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Influence Of Political Affiliation, Distrust Of Government And Pharmaceutical Companies On Hpv Vaccination Intentions And Uptake

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INFLUENCE OF POLITICAL AFFILIATION, DISTRUST OF GOVERNMENT AND
PHARMACEUTICAL COMPANIES ON HPV VACCINATION INTENTIONS
AND UPTAKE

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2021

Dedication

This thesis is wholeheartedly dedicated to my parents, who have been my source of inspiration and strength throughout this process. All of the “You can do this mija”’s are what got me through the moments that felt impossible. You both were right, I did it! To my big sister Ale, thank you for doing this first and making it look so easy. You are my biggest role model, and I couldn’t have done this without your help.

I also dedicate this thesis to my sweet Nini and Uncle Honey. Although both of you didn’t have the chance to physically be here to witness this accomplishment, I felt your spirits looking over me every step of the way.

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ALYSSA ANDREA MARTINEZ, B.S., CHES

THESIS

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Abstract

Background and Significance: The Human Papillomavirus (HPV) is the most common sexually transmitted infection (STI) in the United States. Currently, approximately 79 million people in the United States are infected with HPV. The CDC estimates that there are nearly 31,500 cases of cancers caused by HPV each year in the United States. Cervical cancer is the most common HPV-related cancer and almost all cervical cancers are caused by a few strains of HPV. Research suggests that Latinx women residing in the U.S.-Mexico border may be at increased risk of contracting HPV types that cause cervical cancer. Although there is no treatment for HPV, there is a primary form of prevention, an HPV vaccine. The United States has one of the most liberal vaccination policies allowing for religious and other forms of exemptions. These exemptions are set in place to reduce perceptions of government intrusion on individual autonomy. Attitudes about the role of the government in regulating individual freedoms for immunization measures are closely linked to political affiliation. **Objective:** The purpose of the study is to determine the moderating influence of political affiliation and the mediating influence of distrust of government and pharmaceutical companies on the established association between perceived benefits and severity and vaccination intentions and uptake. **Methods:** The HPV VAKS survey is a cross-sectional survey that will collect demographic information such as age, sex, ethnicity, sexual activity, number of children, and whether their children or themselves have received the HPV vaccine. Knowledge, culture, religion, political affiliation, and familism will also be measured through the survey to assess how they contribute to vaccine uptake among the El Paso community. Factors that may contribute to vaccine acceptance such as trust in the government, health care providers, and other resources will be measured. **Results:** Results indicate that endorsement of a conservative political affiliation and greater distrust of government and pharmaceutical companies is associated with reduced

likelihood of vaccination. Distrust did not mediate the relationship between political affiliation and vaccination likelihood. On the other hand, perceived benefits of vaccination and severity of contracting HPV is positively associated with vaccination. Political affiliation did not moderate the association between perceived benefits and severity and vaccination likelihood.

Conclusion: Results have implications for the development of vaccination promotion public health interventions including tailored interventions designed to reduce distrust and to inform Latinx communities about the benefits of vaccination and negative consequences associated with HPV.

Key words: Human Papillomavirus, Cervical Cancer, HPV Vaccine, Vaccine Intentions, Health Belief Model, Political Affiliation, Distrust in Government

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Introduction

The number of Latinx individuals living in the United States reached 60.6 million in 2019, a new record high (Noe-Bustamante et al., 2020). Latinx individuals now make up 18% of the United States population compared to 16% in 2010. Over the last 9 years, Latinx individuals have accounted for more than half (52%) of the population growth in the United States. Moreover, Texas ranks number 1 among the 3 states with the biggest increase in the Latinx population between 2010 and 2019 (2 million increase) (Noe-Bustamante et al., 2020). According to the 2019 census, El Paso's Latinx population is 82.9%. Despite comprising a sizable segment of the U.S. population, Latinx are disproportionately affected by health disparities in many domains, including reproductive health. Specifically, Latinx women are disproportionately affected by high cervical cancer rates compared to non-Latinx white women.

Cervical Cancer Among Latinx Women

U.S. Latinx women experience a higher cervical cancer incidence compared to non-Latinx white women. According to the CDC, the incidence rate of cervical cancer among Latinx women is higher (8.9/100,000) compared to their non-Latinx white counterparts (7.3/100,000) (CDC, 2020). Unfortunately, U.S. Latinx women also experience higher cervical cancer morbidity and mortality. The cervical cancer mortality rate in Latinx women is 2.6/100,000 compared to Non-Latinx white women which is 2.1/100,000. In 2015, the American Cancer Society predicted that approximately 2,000 Latinx women living in the United States would be diagnosed with cervical cancer. Of those 2,000, 600 were expected to die from cervical cancer. Health disparities in cancer morbidity and mortality are attributed to reduced screening and

screening at a later course of the disease among Latinx women compared to non-Latinx white women (American Cancer Society, 2020).

As stated above, despite having one of the highest incidence rates of cervical cancer, Latinx women undergo significantly fewer cervical cancer preventative screenings (American Cancer Society, 2020). Additionally, screening rates vary by other sociodemographic factors such as country of birth. For example, Latinx foreign born immigrant women who have been living in the United States for less than 10 years are less likely to have been screened in the last 3 years compared to those who have been in the United States for 10 or more years. Furthermore, Latinx women who have no insurance, or a public form of insurance, are less likely to screen for cervical cancer and are less likely to return for a follow-up after an abnormal exam result (American Cancer Society, 2020).

Human Papillomavirus as the Primary Precursor of Cervical Abnormalities

The Human Papillomavirus (HPV) is the most common sexually transmitted infection (STI) in the United States (CDC, 2019). Currently, approximately 79 million people in the United States are infected with HPV. HPV is most prevalent in teens and young adults in their early 20's and is most commonly transmitted through vaginal or anal sex (CDC, 2019). There are over 100 types of HPV and certain strains cause genital warts and cancers of the vulva, vagina, penis, or anus. Strains of HPV can also cause cancer in the back of the throat, and in the tongue and tonsils (oropharyngeal cancer). The most common symptoms of HPV include warts in the genitals or surrounding skin (Mayo Clinic, 2020). The CDC (2018) estimates that there are nearly 31,500 cases of cancers caused by HPV each year in the United States. However, cervical cancer is the most common HPV-related cancer and almost all cervical cancers are caused by a few strains of HPV (American Cancer Society, 2020). In particular, HPV types 16 and 18 cause 70% of cervical cancers and pre-cancerous cervical lesions (WHO, 2019).

Cervical cancer is most commonly diagnosed in women aged 35 to 44 years old, with the average being 50 years old. It is uncommon for cervical cancer to develop in women who are younger than 20 years old. Benard et al (2012) conducted a study which used two federal surveillance systems to quantify the burden of cervical cancer among women 40 years old and younger. Researchers found that 78% of cervical cancers were diagnosed among women ages 30-39, 21% among women 20-29, and 1% in women younger than 20 years old. According to the American Cancer Society (2021), it is predicted that about 14,480 new cases of invasive cervical cancer will be diagnosed in 2021. Of those women diagnosed, about 4,290 will die from cervical cancer.

Research suggests that Latinx women residing in the U.S.-Mexico border may be at increased risk of contracting HPV types that cause cervical cancer. Healthy Paso Del Norte reported that El Paso's rate of cervical cancer is 9.8/100,000, which is higher than the Texas rate (9.2/100,000) and the U.S. rate (7.6/100,000) (Healthy Paso De Norte, 2020). A study conducted along the U.S.-Mexico border to determine the prevalence and distribution of HPV subtypes among 585 women ages 21-65 years old, indicated that HPV subtype prevalence was 53.2% with the most high-risk common subtype 16, occurring in 3.08% of study participants (Shokar et al., 2020). Additionally, among the 53.2%, 48% had multiple HPV infections at the time of screening. The high prevalence of HPV infections among Latinx women residing along the U.S.-Mexico border underscores the need for cervical cancer prevention interventions in this area (Shokar et al., 2020). Although there is no treatment for HPV, there is a primary form of prevention, an HPV vaccine.

The HPV Vaccine

Gardasil 9 is a 3-dose HPV vaccine that is approved by the Food and Drug Administration (FDA). This vaccine is recommended for 11- and 12-year-old adolescent males and females to maximize immunological protection. The vaccine may be administered as early as 9 years old and up to 45 years old (Mayo Clinic, 2020.) Currently, the CDC recommends that adolescents 9-14 years old receive at least two doses six months apart. Teens and young adults who begin the vaccine series later, at ages 15 through 26, should receive the three doses (Mayo Clinic, 2020). Because the HPV vaccine confers protection for approximately 70% of cervical cancers, individuals who have been vaccinated should continue to screen for cervical cancer. The American Cancer Society recommends that cervical cancer screenings should begin at age 25. People aged 25-65 should be screened for HPV every 5 years using a primary HPV test. If primary HPV testing is not available, screening can be done using a test that combines an HPV test with a Papanicolaou (Pap) test. Pap tests alone should be conducted once every 3 years (American Cancer Society, 2020).

