7-2024

# Parental View on HPV Vaccination

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This doctoral project, directed and approved by the candidate's committee, has been accepted by the College of Graduate and Professional Studies of Abilene Christian University in partial fulfillment of the requirements for the degree

**Doctor of Nursing Practice**

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# Parental Views on HPV Vaccination

A dissertation submitted in partial satisfaction

of the requirements for the degree of

Doctor of Nursing Practice

by

Rebecca Elaine Rhodes

July 2024

## Dedication

This doctoral project is dedicated to the extraordinary school nurses whose unwavering dedication, exceptional care, and profound compassion significantly impact students' lives in the present and for years to come. Your relentless pursuit of excellence in health advocacy, preventative care, and holistic support nurtures students' physical well-being. It fortifies their mental and emotional resilience, enabling them to reach their fullest potential. Through your skilled hands and caring hearts, schools transform into sanctuaries of health, safety, and support, where every child can thrive, learn, and grow in an environment that prioritizes their well-being and can reach their fullest potential.

I also dedicate this work to the school nurse leaders. This dedication also honors your transformative influence on the students you serve and the school nurses within your guidance. You inspire, mentor, and create leaders around you, fostering a community of professionals who are as compassionate as they are competent. Your visionary leadership ensures that the impact of school nursing extends far beyond the walls of any institution, contributing to a healthier, brighter future for all students and the nurses dedicated to their care.

**Acknowledgments**

First and foremost, I offer my deepest gratitude to God, for His unending grace has been my stronghold throughout this journey. Through His strength and guidance, I navigated the challenges and celebrated the triumphs of this endeavor. Without Him, none of this would have been possible. To my beloved husband, Doug, and my dear daughter, Hannah, words cannot fully express my appreciation for your unwavering support, love, and encouragement. Your sacrifices have not gone unnoticed, and this achievement is as much yours as it is mine. Your patience and belief in me have been the bedrock of my perseverance. To the rest of my family, I greatly appreciate your part in my journey. Thank you for being an inspiration and support system.

I extend my heartfelt thanks to my academic mentors, who have been instrumental in guiding me through this rigorous journey. To my Chair, Dr. Faisal Aboul-Enein, whose wisdom, support, and unwavering encouragement have been invaluable, and Dr. Catherine Garner, whose guidance and encouragement have significantly shaped my academic path. Dr. Sandra Cleveland deserves a special mention for her guidance and support across many of my classes, imparting lessons that have been fundamental to my growth.

I want to thank the incredible Nursing and Health Services staff who supported my journey. To Ali Hernandez, Amanda Castellanos, Joanna Muniz, Nancy Garcia, and Sylvia Macias, your support, prayers, and encouragement have been a source of strength and inspiration. Your contributions to my journey have been immeasurable. Lastly, but certainly not least, to my DNP partner in crime, Wendy Carley, chasing your pace has been a challenge and a joy. Your support, love, and friendship have been pillars of my success. I am profoundly grateful that God brought us together on this journey. Here’s to calling each other Doctor.

## Abstract

The human papillomavirus (HPV) is a sexually transmitted infection widely seen in the United States. Millions of Americans are affected by it each year, especially those in their late teens and early 20s. Although most infections will resolve on their own, 1 in 10 will lead to health problems such as cancer. The HPV vaccine can prevent over 90% of associated precancers and cancers. However, uptake of the HPV vaccine and its completion among adolescents are significantly lower than other recommended adolescent immunizations, falling short of the Healthy People 2030 goal of 80% coverage. Understanding parental attitudes, beliefs, and perceptions about access to the HPV vaccine is crucial for developing targeted interventions to increase vaccine uptake because parents and guardians make health-based decisions for their children and adolescents. To gain insight, a community assessment was completed using a modified Carolina HPV Immunization Attitudes and Beliefs Scale survey in a quantitative cross-sectional design supplemented with questions assessing perceptions of access. This assessment identified parents' and guardians' attitudes, beliefs, and perceptions of access to the HPV vaccine. Over 8 weeks, participants, including parents or guardians of adolescent students in grades 6–8 in a large southwest U.S. school district, completed the questionnaire once. Results revealed significant factors contributing to low HPV immunization rates, including perceived barriers to access and misconceptions about the vaccine's efficacy and safety. The insights gained from this project can then be used to inform targeted interventions to enhance HPV immunization rates among students in the school district, contributing to the body of knowledge on strategies to increase vaccine acceptance and uptake.


*Keywords:* HPV, vaccination, immunization rates, vaccine efficacy and safety

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# Chapter 1: Introduction

The human papillomavirus (HPV) is the most prevalent sexually transmitted infection (STI) in the United States (Centers for Disease Control and Prevention [CDC], 2022b, 2022c). It affected 42.5 million individuals and resulted in 13 million new infections in 2018, primarily among those in their late teens and early 20s (CDC, 2022b, 2022c). Belonging to the Papillomaviridae family, this non-enveloped, double-stranded, circular DNA virus is recognized for causing infections that can cause abnormal tissue growths, such as warts, and cell changes leading to precancers and cancers (Luria & Cardoza-Favarato, 2022; National Cancer Institute, 2011). The concern of HPV infections is underscored by direct healthcare costs of $775 million incurred in 2018 (CDC, 2021b).

HPV infections are commonly spread through close skin-to-skin contact during vaginal, penile, anal, and oral sexual intercourse, and even when someone has no signs or symptoms of infection (CDC, 2022b). Although most HPV infections resolve independently within 2 years, one in 10 infections can lead to health problems such as genital warts, precancerous cell changes, and cancers of the cervix, vulva, vagina, penis, anus, and oropharynx (CDC, 2021c, 2022c). However, the HPV vaccine can prevent over 90% of HPV-associated cancers and precancers of the anal, vaginal, cervical, and vulvar regions (CDC, 2022a). The HPV vaccine is most effective when received before exposure to HPV (CDC, 2022a), making it a powerful mechanism to protect against cancer and disease-causing HPV infections (President's Cancer Panel, 2018).

