwilling to commit to being vaccinated.

Secondary analyses indicated that participants who were only provided with base rate information perceived less likelihoods of developing HPV related cancers compared to participants who were exposed to base rate information with only positive anecdotal reports. In addition, individuals who received five negative anecdotal reports perceived less likelihoods of developing HPV related cancers compared to participants who were exposed to base rate information and five positive anecdotal reports. These findings suggest that anecdotes, positive or negative, influenced the perceived risk associated with developing HPV related cancer.

Another explanation for why the perceived risk of developing HPV related cancer varied across conditions lies in the type of content that was presented in positive and negative anecdotes. Individuals who read five positive anecdotes may have become more aware of the link between HPV and cancer because the positive anecdotes emphasized the prevention of cancer and other symptoms of HPV. In contrast, the negative anecdotes emphasize the consequences or side effects that may occur after given the vaccine. This explanation is consistent with the finding that individuals who read more negative anecdotes had a lower perception of obtaining HPV related cancer than those who read only positive anecdotes.

In addition, individuals who read mostly positive anecdotes did not differ statistically from those who read only positive anecdotes in their perceived likelihood of developing HPV related cancer. Although the two groups that each received five positive anecdotes did not differ statistically, the group that received only five positive anecdotes did differ statistically from the participants who received mostly negative anecdotes. This may imply that the one negative
anecdote in the *mostly* positive anecdotal group made a difference in this evaluation of risk. That is, the addition of one negative anecdote was just enough to lower the perceived likelihood of developing HPV related cancer, so a difference was not detected when compared to the mostly negative anecdotal group. Conversely, the addition of the one negative anecdote to the *mostly* positive anecdotal group was not enough to create statistical differences between the *mostly* positive and *only* positive anecdotal groups. These findings suggest the number of positive and negative anecdotes received do influence risk perception.

Presumably the type (i.e., source) of information influenced an individual’s decision making, the extent of this influence depends on the type of illness or health behavior. Recreational drug use is targeted using a prevention approach, in which the risks of engaging in the behavior are highlighted. Drug use may be greatly impacted by anecdotal reports of a “bad trip” because the side effects of engaging in the risk behavior are immediate. In comparison, vaccination is proactive and impacts long term outcomes. Although the HPV vaccine may prevent cervical cancer, can anecdotes truly describe someone who doesn’t have HPV related cancer? A person without cancer is just a normal person. The development of cancer and what that looks like for each person is an abstract future outcome. There are, however, many anecdotes that describe pain or sickness after receiving the vaccine. It is a different battle for health care providers and researchers, and the impact on decision making will vary.

4.2 CONSIDERATIONS OF BIAS

Close to one-third of the sample in the present study reported being vaccinated against HPV. The inclusion of vaccinated individuals in the study may have introduced an unintentional bias: vaccinated and non-vaccinated individuals may respond differently to the experimental manipulations. Five of the vaccinated individuals reported experiencing a side effect after
receiving the HPV vaccine. The reported side effects included dizziness, fatigue, injection site pain/soreness, and headache. None of the participants reported experiencing any severe side effects from the vaccine. Thus, their own prior experience with the vaccine may have minimized the perceived likelihood of harm for themselves and their peers. From this perspective, the current findings may underestimate the impact of anecdotal evidence on vaccine related perceptions. Alternatively, five vaccinated individuals reported experiencing mild-to-moderate reactions to the vaccine, and this prior history may also have influenced the perceived likelihood of experiencing adverse vaccine events. If so, then the current findings may overestimate the impact of anecdotal evidence on vaccine related perceptions. In short, prior vaccine status could be a moderator variable influencing the way individuals respond to the experimental manipulations. The current study lacked sufficient statistical power to investigate the potential moderating effects of vaccine status. Future studies would benefit from investigating this issue. At the very least, future studies could eliminate the present confound by only recruiting unvaccinated individuals.

Notably, 29% of sample participants were unsure if they had received the HPV vaccine. The relatively large number of young adults who were unaware of their own vaccine status underscores the potential importance of emerging adulthood on health-related decisions and health-related autonomy. Emerging adulthood is characterized by an increasing awareness of one’s own responsibilities and autonomy in a wide range of domains, including personal health. The current finding suggests that health-related recommendations and interventions that target young adults may need to recognize that young adults are still in the process of accepting responsibility for their own health-related knowledge and decisions. Individuals within this age range may be new to making independent decisions about their health. Prior to adulthood, a
guardian made vaccination decisions for them. It is typical for college students to be at the point where they are learning how to take care of their health and how to answer questions regarding their health. Thus, emerging adulthood may represent a unique point in the adult life cycle with respect to health-related interventions. This recognition provides multiple avenues for future research.

Gender could also influence the way individuals weigh the relative importance of anecdotal and statistical information. Men and women can suffer differing results from an HPV diagnosis. Cervical cancer is testable in women while there is no way to detect HPV in men, unless they show symptoms (e.g., genital warts; CDC, 2021). In addition, the women shoulder the responsibility of bearing children which may bring more weight to their decision making regarding reproductive health.

4.3 STRENGTHS

The present study allowed researchers to investigate an issue of growing concern, vaccination rates. The Covid-19 pandemic has generated many discussions on why individuals should or should not be vaccinated. Although the scientific community is making headway on how to best treat Covid-19 and HPV, the importance of vaccination will remain.

The present study used real anecdotal evidence and statistical evidence retrieved from online websites. Many individuals have likely found the same type of information during their own web searches for health-related information. In addition, college aged students were targeted for this study. This group of young adults reflects the age range at highest risk for contracting HPV (CDC, 2021). In addition, college aged individuals are able to legally make their own medical decisions. They have the ability to seek more information on their own, without the influence of their parents.
4.4 LIMITATIONS

The current study assessed the behavioral intentions of participants but failed to provide participants with the opportunity to schedule appointments for HPV vaccination, which would have provided a more direct assessment of vaccine-related behavior. More generally, participants were asked to respond to hypothetical situations. When given an actual opportunity to receive the vaccine, participants may respond differently than the way they responded to hypothetical scenarios. In addition, when dealing with a sensitive topic such as sexually transmitted infections, participants may not respond to questions honestly. We cannot be sure that individuals shared accurate information regarding their sexual and medical history.

The present study was underpowered. An initial power analysis suggested that 229 participants were needed to detect a small-to-medium effect, assuming one existed in the population. However, data cleaning reduced the final sample size to only 188 participants, thereby minimizing statistical power and the likelihood of detecting a significant effect in the sample if the effect existed in the population. Statistical analyses failed to support three of the four hypotheses in the current study. It is conceivable that a larger sample size would have revealed the significant relations that I hypothesized existed. However, in the current study, it is not known if the lack of support for three of the four hypotheses was due to low statistical power or, alternatively, a genuine absence of the proposed relationships. Future studies would benefit from oversampling so that the loss of subjects due to data cleaning does not reduce statistical power below the conventional level of 80%.

4.5 FUTURE DIRECTIONS

Future studies should investigate how specific populations weigh the relative importance of anecdotal and base rate information on health-related decisions. For example, studies could
target women of college age or male parents with daughters who haven’t been vaccinated. The target population should consist solely of individuals who have not been vaccinated or have children who have not been vaccinated yet. In addition, researchers should begin to study how different types of health related decisions are impacted by anecdotal and base rate information. Future health campaigns should consider using anecdotal information to aid in healthy decision making. With time, health researchers may be able to counteract the effects of negative anecdotes on a positive health behavior.
References


ICO Information Centre on HPV and Cancer. (2021, October). *United States of America*

Kelly, B. J., Leader, A. E., Mittermaier, D. J., Hornik, R. C., & Cappella, J. N. (2009). The HPV vaccine and the media: How has the topic been covered and what are the effects on knowledge about the virus and cervical cancer? Patient Education and Counseling, 77(2), 308-313. doi: 10.1016/j.pec.2009.03.018


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Table 1. Four randomly assigned conditions by base rate and number of positive/negative anecdotes

<table>
<thead>
<tr>
<th>Number of Positive/Negative Anecdotes</th>
<th>Base rate only</th>
<th>Base rate + 5 pos /1 neg</th>
<th>Base rate + 1 pos /5 neg</th>
<th>Base rate + 5 pos</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition I</td>
<td>Condition II</td>
<td>Condition III</td>
<td>Condition IV</td>
<td></td>
</tr>
</tbody>
</table>