Widespread vaccination against HPV can reduce the HPV incidence and ameliorate ethnic disparities in cervical cancer rates. According to the CDC, first dose vaccine uptake in 2019 was 71.5%. Unfortunately, vaccination completion rates among Latinx are lagging. Although vaccination uptake among Latinx (72.8%) is above non-Hispanic whites (70.6%), Latinx are less likely to complete the recommended 2-dose vaccination regimen (Galbraith, et al., 2016). In 2019, vaccination completion rates among Latinx adolescents living in Texas was only 52.4% (CDC, 2019), well below the 80% Healthy People 2020 vaccination goal (Galbraith, et al., 2016). However, in El Paso, Texas, completion rates among Latinx adolescents are above the state average, (65.5%) yet below the level needed to achieve herd immunity.

Background and Significance

The Health Belief Model

Past research investigating factors that influence HPV vaccine acceptance has focused on parents, given their role in making vaccination decisions for their children. Parental research on HPV vaccine acceptance has been dominated by prominent health behavior change theories such as the health belief model (HBM) to understand the factors that facilitate or hinder parental HPV vaccination acceptance for children. The HBM is one of the most widely used theories to predict health behavior (Glanz & Bishop, 2010). This theory postulates that an individual's motivation to enact a behavior is predicted by the following factors: 1) perceived risk of contracting a disease, 2) their beliefs about whether the consequences of the disease are harmful, 3) their perception of whether the benefits of adopting the behavior will decrease or prevent a disease, 4) their perceptions of the potential barriers or costs "related to the realization of the behavior", 5) the perceived external events that remind the individual that a potential course of action is available to prevent or treat a disease, and 6) the perceived self-efficacy to enact a behavior (Guvenc et al., 2016). The specific constructs of the HBM are labeled perceived susceptibility of contracting a disease, perceived severity of the consequences of contracting a disease, perceived benefits of enacting a behavior to prevent or treat a disease, perceived barriers to enacting the behavior, availability of cues to action, and perceived self-efficacy (Rimer, 2008).

In the context of HPV vaccine acceptance research, the HBM constructs have informed studies that investigate whether each of these constructs emerge as influences on parental acceptance of the HPV vaccine. Perceived susceptibility has been defined as perceptions of the likelihood of contracting HPV or being diagnosed with cervical cancer. Perceived severity has

been defined as the beliefs about how negative the perceived consequences of contracting HPV or being diagnosed with cervical cancer could be. Perceived severity and susceptibility have been defined as the perceived threat that an HPV or cervical cancer diagnosis represents. Perceived benefits has been defined as the perceived effectiveness of the vaccine against HPV and cervical cancer (Rimer, 2008). Perceived barriers assessed in the context of HPV vaccination have ranged from monetary (cost of the vaccine), inconvenience (multiple doses separated by time), availability of the vaccine, fear of negative side effects, and barriers more socio-contextual in nature such as perceptions that the vaccine may encourage early initiation of sexual activity in pre-teens (Rimer, 2008). The following section will discuss the major findings from the HPV vaccine parental acceptance research.

As stated above, the first HPV vaccine was approved by the FDA in 2006. One year later in 2007, Brewer and Fazekas conducted the first literature review on parental HPV vaccine acceptance research that had been produced by then. The authors were interested in assessing the role of behavioral theory in the conduct of past research. Twenty-eight articles related to parental vaccine acceptance for adolescents and young adults published from 1995 to 2007 were identified for inclusion (Brewer & Fazekas, 2007). All studies were conducted and published before the FDA approval of the HPV vaccine. A key finding was that the HBM was one of the models that was most widely used to inform studies on parental HPV vaccine acceptance. Findings indicated that perceived severity was the second most influential factor in predicting parental acceptance of HPV vaccines (Brewer & Fazekas, 2007). Among the studies identified, perceived severity of children contracting HPV had not been measured. Regarding perceived benefits, parents identified vaccine effectiveness as being very important. Furthermore, cues to action appeared to be highly predictive of vaccine acceptance as vaccine uptake was higher

among parents who had received a doctor's vaccination recommendation. The most common perceived barriers that parents mentioned included vaccine cost and concerns about the short and long-term side effects of vaccination. In addition, between 6 and 12% of parents identified concerns that vaccination would promote sexual activity in quantitative studies while in qualitative studies this concern seemed more pronounced. An important finding was that research on HPV vaccine acceptance conducted up to that point had centered on non-Latinx parents and adolescents. The authors concluded that findings may not generalize to minority populations, such as Latinx and African American parents. The authors made a call for further research to understand parental HPV vaccine acceptance among populations at highest risk of cervical cancer morbidity and mortality.

Eleven years later in 2016, a second review of the literature on parental HPV acceptance research was conducted with a focus on U.S. African-American and Latinx ethnic minority parents, populations at highest risk of the negative health sequelae of HPV. This literature review conducted by Galbraith and colleagues (2016) condensed the findings of 67 studies. By then, studies conducted varied to the extent to which they were informed by health behavior theories with some not being informed by any theory and others being informed by other theories beyond the HBM including the theory of reasoned action. Findings of the review indicated that awareness of HPV and HPV vaccine acceptance varied by parental socio demographics with Latinx parents, who scored higher on U.S. acculturation, being more aware of HPV. However, high vaccine acceptance among Latinx parents, ranging from 80% to 97%, was observed. By 2016, several studies had investigated the influence of perceived susceptibility on vaccination uptake and findings indicated that parents' low perceived risk of daughters contracting HPV and low perceived severity of daughters being diagnosed with cervical cancer, were inversely related

to vaccination. Barriers to vaccine acceptance that had been documented in the 2007 literature review conducted by Brewer and Fazekas such as lack of perceived vaccine safety evidenced by fears of the possible short- and long-term side effects of vaccination also emerged in the 2016 review. However, among ethnic minority parents, sexuality-related concerns including the concern that the HPV vaccine will lead to premarital sexual activity emerged as an important barrier. A previously undocumented barrier that emerged included mistrust of government and pharmaceutical companies by African American parents. Completion of the HPV vaccine recommended regimen was associated with daughters' older age, not being Latinx or Black, and having a higher household income (Galbraith et al., 2016). Although this review was conducted almost a decade after the Brewer and Fazekas review, some of the gaps in knowledge that had been identified such as a dearth of research among Latinx and African American parents were also identified. New findings emerged such as greater concerns related to sexual disinhibition and mistrust of government and pharmaceutical companies. However, the review also documented the continued prominence of a few health behavior change theories such as the HBM and the theory of planned behavior (TPB) in parental HPV vaccine acceptance research and the authors made a call for the inclusion of theories that would allow a deeper consideration of aspects of sociocultural context especially if further insight on the vaccination facilitators and barriers of ethnic minorities was to be unveiled.

Research has shown that provider recommendations, which the TPB would quantify as a cues to action factor, is highly predictive of vaccine acceptance as vaccine uptake is higher among parents who had received a doctor's vaccination recommendation. In a review of the literature conducted on provider recommendations for HPV vaccination, several studies showed non-vaccination to be linked to low provider recommendation. Kester et al (2012) found that for

adolescent girls who had received one or more dose, 90% (n=223) reported that their provider recommended the vaccine. Furthermore, several studies among Latinx parents found low provider recommendations as a main barrier to HPV vaccination intention and completion. In a qualitative study among Latinx immigrant parents, Aragonés et al., (2015) found that lack of provider recommendation was one of three main barriers to HPV vaccination among 9–17-year-olds. Similarly, Jeudin et al., (2014) conducted a study that measured race, ethnicity, and income factors that impact HPV vaccination. They found that low-income minority adolescents are equally or more likely to start the HPV vaccination series compared to their non-Latinx white counterparts with higher incomes. However, low-income minority adolescents are less likely to complete the 3-dose series. Provider recommendations emerge as a key factor in HPV vaccination intention and completion, and ethnic minority parents of adolescent boys and girls are less likely to report receiving these recommendations.