Despite over 15 years of monitoring and research demonstrating the safety and effectiveness of the HPV vaccine series, the uptake rates among adolescents are lower than other recommended immunizations (Texas Department of State Health Services [DSHS], 2021). Recognizing the need to understand the underlying factors contributing to low HPV

immunization rates, this project investigated the attitudes, beliefs, and perceptions of access parents and guardians of adolescent students in grades 6–8 in a large southwest U.S. school district have to the HPV vaccine. In a community-based assessment, a modified version of the Carolina HPV Immunization Attitudes and Beliefs Scale (CHIAS) survey with questions assessing perceptions of access was utilized in a cross-sectional design to identify parental and guardian attitudes, beliefs, and perceptions of access to the HPV vaccine. The goal was to be able to identify and develop interventions to increase HPV vaccine uptake among adolescent students.

**Problem of Interest**

The general problem of interest is the low uptake and completion of the HPV immunization series. Annually, the CDC surveys parents and guardians to identify the level of adolescent immunization coverage for 13- to 17-year-olds across the United States through the National Immunization Survey-Teen (NIS-Teen; DSHS, 2024). The 2021 NIS-Teen was conducted between January 2021 and February 2022, and 990 Texas teens' parents or guardians participated in the survey (DSHS, 2024). The 2021 NIS-Teen results indicate that 61.7% of all adolescents in the United States were up-to-date with their HPV immunization, while in Texas, only 51.5% of 13 to 17-year-olds had received the complete HPV immunization series (DSHS, 2024). Additionally, in 2020, 54.9% of Texas adolescents were up-to-date with their HPV immunization series, a 3.4% drop from 2020 to 2021 (DSHS, 2023, 2024).

Furthermore, the HPV immunization rates for local students in grades 6–8 are significantly lower than national and state levels, with only 21.03% of students in this age group receiving one dose of the HPV immunization series and only 5.9% receiving two or more doses. In the United States, Texas, and the school district where this study occurred, HPV immunization rates fall well below the Healthy People 2030 goal of 80% (Healthy People 2030, n.d.). These

statistics highlight the urgent need for developing and implementing targeted strategies to improve the uptake of HPV immunization among local sixth to eighth grade students.

**Background**

HPV encompasses a group of over 200 viruses (National Cancer Institute, 2023). Over 40 types are known to infect the genitals, anus, rectum, and mouth and throat lining. These types are classified as either low-risk (nononcogenic) or high-risk (oncogenic; CDC, 2022d). Most nononcogenic HPV types do not cause health-related problems (Pan American Health Organization, 2023). However, some nononcogenic types can lead to warts on and around the genitals, anus, mouth, and throat (Pan American Health Organization, 2023). Oncogenic HPV types, on the other hand, can cause cancer. Approximately 14 HPV types have been identified as cancer-causing agents, with HPV16 and HPV18 being responsible for most HPV-related cancers (Pan American Health Organization, 2023). These facts highlight the critical need for comprehensive awareness about HPV and the HPV vaccine, prevention strategies, and increased vaccination efforts to protect individuals from the most harmful strains and mitigate the overall impact of HPV-related health problems on society.

In 2017, the World Health Organization (WHO) estimated that the global prevalence of HPV among women was 11.7% (Pan American Health Organization, 2023). For women in Latin America and the Caribbean, the prevalence of HPV infections was 16.1%, while the highest prevalence worldwide was found among women in Sub-Saharan Africa at 24% (Pan American Health Organization, 2023). Among men, the prevalence of HPV infections was 21% (Pan American Health Organization, 2023). Additionally, men with at least three partners in their lifetime were four and a half times more likely to contract an HPV infection than men with fewer lifetime partners (Pan American Health Organization, 2023). These statistics highlight the

substantial global impact of HPV infections, emphasizing the need for targeted interventions to reduce the prevalence and transmission of this pervasive virus.

Furthermore, HPV infections contribute to approximately 4.5 to 5.2% of global cancers, translating to nearly 630,000 new cases of cancer annually (Shapiro, 2022). The primary burden of HPV-related cancers worldwide is cervical cancer in low and middle-income countries (Shapiro, 2022). In these countries, HPV-related cancers represent 6.7% of all cancers (Shapiro, 2022). In high-income countries, 2.8% of cancers are attributed to HPV infections. HPV infections have become a significant and increasing cause of head and neck cancers in male and female patients (Shapiro, 2022). This data signifies an urgent need for interventions to improve immunization rates to reduce the devastating impact of HPV-related cancers on individuals and communities globally.

Most HPV-related cancers are preventable, and due to the global burden of HPV, primary and secondary prevention strategies have been emphasized (Shapiro, 2022). The only secondary prevention strategies for HPV-related cancer are Pap screening and HPV DNA testing to detect cervical cancer (Shapiro, 2022). No comparable screenings exist for other HPV-related cancers (CDC, 2022a; Shapiro, 2022). However, primary prevention through HPV immunization is available (Shapiro, 2022). The HPV vaccine can prevent over 90% of HPV-related cancers and precancers of the anus, vagina, cervix, and vulva regions and between 70 and 90% of all HPV-related cancers (CDC, 2022a; Shapiro, 2022). Since the HPV vaccine prevents rather than treats HPV infections, it is most effective when administered before exposure to HPV (CDC, 2022a; Shapiro, 2022).

The CDC Advisory Committee on Immunization Practices (ACIP) has recommended the use of the human papillomavirus (HPV) vaccine since 2007 (Wexler, 2019). The ACIP

recommends that children age 11 to 12, and as early as 9, receive the HPV vaccine (CDC, 2021c). They also recommended the HPV vaccine for anyone who has not previously received it, up to age 26 (CDC, 2021c). For those between the ages of 27 and 45, HPV immunization may be given based on shared decision-making with their healthcare provider (CDC, 2021c). Although HPV immunization prevents several health problems, global vaccine coverage has not reached sufficient levels to provide herd immunity (Shapiro, 2022). For example, the WHO estimated that HPV immunization rates in 2020 among WHO regions ranged from 29% to 60% coverage (Shapiro, 2022). The HPV vaccine is an underutilized strategy for preventing cancer and associated financial costs (Shapiro, 2022).

**Purpose**

This study aimed to complete a community assessment and survey parents and guardians of grade 6–8 students using the modified Carolina HPV Immunization Attitudes and Beliefs Scale (CHIAS) survey. The CHIAS survey has been used to understand what role the factors of perceived harm, barriers, effectiveness, uncertainty, risk denial, and access play in parental decision-making to vaccinate children with the HPV vaccine (McRee et al., 2010). The goal was to gather data that could be utilized to develop effective targeted interventions to increase HPV immunization rates among students. Increasing HPV immunization uptake is critical because HPV infections are the most common STI and can lead to several types of cancer, including cervical, anal, and oropharyngeal cancer.