Table 2. Ease of reading scores by condition information

<table>
<thead>
<tr>
<th>Reading Score</th>
<th>Base rate only</th>
<th>Base rate and 5 pos + 1 neg anecdotes</th>
<th>Base rate and 5 neg + 1 pos anecdotes</th>
<th>Base rate and 5 pos Anecdotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flesch Reading Ease</td>
<td>64.3</td>
<td>79.5</td>
<td>75</td>
<td>81 6.1</td>
</tr>
<tr>
<td>Gunning Fog</td>
<td>10.4</td>
<td>8.2</td>
<td>9.1</td>
<td>7.9</td>
</tr>
<tr>
<td>Flesch-Kincaid Grade Level</td>
<td>8.1</td>
<td>5.4</td>
<td>6.4</td>
<td>5</td>
</tr>
<tr>
<td>Coleman-Liau Index</td>
<td>9</td>
<td>6</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>SMOG Index</td>
<td>7.7</td>
<td>6</td>
<td>6.6</td>
<td>5.8</td>
</tr>
<tr>
<td>Automated Readability Index</td>
<td>7.6</td>
<td>4.5</td>
<td>5.9</td>
<td>4</td>
</tr>
<tr>
<td>Linsear Write Formula</td>
<td>8.3</td>
<td>6.5</td>
<td>7.6</td>
<td>6.1</td>
</tr>
<tr>
<td>Grade Level Consensus</td>
<td>8</td>
<td>6</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Reading Level Consensus</td>
<td>Standard/average</td>
<td>Easy to read</td>
<td>Fairly easy to read</td>
<td>Easy to read</td>
</tr>
<tr>
<td>Reader’s Age Consensus</td>
<td>12-14 yrs. old</td>
<td>10-11 yrs. old</td>
<td>11-13 yrs. old</td>
<td>8-9 yrs. old</td>
</tr>
</tbody>
</table>
Table 3. Valence of positive and negative anecdotes by information set

<table>
<thead>
<tr>
<th>Information Set</th>
<th>LIWC Positive Emotion</th>
<th>LIWC Negative Emotion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Rate</td>
<td>0.00%</td>
<td>2.22%</td>
</tr>
<tr>
<td>5 Positive &amp; 1 Negative Anecdote</td>
<td>4.78%</td>
<td>1.20%</td>
</tr>
<tr>
<td>5 Negative &amp; 1 Positive Anecdote</td>
<td>1.74%</td>
<td>3.36%</td>
</tr>
<tr>
<td>5 Positive Anecdotes</td>
<td>5.49%</td>
<td>1.25%</td>
</tr>
</tbody>
</table>

*Note.* The percentage represents the number of positive/negative words in proportion to the total number of words in each set of information.
Table 4. Participant characteristics for total sample and by study condition

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Overall Sample (N = 188)</th>
<th>Base Rate Only (n = 47)</th>
<th>Base Rate and 5 pos + 1 neg anecdotes (n = 47)</th>
<th>Base Rate and 5 neg + 1 pos anecdotes (n = 46)</th>
<th>Base Rate and 5 pos anecdotes (n = 48)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (%)</td>
<td>N (%)</td>
<td>N (%)</td>
<td>N (%)</td>
<td>N (%)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-20 years</td>
<td>123 (65.4)</td>
<td>28 (59.6)</td>
<td>28 (59.6)</td>
<td>33 (71.7)</td>
<td>34 (70.8)</td>
</tr>
<tr>
<td>21-23 years</td>
<td>51 (27.2)</td>
<td>14 (29.8)</td>
<td>16 (34.1)</td>
<td>11 (23.9)</td>
<td>10 (20.9)</td>
</tr>
<tr>
<td>24-26 years</td>
<td>14 (7.4)</td>
<td>5 (10.7)</td>
<td>3 (6.4)</td>
<td>2 (4.3)</td>
<td>4 (8.4)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>70 (37.2)</td>
<td>25 (53.2)</td>
<td>13 (27.7)</td>
<td>19 (41.3)</td>
<td>13 (27.1)</td>
</tr>
<tr>
<td>Female</td>
<td>118 (62.8)</td>
<td>22 (46.8)</td>
<td>34 (72.3)</td>
<td>27 (58.7)</td>
<td>35 (72.9)</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>164 (87.2)</td>
<td>37 (87.7)</td>
<td>39 (83)</td>
<td>42 (91.3)</td>
<td>46 (95.8)</td>
</tr>
<tr>
<td>White</td>
<td>4 (2.1)</td>
<td>3 (6.4)</td>
<td>0 (0)</td>
<td>1 (2.2)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Black</td>
<td>10 (5.3)</td>
<td>2 (4.3)</td>
<td>5 (10.6)</td>
<td>2 (4.3)</td>
<td>1 (2.1)</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>3 (1.6)</td>
<td>1 (2.1)</td>
<td>1 (2.1)</td>
<td>0 (0)</td>
<td>1 (2.1)</td>
</tr>
<tr>
<td>Other</td>
<td>6 (3.2)</td>
<td>4 (8.5)</td>
<td>2 (4.3)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Sexual Orientation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterosexual</td>
<td>166 (88.3)</td>
<td>41 (87.2)</td>
<td>40 (85.1)</td>
<td>41 (89.1)</td>
<td>44 (91.7)</td>
</tr>
<tr>
<td>Gay/Lesbian</td>
<td>8 (4.3)</td>
<td>2 (4.3)</td>
<td>3 (6.4)</td>
<td>2 (4.3)</td>
<td>1 (2.1)</td>
</tr>
<tr>
<td>Bisexual</td>
<td>7 (3.7)</td>
<td>3 (6.4)</td>
<td>2 (4.3)</td>
<td>1 (2.2)</td>
<td>1 (2.1)</td>
</tr>
<tr>
<td>Other</td>
<td>4 (2.1)</td>
<td>1 (2.1)</td>
<td>0 (0)</td>
<td>1 (2.2)</td>
<td>2 (4.2)</td>
</tr>
<tr>
<td>Relationship Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single, Never Married</td>
<td>135 (71.8)</td>
<td>33 (70.2)</td>
<td>31 (66)</td>
<td>33 (71.7)</td>
<td>38 (79.2)</td>
</tr>
<tr>
<td>Monogamous Relations</td>
<td>40 (21.3)</td>
<td>11 (23.4)</td>
<td>12 (25.5)</td>
<td>10 (21.7)</td>
<td>7 (14.6)</td>
</tr>
<tr>
<td>Living w/ Partner</td>
<td>12 (6.4)</td>
<td>3 (6.4)</td>
<td>4 (8.5)</td>
<td>2 (4.3)</td>
<td>3 (6.3)</td>
</tr>
<tr>
<td>Married</td>
<td>1 (0.5)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>1 (2.2)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Student Classification</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman</td>
<td>68 (36.2)</td>
<td>16 (34)</td>
<td>16 (34)</td>
<td>17 (37)</td>
<td>19 (39.6)</td>
</tr>
<tr>
<td>Sophomore</td>
<td>43 (22.9)</td>
<td>12 (25.5)</td>
<td>12 (25.5)</td>
<td>8 (17.4)</td>
<td>11 (22.9)</td>
</tr>
<tr>
<td>Junior</td>
<td>51 (27.1)</td>
<td>13 (27.7)</td>
<td>14 (29.8)</td>
<td>14 (30.4)</td>
<td>10 (20.8)</td>
</tr>
<tr>
<td>Senior</td>
<td>26 (13.8)</td>
<td>6 (12.8)</td>
<td>5 (10.6)</td>
<td>7 (15.2)</td>
<td>8 (16.7)</td>
</tr>
<tr>
<td>Stronger Language</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>119 (63.3)</td>
<td>33 (70.2)</td>
<td>30 (63.8)</td>
<td>28 (60.9)</td>
<td>28 (58.3)</td>
</tr>
<tr>
<td>Spanish</td>
<td>25 (13.3)</td>
<td>3 (6.4)</td>
<td>5 (10.6)</td>
<td>9 (19.6)</td>
<td>8 (16.7)</td>
</tr>
<tr>
<td>Mixed English/Spanish</td>
<td>42 (22.3)</td>
<td>10 (21.3)</td>
<td>11 (23.4)</td>
<td>9 (19.6)</td>
<td>12 (25)</td>
</tr>
<tr>
<td>Other</td>
<td>2 (1.1)</td>
<td>1 (2.1)</td>
<td>1 (2.1)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Prior Know of HPV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>160 (85.1)</td>
<td>41 (87.2)</td>
<td>39 (83)</td>
<td>38 (82.6)</td>
<td>42 (87.5)</td>
</tr>
<tr>
<td>Prior Know of HPV Vaccine</td>
<td>No</td>
<td>Not Sure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------</td>
<td>----</td>
<td>----------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>139 (73.9)</td>
<td>33 (70.2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>38 (20.2)</td>
<td>12 (25.5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not sure</td>
<td>10 (5.3)</td>
<td>2 (4.3)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 5. Chi-square test of independence across conditions for gender and vaccination status

<table>
<thead>
<tr>
<th>Topic</th>
<th>Response</th>
<th>N Base Rate Only</th>
<th>N Base Rate and 5 pos + 1 neg anecdotes</th>
<th>N Base rate and 5 neg + 1 pos anecdotes</th>
<th>N Base rate and 5 pos anecdotes</th>
<th>Pearson Chi-Square</th>
<th>df</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>25</td>
<td>13</td>
<td>19</td>
<td>13</td>
<td>9.407</td>
<td>3</td>
<td>0.024*</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>22</td>
<td>34</td>
<td>27</td>
<td>35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Received HPV vaccine</td>
<td>Yes</td>
<td>14</td>
<td>17</td>
<td>18</td>
<td>20</td>
<td>5.74</td>
<td>6</td>
<td>0.453</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>13</td>
<td>18</td>
<td>16</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unsure</td>
<td>20</td>
<td>12</td>
<td>12</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Had side effects after HPV vaccine</td>
<td>Yes</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1.91</td>
<td>3</td>
<td>0.591</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>14</td>
<td>15</td>
<td>17</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has a child above 10 years old who received HPV vaccine</td>
<td>Yes</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2.4</td>
<td>2</td>
<td>0.301</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has a child who had mild sides effect from HPV vaccine</td>
<td>Yes</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Has a child who had severe side effect from HPV vaccine</td>
<td>Yes</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