Although past research does indicate that the constructs of the HBM and the TPB, which are the theories most widely used in immunizations research, do predict vaccination intention and uptake, these theories are limited in their consideration of aspects of sociocultural context. This is underscored by the conclusions of the seminal reviews discussed above which call for additional research to understand how other variables that may better capture the context of a person's life, variables other than perceived severity of HPV, and attributes of the vaccine such as safety and effectiveness and logistical vaccination barriers (e.g., cost, access) influences vaccination intentions and uptake. The Galbraith et al., 2016 review alluded to some possibilities such as distrust of government and pharmaceutical companies. To our knowledge, the potential influence of distrust has not been studied in Latinx parents. This is a significant gap in research as studying the potential influence of these variables and other associated demographic factors

among ethnic minority parents is important because the healthcare experiences of members of ethnic minority communities are often negative compared to non-ethnic minorities. In addition, the context in which the HPV vaccine became available to the general public is unique compared to other childhood immunizations. This context needs to be considered in further research to capture other variables of influence in efforts to better design health promotion campaigns aimed at promoting vaccination. Below, I discuss the context in which the HPV vaccine was introduced in the United States and hence, variables that should be studied because they may capture this context.

Public Controversy and HPV Vaccination State Mandates in the United States

There has been an increased fear among public health experts that public perceptions of immunizations are changing due to the unprecedented sharing of information facilitated through the rapid advances in communication technology that we have experienced as a society. Individuals, now more than ever, have access to an unprecedented vast amount of information about health innovations at a global scale. The unprecedented availability of information has made evident the need to increase the public's understanding related to the science behind vaccination particularly about vaccine safety (Francois et al., 2005). The rolling out of the HPV vaccine in the U.S. was not informed by a carefully planned public health strategy designed to provide easily understandable information about the science behind vaccination. The public's perception of vaccine safety and effectiveness may have been compromised as a result.

Furthermore, the information disseminated by different entities was not balanced so that constituents could understand the role of lobbying efforts and politics involved so that trust among the public could be guarded. The importance of addressing this unmet need is

underscored, in the case of the HPV vaccine, because before licensure, pharmaceutical companies developed and implemented aggressive campaigns directed at medical providers and politicians. These aggressive efforts yielded results after licensure; the Advisory Committee on Immunization Practices recommended the HPV vaccine for 11-12 young adults which then promoted legislative attempts at mandating the vaccine. Over the course of a year right after licensure, 24 U.S. states had attempted to pass some form of vaccine mandate and 41 some form of effort to promote uptake (Colgrove Abiola, & Mello, 2010). However, the aggressive involvement of pharmaceutical companies may have eroded the trust of the public as although the HPV vaccines had proven to be safe and effective, mandate efforts were perceived as proceeding very quickly and provoked the public's resistance (Gostin, 2011). Controversy centered on political and ethical concerns. Colgrove et al., (2010), conducted a study that involved 73 key informants from six states that were engaged in HPV vaccine mandate legislation and policy deliberations at the time of the study. The states included California, Indiana, New Hampshire, New York, Texas, and Virginia. All six states are geographically and politically diverse with a wide range of vaccination policies (Colgrove et al., 2010). The results of this study found that factors impeding the adoption of an HPV vaccine mandate included newness of the vaccine, the sexually transmitted nature of HPV, non-transmissibility of HPV in the classroom setting, discomfort with the vaccine manufacturer's involvement, and price of the vaccine (Colgrove et al., 2010). The resistance and controversy further promoted negative attitudes towards vaccination and inhibited parental acceptance. Controversy over the flurry of efforts and attempted school immunization mandates increased media attention which in turn capitalized on publicizing rare negative vaccine side-effects which in turn, fueled mistrust of government and pharmaceutical companies marketing the vaccine. Media attention centered

around fears of vaccine safety and promoting early onset of sexual relations among adolescents (Gibbs, 2006; O'Rourke, 2007; Charo, 2007). As a result of the controversy generated, efforts at passing school entry immunization efforts ceased. Presently, only three U.S. states mandate the HPV vaccine: Virginia, District of Columbia, and Rhode Island which have rates above the national average (Rosen, et al., 2017). Although this controversy was quite notorious, very few studies have been conducted to understand the potential influence of politics and distrust of government and entities promoting vaccination on HPV vaccination intention and uptake.

Political Affiliation, Distrust of government and Pharmaceutical Companies, and HPV Vaccine Attitudes

Political Affiliation and its Role in Controversy

The United States has one of the most liberal vaccination policies, allowing for religious and other forms of exemptions (Charo, 2007). These exemptions are set in place to reduce perceptions of government intrusion on individual autonomy (Salmon et al., 2005). Attitudes about the role of the government in regulating individual freedoms ranging from gun control to immunization measures are closely linked to political affiliation. In fact, in the United States, political affiliation is associated with perception and acceptance of immunization mandates. In a study, Bernstein et al (2016) aimed to assess how political orientation influence health behaviors in the United States. The researchers used the Annenberg National Health Communication Survey (ANHCS) data to examine health behaviors such as flu vaccinations and it was found that democrats/liberals had higher odds of flu vaccinations. Regarding HPV vaccine acceptance research, previous studies have assessed how political affiliation impacts HPV vaccination rates. Researchers found that adolescents living in Democratic states were significantly more likely to have received the HPV vaccine (63.4% girls, 47.4% boys) compared to adolescents in Republican states (56.0% girls, 33.9% boys). The considerable controversy that shrouded the unveiling of the HPV vaccine in the United States provoked resistance and controversy and politics were closely intertwined with the resistance. The resistance seemed to follow along the lines of political bipartisanship as respondents who affiliated with the Republican political party vocally demonstrated antipathy toward government coercion by expressing that “the bar should

be set very high for any governmental intrusion on individual or parental autonomy” (Colgrove et al., 2010).

Particularly in Texas, resistance against this “governmental coercion” showed to be a prominent feature in the civic environment in the state, whether discussion involved vaccine mandates or not. Rick Perry, the Republican governor of Texas in 2007, signed an executive order that required all girls ages 11-12 to be vaccinated against HPV. This executive order stated that girls who had not been vaccinated would not be allowed to enroll in sixth grade without a Non-Medical Exemption (Tanne, 2007). As result of this executive order, Perry came under legal fire from the Texas attorney general, stating that the policy was an intrusion on parental discretion and opened the doors for “teenage promiscuity” (Charo, 2007). As a result of the backlash, the executive order was quickly overturned. Furthermore, in order to discredit the legislative effort of Governor Perry, a payment of Merck, the company marketing the HPV vaccine, towards his political campaign came to the surface. Controversy over governmental efforts to make the vaccine mandatory prompted the mass media to provide unprecedented coverage to the HPV vaccine relative to other vaccines. Further, the media has drawn considerable attention to the conflict of financial interests of politicians attempting to make vaccination mandatory such as the case of Texas Governor Perry. This controversy created undue concern about the safety and effectiveness of the vaccine (Keelan, Pavri, Balakrishnan, & Wilson, 2010; Tozzi et al., 2010).

The current state of information dissemination about HPV and the vaccine may have fueled uncertainty and skepticism particularly in medically underserved ethnic minority parents and may have reduced their motivation to prevent adverse consequences of HPV. The state of Texas has been a Republican state since the 1980 Presidential election. However, El Paso is

among the large urban cities in Texas that is largely Democratic. In the 2016 Presidential election, 69.08% of El Pasoans voted Democratic and 66.8% voted Democratic in the 2020 election (Massachusetts Institute of Technology, 2020). Although El Paso residents vote largely democratic there is variation. The proposed study will be the first study to investigate the influence of political affiliation on perceptions of the vaccine and vaccination intentions and uptake in a setting where considerable controversy was generated, and political bipartisanship largely determined views about the HPV vaccine.

Distrust of Government and Pharmaceutical Companies

To complicate matters, the primary source of parental information about the HPV vaccine was at one point dominated by aggressive media campaigns and magazine ads sponsored by pharmaceutical companies marketing the vaccine (Hughes et al., 2009). A closer examination of the information being disseminated by pharmaceutical companies reveals that vaccination benefits are emphasized at the expense of risks of side-effects. This state of information dissemination could have also created undue skepticism in medically underserved ethnic minority parents, particularly, because their experience with the healthcare system is often negative and results in distrust (Oakley, Lopez-Cevallos, & Harvey, 2019). Moreover, in light of the state of information dissemination, it is important to understand how variables associated with skepticism of government and pharmaceutical companies may be influencing vaccination intentions and uptake among ethnic minority parents (Sanders Thompson, Arnold, & Notaro, 2011). Research conducted to understand how this controversy may have affected parental attitudes centered on the influence of social media. Several studies were conducted to understand how parents discussed and perceived this controversy and the potential influence on vaccine

attitudes. A systematic review of the literature indicated that 57% of the 35 most watched YouTube videos posted between June and December 2014, were negative or anti-vaccine (Ortiz, Smith, & Coyne-Beasley, 2019)

In recent years, outbreaks of vaccine preventable diseases such as measles and pertussis have been largely in part to high rates of nonmedical exemptions (NMEs) (Lee et al., 2016). Recent studies have attempted to understand why a parent may choose to obtain an NME for their children in efforts to better improve vaccine rates in populations with high vaccine refusal and distrust. Lee et al., (2016) conducted a study among parents of school age children across various states. This study found that parents who distrust the government and their healthcare providers are more likely to refuse to vaccinate their children. Parents who distrust the government were 2.11 times more likely to visit an alternative medicine doctor than parents who do trust the government. Similarly, parents who distrust the government were more likely to trust vaccine misinformation from alternative medicine doctors as well as thinking government sources such as the CDC, FDA, and local and state health departments are unreliable than those who do trust the government (Lee, 2016). This study concluded that parents who distrust government entities need to be reached using different communication methods.