Additionally, in 2021, more than 20% of high school students in the United States were sexually active, and nearly one-third had ever had sexual intercourse in their lifetime (CDC, 2021a). Also, 6% of high school students had had sexual intercourse with four or more partners in their lives (CDC, 2021a). Young people who engage in sexual behaviors are at risk of adverse

health outcomes such as unintended pregnancy and sexually transmitted diseases (STDs; CDC, 2021a). In fact, in 2020, more than half of the 20 million new cases of STDs were among people aged 15 to 24 (CDC, 2021a). In 2018, HPV, trichomoniasis, chlamydia, and genital herpes accounted for 98% of all STDs and 93% of new STD infections (CDC, 2021a).

Given the prevalence of HPV and other STDs among young people, it is concerning that HPV immunization rates in the United States remain below the Healthy People 2030 goal of 80% despite recommendations from medical experts and public health agencies (Healthy People 2030, n.d.). Vaccinating a child or adolescent against HPV requires parental consent. Consequently, parental acceptability of the HPV vaccine is critical for vaccine uptake (Gowda et al., 2012). Understanding the factors influencing parental and guardian perceptions and access to HPV immunization is essential to developing target interventions (CDC, 2021b, 2022c). By improving HPV immunization rates, the incidence of HPV infections and HPV-related health problems, like cancer, will ultimately be reduced, promoting a healthier generation of students.

**Significance**

The HPV vaccine can provide significant benefits to adolescents and young adults. The HPV vaccine is highly effective in preventing infections caused by the types of HPV that are most likely to cause cancers, precancer cell changes, and genital warts (CDC, 2021c, 2022a, 2022c). By receiving the HPV vaccine, adolescents and young adults can significantly reduce their risk of developing HPV-related cancers later in life. Additionally, the vaccine can help prevent the spread of HPV to sexual partners, which can help reduce the overall incidence of HPV infections. The HPV vaccine is essential for protecting adolescents' and young adults' health and well-being both now and in the future.

Over 15 years of monitoring and research demonstrate that the HPV vaccine series is safe and effective. Despite this evidence, Texas HPV immunization rates remain lower than other recommended adolescent immunizations (DSHS, 2021). Action must be taken to improve HPV immunization uptake among Texas adolescents, especially local students in grades 6–8 in a large southwest U.S. school district where this practice project occurred. Parental attitudes and beliefs about HPV infections and the HPV vaccine significantly contribute to vaccine uptake (Hanson et al., 2019). Using a standardized measure of parental and guardian beliefs, like the modified CHIAS, can assist in predicting HPV immunization uptake and could substantially contribute to developing effective targeted interventions to increase HPV immunization rates. A deeper understanding of parental and guardian perceptions was sought by administering a modified CHIAS survey in conjunction with assessing perceptions of access to parents or guardians of students in grades 6–8 of a large southwest U.S. school district. The data collected from the survey was used to identify specific factors that contribute to low HPV immunization rates among the students in grades 6–8 of a large southwest U.S. school district and develop tailored interventions to address the contributing factors, with hopes of ultimately leading to improved HPV immunization rates within the community.

**Nature of the Project**

The study conducted a community assessment through a quantitative, cross-sectional design to inform improvements in clinical practice. The community assessment focused on the five factors associated with the uptake of a new vaccine: Accessibility, Availability, Affordability, Acceptability, and Accommodation, as defined by Penchansky and Thomas (1981). An electronic survey tool was used to administer a modified version of the CHIAS survey that was adapted to include questions related to the five dimensions of access to healthcare. A cross-sectional design

was utilized in this study. It is a popular research design among organizations, research, and fields that frequently use survey methods to collect data (Spector, 2019). Cross-sectional is a popular design because the outcome and exposure can be measured simultaneously in study participants (Setia, 2016). Furthermore, this design can be used for population-based surveys to assess the prevalence of a specific element being investigated (Setia, 2016). The cross-sectional research design allows the investigator to study the association between variables, such as parental beliefs and attitudes toward the HPV vaccine and uptake of the HPV vaccine, making the cross-sectional design well-suited for this study (Setia, 2016).

This practice project aimed to understand better parental and guardian attitudes and beliefs toward HPV immunization as well as factors associated with access. A modified CHIAS survey was administered that included an assessment of the five dimensions of access to the targeted population. Data collected from the survey was used to identify specific factors contributing to low HPV immunization uptake among students in grades 6–8 of a large southwest U.S. school district. Then, targeted interventions were developed to address these factors and hopefully increase HPV immunization rates among the targeted population.

**PICO Question**

The PICO question was: In English and Spanish-speaking parents or guardians of a large southwest U.S. school district school district, adolescent male and female sixth, seventh, and eighth grade students (P), do the factors of harms, barriers, effectiveness, uncertainty, and risk denial in a modified Carolina HPV Immunization Attitudes and Beliefs Scale (CHIAS) survey, incorporating the five dimensions of access (i.e., accessibility, availability, affordability, acceptability, and accommodation; I) provide a comprehensive measure of HPV immunization

attitudes, beliefs, and access-related factors that can be used for examining and developing interventions to improve HPV immunization uptake (O)?

- Population: English- and Spanish-speaking parents or guardians of a large southwest U.S. school district adolescent male and female sixth, seventh, and eighth grade students.
- Intervention: Administration of a modified Carolina HPV Immunization Attitudes and Beliefs Scale (CHIAS) survey, including questions to assess the five dimensions of access (accessibility, availability, affordability, acceptability, and accommodation).
- Comparison: There is no comparison.
- Outcome: Provide a standard measure of HPV immunization attitudes and beliefs that can be used to examine and develop interventions to improve HPV immunization uptake.

The study's population consisted of parents and guardians of adolescents enrolled in grades 6–8 in a large southwest U.S. school district that has approximately 7,100 students in these grades. The students were from six different middle schools, two elementary schools, and one K -12 campus. A modified CHIAS survey with questions incorporating the five dimensions of access was administered in English or Spanish using the electronic survey tool Qualtrics. This type of assessment provided a valuable tool for examining the factors related to parental and guardian attitudes, beliefs, and perceptions of access to the HPV vaccine, including harms, barriers, effectiveness, uncertainty, risk denial (acceptability), and the other dimensions of access, including accessibility, availability, affordability, and accommodation. The CHIAS survey was designed to help understand parental and guardian attitudes toward HPV immunization, including questions that assessed the five access dimensions provided an additional understanding of the complexity of factors influencing a patient's ability to obtain and utilize healthcare (McRee et al., 2010; Penchansky & Thomas, 1981). By studying both the

CHIAS factors and the access dimensions, a holistic understanding of the barriers, attitudes, and beliefs influencing HPV immunization uptake was obtained. The information gained was used to develop targeted interventions that address the specific challenges and improve the HPV immunization rates within the targeted population.