Note: *p < 0.05, indicating significant differences in distribution among conditions
Table 6. Descriptive characteristics for behavioral intentions towards receiving the HPV vaccine

<table>
<thead>
<tr>
<th>How likely are you to get the HPV vaccine in the next year?</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Std. Error</th>
<th>95% Confidence Interval for Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower Bound</td>
</tr>
<tr>
<td><strong>Group I:</strong> Base Rate Only</td>
<td>45</td>
<td>80.72</td>
<td>26.14</td>
<td>3.90</td>
<td>72.87</td>
</tr>
<tr>
<td><strong>Group II:</strong> Base Rate + 5 Positive/1 Negative Anecdote</td>
<td>47</td>
<td>82.06</td>
<td>23.24</td>
<td>3.38</td>
<td>75.26</td>
</tr>
<tr>
<td><strong>Group III:</strong> Base Rate + 1 Positive/5 Negative Anecdotes</td>
<td>38</td>
<td>64.09</td>
<td>31.02</td>
<td>5.03</td>
<td>53.90</td>
</tr>
<tr>
<td><strong>Group IV:</strong> Base Rate + 5 Positive Anecdotes</td>
<td>48</td>
<td>86.70</td>
<td>21.55</td>
<td>3.11</td>
<td>80.44</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>178</td>
<td>79.14</td>
<td>26.47</td>
<td>1.98</td>
<td>75.22</td>
</tr>
</tbody>
</table>

Note: Behavioral intention was rated on a scale of 0-100, with 100 being completely likely
Table 7. One-Way ANOVA comparing behavioral intentions between groups

<table>
<thead>
<tr>
<th>How likely are you to get the HPV vaccine in the next year?</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>11857.23</td>
<td>3</td>
<td>3952.41</td>
<td>6.13</td>
<td>0.001*</td>
</tr>
<tr>
<td>Within Groups</td>
<td>112129.73</td>
<td>174</td>
<td>644.424</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>123986.95</td>
<td>177</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: *p < 0.05 indicating significant differences in likelihood to receive HPV vaccine between groups
Table 8. Post hoc $t$-tests using Tukey’s HSD to determine differences in behavioral intentions between groups

<table>
<thead>
<tr>
<th>How likely are you to get the HPV vaccine in the next year?</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>St. Error</th>
<th>Base Rate Only</th>
<th>Base Rate + 5 Positive/1 Negative Anecdote</th>
<th>Base Rate + 5 Negative/1 Positive Anecdote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Rate Only</td>
<td>45</td>
<td>80.72</td>
<td>26.14</td>
<td>3.90</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base Rate + 5 Positive/1 Negative Anecdote</td>
<td>47</td>
<td>82.06</td>
<td>23.24</td>
<td>3.38</td>
<td>$t(90) = 1.34, p = 0.99$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base Rate + 5 Negative/1 Positive Anecdote</td>
<td>38</td>
<td>64.09</td>
<td>31.02</td>
<td>5.03</td>
<td>$t(81) = 16.63, p = 0.018^*$</td>
<td>$t(83) = 17.96, p = 0.008^*$</td>
<td></td>
</tr>
<tr>
<td>Base Rate + 5 Positive Anecdotes</td>
<td>48</td>
<td>86.70</td>
<td>21.55</td>
<td>3.11</td>
<td>$t(91) = 5.98, p = 0.67$</td>
<td>$t(93) = 4.64, p = 0.81$</td>
<td>$t(84) = 22.6, p = 0.00^{**}$</td>
</tr>
</tbody>
</table>

Note: $p^* < 0.05; p^{**} < 0.01$, indicating significant differences in likelihood to get the HPV vaccine between groups; larger means indicate greater likelihood.
Table 9. Post hoc $t$-tests using Bonferroni ($p = 0.0125$) to determine differences in perceived likelihood of developing HPV related cancer between groups

<table>
<thead>
<tr>
<th>What is your likelihood of getting HPV related cancers in the future?</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>St. Error</th>
<th>Base Rate Only</th>
<th>Base Rate + 5 Positive/1 Negative Anecdote</th>
<th>Base Rate + 5 Negative/1 Positive Anecdote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Rate Only</td>
<td>43</td>
<td>28.77</td>
<td>24.14</td>
<td>3.68</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base Rate + 5 Positive/1 Negative Anecdote</td>
<td>46</td>
<td>43.74</td>
<td>25.09</td>
<td>3.69</td>
<td>$t(87) = 14.97$, $p = 0.025^*$</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$t(87) = 10.65$, $p = 0.24$</td>
<td></td>
</tr>
<tr>
<td>Base Rate + 5 Negative/1 Positive Anecdote</td>
<td>43</td>
<td>33.09</td>
<td>21.87</td>
<td>3.33</td>
<td>$t(84) = 4.33$, $p = 1.0$</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$t(87) = 8.57$, $p = 0.567$</td>
<td></td>
</tr>
<tr>
<td>Base Rate + 5 Positive Anecdotes</td>
<td>45</td>
<td>52.31</td>
<td>25.86</td>
<td>3.85</td>
<td>$t(86) = 23.54$, $p = 0.00^{**}$</td>
<td>$t(89) = 8.57$, $p = 0.567$</td>
<td>$t(86) = 19.22$, $p = 0.00^{**}$</td>
</tr>
</tbody>
</table>

*Note: $p^* < 0.05$; $p^{**} < 0.01$, indicating significant differences in perceived likelihood of developing HPV related cancer between groups; larger means indicate greater likelihood.*
Appendices

Appendix A

Informed Consent (All Groups):

University of Texas at El Paso (UTEP) Institutional Review Board Informed Consent Form for Research Involving Human Subjects

Protocol Title: The Relative Impact of HPV Vaccination Information in the Evaluation of Gist

Principal Investigator: Candice Coffman

UTEP: Psychology Department

Introduction

You are being asked to take part voluntarily in the research project described below. Please take your time making a decision. Before agreeing to take part in this research study, it is important that you read this consent form. Please ask research investigators or research staff to explain any words or information that you do not clearly understand.

Why is this study being done?

You are being asked to take part in a research study that is investigating how students interpret health information and communications. Our findings may help public health officials develop more effective strategies for communicating health information to the public. Approximately, 192 participants will be enrolling in this study at UTEP. If you decide to enroll in this study, then the project will require approximately 75 minutes to complete the tasks. The first session will take approximately 60 minutes. The second session will take approximately 15 minutes.

What is involved in the study?
If you agree to take part in this study, then you will be asked to read information about the Human Papillomavirus (HPV) vaccination. After reading the information, we will ask you to respond to the information you have read. We will ask you to complete a general background survey, a survey on your previous knowledge of the HPV vaccine, a survey on your thoughts about the HPV vaccine, and a survey of your knowledge and experiences with Sexually Transmitted Infections.

**What are the risks and discomforts of the study?**

There are minimal direct or indirect risks associated with participation in this study. Some students may find the tasks slightly boring or the subject matter slightly uncomfortable.

**What will happen if I am injured in this study?**

There is no risk of injury during participation in this study beyond the above mentioned risk. The University of Texas at El Paso and its affiliates do not offer to pay for or cover the cost of medical treatment for research related illness or injury. No funds have been set aside to pay or reimburse you in the event of such injury or illness. You should report any such injury to Candice F. Coffman at cfcoffman@miners.utep.edu and the Institutional Review Board (IRB) at UTEP at 915-747-8841 or irb.orsp@utep.edu

**Are there benefits to taking part in this study?**

You will receive course credit through the Sona Systems toward your Psychology course. If you complete both sessions of the study, you will receive one entry into a raffle. Eight entries will be randomly selected at the end of data collection. Each selected name will receive a $100 VISA gift card. You may also gain a clearer understanding of how psychological research is conducted. This research may have broader implications in helping researchers understand health opinions.

**What other options are there?**
You have the option not to take part in this study. There will be no penalties involved if you choose not to take part in this study. You can choose to participate in other studies that are being conducted in the Psychology Department to help meet your research requirement for Introduction to Psychology. You can also ask your instructor to assign you a research paper to read and summarize in a brief paper.

**Who is paying for this study?**

Internal Funding: Dodson Research Grant via the UTEP Graduate School.

External Funding: None.

**What are my costs?**

There are no costs to you for participating in the study.

**Will I be paid to participate in this study?**

If your name is selected from the raffle, you will receive a $100 VISA gift card. You will not be paid cash for taking part in this research study.