Confidence in vaccines and the systems that produce them are important for acceptance and trust of vaccines. In a study conducted in 2019, researchers explored the beliefs of non-Latinx white and African American adults in regard to the influenza vaccine produced by both government and pharmaceutical companies (Jamison et al., 2019). Among 119 adult participants, it was found that most participants did not trust pharmaceutical companies and believed that they are solely motivated by profit. Additionally, non-Latinx white participants self-reported to have more trust in the government than African American participants. Non-Latinx white participants,

although self-reported more trust, questioned government competency while African American participants were more doubtful of government motives. While being interviewed, a major theme among African American participants included the history of medical racism. Many participants voiced their mistrust in the government and its motives, and used examples in history, such as the Tuskegee experiment, and current acts of discrimination. African Americans displayed significant mistrust in government and pharmaceutical companies, who they saw as having the ability to use minority populations as guinea pigs to test experimental vaccinations. Although public health experts and medical providers cannot undo injustices from the past, it is important for them to recognize these feelings of mistrust and take steps to strengthen trust among minority populations. One way to do this includes to explore the concept of trustworthiness and determine if institutions that produce vaccinations are doing enough to earn the trust of the public. The study concluded that trust among government and pharmaceutical companies is fragile and difficult to gain. Research that focuses on what the government and pharmaceutical companies can do to increase vaccine confidence and trust is needed.

Vaccine Hesitancy

Vaccines are one of the most cost-effective and efficacious methods for primary disease prevention at the individual and community level. Since the first smallpox vaccine created by Edward Jenner in 1796, vaccines have saved numerous lives and have improved the health and well-being of individuals worldwide (World Health Organization [WHO], 2014). The WHO estimates that vaccines prevent up to 3 million deaths every year (WHO, 2019). Although no vaccine is 100% effective, when widely used in communities, vaccines have the power to eliminate and even eradicate disease, this is known as herd immunity. However, in order to reach herd-immunity, high uptake rates among individuals and communities must be achieved. Although vaccines have been recognized as a significant public health invention, a growing number of populations are delaying or refusing vaccines for themselves and/or their children.

In 2014, the SAGE Working Group (WG) defined vaccine hesitancy as “an instance where people with access to vaccines delay or refuse vaccination” (WHO, 2014). Vaccine hesitancy is a nascent field of research as it was only in 2012 that a formal working group was assembled to research and define vaccine hesitancy (McDonald & The Sage Working Group, 2015). However, the research that has been conducted to date suggests that it can be the result of factors such as complacency, convenience, and confidence (3 C’s model) and is complex and context specific, varying across time, people, and vaccines. The 3 C’s model was developed to help researchers better understand vaccine hesitancy and human behavior. In the context of the of 3 C’s model, complacency is defined as existing where perceived risks of vaccine-preventable infections are low and the need to be vaccinated is not seen as necessary to prevent illness. Convenience includes availability of the vaccines, affordability, willingness to pay, accessibility, ability to understand the language and health literacy of the vaccine and recipient, and the appeal

of the vaccine. Finally, confidence is defined as the trust in the effectiveness and safety of the vaccine, trust in the system that delivers the vaccine, and the motivations of political figures who determine that vaccines are needed and necessary (McDonald & The Sage Working Group, 2015). Vaccine hesitancy used to be seen as set on a continuum with individuals ranging from accepting all vaccines without hesitation or doubt to individuals who refuse all vaccines. However, WG now emphasizes that hesitancy is more of a behavioral phenomenon that is specific in terms of which vaccine is in question and the context, with a goal of reaching a specified vaccination goal (McDonald & The Sage Working Group, 2015).

Recently there has been a surge in vaccine hesitancy that has led to reduced vaccinations and as a result, an increase in the number of people presenting with diseases that had been significantly reduced or eradicated due to herd immunity, such as the measles. In 2019, WHO listed vaccine hesitancy as one of the top 10 biggest threats to global health (WHO, 2019). One of the main drivers of vaccine hesitancy are concerns regarding vaccine safety, which can be traced as far back as the introduction of the smallpox vaccine mandate in the mid-1800's (Larson et al., 2011).

In a study to determine what motivates parents to seek second opinions for vaccinating their children against HPV, Wong et al (2021) found that parents who reported seeing information about the HPV vaccine on social media were more likely to seek second opinions (OR = 2.50, 95% CI: 1.69, 3.69). Additionally, as mentioned above, with the internet and various social media platforms, individuals who are vaccine hesitant now have the ability to rapidly disseminate both information and misinformation to a vast number of individuals in an unprecedented way. Social media platforms give new opportunity for organization and empowerment among online communities who share the same ideologies.

Highly Publicized Autism-vaccination Link Eroded Trust in Vaccines

Concerns with vaccine safety grew as a result of the highly publicized autism-vaccination link. In 1998, concerns about vaccine safety increased dramatically after a now retracted publication in *The Lancet*, by Andrew Wakefield and 12 of his colleagues, suggested a causal link between the measles-mumps-rubella (MMR) vaccine and autism spectrum disorder (ASD). This publication generated public controversy due to vast media coverage, which led to a decline in MMR vaccine uptake and boosted the anti-vaccine movement (Budzyn et al, 2010). Shortly after publication, multiple epidemiological studies that refuted the link between the MMR vaccine and autism were conducted and published except that the media no longer publicized such studies. In 2010, Wakefield lost his medical license for medical misconduct, yet the implications of his infamous publication remain at the forefront of various anti-vaccine movements.

There is few research that explores how racial and ethnic differences influence different attributions for the cause of ASD and the consequential vaccine hesitancy. In a study conducted among 225 parents of children with ASD, researchers used the Parent Attitudes about Childhood Vaccines (PACV) survey and the Revised Illness Perception Questionnaire to measure vaccine hesitancy. Of the parents 225 parents surveyed, 65 (28.9%) were reported to be vaccine hesitant (PACV score > 50) (Chang & Kochel, 2020). Significant differences among White and non-White parents were found. White vaccine hesitant parents believed that their child's ASD was a result of deterioration of their child's immunity due to vaccines. All vaccine hesitant parents, regardless of race and ethnicity, believed that diet, their own decisions, and vaccines were all potential causes of ASD (Chang & Kochel, 2020).

Vaccine Hesitancy Among U.S. Ethnic Minorities

As stated above, Latinx populations, specifically those living on the U.S./Mexico border, are at an increased risk for invasive cervical cancers. Past research on vaccine hesitancy in the United States indicates that Latinx parents are less likely to be vaccine hesitant (Szilagyi et al., 2020). As stated above, vaccine hesitancy refers to specifically refusing or delaying vaccination when recommended. In a study conducted by Szilagyi and colleagues to determine HPV vaccination barriers, more than 75% of parents who have vaccinated their children against HPV reported that vaccination was convenient and recommended by their child's pediatrician. Although, 18% reported that the costs of the vaccine and not having access to regular care posed difficulty. Furthermore, researchers of this study found that parents who had received a doctor recommendation were far less likely to be hesitant, while those who reported difficulty with cost and access to care reported to be more hesitant.

In summary, the Health Belief Model in particular, has been prominently featured in HPV vaccine parental acceptance research. A vast number of studies informed by the health belief model have been conducted to date. Findings suggest that perceived benefits of vaccination, in particular perceived vaccine effectiveness at preventing HPV and perceived severity of contracting HPV consistently emerge as predictors of vaccination intentions and uptake across several studies, including those conducted with ethnic minority parents. In addition, a provider's recommendation, which has been conceptualized as a cue to action, is one of the strongest predictors of vaccination intentions and uptake and conversely lack of recommendation emerges as a barrier. Lack of information about the vaccine and fear of side effects also emerge as barriers. Notable gaps in prior research with populations that are disproportionately affected by HPV and cervical cancer such as Latinx include limited

understanding of whether political affiliation and distrust of government and pharmaceutical companies influence vaccine intentions and uptake. In particular, no prior study has investigated how political affiliation and distrust influences the health belief model constructs of perceived severity and benefits and the link between such constructs and vaccination intent and uptake among Latinx parents.