## Definitions

The key terms used in this study are defined below to establish clarity.

**Acceptability.** The degree to which the patient is comfortable with the characteristics of the healthcare provider and how comfortable the healthcare provider is with the patient's characteristics (Wyszewianski, 2002).

**Access.** A "general concept which summarizes a set of more specific areas of fit between the patient and the health care system" (Penchansky & Thomas, 1981, p. 128).

**Accessibility.** The ease with which a patient can physically access healthcare (Wyszewianski, 2002).

**Accommodation.** The degree to which a healthcare provider or healthcare system aligns with the patient's needs and preferences (Wyszewianski, 2002).

**Affordability.** The relationship between the healthcare provider's fees and the patient's ability and willingness to pay for services (Wyszewianski, 2002).

**Attitudes.** How one thinks or feels about something or behaves toward something that demonstrates how one thinks and feels (Oxford Learner's Dictionaries, 2023a).

**Availability.** The degree to which the healthcare provider has the necessary resources to meet the patient's needs (Wyszewianski, 2002).

**Barriers.** The parent or guardian's perceived barriers to their child receiving the HPV vaccine include cost, access to a healthcare provider, and convenient opportunities for vaccination (Gowda et al., 2012; McRee et al., 2010).

**Belief.** A strong feeling that something exists or is true, or the confidence that something is good, accurate, or correct (Oxford Learner's Dictionaries, 2023b).

**Effectiveness.** In this study, a parent or guardian's perception of the effectiveness of the HPV vaccine to protect against genital warts, precancerous cell changes, and cancer (McRee et al., 2010).

**Harm.** In this study, a parent or guardian's perceived potential harm from the HPV vaccine, including short and long-term health problems, lack of sufficient safety data, and concern for the increased likelihood their child will become sexually active after receiving the HPV vaccine (Gowda et al., 2012; McRee et al., 2010).

**Human Papillomavirus (HPV).** A type of virus that can cause abnormal tissue growth, other cell changes, and can cause oropharyngeal, penile, anal, vulvar, cervical, and vaginal cancers (National Cancer Institute, 2011).

**Ineffectiveness.** In this study, a perception held by some parents or guardians that the HPV vaccine offers limited benefits, such as its perceived inability to effectively prevent cancer or the belief that the vaccine is not essential due to the availability of cervical cancer screening options (Gowda et al., 2012).

**Risk denial.** In this study, a parent or guardian's perception that someone who receives the HPV vaccine is more likely to become sexually active, is too young to get a vaccine for a STI, or that the HPV vaccine is not necessary because cervical cancer screening can be completed to ensure cervical cancer does not develop (Dempsey et al., 2014).

**Uncertainty.** In this study, a parent or guardian's perception of not knowing or believing that there is adequate information about the HPV and their perception of vaccination practices within their community (McRee et al., 2010).

**Uptake.** The action of taking up or using something that has been made available (Oxford Learner's Dictionaries, 2023c).

## Scope and Limitations

The scope of this study included the parents or guardians of grades 6–8 students in a large southwest U.S. school district. The study participants included parents and guardians who voluntarily participated by completing a one-time modified CHIAS survey that was made available for over 8 weeks using the online survey tool Qualtrics. The study was conducted to provide a comprehensive understanding of parental or guardian attitudes, beliefs, and perceptions of access toward the HPV vaccine and its uptake.

## Summary

Low HPV immunization rates across the nation, Texas, and in the large southwest U.S. school district where this study occurred is a significant public health concern because HPV infections can lead to genital warts, precancerous cell changes, and six different types of cancer (CDC, 2021c, 2022c). Using a modified CHIAS survey and incorporating questions regarding the five dimensions of access to examine the attitudes, beliefs, and access-related factors parents and guardians have toward the HPV vaccine was used to help address this problem. This cross-sectional study targeting parents and guardians of grades 6–8 students in a large southwest U.S. school district was used to identify specific factors contributing to low HPV immunization rates within the community. In addition, this study aimed to utilize the collected data to develop

targeted interventions and strategies to increase HPV immunization rates among the students in the school district.

Understanding parental and guardian attitudes, beliefs, and perceptions of access to HPV immunization can assist in developing more effective strategies for increasing the uptake of the HPV vaccine within a population. This study was designed to contribute to the nursing profession by highlighting the importance of addressing parental and guardian attitudes, beliefs, and perceptions of access to the HPV vaccine when attempting to increase vaccine uptake. Ultimately, the study findings are designed to help reduce the incidence of HPV-related health problems like genital warts, precancerous cell changes, and HPV-related cancers and improve the health and well-being of the community under this study.

Chapter 1 addressed the challenges related to HPV infection, the purpose and scope of this study, and its contributions to the nursing profession and the targeted population. Moving forward, Chapter 2 will present a comprehensive literature review on HPV, encompassing the conceptual framework that underpins this study and detailing the search methodology employed and the findings derived from the literature search. Chapter 3 will focus on discussing the study's design, examining the appropriateness of the selected methodology, and highlighting the interprofessional collaboration involved in completing this research. Chapter 4 discusses data analysis procedures and the results obtained from the study. Chapter 5 summarizes the project, major findings, implications, recommendations, plan for dissemination, and this study's contribution to the nursing profession.

# Chapter 2: Literature Review

Human papillomavirus (HPV) immunization can protect against HPV infections and subsequent health issues, especially when administered before the start of sexual activity (CDC, 2022a). This is important because HPV is the most common STI in the United States, causing abnormal tissue growth and even cancer (CDC, 2022b, 2022c; National Cancer Institute, 2011). Although most HPV infections resolve independently, some lead to health problems such as genital warts, precancerous cell changes, and cancer (CDC, 2021c, 2022c). However, in Texas, only 54.9% of adolescents were up to date on their HPV immunization in 2020, well below the Healthy People 2030 goal of 80% (DSHS, 2023). This chapter reviews the literature about parental and guardian attitudes and beliefs toward HPV infections and the HPV vaccine and discusses social determinants of health as the conceptual framework that will guide this research project.