**What if I want to withdraw or I am asked to withdraw from this study?**

Taking part in this study is voluntary. You have the right to choose not to take part in this study. If you choose not to take part in this study, there will be no penalty. If you choose to take part, you have the right to stop at any time. However, we encourage you to talk to a member of the research group so that they know why you are leaving the study. If there are any new findings during the study that may affect whether you want to continue to take part, you will be told about them.

**Who do I call if I have questions or problems?**

If you have a question, you should contact the principal investigator, Candice F. Coffman by phone at 915-747-6567 or cfcoffman@miners.utep.edu.
If you have questions or concerns about your participation as a research subject, please contact the UTEP Institutional Review Board (IRB) at 915-747-8841 or irb.orsp@utep.edu.

**What about confidentiality?**

Your part in this study is confidential. You will be asked to write your first name, email address, and phone number on a survey separate from the study. This survey will be stored separately from the other materials and only used to contact you for the second session of the study and if you are a winner of the raffle. All records will be stored in a file cabinet in the psychology building. Only researchers directly associated with this project will have access to these surveys. Your participation is also completely anonymous. Your name will not be connected to any of the answers you provide on this survey. None of the information will identify you by name.

**Authorization Statement**

I have read each page of this consent form about the study (or it was read to me). I know that being in this study is voluntary, and I choose to be in this study. I know I can stop being in this study without penalty. I can get information on results of the study later if I wish. The following information may serve as my electronic signature:

First Name

Last Name

Date: Month/Day/Year
Appendix B

Demographic Questionnaire (All Groups):

Please answer the following questions:

1. Age: 

2. Gender:
   - Male
   - Female
   - Transgender Male
   - Transgender Female

3. Ethnicity:
   - Hispanic or Latino
   - White, not of Hispanic origin
   - Black, not of Hispanic origin
   - Asian or Pacific Islander
   - Native American
   - Other (type in):

4. Sexual Orientation:
☐ Heterosexual
☐ Gay or Lesbian
☐ Bisexual
☐ Other (type in): __________________________

5. Marital Status:
☐ Single, never married
☐ In a monogamous relationship
☐ Living with significant other
☐ Married
☐ Divorced/Separated
☐ Widowed

6. Academic level:
☐ Freshman
☐ Sophomore
☐ Junior
☐ Senior
☐ Graduate Student
☐ Not Sure

7. Academic major at UTEP? __________________________
8. What language do you consider your stronger language overall?

☐ English

☐ Spanish

☐ Mixed English and Spanish

☐ Other (please indicate)
Appendix C

Language Proficiency (All Groups):

Please evaluate your language ability in Spanish and English in the following four different areas: (1) reading; (2) writing; (3) speaking; and (4) listening. When evaluating your ability, please think about how well you use these languages in your everyday activities. In each case, select the appropriate answer:

1. Rate your ability to read in Spanish:
   - □ Very poor or no ability
   - □ Below average ability
   - □ Average ability
   - □ Above average ability
   - □ Excellent

2. Rate your ability to write in Spanish:
   - □ Very poor or no ability
   - □ Below average ability
   - □ Average ability
   - □ Above average ability
   - □ Excellent

3. Rate your ability to speak in Spanish:
4. Rate your ability to **listen in Spanish**:
   - Very poor or no ability
   - Below average ability
   - Average ability
   - Above average ability
   - Excellent

5. Rate your ability to **read in English**:
   - Very poor or no ability
   - Below average ability
   - Average ability
   - Above average ability
   - Excellent

6. Rate your ability to **write in English**:
   - Very poor or no ability
   - Below average ability
☐ Average ability
☐ Above average ability
☐ Excellent

7. Rate your ability to **speak in English:**
   ☐ Very poor or no ability
   ☐ Below average ability
   ☐ Average ability
   ☐ Above average ability
   ☐ Excellent

8. Rate your ability to **listen in English:**
   ☐ Very poor or no ability
   ☐ Below average ability
   ☐ Average ability
   ☐ Above average ability
   ☐ Excellent
Appendix D

Pre-Test HPV Knowledge (All Groups):

Please answer the following questions about the Human Papillomavirus (HPV) and the Human Papillomavirus vaccine:

1. Have you heard of the Human Papillomavirus (HPV)?
   □ Yes   □ No   □ Not Sure

2. Have you heard of the vaccine for Human Papillomavirus (HPV)?
   □ Yes   □ No   □ Not Sure

3. Do you think that the Human Papillomavirus (HPV) is a sexually transmitted disease?
   □ Yes   □ No   □ Not Sure

4. Do you think that a Human Papillomavirus (HPV) infection can go away without treatment?
   □ Yes   □ No   □ Not Sure

5. People with Human Papillomavirus (HPV) might not have any symptoms:
   □ False   □ True   □ Not Sure

6. The Centers for Disease Control and Prevention recommends the Human Papillomavirus (HPV) vaccine for girls and boys age 11-12 years old.
   □ False   □ True   □ Not Sure

7. The Human Papillomavirus (HPV) vaccine can be administered to individuals up to age 26.
   □ False   □ True   □ Not Sure
Appendix E

Pre-Test Perceived Vaccine Intentions (All Groups):

Imagine you are receiving the Human Papillomavirus (HPV) vaccine for the first time…

In your opinion, how likely are you to get the HPV vaccine in the next year if it was completely free? Slide the bar to indicate your likelihood.

![Bar Graph]

84.62
Appendix F

Pre-Test Perceived Likelihood of Personal Risk (Counterbalanced, All Groups):

Imagine you are receiving the Human Papillomavirus (HPV) vaccine for the first time…

In your opinion, how likely are you to have a bad reaction to the Human Papillomavirus (HPV) vaccine if you received it during the next month? Slide the bar to indicate your likelihood.

Imagine you are receiving the Human Papillomavirus (HPV) vaccine for the first time…

In your opinion, how likely are you to have a normal reaction to the Human Papillomavirus (HPV) vaccine if you received it during the next month? Slide the bar to indicate your likelihood.
Appendix G

Pre-Test Perceived Likelihood of HPV/Cancer (Counterbalanced, All Groups):

If you decide not to get vaccinated, what is your likelihood of getting HPV in the future?

If you decide not to get vaccinated, what is your likelihood of getting cervical, penile, or other HPV related cancers in the future?
Pre-Test Perceived Seriousness (All Groups):

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<thead>
<tr>
<th></th>
<th>Not Serious</th>
<th>2</th>
<th>3</th>
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<th>5</th>
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<th>7</th>
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### Appendix I

#### Pre-Test Perceived Effectiveness (Counterbalanced, All Groups):

<table>
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<tr>
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| In your opinion, do you think the HPV vaccine is effective in preventing genital warts? |

<table>
<thead>
<tr>
<th>Completely Ineffective</th>
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<th>2</th>
<th>3</th>
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| In your opinion, do you think the HPV vaccine is effective in preventing cervical cancer? |

<table>
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<tr>
<th>Completely Ineffective</th>
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Introduction on HPV (All Groups):

The Human Papillomavirus, also known as HPV, is obtained by having vaginal, anal or oral sex with a person who has the virus. HPV is the most common sexually transmitted infection (STI). HPV can be cancer causing. HPV is associated with cervical, anal, and throat cancer. A vaccine for HPV is available which can help protect people from cancer causing HPV.

Instructions (All Groups):

Imagine that you and your friends were discussing the Human Papillomavirus (HPV) vaccine. Receiving the HPV vaccination is required in several states in the U.S. but not in Texas. You tell your friends that you will search for more information about HPV vaccine online and post a tweet to them about the vaccine. You search the web and find a website with information on the HPV vaccine. Please carefully read the following information that you retrieved about the vaccine:
Appendix K

**Base rate (All Groups):**

The website you find during your search has a Human Papillomavirus Vaccine Fact Sheet provided by the Centers for Disease Control and Prevention. You read the following information:

The Human Papillomavirus, also known as HPV, is obtained by having vaginal, anal or oral sex with a person who has the virus. HPV is the most common sexually transmitted infection. Approximately 1 in 2 people are infected with at least one form of the HPV virus. Some forms of HPV can cause cancer. A vaccine is available to prevent the main cancer causing forms of HPV. The vaccine prevents most cervical cancers, most types of anal cancer, and most types of throat cancers caused by HPV. In addition, the vaccine prevents the development of most genital warts. The majority of people do not experience any problems after receiving the vaccine. A small percentage of patients experience minor side effects to the vaccine such as headache, dizziness, and nausea. These minor, common side effects were experienced by patients approximately 12% of the time after receiving the HPV vaccine. That is, for every 100,000 vaccinations minor side effects were reported approximately 12,000 times. In very rare cases, much more serious reactions to the HPV vaccine have been reported such as stroke, muscle weakness due to nerve damage, and the possibility of one’s appendix bursting. These reactions were reported in less than two-hundredths of one percent (0.02%) of doses administered. That is, out of 600,558 vaccinations, only 105 serious, adverse reactions were reported.
Appendix L

**Instructions for Anecdotes (Randomized, Groups II, III, & IV)**

The website you find during your online search includes web postings from individuals who described their experiences with the HPV vaccine. These web postings are described below. Please read the web postings and then respond to the questions.