Additionally, there is fewer research on vaccine hesitancy among Latinx populations likely than non-Latinx populations. As vaccine hesitancy is of growing concern due to a rise in previously eradicated, vaccine-preventable diseases, reasons being vaccine hesitancy is of the utmost importance. Research regarding how political affiliation along with constructs of the HBM such as perceived benefits and perceived severity affects vaccine uptake is lacking, especially among Latinx populations.

Study Aim

The aim of the proposed study is to investigate the influence of political affiliation and its role in strengthening or diminishing the link between perceived severity and benefits of vaccination intention and uptake. This study will also investigate the potential mediating role of distrust of the government and pharmaceutical companies on the influence of vaccination intentions and uptake.

The study of these associations has received little attention and no research has examined the role of these variables in vaccination intention and uptake among Latinx parents. As mentioned above, few studies have examined the influence of distrust and political affiliation among Latinx individuals. It is important to continue to understand the factors that may inhibit vaccination uptake among Latinx who are disproportionately affected by health disparities in cervical cancer rates.

Study Purpose

The purpose of the study is to determine the moderating influence of political affiliation and the mediating influence of distrust of government and pharmaceutical companies on the established association between perceived benefits and severity and vaccination intentions and uptake. The hypotheses for the proposed study are the following:

Hypotheses:

1. Perceived benefits of vaccination and perceived severity of contracting HPV will be positively related to vaccination likelihood and uptake.
2. Conservative political affiliation will moderate the relationship between benefits, severity and vaccination likelihood such that this association will be attenuated among individuals who self-report a conservative political affiliation.
3. Endorsement of a conservative political affiliation will be inversely related to vaccination likelihood and mistrust about government and pharmaceutical companies will mediate the relationship between political affiliation and vaccination likelihood.

Methods

Participants

A total of 600 participants were recruited to take part in an online survey. Participants who self-reported to have children were 436. Of these, the majority was Spanish-speaking females ages 25-44 with an average household income of \$40,000 or more.

Procedure

The survey was administered online via UTEP QuestionPro to adults ages 18-65 living and/or working in El Paso, Texas between 06/2020 and 08/2020. Participants were recruited through Facebook ads based on the following inclusion criteria; men and women ages 18-65, living and/or working in El Paso, Texas.

Participants were recruited via social media platforms such as Facebook. Advertisement filters to include the inclusion criteria were used to ensure that participants meet the requirements to participate in this survey. Electronic consent forms were used to obtain consent from each participant before completing the survey. Participants completed the survey online using their personal computers, phones, or tablets. Surveys took approximately 30 minutes to complete. Upon completion of the survey, participants were compensated for their time with a \$25 e-gift card to Walmart.

The first two questions of the survey verified eligibility criteria, specifically that participants were between the ages of 18 and 65 and living or working in El Paso County. Once participants' responses indicated that they meet this criterion, the survey obtained consent through an electronic consent form. The survey design included an attention checker that required the participant to verify he/she was present. Upon completion of the survey, participants

were directed to a compensation sheet which asked for the participant's email, initials and date of survey completion. Participants then received an email with a link to an e-gift card to compensate them for their time. The UTEP IRB approved the study.

Measures

Participants were asked to answer the following survey measures:

Demographics. The following nine questions assessed demographic characteristics: "Are you between the ages of 18 and 65?" "Do you live or work in El Paso County?" Response options were: (1) *yes*, (2) *no*. "What is your age in years?" "Please provide your zip code." "What races do you identify with? (Select all that apply.)" Response options were: (1) *White*, (2) *Black*, (3) *Asian*, (4) *Pacific-Islander*, (5) *Native-American*, (6) *Other*, and (7) *Prefer not to answer*." "Please indicate if you are Hispanic or Latino." Response options were: (1) *Non-Hispanic*, (2) *Hispanic/Latinx/Spanish Descent*, (3) *Prefer not to answer*. Spoken languages (Select all that apply)." Response options were: (1) *English*, (2) *Spanish*, (3) *American Sign Language (ASL)*, (4) *Spanish Sign Language (SLS)*, (5) *Other*, (6) *Prefer not to answer*. "What is the primary language spoken at home?" Response options were: (1) *English*, (2) *Spanish*, (3) *Other*. "What is your total combined family income for all members in your household?" Response options were: (1) *Less than \$5,000*, (2) *\$5,001-\$20,000*, (3) *\$20,001-\$40,000*, (4) *\$40,001-\$60,000*, (5) *\$60,001-\$80,000*, (6) *\$80,001-\$100,000*, (7) *\$100,001 or more*. "Which gender identity do you most identify with?" Response options were: (1) *Male*, (2) *Female*, (3) *Transgender Female*, (4) *Transgender Male*, (5) *Gender Variant/Non-Conforming*, (6) *Prefer not to answer*.

Political Affiliation. Political affiliation was measured with one single item: "What is your political affiliation?" Response options include the following: (1) *None*, (2) *Prefer not to*

answer, (3) *Very conservative*, (4) *Somewhat conservative*, (5) *Middle of the road (moderate)*, (6) *Somewhat liberal*, (7) *Very liberal*. For the purposes of statistical analysis prefer not to answer was considered a missed response, and responses were aggregated such that very conservative and somewhat conservative were aggregated into conservative and somewhat liberal and very liberal were aggregated into liberal. This computation yielded a variable with 4 responses: None, Conservative, middle of the road, and liberal. Moreover, k-1 or three dummy coded variables were computed comparing no political affiliation versus others, conservative versus others, and liberal versus others.

Mistrust of Government and Pharmaceutical Companies. Mistrust of government and pharmaceutical companies were measured with two items: “The HPV vaccine is being pushed to make money for drug companies and/or doctors.” “I would not get a vaccine because I do not trust what the government says about it.” Responses were captured on a 5-point Likert scale: (1=*Strongly disagree*, 2=*Disagree*, 3=*Neither agree nor disagree*, 4= *Agree*, 5= *Strongly agree*). These two items were aggregated for the purposes of analysis, interitem correlation = .48.

Vaccination Likelihood. Vaccination likelihood was measured with two items adapted from Frieze et al., (2020): “How likely are you to get your daughter vaccinated for HPV?” “How likely are you to get your son vaccinated for HPV?” Response items were captured on a 5-point Likert scale: (1) *Not applicable*, (2) *Not at all likely*, (3) *Unlikely*, (4) *Neutral*, (5) *Somewhat likely*, (6) *Extremely likely*. Not applicable was considered a missed response. These two items were aggregated for the purposes of analysis, interitem correlation = .92.

Vaccination Uptake. Vaccination uptake was measured with one item: “Have any of your children received the HPV vaccine?” Response items include the following: (1) *Yes*, (2) *No*, (3) *Prefer not to answer*. Prefer not to answer was considered a missed response.

Perceived severity. Three items adapted from Frietze et al., (2020) were used to assess perceived severity: “How severe do you think genital HPV infection is for a female partner?” “How severe do you think genital HPV infection is for a male partner?” and “How severe do you think genital HPV infection is for yourself?” Response items include the following: (1) *Not severe at all*, (2) *A little severe*, (3) *Somewhat severe*, (4) *Very severe*, (5) *Extremely severe*, (6) *Not applicable*. Not applicable was considered a missed response. These items were aggregated for the purposes of analyses, $\alpha = .66$.

Perceived benefits (effectiveness). A single item adapted from Frietze et al., (2020) was used to assess perceived benefits (effectiveness): “I believe the HPV vaccine is effective in preventing genital HPV (e.g., vaginal, penile, or anal).” Responses were captured on a 5-point Likert scale, (1=*Strongly disagree*, 2=*Disagree*, 3=*Neither agree nor disagree*, 4=*Agree*, 5=*Strongly agree*).

Religiosity. Three items were used to assess religiosity: “In my life, I experience the presence of the divine (i.e., God).” “My religious beliefs are what really like behind my whole approach to life.” “I try hard to carry my religion over into all other dealings in life.” Responses were captured on a 5-point Likert scale, (1=*Strongly disagree*, 2=*Disagree*, 3=*Neither agree nor disagree*, 4=*Agree*, 5=*Strongly agree*). These items were aggregated for the purposes of analyses, $\alpha = .82$.