## Literature Review Methodology

A literature review was completed to guide this study and provides support for the need of this study. The review of the literature provided insight and an overview of how parental and guardian attitudes and beliefs about HPV infections and the HPV vaccine influence HPV immunization uptake. With assistance from a research librarian, the search strategy included the search string *middle school or junior high or 6th or 7th or 8th or secondary school or adolescent AND immunize or vaccine or inoculate AND attitude or belief or perception AND harm or barrier or effective or uncertain or risk or denial AND HPV or human papillomavirus or human papilloma virus*. Search engines included Academic Search Complete, APA PsychInfo, Applied Science and Technology Source, Complementary Index, Gale in Context: Opposing Viewpoints, JSTOR Journals, Medical Literature Analysis and Retrieval System Online (MEDLINE), and the

Abilene Christian University library database. The articles included were published from 2010 to 2023 and consisted primarily of research completed in the United States.

## Review of Literature

### *CHIAS Survey*

Parental attitudes and beliefs significantly impact vaccine uptake (Gowda et al., 2012). This suggests that having a standardized measure of parental attitudes and beliefs that can predict parental intention to vaccinate their child against HPV would help in developing and implementing evidence-based interventions to increase HPV immunization rates.

One tool that researchers have utilized to investigate parental attitudes and beliefs toward the HPV vaccine is the Carolina HPV Immunization Attitudes and Beliefs Scale (CHIAS) developed by McRee et al. (2010). CHIAS was explicitly designed to investigate parental attitudes and beliefs and their association with parental intention to vaccinate their daughters with the HPV vaccine (McRee et al., 2010). Linear regression also examined the scale's relationship between CHIAS and parental intent to vaccinate. To evaluate CHIAS, McRee et al. (2010) recruited caregivers of females aged 10 to 18 who had not received the HPV vaccine. The participants ($n$ = 783) participated in telephone baseline and one-year follow-up surveys. Investigators completed a principal components analysis on 16 HPV attitudes and beliefs components that assessed the scale's psychometric properties. The scale identified four factors: harms, barriers, effectiveness, and uncertainty. Parents with higher perceived harms ($\beta$ = -0.59) and uncertainty about the HPV vaccine ($\beta$ = -0.43) demonstrated a lower association with intention to vaccinate their daughters. Conversely, parents with higher perceived HPV vaccine effectiveness ($\beta$ = 0.27) and perceived more barriers ($\beta$ = 0.16) to vaccinating their daughter exhibited a greater intention to have their daughter receive the HPV vaccine. All factors ($p \leq$

0.001) demonstrated a correlation between parental attitudes and beliefs and their choice to vaccinate their daughter against HPV (McRee et al., 2010).

Building on the original CHIAS survey, Gowda et al. (2012) conducted a cross-sectional study to explore further the attitudes and beliefs of mothers of female adolescents toward the HPV vaccine and their intention to vaccinate their daughters. They utilized a modified web-based CHIAS survey and recruited participants ($n$ = 228) who represented a national sample of mothers of female adolescents from the C.S. Mott Children's Hospital National Poll on Children's Health. Survey data were analyzed using exploratory factor analysis to identify attitudinal constructs. Investigators used bivariant and multivariant analyses to identify associations between maternal attitudinal constructs, HPV vaccine uptake, and intention for HPV vaccination. The analysis identified three attitudinal constructs: harms/ineffectiveness (Cronbach's $\alpha$ = 0.92), barriers (Cronbach's $\alpha$ = 0.93), and social norms (Cronbach's $\alpha$ = 0.74). Multivariate analysis indicated that harms/ineffectiveness and social norms correlated with HPV vaccine uptake. Respondents with higher levels of perceived harms were less likely to have their daughter vaccinated against HPV (*OR* = 0.16, *95% CI:* 0.07,0.34). Also, mothers with lower perceived social norms scores were less likely to vaccinate their daughters against HPV (*OR* = 0.48, *95% CI*: 0.26, 0.88). This modified CHIAS survey was able to measure maternal attitudes and intention for HPV immunization and predict HPV vaccine uptake among female adolescents (Gowda et al., 2012).

To expand upon the use of the CHIAS survey, Hanson et al. (2019) applied a modified version to both male and female adolescents from the North-Central Wisconsin Healthcare System ($n$ = 108) to explore if the factors of barriers, harms, ineffectiveness, and uncertainty scores over 1 year were associated with HPV vaccine uptake. Participants completed baseline

and 1-year follow-up surveys after healthcare providers in the North-Central Wisconsin Healthcare System received systematic interventions to increase HPV vaccination rates. The survey revealed that respondents generally had positive attitudes toward the HPV vaccine, with mean scores for each factor improving over time. Notable enhancements were observed for barriers ($p < 0.01$) and uncertainties ($p < 0.01$). However, despite the improvement in respondents' mean scores, these changes had minimal to no effect on the adolescents receiving the HPV vaccine. Analysis of the study results indicates that a higher baseline harms score and discussion of the HPV vaccine with parents were the only factors directly associated with HPV vaccine receipt, thereby linking parental attitudes and beliefs to adolescent HPV vaccine uptake (Hanson et al., 2019).

VanWormer et al. (2017) also utilized a modified CHIAS survey to conduct a cohort analysis in conjunction with a medical care quality improvement project to enhance HPV immunization rates among adolescents in seven Wisconsin communities. The researchers assessed parents' attitudes ($n = 168$) regarding HPV using a modified CHIAS survey at baseline and 1-year follow-up. They examined whether barriers, harms, uncertainties, and ineffectiveness factors were linked to vaccination intentions and actual HPV vaccine uptake. The multivariate analysis revealed that a favorable shift in parental scores for the factor of uncertainties ($OR = 4.9$; *95% CI*: 2.0, 12.2; $p < 0.001$) significantly increased the likelihood of adolescents receiving the next HPV vaccine dose. In contrast, parents with high baseline harms scores were less inclined to vaccinate their adolescents against HPV ($OR = 11.7$; *95% CI*: 2.0, 12.2; $p < 0.001$) and were less likely to change their stance over time. Even if they altered their opinions, it did not influence their adolescents' HPV vaccination status. VanWormer et al. (2017) emphasized the importance of improving parental attitudes toward the HPV vaccine to boost immunization rates.

Educating parents about the safety and efficacy of the HPV vaccine is crucial for altering their perceptions and convictions, ultimately leading to increased vaccine uptake (VanWormer et al., 2017).