**Anecdotes for Group II (5 positive, 1 negative):**

**Report Id: 1 Positive (105 words)**

“I’m happy that my doctor was able to give me the injection. It’s a huge value if it is possible to protect me from Cancer. The injection felt similar to a B vitamin shot. I do plan on continuing the shots. I decided it will be worth it, if I’m protected from cervical cancer. Three days after the shot, my arm is a little red & there is a lump. Both of my grandmothers died from cancer in their mid-thirties. I wish I knew my grandmothers & maybe if they were able to get this vaccine, I would have had the chance to meet them.”

-Previous HPV study

**Report Id: 2 Positive (152 words)**

“I have been dating my boyfriend for about 3 years now and he is such an amazing guy that I love deeply. We are finally at the stage of moving forward in our relationship and ready to become engaged, married, and have kids. One of the first things that attracted me to him was how honest and trustworthy he was. On our first date he came forth and told me he had HPV. I was grateful that he told me about this. He is my first serious relationship and my first sexual partner. I was a virgin when I met him. I decided to get the HPV vaccine before starting a sexual relationship with my boyfriend. I’m so grateful that something like it is available. I now feel
comfortable having that type of relationship with my boyfriend and having kids someday. I don’t
know what I would have done without the vaccine.”

-Adapted from http://www.experienceproject.com/stories/Have-Hpv/3277113 (152 words)

**Report Id: 3 Positive (46 words)**

“I have gotten all three shots. All three shots have been fine. This is an approved vaccine. This
vaccine is out there to protect you, improve your quality of life, and hopefully reduce large risks.
I rather have all three shots than get cancer and die.”

-Previous HPV study

**Report Id: 4 Positive (184 words)**

“HPV vaccine. I wish I had it sooner. Forget all the medical mumbo jumbo- HPV can cause
warts and they suck. All you hear about is women getting them. But another part of it you don't
hear about is men getting them. I've had them on my, well, I'll just say it, anus. They are
extremely painful and even more painful to get rid of. The doctor told me I had HPV. She said
they can cause major problems if not taken care of - cancers, sterility and more. I was shocked.
The doctor put me at ease and then said here comes the fun part. She brought out a canister of
nitrous and said alright, bend over and we'll burn them off. BURN them off?? Yes. Burn. I
asked the doctor how I could have prevented this. She told me about the HPV vaccine. Although
the vaccine won’t get rid of the type of HPV I already have. I’ve decided to get it anyway to help
prevent some of the other cancer causing types. I don’t want this to get any worse by getting
more types. Everyone should get the vaccine.”

Adapted from http://www.hpvhope.org/stories.html under “HPV: Not Just a Women’s Issue”

**Report Id: 5 Positive (143 words)**
“So why does the HPV vaccine make my list of blessings? One reason is that is provides protection against, what seems to me, a fairly equal opportunity virus. I’m active, eat pretty well, don’t smoke, and enjoy hiking and skiing and playing basketball. But HPV didn’t seem to care that I was an otherwise healthy person. I had my tonsils removed to test that the swollen lymph node on the right side of my throat was indeed due to cancer – HPV-positive oropharyngeal cancer, to be specific. Another reason why I think the HPV vaccine is a blessing is that I have two teenage sons. So I’m thankful that even if, they only make almost all the right choices, there’s at least one thing I can be almost certain of: with the HPV vaccine neither of them will be diagnosed with HPV-positive throat cancer.”

“I would personally NEVER get the HPV vaccine because I actually know someone who is now paralyzed from the waist down because of it. She is the same age as my brother (21) and her whole life is now affected because her over-protective mother didn’t do her research (the girl was 16 when the shot was given- it is also when her mother found out the girl was sexually active…). I also read that a 17 year old girl names Jessica had a side effect from her HPV vaccines. She died instantly. After weeks of headaches, sore muscles and joints and always being tired her heart stopped. Her parents wrote that they were devastated.”

-Previous HPV study

**Report Id: 7 Negative (64 words)**

“Last June I had gotten my HPV vaccine shot and was as sick as a dog. I had horrible migraines, excruciating lower stomach pains, crazy irregular menstrual cycles, was losing hair, was always tired, had constant arthritis like pains all over my body, and had occasional episodes of rapid heartbeat and trouble breathing. I became extremely depressed and was just miserable all the time.”

-Previous HPV study

**Report Id: 8 Negative (181 words)**

“I got the HPV vaccination. You know, the one for the prevention of cervical cancer where the commercial always ended in ‘one less’? Too bad I ended up being one more. Around three weeks after I got the first vaccine I had my first seizure. It basically went downhill from there. The doctors told us that there was no possible way that this vaccination was causing my problems; so naturally, we believed them, and I got the last two shots. Ironically, things got progressively worse. And now, over three and a half years later, I am still dealing with my problems. About two years after my seizures started, one of my friends named Caleigh also
began to have seizures. Caleigh had just gotten her first vaccination. Her seizures were so violent that she actually bruised up her wrist until it was swollen. All the pieces started to fall into place. We both had seizures a couple weeks after we got the shot. I feel the HPV vaccination has taken what should have been some of the best years of my life.”

Adapted from http://sanevax.org/taylor-from-indiana/

Report Id: 9 Negative (178 words)

“HPV shots are kind of new for guys. I had the first two shots and did fine. The pain at the injection site was minimal. I had the third shot on Thursday, and a few minutes later my arms started to go numb. I was already driving on my way home. My hands became so numb that I couldn't even hold the steering wheel, and my whole body was shaking so badly. Then severe dizziness set in, and increasing difficulty swallowing and breathing. I barely made it to the emergency room fast enough. When I got there it took me three attempts to grab my cell phone to call my mom. The doctors at the ER gave me steroids to keep my throat open, and lots of antihistamines in an IV. Yesterday I was still dizzy, and got another numb sensation in my hands, and my muscles in my legs were really sore and I had a fever. Still had some difficulty swallowing. I have never had a bad reaction to any medication ever in my entire life.”

Adapted from http://www.rxlist.com/script/main/rxlist_view_comments.asp?drug=gardasil&questionid=fd144456.pem under comment # jb, 19-24 (Patient) Published: April 19

Report Id: 10 Negative (175 words)

“A week after my sister got the shot, she started to complain here and there, of a headache and of feeling sick to her stomach. When she would tell me these things, I would tell her to lie down, murmur to her that she had probably had a long day, or I would give her some Tylenol. A few
weeks later, I noticed my sister kept dropping her phone. She was crying, she was drooling, and her eyes were not looking right. She was rushed to the ER. She had an MRI, a CAT scan, an EEG, and a spinal tap done. Whatever they were looking for, they did not find, all the tests were negative. In the four days we were at the hospital, she had stopped talking, stopped eating, stopped walking, and was now urinating on herself. She eventually lost lung functioning and was placed on a ventilator for several months. I thought vaccines would keep people safe and healthy. I didn’t know that vaccines could do this. No one ever told me.”

Adapted from http://sanevax.org/amy-from-indiana/

**Report Id: 2 Positive (152 words)**

“I have been dating my boyfriend for about 3 years now and he is such an amazing guy that I love deeply. We are finally at the stage of moving forward in our relationship and ready to become engaged, married, and have kids. One of the first things that attracted me to him was how honest and trustworthy he was. On our first date he came forth and told me he had HPV. I was grateful that he told me about this. He is my first serious relationship and my first sexual partner. I was a virgin when I met him. I decided to get the HPV vaccine before starting a sexual relationship with my boyfriend. I’m so grateful that something like it is available. I now feel comfortable having that type of relationship with my boyfriend and having kids someday. I don’t know what I would have done without the vaccine.”

-Adapted from http://www.experienceproject.com/stories/Have-Hpv/3277113

**Anecdotes for Group IV (5 positive):**

**Report Id: 1 Positive (105 words)**
“I’m happy that my doctor was able to give me the injection. It’s a huge value if it is possible to protect me from Cancer. The injection felt similar to a B vitamin shot. I do plan on continuing the shots. I decided it will be worth it, if I’m protected from cervical cancer. Three days after the shot, my arm is a little red & there is a lump. Both of my grandmothers died from cancer in their mid-thirties. I wish I knew my grandmothers & maybe if they were able to get this vaccine, I would have had the chance to meet them.”

-Previous HPV study

Report Id: 2 Positive (152 words)

“I have been dating my boyfriend for about 3 years now and he is such an amazing guy that I love deeply. We are finally at the stage of moving forward in our relationship and ready to become engaged, married, and have kids. One of the first things that attracted me to him was how honest and trustworthy he was. On our first date he came forth and told me he had HPV. I was grateful that he told me about this. He is my first serious relationship and my first sexual partner. I was a virgin when I met him. I decided to get the HPV vaccine before starting a sexual relationship with my boyfriend. I’m so grateful that something like it is available. I now feel comfortable having that type of relationship with my boyfriend and having kids someday. I don’t know what I would have done without the vaccine.”