Statistical Analyses

A power analysis assuming a small effect ($r = 0.12$), determined that approximately 543 participants were required to achieve at least 80% power to detect an effect. A sample of 600 participants will be recruited which will yield the necessary power to test the proposed analyses. Before proceeding to test hypotheses, all variables were inspected to ensure their

distribution conforms to normality assumptions. Box-plots were created for all continuous variables and skewness and symmetry was assessed.

Descriptive statistics including frequencies and means were computed to describe the sample. In addition, bivariate correlations were computed to test associations between variables hypothesized to be significantly related. All missing data was handled using multiple imputation (MI) accepting the mild assumption that incomplete data arise from a conditionally random (MAR) mechanism.^{40,9} P-value was set at .05 and confidence intervals for parameters were estimated.

To test the proposed hypotheses, bivariate correlations, a path analysis, and linear regression were computed with statistical software MPLUS²⁵ and SPSS²⁶, respectively. Figures 1 and 2 present the models that were tested. The lines depict the corresponding associations that were tested to yield answers to the proposed hypotheses. Bivariate correlations allowed the estimation of associations between perceived benefits and perceived severity and vaccination likelihood and uptake (Hypothesis 1). Path analysis allowed the estimation of direct effects to test the association between political affiliation and vaccination likelihood and indirect effects to test the mediating effect of mistrust of government and pharmaceutical companies on the political affiliation and vaccination likelihood link (hypothesis 3).

In order to test the moderating impact of political affiliation on the perceived severity and benefits - vaccination likelihood link (hypothesis 2), two linear regression equations were computed. Two interaction terms, one for perceived severity and political affiliation and one for perceived benefits and political affiliation were computed. The procedure delineated by Hayes (2018) was followed. Specifically, Hayes (2018) defined a moderation effect (W) as a statistically significant interaction term ($X*W$), regardless of whether W affects the outcome, Y.

Thus, mediation was tested as the cross-product of the a-path coefficient (a = effect of X on M) and b-path coefficient (b = effect of M on Y). However, because there is no theoretical sampling distribution for the $a*b$ cross-product, repeated bootstrapped samples yielding 1000 randomly generated estimates of the mediated effects ($k=1000$) was used which approximate an empirically derived sampling distribution that is then used to create a 95% confidence interval around the $a*b$ effect¹⁹ along with heteroscedasticity-consistent standard errors, is the primary mode to determine the presence of mediation. We also applied a bias correction as the sampling distribution that is derived can be, and often is, skewed (i.e., confidence intervals are often asymmetrical with respect to the upper and lower bound estimates surrounding the mediated effect).¹⁹All continuous data was analyzed in the SPSS macro titled PROCESS,²¹⁻²³ which is capable of estimating valid coefficients for binary outcomes using the Newton-Raphson iteration algorithm.²¹⁻²³

Results

Missing data. Missing data was handled through multiple imputation using the multiple imputation procedure in SPSS v.27. Missing data patterns were inspected which revealed that 2.26% of the demographic values were missing with the exception of the variable political affiliation for which 20% (N = 88) of the values were missing. For the model variables, 17.23% of values were missing and the percent missing among variables ranged from 14.9% to 59.7% with the variables intentions and likelihood of vaccinating children missing 45.5% and 59.7% respectively due to a planned missing data survey design. The multiple imputation procedure was employed to impute missing values for variables with >5% missing data as recommended by Graham (2012). A fully conditional specification MCMC multiple imputation procedure was computed with 40 imputations and 50 iterations following the recommendations of Graham (2012). The datasets were aggregated for analyses.

Hypothesis Testing. To test the hypothesis that perceived benefits of vaccination and perceived severity of contracting HPV would be positively related to vaccination likelihood and uptake, first, bivariate correlations were computed. Table 2 presents the correlations. As Table 2 indicates, vaccine uptake was only significantly associated with vaccination likelihood ($r=.35$, $p < .01$). Consequently, all subsequent analysis were computed with vaccination likelihood as the dependent variable and the influence of variables on vaccination uptake was not considered further.

To test the hypothesis that endorsement of conservative political affiliation would moderate the relationship between benefits, severity, and vaccination likelihood such that the benefits and vaccination likelihood and severity and vaccination likelihood associations would be attenuated among individuals who self-report a conservative political affiliation, two linear

regressions were computed using the enter procedure. For each regression equation, the dependent variable was vaccination likelihood. For one of the regression equations, the independent variables were the dummy coded variable comparing endorsement of conservative political affiliation versus others, perceived benefits, and the computed interaction term between political affiliation and perceived benefits. For the second regression equation, the independent variables were the dummy coded variable comparing endorsement of conservative political affiliation versus others, perceived severity, and the computed interaction term between political affiliation and perceived severity. Tables 6 and 7 present the results. As these tables indicate, only perceived severity ($\beta = .12, p < .02, \text{Adjusted } R^2 = .050$) and perceived benefits ($\beta = .37, p < .01, \text{Adjusted } R^2 = .156$) emerged as significantly associated with likelihood of vaccinating children against HPV.

To test the hypothesis that endorsement of a conservative political affiliation would be inversely related to vaccination likelihood and mistrust about government and pharmaceutical companies would mediate the relationship between political affiliation and vaccination likelihood, first, a linear regression was computed with the three dummy coded political affiliation variables to test the association between political affiliation and vaccination likelihood. Results indicated that the dummy coded variable contrasting conservative political affiliation versus other emerged as significantly associated with likelihood of vaccinating children against HPV ($\beta = -.21, p < .001, \text{Adjusted } R^2 = .037$). To test the mediating influence of mistrust on the political affiliation-vaccination likelihood link, first, the indirect effect of mistrust was computed using path analysis. Tables 3 and 4 present the indirect, direct, and total effects estimates. As these Tables indicate, an indirect effect of mistrust was not statistically significant. However, a direct effect of mistrust on vaccination likelihood emerged ($\beta = -.46, p < .001$).

Exploratory Analysis. In order to investigate the influence of all variables considered including religiosity on vaccination likelihood, a linear regression using the enter procedure, was computed with vaccination likelihood as the dependent variable and political affiliation (3 dummy coded variables), mistrust, perceived severity and benefits, and religiosity as the independent variables. Table 7 presents the results. As Table 7 indicates, conservative political affiliation vs others ($\beta = -.17, p < .001$), mistrust ($\beta = -.39, p < .001$), and perceived benefits ($\beta = .20, p < .001$) emerged as significantly associated with vaccination likelihood, adjusted $R^2 = .291$.

Discussion

Summary of Results

The purpose of the study was to determine how political affiliation and distrust of government and pharmaceutical companies influence HPV vaccination uptake. As the results of the hypotheses testing mentioned above showed, the prediction that perceived benefits and perceived severity would be associated with HPV vaccination uptake was not corroborated. Although the reasons why associations with vaccination uptake were not significant are not clear, I would like to discuss some possibilities. One possibility is that the study was not adequately powered to detect the association. Second, vaccination uptake may be associated with logistical barriers rather than the variables assessed in this study.

Because vaccination uptake was not significantly associated with other assessed variables, focus of the analysis shifted to compute vaccination likelihood as the dependent variable. Furthermore, an exploratory analysis was conducted to investigate how the variables of interest were associated with likelihood, as this variable was significantly associated with other variables assessed. Results of the exploratory analysis showed that endorsement of conservative political affiliation compared to others and distrust of government and pharmaceutical companies were inversely related to vaccination likelihood. In other words, individuals who self-reported a conservative political affiliation conveyed reduced likelihood of vaccination compared with individuals who self-reported other political affiliations and greater distrust was also associated with reduced likelihood of vaccination. However, distrust did not emerge as a mediator of the relationship between political affiliation and vaccination likelihood. Although results do not support distrust as a possible explanation for this association, both distrust and political affiliation emerged as significantly associated among a sample of primarily Latinx individuals.

This finding corroborates prior research conducted with other ethnic minority populations and warrants further study including reasons for the distrust. To my knowledge, this is the first study to document this association among a sample largely composed of Latinx individuals.

Furthermore, perceived benefits and severity were significantly associated with likelihood to vaccinate against HPV such that greater perceived benefits of vaccination and greater perceived severity of contracting HPV was associated with greater likelihood of vaccinating. The associations between perceived benefits and severity have been extensively documented in the literature and it is important to note that these factors continue to emerge as significant influences on vaccination likelihood.

While the original predictions that included HPV vaccination uptake did not show to be significant in this study, the finding that the association of conservative political affiliation, distrust of government and pharmaceutical companies, perceived benefits, and likelihood to vaccinate against HPV is impactful.