Research on the CHIAS survey shows that it is a valuable tool and can provide a standard measure to identify attitudes and beliefs surrounding HPV infections and the HPV vaccine (Gowda et al., 2012; Hanson et al., 2019; McRee et al., 2010; VanWormer et al., 2017). Moreover, this facilitates the creation and execution of data-driven strategies to enhance HPV vaccination rates by tackling obstacles such as vaccine reluctance. This suggests that utilizing the CHIAS survey can contribute to a better understanding of the factors influencing parental decisions, ultimately supporting efforts to improve HPV vaccine uptake and public health outcomes.

### *Factors Influencing HPV Vaccine Hesitancy*

Vaccine hesitancy is among the top 10 health threats in the United States, as identified by the World Health Organization (World Health Organization, 2019). Vaccine hesitancy also contributes to the low uptake of the HPV vaccine (Rositch et al., 2022). Parental decision-making drives vaccine practices for adolescents, making parental vaccine hesitancy a critical component of HPV vaccine uptake (Rositch et al., 2022). Understanding the complexity of parental HPV vaccine hesitancy is essential to developing and implementing evidence-based interventions to increase HPV immunization rates (Rositch et al., 2022).

Given the critical role that parental vaccine hesitancy plays in HPV vaccine uptake, it is important to explore the reasons behind this hesitancy in greater detail. In a cross-sectional study, Rositch et al. (2022) used data from the 2019 National Immunization Survey-Teen to better understand parental HPV vaccine hesitancy and identify factors contributing to low HPV

vaccination rates among adolescents. The study included parents of adolescents ($n$ = 7,802) who self-reported not receiving any doses of the HPV vaccine series and whose parents answered questions about their intentions regarding HPV vaccination. Descriptive statistics and multinomial logistic regression models were employed to estimate an adjusted relative risk ratios for parents categorized as very hesitant, somewhat hesitant, and unsure. The analysis revealed that the main concerns for both very hesitant and somewhat hesitant parents were the safety and potential side effects of the HPV vaccine. On the other hand, parents who were unsure mainly cited a lack of provider recommendations as the reason for their reluctance to vaccinate against HPV. Recognizing and addressing parental attitudes and beliefs is crucial for devising targeted interventions that can effectively encourage vaccine-hesitant parents to vaccinate their children against HPV (Rositch et al., 2022).

To understand and address parental attitudes and beliefs more effectively, O'Leary et al. (2018) conducted a cross-sectional study to evaluate parental attitudes and perceived barriers to HPV vaccine uptake among female adolescents who had not initiated or not completed the HPV vaccine series. The study included 244 respondents (noninitiators, $n$ = 122; noncompleters, $n$ = 122) from an extensive safety net system in Denver, Colorado. The survey was developed based on qualitative work conducted by the research team, and a modified CHIAS survey was available in both English and Spanish. Survey results were analyzed using chi-squared testing of proportions. Parental attitudes were stratified into noninitiators and noncompleters. The analysis revealed that noninitiators had greater safety concerns than noncompleters. They were also less likely to believe the HPV vaccine would protect their daughter's health and prevent cervical cancer. They preferred to wait before vaccinating their daughters, considering the vaccine too new. Self-reported noncompleters mainly cited reasons such as the next dose not being due yet,

being unaware of the need for multiple doses, and developing safety concerns after the initial dose. Parental safety concerns, low perceived risk of infection, and lack of awareness about multiple doses contributed to HPV vaccine hesitancy and noncompletion. These factors can be used to develop and implement targeted, evidence-based interventions to boost HPV vaccine uptake (O'Leary et al., 2018).

In light of the significance of parental attitudes in vaccine uptake, Szilagyi et al. (2020) conducted a study to determine the prevalence of HPV vaccine hesitancy among parents of adolescents aged 11 to 17 in the United States. Study participants ($n$ = 2,020) were randomly selected using the Ipsos panel who completed a modified Vaccine Hesitancy Scale. Based on their survey scores, respondents were categorized as either vaccine-hesitant or non-hesitant. Multivariate analysis revealed that vaccine-hesitant parents were one-third less likely to initiate vaccination (*RR* = 0.29, *95% CI*: 0.24, 0.35) or complete the vaccine series (*RR* = 0.29, *95% CI*: 0.23, 0.36) for their adolescent. Furthermore, vaccine-hesitant parents were six times more likely to refuse vaccination due to vaccine-related concerns (*RR* = 6.09, *95% CI*: 5.26, 7.04) such as severe side effects and the vaccine's novelty, which made them question its safety. Vaccine-related concerns included severe side effects from the HPV vaccine, and because the HPV vaccine is new, they are unable to determine if it is safe. These hesitant parents also disagreed that the HPV vaccine would protect against HPV-related cancers, benefit their adolescents, or be effective. They additionally lacked trust in their adolescent's healthcare provider. The study found that HPV vaccine hesitancy was prevalent among respondents and significantly impacted parental refusal of the vaccine for their adolescents. This underscores the importance of devising and implementing strategies that effectively address HPV vaccine hesitancy (Szilagyi et al., 2020).

Parental vaccine hesitancy is a complex issue with several contributing factors. In the previously mentioned studies, vaccine-hesitant parents frequently cited concerns about vaccine safety, severe side effects, and the HPV vaccine being new (O'Leary et al., 2018; Rositch et al., 2022; Szilagyi et al., 2020). Gaining a deeper understanding of this complex issue and the factors that lead to vaccine hesitancy is crucial for developing and implementing targeted and effective strategies to increase HPV vaccine uptake.

### *Cultural and Religious Impacts*

Various barriers can impede the uptake of the HPV vaccine, with parental culture and religion playing important roles in vaccine decision-making and HPV vaccination. Prior research has observed that religious and cultural prohibitions on premarital sexual intercourse can act as barriers to HPV vaccination (Alarcao & Zdravkova, 2022). These prohibitions may also result in some minority groups having low levels of HPV awareness and knowledge, which can impact HPV vaccination rates (Alarcao & Zdravkova, 2022). Understanding how culture and religion influence HPV vaccination is crucial for developing and implementing evidence-based interventions that effectively address these barriers.