-Adapted from http://www.experienceproject.com/stories/Have-Hpv/3277113 (152 words)

Report Id: 3 Positive (46 words)

“I have gotten all three shots. All three shots have been fine. This is an approved vaccine. This vaccine is out there to protect you, improve your quality of life, and hopefully reduce large risks. I rather have all three shots than get cancer and die.”

-Previous HPV study
Report Id: 4 Positive (184 words)

“HPV vaccine. I wish I had it sooner. Forget all the medical mumbo jumbo- HPV can cause warts and they suck. All you hear about is women getting them. But another part of it you don't hear about is men getting them. I've had them on my, well, I'll just say it, anus. They are extremely painful and even more painful to get rid of. The doctor told me I had HPV. She said they can cause major problems if not taken care of - cancers, sterility and more. I was shocked. The doctor put me at ease and then said here comes the fun part. She brought out a canister of nitrous and said alright, bend over and we'll burn them off. BURN them off???: Yes. Burn. I asked the doctor how I could have prevented this. She told me about the HPV vaccine. Although the vaccine won’t get rid of the type of HPV I already have. I’ve decided to get it anyway to help prevent some of the other cancer causing types. I don’t want this to get any worse by getting more types. Everyone should get the vaccine.”

Adapted from http://www.hpvhope.org/stories.html under “HPV: Not Just a Women’s Issue”

Report Id: 5 Positive (143 words)

“So why does the HPV vaccine make my list of blessings? One reason is that is provides protection against, what seems to me, a fairly equal opportunity virus. I’m active, eat pretty well, don’t smoke, and enjoy hiking and skiing and playing basketball. But HPV didn’t seem to care that I was an otherwise healthy person. I had my tonsils removed to test that the swollen lymph node on the right side of my throat was indeed due to cancer – HPV-positive oropharyngeal cancer, to be specific. Another reason why I think the HPV vaccine is a blessing is that I have two teenage sons. So I’m thankful that even if, they only make almost all the right choices, there’s at least one thing I can be almost certain of: with the HPV vaccine neither of them will be diagnosed with HPV-positive throat cancer.”
Appendix M

Twitter Post (All Groups):

You have just read information about the vaccine for the Human Papillomavirus (HPV). Now, create a tweet to your friends about the vaccine. Use the space below to create the tweet.

Twitter Post Understanding (Pilot testing):

Do you understand the character limit involved with creating tweets? That is, did you know that tweets have a limit of 140 characters?

Were you able to stay under the 140 character limit easily?

What other comments or concerns do you have about the twitter post task?
Appendix N

Post-Test Perceived Vaccine Intentions (All Groups):

Imagine you are receiving the Human Papillomavirus (HPV) vaccine for the first time…

In your opinion, how likely are you to get the HPV vaccine in the next year if it was completely free? Slide the bar to indicate your likelihood.

![Bar Graph with 84.62 likelihood]
Appendix O

**Post-Test Perceived Likelihood of Personal Risk (Counterbalanced, All Groups):**

Imagine you are receiving the Human Papillomavirus (HPV) vaccine for the first time...

In your opinion, how likely are you to have a bad reaction to the Human Papillomavirus (HPV) vaccine if you received it during the next month? Slide the bar to indicate your likelihood.

Imagine you are receiving the Human Papillomavirus (HPV) vaccine for the first time...

In your opinion, how likely are you to have a normal reaction to the Human Papillomavirus (HPV) vaccine if you received it during the next month? Slide the bar to indicate your likelihood.
Appendix P

**post-Test Perceived Likelihood of HPV/Cancer (Counterbalanced, All Groups):**

If you decide not to get vaccinated, what is your likelihood of getting HPV in the future?

![Graph showing likelihood of getting HPV in the future with a value of 84.62%]

If you decide not to get vaccinated, what is your likelihood of getting cervical, penile, or other HPV related cancers in the future?

![Graph showing likelihood of getting cervical, penile, or other HPV related cancers with a value of 84.62%]
Appendix Q

**Post-Test Perceived Seriousness (All Groups):**

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</table>

*In your opinion, how serious would it be if you got HPV related cancer?*
Appendix R

Time 1 Perceived Likelihood of Peer Risk (All Groups):

1. In your opinion, what is the likelihood that a male or female who is your age would experience minor problems, like fever, discomfort, or pain if they were administered the vaccine for the Human Papillomavirus (HPV)? Slide the bar to indicate the likelihood.

![Bar Chart](image)

2. In your opinion, what is the likelihood that a male or female who is your age would experience serious negative side-effects, like seizures, stroke, or appendicitis if they were administered the vaccine for the Human Papillomavirus (HPV)? Slide the bar to indicate the likelihood.

![Bar Chart](image)
3. In your opinion, what is the likelihood that a male or female who is your age would experience lasting health problems, like long-term seizures or infertility if they were administered the vaccine for the Human Papillomavirus (HPV)? Slide the bar to indicate the likelihood.

![Likelihood Slider with 84.62% indicated]
Appendix S

Post-Test Perceived Effectiveness (Counterbalanced, All Groups):

In your opinion, do you think the HPV vaccine is effective in preventing genital warts?

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In your opinion, do you think the HPV vaccine is effective in preventing cervical cancer?

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Appendix T

Post-Test HPV Knowledge (All Groups):

1. Had you heard of the Human Papillomavirus (HPV) before this study?
   - □ Yes
   - □ No
   - □ Not Sure

2. Had you heard of the vaccine for Human Papillomavirus (HPV) before this study?
   - □ Yes
   - □ No
   - □ Not Sure

3. Do you think Human Papillomavirus (HPV) is a sexually transmitted disease?
   - □ Yes
   - □ No
   - □ Not Sure

4. Do you think a Human Papillomavirus (HPV) infection can go away without treatment?
   - □ Yes
   - □ No
   - □ Not Sure

5. Do you think Human Papillomavirus (HPV) can cause genital warts?
   - □ Yes
   - □ No
   - □ Not Sure

6. Do you think Human Papillomavirus (HPV) can cause herpes?
   - □ Yes
   - □ No
   - □ Not Sure

7. People with Human Papillomavirus (HPV) might not have any symptoms:
   - □ False
   - □ True
   - □ Not Sure

8. The Centers for Disease Control and Prevention recommends the Human Papillomavirus (HPV) vaccine for girls and boys age 11-12 years old.
   - □ False
   - □ True
   - □ Not Sure

9. The Human Papillomavirus (HPV) vaccine can be administered to individuals up to age 26.
- False
- True
- Not Sure
Appendix U

Health History (All Groups):

1. Please indicate whether you have been vaccinated for the following:

   - Chickenpox (varicella)  
     - Yes  
     - No  
     - Not Sure  

   - Diphtheria, tetanus, and pertussis (DTaP)  
     - Yes  
     - No  
     - Not Sure  

   - Flu (influenza)  
     - Yes  
     - No  
     - Not Sure  

   - Pneumonia (Haemophilus influenza type b)  
     - Yes  
     - No  
     - Not Sure  

   - Hepatitis A  
     - Yes  
     - No  
     - Not Sure  

   - Hepatitis B  
     - Yes  
     - No  
     - Not Sure  

   - Measles, Mumps, and Rubella (MMR)  
     - Yes  
     - No  
     - Not Sure  

   - Phlegmatosis (PHS)  
     - Yes  
     - No  
     - Not Sure  

   - Meningitis (Pneumococcal infections)  
     - Yes  
     - No  
     - Not Sure  

   - Polio  
     - Yes  
     - No  
     - Not Sure  

   - Human Papillomavirus (HPV)  
     - Yes  
     - No  
     - Not Sure  

   Other (please specify):  

2. Have you ever had a Sexually Transmitted Disease/Infection?

   - Yes  
   - No *if no, skip to question 7  
   - I have never been tested for them *skip to question 6

3. What Sexually Transmitted Disease/Infection(s) have you had (check all that apply)?

   - Hepatitis  
   - Hepatitis C  
   - HIV / AIDS  
   - HPV / Warts  
   - Human Papillomavirus (HPV)

4. How many times have you been diagnosed with the following (Type 0 if you have never
been diagnosed with the Sexually Transmitted Disease/Infection)?

____ Chancroid          ____ Chlamydia          ____ Crabs         ____ Herpes
____ Gonorrhea          ____ Scabies               ____ Syphilis     ____ Trichomoniasis
_____ Yeast in Men    ____ Vaginal Yeast     ____ Vaginosis (BV)
____ Pelvic Inflammatory Disease (PID)

5. Have you ever gotten a Human Immunodeficiency Virus (HIV) test?

☐ Yes  ☐ No (if no, go to question 7)

6. When was the last time you received a Human Immunodeficiency Virus (HIV) test?

☐ 1 month ago   ☐ 6 months ago   ☐ 1 year ago   ☐ More than 1 year ago

7. In the past year, have you talked to a doctor or other health care provider about the HPV vaccine?

☐ Yes  ☐ No

8. Has a healthcare provider recommended the HPV vaccine to you?

☐ Yes  ☐ No

9. If you wanted more information about HPV and the HPV vaccine from who would you feel most comfortable getting it?

☐ Health care provider

☐ Friend

☐ Parent

☐ Other family member or person (please specify):_________________

10. If you wanted more information about HPV and the HPV vaccine from which sources would you feel most comfortable getting it?
☐ Media (TV News, Magazine, Newspaper)

☐ Social Media (Twitter, Facebook, Instagram, etc.)