Implications for Future Research

From the start of this thesis project, it was apparent that the topic and timing were relevant to the current state of the nation. Particularly, with the hesitancy surrounding the highly politicized COVID-19 vaccine. The results from this thesis project and the timing in history may have a significant impact on how researchers promote interventions for mass vaccination. The results and lessons learned from this thesis project have implications for future vaccination research, especially among minority populations, such as that of El Paso. In particular, the results of this study can guide future research on attitudes about other vaccines, such as the COVID-19 vaccine, among individuals who identify as politically conservative. The results from this study may have implications on how HPV vaccination campaigns are targeted towards parents who

live in conservative geographical regions. Future researchers can determine where vaccine hesitancy exists in El Paso and the reasons behind it. The finding that political affiliation did not moderate the relationship between perceived benefits, severity, and likelihood, suggests that educational interventions should promote the severity of vaccine-preventable disease and the benefits of vaccination among Latinx individuals who endorse a conservative political affiliation, as political affiliation did not attenuate this relationship. Moving forward, interventions that provide non-biased, evidence-based education to parents of adolescents, may help in combating vaccine hesitancy and move El Paso closer to optimal HPV vaccination rates.

As found in the literature, results also indicate that distrust of government and pharmaceutical companies is negatively associated with likelihood of vaccination. Trust, especially in governmental entities and large for-profit companies is hard to gain once it is lost. Research on how the United States government and Big Pharma can learn from past acts of racism, prejudice, and wrongdoings among minority populations is needed to help these populations have trust in life saving vaccines and the systems that produce them. Although El Paso's vaccine rate is higher than the rest of Texas, it is still below the needed coverage to achieve herd immunity against high-risk types of HPV that cause cervical cancer. This study shows that distrust of government and pharmaceutical companies is present in a majority Latinx population.

Strengths and Limitations

A major strength of this study is the population that was surveyed. During the literature review process, research that focused primarily on Latinx populations, vaccine hesitancy, political affiliation, and distrust of government was minimal compared with research with ethnic majority populations. The findings of this study can serve as a baseline assessment to assess

changes in attitudes after interventions are deployed. Future research should study how corporations such as Big Pharma can establish trust and confidence among populations, especially those similar to El Paso. Particular to El Paso, more research on conservative political affiliation and hesitation against vaccinations other than HPV is also needed.

As in many cases, the COVID-19 pandemic posed many challenges and limitations for this thesis project. When the data collection methods were initially developed, it was planned to be completed in person. Research assistants were to be deployed into the public, targeting busy areas of the city such as grocery stores in different zip codes, downtown El Paso, and other locations with high foot traffic. This method would allow for the data captured to be diverse in representation of the population. However, as COVID-19 restrictions began to tighten, data collection methods moved to virtual platforms, such as Facebook, for the safety of the research team and participants. Although Facebook allows researchers to apply various target filters for promotion, control for who the survey was targeted to was limited. Additionally, online participation did not allow for participants to ask for clarification on questions, resulting in missing data on important questions such as political affiliation.

An important limitation was how political affiliation was measured in this study. As mentioned above, political affiliation was measured with one single item: “What is your political affiliation?” Response options included the following: (1) *None*, (2) *Prefer not to answer*, (3) *Very conservative*, (4) *Somewhat conservative*, (5) *Middle of the road (moderate)*, (6) *Somewhat liberal*, (7) *Very liberal*. For the purposes of statistical analysis prefer not to answer was considered a missing response, and responses were aggregated such that very conservative and somewhat conservative were aggregated into conservative and somewhat liberal and very liberal were aggregated into liberal. This computation yielded a variable with 4 responses: None,

conservative, middle of the road, and liberal. However, we determined that this method of measurement posed many challenges, as a majority of the participants (41%) responded *None*. The large proportion of none responses is perhaps due to the political divide that the United States is currently experiencing. According to a study conducted by the Pew Research Center, Americans are more divided ideologically compared to 19 other countries surveyed (Dimock & Wike, 2020). This stark divide between political parties may be due to the fact that the United States has a rigid two-party system that draws a solid battle line between both parties. As we progress through history, it has been noted that division between Republicans and Democrats continues to intensify. The 2020 election emulated this divide. The 2020 election had the highest voting turnout in 120 years, with each candidate representing two different groups of people who share deep mistrust of each other and disagree over most policies (Dimock & Wike, 2020). Additionally, other personal identities such as race, religion, and beliefs have been shown to be part of one's political affiliation in a way that has only been seen during eras of intense division. Reflecting on this thesis project, it is our assumption that many people who were surveyed may have had difficulty identifying with either of these political parties due to the current political climate. Perhaps choosing the answer choice "*None*" resonated more compared to identifying oneself with one of the two deeply divided political parties.

Additionally, if studies similar to this one was to be conducted among a diverse population such as El Paso's, in-person data collection would be optimal in an effort to target a more diverse set of participants to represent that of El Paso's more accurately. As shown in Table 1, 82.8% of participants identified as female, and 71.3% of participants were ages 25-44. Furthermore, in-person participation would allow for clarification on questions that may have felt confusing to participants. However, if online data collection were to be replicated, using

more precise Facebook and QuestionPro filters to target a more diverse population should be considered. For instance, utilizing the QuestionPro setting that would allow for an equal number of female and male participants.

Conclusion

In conclusion, this thesis project found that conservative political affiliation, distrust of government, and perceived benefits of vaccination against HPV, and perceived severity of contracting HPV among parents is significantly associated with likelihood of vaccinating children against HPV. These findings contribute to the literature among Latinx populations, where notable gaps in research that include these variables exist.

IRB Approval

The survey and study have been approved by the University of Texas at El Paso Institutional Review Board (IRB).

MPH Program Foundational Competencies

1. *Evidence-based Approaches to Public Health*
 2. Select quantitative and qualitative data collection methods appropriate for given public health context
 3. Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate
 4. Interpret results of data analysis for public health research, policy or practice.
2. *Public Health and Health Care Systems*
 6. Discuss the means by which structural bias, social inequities and racism undermine health and create challenges to achieving health equity at organizational, community and societal levels
3. *Planning and Management to Promote Health*
 8. Apply awareness of cultural values and practices to the design or implementation of public health policies or programs
4. *Policy in Public Health*
5. *Leadership*
 16. Apply principles of leadership, governance, and management, which include creating a vision, empowering others, fostering collaboration and guiding decision
6. *Communication*
 18. Select communication strategies for different audiences and sectors
 19. Communicate audience-appropriate public health content, both in writing and through oral presentation
 20. Describe the importance of cultural competence in communicating public health content

7. *Inter-Professional Practice*

21. Perform effectively on inter-professional teams

8. *Systems Thinking*

22. Apply systems thinking tools to a public health issue

MPH Program Hispanic and Border Health Concentration Competencies

1. State the principles of prevention and control of disease and discuss how these can be modified to accommodate cultural values and practices in Hispanic and border communities.
2. Develop prevention strategies for the different stages of the major communicable and non-communicable diseases in Hispanic and US/Mexico border communities.
3. Differentiate quantitative health indicators in major communicable and noncommunicable diseases in US/Mexico border vs non-border communities.