Lee et al. (2018) conducted a descriptive comparative study to evaluate Korean-American parental perceptions and knowledge levels regarding HPV vaccination. Data were collected from a convenience sample of Korean American parents of children and adolescents aged 11 to 18 ($n$ = 74) who completed an online questionnaire. The questionnaire was analyzed using Cronbach's $\alpha$ (0.79), revealing a significant difference in scores for perceived benefits and perceived barriers between parents who vaccinated their adolescents (benefits: 3.08, $SD$ = 1.00; barriers: 2.43, $SD$ = 2.11) and those who did not (benefits: 3.89, $SD$ = 1.14; barriers: 3.05, $SD$ = 0.77). Parents who did not vaccinate their adolescents had lower perceived benefits scores, indicating they viewed

the HPV vaccine as less beneficial and less effective. Knowledge scores were similar between both groups. However, the results also highlighted that overall parental knowledge of the HPV vaccine was inadequate (*mean score* = 3.14, *SD* = 2.4), limiting the participants' ability to make informed decisions. The lack of HPV knowledge could be attributed to cultural values shared by Korean Americans, where premarital sex is discouraged, and discussions about sex are considered taboo. Researchers must consider the cultural values of their target population when developing and implementing strategies to increase HPV vaccine uptake (Lee et al., 2018).

Recognizing the significance of understanding cultural influences on HPV vaccination, Zhu et al. (2019) conducted a cross-sectional study to investigate Chinese-American parents' knowledge, attitudes, and decision-making processes related to the HPV vaccine. The study involved 110 participants who completed a questionnaire developed by the investigators, with bivariate and multivariate analyses performed on the collected data. The results showed that parents with higher knowledge levels about HPV and the HPV vaccine ($OR = 1.32$, $p < .001$), who were influenced by their physician ($OR = 8.80$, $p < .001$), and who had lived in the United States for more than 15 years ($OR = 2.44$, $p < .05$), were more likely to vaccinate their children against HPV. Conversely, parents were less likely to vaccinate their children if they intended to involve them in decision-making (OR = .30, $p < .05$). The study's Chinese American participants highlighted the potential impact of cultural influences. Chinese Americans come from a collectivist culture and often view physicians as wise and benevolent authority figures, which may lead to either deferring decision-making to the physician or being heavily influenced by their recommendations. Additionally, limited knowledge about HPV and the HPV vaccine could stem from contemporary Chinese culture, where discussing sexuality or sexual behavior is taboo and can be considered offensive between parents and children. Premarital sexual intercourse is

also seen as a violation of personal virtue and brings shame to the family. As a result, the HPV vaccine may be perceived as unnecessary in contemporary Chinese culture due to expectations of "sexual propriety." This information underscores the need to consider cultural beliefs when developing and implementing strategies to increase HPV vaccine uptake (Zhu et al., 2019).

Continuing to explore the impact of cultural and religious factors on HPV vaccination, Redd et al. (2022) conducted a cross-sectional study examining parental attitudes towards HPV immunization in relation to their Christian religious views and affiliation. Participants ($n$ = 442) completed an online survey the study's investigators developed. The data analysis involved confirmatory factor analysis, structural equation modeling, and univariate factor analysis. The study found that parents with greater knowledge and understanding of HPV ($r$ = 0.5297, $p <$ 0.00001), the risk associated with HPV infections ($SEM$ = 0.784), and the perception that the HPV vaccine is safe ($r$ = -0.3828, $p \leq 0.00001$) and effective ($r$ = 0.3828, $p < 0.00001$), were more likely to have the intention to vaccinate their adolescents. The strongest predictors of vaccination intention were positive parental attitudes toward vaccines ($SEM$ = 0.158) and knowledge about HPV. However, parents with highly religious views who believed that their religious adherence protected against HPV demonstrated a negative predictor of vaccination intention ($SEM$ = -0.614). These findings highlight the importance of considering religious beliefs when developing and implementing interventions to increase HPV vaccine uptake. Interventions should focus on explaining the risks associated with HPV infections and emphasizing the benefits and safety of the HPV vaccine (Redd et al., 2022).

Various cultural and religious factors contribute to the barriers to HPV vaccine uptake and impact parental decision-making (Alarcao & Zdravkova, 2022). Lee et al. (2018) demonstrated that inadequate knowledge about the HPV vaccine among Korean-American

parents might be attributed to cultural values discouraging premarital sex and treating sexual topics as taboo. Zhu et al. (2019) highlighted that Chinese-American parents with higher knowledge levels, were influenced by physicians, and lived in the United States for more than 15 years were more likely to vaccinate their children. However, cultural factors like collectivist beliefs, viewing physicians as authority figures, and sexual taboos limited vaccine uptake. Redd et al. (2022) revealed that Christian parents with more knowledge about HPV and positive attitudes toward vaccines were more likely to vaccinate their children. Still, those with strong religious views had a lower intent to vaccinate. Interventions to increase HPV vaccine uptake should consider these cultural and religious factors and focus on explaining the risks associated with HPV infections and the benefits and safety of the HPV vaccine.

### *Social Influences*

Parents are influenced by various sources when making health behavior decisions, such as whether to vaccinate their children against HPV. Exposure to information about HPV infections and the vaccine can come from various channels, and while some sources provide helpful guidance for immunization decision-making, misinformation can also be encountered (Thompson et al., 2022). Using the internet and social media to obtain health information can significantly impact parents' thoughts and perceptions of immunization, including the HPV vaccine (Niu et al., 2020). The way parents navigate social media for health-related information may directly or indirectly shape their beliefs and choices. However, evidence suggests that healthcare providers play a crucial role in influencing health behavior decisions and can contribute positively to the uptake of the HPV vaccine (Niu et al., 2020). As such, various online and offline sources can sway parents' decision-making processes when considering the HPV vaccine for their children.

Considering the various sources of information that can influence parents' decision-making, Volkman et al. (2021) explored how these sources impact perceived risk, safety, and knowledge related to immunizations among young adults aged 18 to 24 ($n$ = 180). Using data from the WHO's working group on vaccine hesitancy report, the study analyzed the role of vaccine beliefs, perceived knowledge, risk perceptions, safety perceptions, and sources of information in shaping vaccination decisions. Data analysis ($p$ = .05) involved descriptive statistics, Pearson correlations, and standard multiple regression. The results revealed that risk and safety perceptions ($p < .001$) took precedence over knowledge in determining vaccine beliefs, with healthcare providers ($beta = .16$, $p < .05$) and social media ($beta = -.20$, $p < .05$) being significant predictors of perceived immunization knowledge. Interestingly, social media ($beta = -.19$, $p < .05$) was the only significant predictor of risk perceptions, while healthcare providers ($beta = .24$, $p < .01$) were the only significant predictors of safety perceptions. This finding implies that addressing risk and safety perceptions may be more critical than improving overall immunization knowledge when developing interventions to increase vaccine uptake (Volkman et al., 2021).