☐ Internet sites (please specify):__________________________

☐ Other (please specify):__________________________________

11. Have you gotten the HPV vaccine?

☐ Yes

☐ No *if no, skip to question 16

☐ Don’t Know/Unsure *if unsure, go to next section

12. How many doses of the HPV vaccine have you received?

☐ 1 dose  ☐ 2 doses  ☐ all 3 doses  ☐ Don’t know/Unsure

13. Did you experience any side effects after receiving the HPV vaccine?

☐ Yes   ☐ No *if no, skip to question 15

14. If yes, please describe the side effects you experienced after receiving the HPV vaccine in the space provided:

15.  

☐ Primary Care Provider office  ☐ Health clinic  ☐ Hospital

☐ UTEP Student Health Center  ☐ Other (please specify)__________________

*skip to question 17
16. What are your reasons for not getting the HPV vaccine (check all that apply):

☐ The vaccine costs too much  ☐ The vaccine needs 3 shots  ☐ The vaccine is unsafe

☐ I need more information on the vaccine  ☐ I need more information on HPV

☐ I am afraid of needles  ☐ I am embarrassed to request the vaccine

☐ I am not at risk for HPV  ☐ I am too old to get the vaccine

☐ My doctor has not recommended I get the vaccine

☐ My parents do not want me to get the vaccine

☐ My spouse/partner does not want me to get the vaccine

☐ Other (please specify):  ____________________________
Appendix V

Exposure to Vaccinated Individuals (All Groups):

1. Are you a parent?
   - □ Yes
   - □ No *skip to question 24

2. Please indicate how many of your children are younger than 10 years old:
   (put “0” if you do not have any children younger than 10 years old)

3. Please indicate how many of your children are between 10-20 years old:
   (put “0” if you do not have any children between 10-20 years old)

4. Please indicate how many of your children are 21 years of age or older:
   (put “0” if you do not have any children that are 21 years of age or older)

5. If you have one or more children at or above age 10 years old, have any of your children received the Human Papillomavirus vaccine?
   - □ Yes
   - □ No *skip to question 24

6. Did any of your children experience mild adverse side effects after receiving the Human Papillomavirus vaccine such as dizziness or muscle pain?
7. Did any of your children experience severe adverse side effects after receiving the Human Papillomavirus vaccine such as seizure or appendicitis?

☐ Yes

☐ No

8. Have any of the following people you know received the Human Papillomavirus (HPV) vaccine (check all that apply):

☐ Friend

☐ Friend of a friend

☐ Family member

☐ Spouse/significant other

☐ My child

☐ Friend of my child

☐ Other (please specify):

9. Have any of the following people you know had a severe adverse reaction (such as seizures or appendicitis) to the Human Papillomavirus (HPV) vaccine (check all that apply):

☐ Friend

☐ Friend of a friend

☐ Family member

☐ Spouse/significant other

☐ My child

☐ Friend of my child

☐ Other (please specify):
Appendix W

Exposure to Study (All Groups):

1. Have you ever heard of a tweet (twitter post)?
   - [ ] Yes
   - [ ] No
   - [ ] Not Sure

2. Have you ever created or posted a tweet (twitter post)?
   - [ ] Yes
   - [ ] No

3. Has anyone you know participated in this study?
   - [ ] Yes
   - [ ] No *skip to next section

4. Has anyone who has participated in this study talked with you about the purpose or procedures involved in this study?
   - [ ] Yes
   - [ ] No
Appendix X

Time 1 Self-Generated ID (All Groups):

1. Which of the following is your favorite color?  
   1.____Blue            5. ___ Red  
   2.____Green           6.____Yellow  
   3.____Black           7.____ White  
   4.____ Pink           8.____ Purple

2. What was your favorite subject in High School?  
   1.____Math/Science      5. ____History  
   2.____Art/Music        6.____ English  
   3.____Economics        7. ____ Speech  
   4.____Foreign Language 8. ____ Electives

3. What is your favorite type of T.V. show?  
   1.____Comedy            5. ____ Horror  
   2.____Science Fiction   6. ____ Sports  
   3.____Romance          7. ____ Crime  
   4.____Reality T.V      8. ____ News
4. What is your favorite type of car/truck?  
1. ___Mercedes  
2. ___Volvo  
3. ___Buick  
4. ___BMW  
5. ___Volkswagen  
6. ___Ford  
7. ___Nissan  
8. ___Toyota

5. What is your favorite type of food?  
1. ___Burgers/hotdogs  
2. ___Chinese  
3. ___German  
4. ___Indian  
5. ___Italian  
6. ___Mexican  
7. ___Vegetarian  
8. ___Seafood

6. What is your favorite type of music?  
1. ___Country  
2. ___Classical  
3. ___Electronic  
4. ___Gospel  
5. ___Metal  
6. ___Pop  
7. ___Rap  
8. ___Rock
7. What month were you born?  

1. _____January
2. _____February
3. _____March
4. _____April
5. _____May
6. _____June
7. _____July
8. _____August
9. _____September
10. _____October
11. _____November
12. _____December
Dear Participant,

Thank you for completing the first half of this study. You will be awarded a one hour research credit for your participation. In three days, you will be emailed a link to complete the second half of the survey. The second half of the study will take approximately 15 minutes to complete. Your name will be entered into a raffle for a $100 Visa gift card. Eight winners will be selected when data collection is finished.

During the next 3 days we ask that you do not do the following:

- Do not discuss this study with your peers
- Do not discuss HPV or the vaccine for HPV with others
- Do not read information on HPV or the vaccine for HPV online or in print

You are reminded that your original consent document included the following information:

Your part in this study is confidential. You will be asked to write your first name and email address on a survey separate from the study. This survey will be stored separately from the other materials and only used to contact you for the second session of the study. All records will be stored in a file cabinet in the psychology building. Only researchers directly associated with this project will have access to these surveys. Your participation is also completely anonymous. Your
name will not be connected to any of the answers you provide on this survey. None of the information will identify you by name.

If you have questions about your participation in the study or would like information on the results, please contact me, Candice Coffman, at cfcoffman@miners.utep.edu, or my faculty advisor, Dr. Lawrence Cohn, at lcohn@utep.edu.

If you have questions about your rights as a research participant, you may contact the UTEP Institutional Review Board (IRB) at 915-747-8841 or irb.orsp@utep.edu.

If you have experienced distress as a result of your participation in this study, please contact the University Counseling Center:
Address: 202 Union West, El Paso, Texas 79968
Phone: (915) 747-5302
Hours: Mondays & Tuesdays 8am-7pm, Wednesdays – Fridays 8am-5pm

Authorization Statement:
I have read the above information about my participation in this study and rights as a participant. I know that being in this study is voluntary, and I choose to be in this study. I will abide by the rules of this study and will complete the second half of the study on time. I will return three days from now to complete the survey. The following information may serve as my electronic signature:
Appendix Z

**Time 2 Recall Task (All Groups):**

Three days ago, you read a fact sheet and 6 web postings regarding the Human Papillomavirus (HPV) and the HPV vaccine. Please type *everything you remember* reading from the fact sheet and web postings in the space below:
Appendix AA

Time 2 Perceived Likelihood of Personal Risk (Counterbalanced, All Groups):

Imagine you are receiving the Human Papillomavirus (HPV) vaccine for the first time…

In your opinion, how likely are you to have a bad reaction to the Human Papillomavirus (HPV) vaccine if you received it during the next month? Slide the bar to indicate your likelihood.

Imagine you are receiving the Human Papillomavirus (HPV) vaccine for the first time…

In your opinion, how likely are you to have a normal reaction to the Human Papillomavirus (HPV) vaccine if you received it during the next month? Slide the bar to indicate your likelihood.
Appendix BB

Time 2 Perceived Likelihood of HPV/Cancer (Counterbalanced, All Groups):

If you decide not to get vaccinated, what is your likelihood of getting HPV in the future?

If you decide not to get vaccinated, what is your likelihood of getting cervical, penile, or other HPV related cancers in the future?
Appendix CC

Time 2 Perceived Seriousness (All Groups):

<table>
<thead>
<tr>
<th></th>
<th>Not Serious</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>Extremely Serious</th>
</tr>
</thead>
<tbody>
<tr>
<td>In your opinion, how serious would it be if you got HPV related cancer?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix DD

Time 2 Perceived Likelihood of Peer Risk (All Groups):

1. In your opinion, what is the likelihood that a male or female who is your age would experience minor problems, like fever, discomfort, or pain if they were administered the vaccine for the Human Papillomavirus (HPV)? Slide the bar to indicate the likelihood.