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Figure 1. Mediation Model

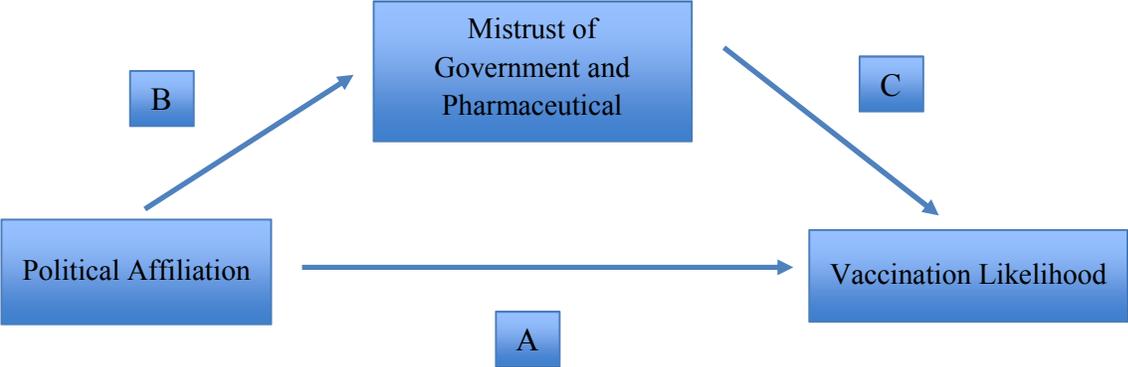


Figure 2. Moderation Model

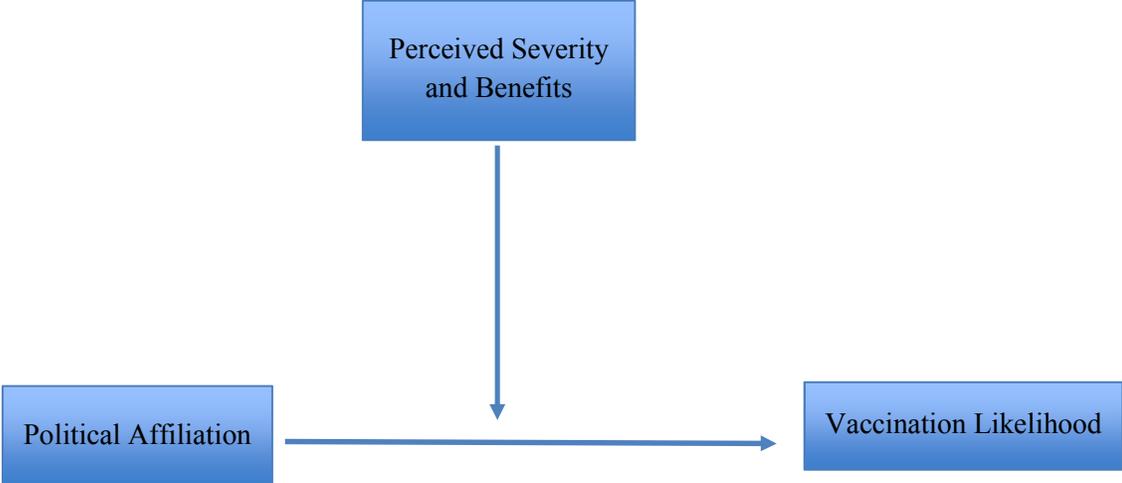


Table 1. Demographic Characteristics (N = 437)

	<i>f</i>	%
Gender		
Male	66.6	15.2
Female	361.8	82.8
Transgender	0	0
Non-Conforming	8.6	2
Age		
20 to 24	22.2	0.5
25 to 44	311.6	71.3
45 to 54	54.6	12.4
55 to 64	27.3	6.2
65 and over	1	0.2
Monthly Income		
Less than \$5,000	56.4	12.9
\$5,000-20,000	96.2	22.0
\$20,001-40,000	125.2	28.6
\$40,001 or more	159.2	36.4
Child Vaccinated		
No	203.2	46.5
Yes	233.8	53.5
Self Vaccinated		
No	327.2	74.9
Yes	109.8	25.1
Political Affiliation		
None	188.2	43.1
Conservative	70.8	16.2
Moderate	98.2	22.5
Liberal	79.7	18.2
Primary Language		
English	176.4	40.4
Spanish	260.6	59.6
Other	0	0
STI and Reproductive Cancer Diagnoses		
Cervical Cancer	40	9.2
Vulvar Cancer	0	0
Genital Warts	23	5.3
Herpes	29	6.6
Penile Cancer	3	0.07
Anal Cancer	2	0.05
Head and Neck Cancer	6	0.1
Throat Cancer	17	0.4

Note. Numbers have been rounded to the nearest 100^t

Table 2. Bivariate Correlations (N = 437)

	1	2	3	4	5	6	7
1. HPV Vaccine Uptake	--	.35**	-.05	.09	.06	-.02	.07
2. HPV Vaccination Likelihood		--	.20**	.36**	.10*	.46**	-.00
3. Political Affiliation			--	-.12*	.05	.02	.12*
4. Perceived Benefits				--	.08	.33**	-.05
5. Perceived Severity					--	-.10*	.01
6. Mistrust of Government and Pharma						--	.05
7. Religiosity							--

Note. *p<.05;**p<.01. Political affiliation is dichotomous comparing 1 = ‘conservatives’ versus 0 = ‘others.’ Greater religiosity scores indicate less religiosity.

Table 3. Path Analysis Direct and Indirect Effects (N=437)

Direct Effects		<i>β</i>	<i>SE</i>	<i>p</i>
Political Affiliation	Mistrust of Government and Pharma	-.11	.06	.08
Political Affiliation	Vaccination Likelihood	-.25	.06	<.001
Mistrust of Government and Pharma	Vaccination Likelihood	-.46	.04	<.001
Indirect Effects		<i>β</i>	<i>SE</i>	<i>p</i>
Mistrust of Government and Pharma	Vaccination Likelihood	.02	.05	.39

Note. β standardized path coefficient, *SE* standard error. Political affiliation is dichotomous comparing 1 = ‘conservatives’ versus 0 = ‘others.’

Table 4. Total, Direct, and Indirect Effects of Mistrust on Vaccination Likelihood (N=436)

Effect	Point Estimate	Product of Coefficient		Bootstrapping 5000 Times CI Bias Corrected	
		<i>SE</i>	<i>z</i>	Lower	Upper
Total	-.466	.106	--	-.676	-.257
Direct	-.437	.093	--	-.621	-.252
Indirect	-.029	.050	-.584	-.130	.068

Table 5. Influence of Political Affiliation, Severity, and their Interaction on Likelihood of Vaccinating Children against HPV (N=437).

Variable	B	SE	<i>B</i>	95% CI	<i>t</i>	<i>p</i>
Political Affiliation Conservative vs Others	-.41	.411	-.181	-1.21,.39	-.99	.318
Perceived Severity	.126	.055	.123	.01,.23	2.30	.022
Political Affiliation x Severity	-.021	.113	-.033	-.24,.20	-.18	.857

Note. Political Affiliation variables are dummy coded variables.

Table 6. Influence of Political Affiliation, Benefits, and their Interaction on Likelihood of Vaccinating Children against HPV (N=437).

Variable	B	SE	<i>B</i>	95% CI	<i>t</i>	<i>p</i>
Political Affiliation Conservative vs Others	-.400	.423	-.177	-1.23,.43	-.94	.344
Perceived Benefits	.371	.057	.337	.25,.48	6.52	.022
Political Affiliation x Benefits	.008	.112	.013	-.21,.22	-.21	.944

Note. Political Affiliation variables are dummy coded variables.

Table 7. Linear Regression Testing Factors associated with Likelihood of Vaccinating Children against HPV (N=437)

Variable	B	SE	<i>B</i>	95% CI	<i>t</i>	<i>p</i>
Political Affiliation None vs Others	.014	.090	.007	-.16,.19	.16	.872
Political Affiliation Conservative vs Others	-.386	.100	-.17	-.58,-.18	-3.85	<.001
Political Affiliation Liberal vs. Others	-.092	.097	-.042	-.28,.09	-.95	.341
Mistrust of Government and Pharma	-.447	.049	-.398	-.54,-.35	-9.18	<.001
Perceived Severity	.057	.042	.056	-.02,.13	1.36	.139
Perceived Benefits	.222	.048	.202	.12,.31	4.61	<.001
Religiosity	.038	.038	.042	-.03,.11	.99	.112

Note. Political Affiliation variables are dummy coded variables (others is coded as zero). Greater religiosity scores indicate less religiosity.

Vita

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Alyssa Martinez received her Bachelor of Science in Health Promotion with minors in Community Health and Biological Sciences from the University of Texas at El Paso in May 2019. She then continued her education and pursued her Master of Public Health with a concentration in Hispanic and Border Health from the University of Texas at El Paso in December 2021. During her Graduate School career, Alyssa served as a Graduate Research Assistant for UTEP's School of Pharmacy and the Department of Public Health Sciences. She worked closely with Dr. Margie Padilla, Dr. Gabriel Fietze, and Dr. Eva Moya under a grant that focuses on HPV vaccine attitudes and knowledge, as well as a newly funded grant that focuses on COVID-19 in the El Paso community. At the height of the pandemic, Alyssa also volunteered for the UTEP COVID-19 clinic, where she created educational materials for patients and providers, assisted with patient check-in, and facilitated the patient observation rooms. For her Master of Public Health Thesis, Alyssa worked with her faculty mentor Dr. Julia Lechuga from the Department of Public Health Sciences.

Currently, Alyssa works for the City of El Paso Department of Public Health as a Cancer Disease Intervention Specialist. In this role, she serves the El Paso community by connecting residents to cancer screening services at an affordable cost. Her research areas of interest include infectious diseases, reproductive health and community health. After receiving her MPH, Alyssa plans to further her education at UTEP, pursue her PhD in Interdisciplinary Health Sciences, and continue her research on HPV vaccines.