![Bar Chart](chart1.png)

2. In your opinion, what is the likelihood that a male or female who is your age would experience serious negative side-effects, like seizures, stroke, or appendicitis if they were administered the vaccine for the Human Papillomavirus (HPV)? Slide the bar to indicate the likelihood.

![Bar Chart](chart2.png)
3. In your opinion, what is the likelihood that a male or female who is your age would experience lasting health problems, like long-term seizures or infertility if they were administered the vaccine for the Human Papillomavirus (HPV)? Slide the bar to indicate the likelihood.

![Bar Graph]

84.62
Appendix EE

**Time 2 Perceived Effectiveness (Counterbalanced, All Groups):**

<table>
<thead>
<tr>
<th>In your opinion, do you think the HPV vaccine is effective in preventing genital warts?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completely Ineffective</td>
</tr>
<tr>
<td>Extremely Effective</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>In your opinion, do you think the HPV vaccine is effective in preventing cervical cancer?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completely Ineffective</td>
</tr>
<tr>
<td>Extremely Effective</td>
</tr>
</tbody>
</table>
Appendix FF

**Time 2 HPV Knowledge (All Groups):**

1. Had you heard of the Human Papillomavirus (HPV) before this study?
   - ☐ Yes
   - ☐ No
   - ☐ Not Sure

2. Had you heard of the vaccine for Human Papillomavirus (HPV) before this study?
   - ☐ Yes
   - ☐ No
   - ☐ Not Sure

3. Do you think Human Papillomavirus (HPV) is a sexually transmitted disease?
   - ☐ Yes
   - ☐ No
   - ☐ Not Sure

4. Do you think a Human Papillomavirus (HPV) infection can go away without treatment?
   - ☐ Yes
   - ☐ No
   - ☐ Not Sure

5. Do you think Human Papillomavirus (HPV) can cause genital warts?
   - ☐ Yes
   - ☐ No
   - ☐ Not Sure

6. Do you think Human Papillomavirus (HPV) can cause herpes?
   - ☐ Yes
   - ☐ No
   - ☐ Not Sure

7. People with Human Papillomavirus (HPV) might not have any symptoms:
   - ☐ False
   - ☐ True
   - ☐ Not Sure

8. The Centers for Disease Control and Prevention recommends the Human Papillomavirus (HPV) vaccine for girls and boys age 11-12 years old.
   - ☐ False
   - ☐ True
   - ☐ Not Sure

9. The Human Papillomavirus (HPV) vaccine can be administered to individuals up to age 26.
<table>
<thead>
<tr>
<th></th>
<th>False</th>
<th>True</th>
<th>Not Sure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix GG

**Time 2 Information Seeking (All Groups):**

Since the first part of the study, have you…

1. **Talked with anyone about the Human Papillomavirus (HPV) (check all that apply):**
   - □ Have not talked about HPV with anyone
   - □ Health care provider
   - □ Friend
   - □ Parent
   - □ Spouse or significant other
   - □ Other family member or person (please specify): ______________________

Since the first part of the study, have you…

2. **Talked with anyone about the Human Papillomavirus (HPV) vaccine (check all that apply):**
   - □ Have not talked about the HPV vaccine with anyone
   - □ Health care provider
   - □ Friend
   - □ Parent
   - □ Spouse or significant other
   - □ Other family member or person (please specify): ______________________
Since the first part of the study, have you…

3. **Read or received any information on the Human Papillomavirus (HPV) from the following sources (check all that apply):**

   - ☐ Media (TV News, Magazine, Newspaper)
   - ☐ Social Media (Twitter, Facebook, Instagram, etc.)
   - ☐ Internet sites (please specify): __________________
   - ☐ Other (please specify): _______________________

Since the first part of the study, have you…

4. **Read or received any information on the Human Papillomavirus (HPV) vaccine from the following sources (check all that apply):**

   - ☐ Media (TV News, Magazine, Newspaper)
   - ☐ Social Media (Twitter, Facebook, Instagram, etc.)
   - ☐ Internet sites (please specify): __________________
   - ☐ Other (please specify): _______________________

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Appendix HH

Time 2 Self-Generated ID (All Groups):

1. Which of the following is your favorite color?  
   1. ___ Blue  
   2. ___ Green  
   3. ___ Black  
   4. ___ Pink  
   5. ___ Red  
   6. ___ Yellow  
   7. ___ White  
   8. ___ Purple

2. What was your favorite subject in High School?  
   1. ___ Math/Science  
   2. ___ Art/Music  
   3. ___ Economics  
   4. ___ Foreign Language  
   5. ___ History  
   6. ___ English  
   7. ___ Speech  
   8. ___ Electives

3. What is your favorite type of T.V. show?  
   1. ___ Comedy  
   2. ___ Science Fiction  
   3. ___ Romance  
   4. ___ Reality T.V  
   5. ___ Horror  
   6. ___ Sports  
   7. ___ Crime  
   8. ___ News
4. What is your favorite type of car/truck?  
1. ___Mercedes  5. ___Volkswagen  
2. ___Volvo  6. ___Ford  
3. ___Buick  7. ___Nissan  
4. ___BMW  8. ___Toyota  

5. What is your favorite type of food?  
1. ___Burgers/hotdogs  5. ___Italian  
2. ___Chinese  6. ___Mexican  
3. ___German  7. ___Vegetarian  
4. ___Indian  8. ___Seafood  

6. What is your favorite type of music?  
1. ___Country  5. ___Metal  
2. ___Classical  6. ___Pop  
3. ___Electronic  7. ___Rap  
4. ___Gospel  8. ___Rock
7. What month were you born?

1. ____January
2. ____February
3. ____March
4. ____April
5. ____May
6. ____June
7. ____July
8. ____August
9. ____September
10. ____October
11. ____November
12. ____December
Appendix II

Time 2 Debriefing Form (All Groups):

The Relative Impact of HPV Vaccination Information in the Evaluation of Gist

Dear Participant,

During this study, you were asked to read information about the Human Papillomavirus (HPV) vaccine. You were then asked to answer questions on your perception of the vaccine. As stated in the consent form, the purpose of the study was to examine health communications.

To avoid influencing the perceptions of future participants, we ask that you do not discuss this study with your peers as it may affect our ongoing data collection.

You are reminded that your original consent document included the following information: Your part in this study is confidential. You will be asked to write your first name and email address on a survey separate from the study. This survey will be stored separately from the other materials and only used to contact you for the second session of the study. All records will be stored in a file cabinet in the psychology building. Only researchers directly associated with this project will have access to these surveys. Your participation is also completely anonymous. Your name will not be connected to any of the answers you provide on this survey. None of the information will identify you by name.
If you have any concerns about your participation or the data you provided in light of this disclosure, please discuss this with us. We will be happy to provide any information we can to help answer questions you have about this study.

If your concerns are such that you would now like to have your data withdrawn, we will do so.

If you have questions about your participation in the study or would like information on the results, please contact me, Candice Coffman, at cfcoffman@miners.utep.edu, or my faculty advisor, Dr. Lawrence Cohn, at lcohn@utep.edu.

If you have questions about your rights as a research participant, you may contact the UTEP Institutional Review Board (IRB) at 915-747-8841 or irb.orsp@utep.edu.

If you have experienced distress as a result of your participation in this study, please contact the University Counseling Center:

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Phone: (915) 747-5302
Hours: Mondays & Tuesdays 8am-7pm, Wednesdays – Fridays 8am-5pm

More information about the Human Papillomavirus vaccine can be obtained from the Centers for Disease Control at the following website: http://www.cdc.gov/hpv/vaccine.html.
If you are interested in where you may receive the vaccine, you may contact your personal insurance provider or the UTEP Student Health Center:

Address: Union Building East, 351 W. University Avenue Ste 100, El Paso, Texas 79968
Phone: (915) 747-6545
Hours: Monday-Thursday 8am-4pm, Friday 8-11am & 1-4pm

Please again accept our appreciation for your participation in this study.
Appendix JJ

**Raffle Information (All Groups):**

Please provide us with the following information in order to be entered into the raffle to win a $100 Visa gift card. Eight winners will be selected upon completion of data collection. Your information will be kept confidential and will not be linked with your survey responses.

First Name:  

Best Email to Contact You:  

Best Phone Number to Contact You:
**Curriculum Vita**

Candice Coffman earned her Bachelor of Arts degree in Psychology from Texas State University in 2010. She also completed all of the coursework towards a Master’s degree in Clinical Psychology from the University of Texas of the Permian Basin. Candice began the doctoral program in Health Psychology at the University of Texas at El Paso (UTEP) in 2014.

Candice Coffman has served as a research assistant and assistant instructor for the UTEP Psychology Department. She has also assisted in the UTEP Provost’s Office with programmatic assessment and university accreditation. She is currently the Director of Faculty Support and Instructional Quality for Drury University.

Candice Coffman’s thesis, *Twitter Posts, Gist, and the Perceived Harmfulness of the Human Papillomavirus Vaccine*, was supervised by Dr. Lawrence D. Cohn.

This thesis was typed by Candice Coffman

**Contact Information:** cfcoffman@miners.utep.edu