In light of the significant role that social media plays in shaping parents' perceptions of vaccines, Thompson et al. (2022) conducted a cross-sectional study to examine parental perceptions of HPV vaccine information on social media and internet verification strategies that influence HPV vaccine decision-making. Participants included parents of children and adolescents from the Dallas-Fort Worth area ($n$ = 1192). Descriptive statistics were used to report participant characteristics. Data were analyzed using chi-square testing for categorical data, Kruskal-Wallis for continuous data, Dwass-Steel-Critchlow-Flinger testing for multiple comparisons, and univariate and multivariate multinomial logistic regression. The results

indicated parental distrust of providers ($p < .001$), perceptions of HPV vaccine information as credible on social media ($p \leq .001$), social media information leading parents to question HPV vaccination ($p = .003$), and internet verification skills ($p = .001$) were related to not wanting to vaccinate their child against HPV. Interestingly, parents whose children had received the HPV vaccine reported engaging in more internet verification behaviors ($p = .96$) than those with unvaccinated children or those not wanting to vaccinate ($p = .001$). This suggests that the information parents encounter on social media can significantly influence their beliefs and attitudes toward the HPV vaccine and ultimately impact their decision to vaccinate their children against HPV (Thompson et al., 2022).

Shifting the focus to the role of social media and communication in vaccination decisions, Niu et al. (2020) examined the interplay between health-related social media usage, patient-centered communication, HPV knowledge, and demographics in relation to the perceived effectiveness of the HPV vaccine for individuals with a family member aged 9 to 27. By analyzing data from the National Cancer Institute's 2017 Health Information National Trends Survey and employing bivariate and multivariable logistic regression, the study revealed significant associations between age, education, and HPV knowledge with the perceived effectiveness of the HPV vaccine. Specifically, higher perceptions were observed among individuals aged 18-34 ($AOR = 1.93$, $95\%\ CI = 1.21\text{-}3.08$, $p < .05$), those with postgraduate degrees ($AOR = 2.04$, $95\%\ CI = 1.10\text{-}3.77$, $p < .05$), and with greater HPV knowledge ($AOR = 2.12$, $95\%\ CI = 1.70\text{-}2.65$, $p < .05$). While health-related social media activities and patient-focused communication were connected to increased HPV knowledge, there was no significant correlation between health-related communication, social media, or healthcare provider's information and enhanced perceptions of HPV vaccine effectiveness. Thus, Niu et al. (2020)

argued that to improve HPV vaccine uptake, improvement strategies should be designed to create effective narrative content that emphasizes preventive benefits in both provider communication and social media use.

Various factors, including parental attitudes, beliefs, cultural and religious factors, and exposure to different information sources, such as the internet and social media, play a significant role in shaping HPV vaccine uptake (Niu et al., 2020; Thompson et al., 2019). Vaccine-hesitant parents often express concerns about safety, side effects, and the novelty of the HPV vaccine, while minority groups may have low HPV awareness due to religious and cultural prohibitions on premarital sexual intercourse. Healthcare providers are critical in promoting HPV vaccine uptake, with perceptions of safety and risk-taking precedence over knowledge when determining vaccine beliefs (Volkman et al., 2021). To enhance HPV vaccine uptake, it is crucial to design and implement strategies that take these factors into account, emphasizing the risks associated with HPV infections, highlighting the benefits and safety of the HPV vaccine, and underscoring the value of effective narrative content in both provider communication and social media use (Niu et al., 2020).

**Conceptual Framework**

Many factors influence the intricacies of HPV vaccine uptake, including those that stem from parental attitudes and beliefs. These factors include social influences, religion, culture, concerns regarding vaccine safety and potential side effects, inadequate healthcare provider recommendations, and limited knowledge (Alarcao & Zdravkova, 2022; Niu et al., 2020; O'Leary et al., 2018; Rositch et al., 2022; Szilagyi et al., 2020; Thompson et al., 2019). Patients' choice to utilize accessible healthcare services is influenced by their perception of the services provided (Hoseini-Esfidarjani et al., 2021). This perception can also affect how and if a parent

chooses to vaccinate their child against HPV. Factors that influence the perception of access include accessibility, availability, affordability, acceptability, and accommodation (Penchansky & Thomas, 1981).

To effectively develop interventions that increase HPV immunization rates, it is critical to understand the elements of parental attitudes, beliefs, and perceptions of access. Furthermore, a guiding framework is essential to thoroughly examine and address this multifaceted issue. This study utilized social determinants of health as a framework to better understand the critical determinants influencing HPV immunization uptake. Social determinants of health (SDOH) refer to the circumstances present in the surroundings where individuals are born, reside, receive education, work, engage in leisure activities, practice their faith, and grow old. These factors influence a broad spectrum of health outcomes, overall well-being, and risk exposure throughout life (U.S. Department of Health and Human Services [HHS], 2023).

**Social Determinants of Health**

Healthcare systems and providers are traditionally viewed as the primary means for improving health in the United States. However, there is a growing understanding that social, economic, and environmental factors also significantly impact health (Hacker et al., 2022). These broader factors, such as structural racism and socioeconomic conditions, are estimated to drive up to 50% of health outcomes (Hacker et al., 2022). Recognizing and addressing these broader influences can lead to substantial improvements in overall well-being when tackled by policymakers, program developers, and implementers (Dean et al., 2013). The SDOH concept, which encompasses the broader influences and structures that shape daily life, also includes nonmedical factors related to an individual's life circumstances (World Health Organization, 2023). People's living and working conditions strongly impact their overall health, well-being,

and quality of life (HHS, 2023; Wilkinson & Marmot, 2003). The U.S. Department of Health and Human Services, Healthy People 2030 initiative (2023) has grouped SDOH into five domains. The five domains include health care access and quality, education access and quality, economic stability, neighborhood and built environment, and social and community context (HHS, 2023).

The five dimensions of access, accessibility, availability, affordability, acceptability, and accommodation, as described by Penchansky and Thomas (1981), can be connected to the broader concept of SDOH. The dimensions of access and SDOH are essential factors influencing an individual's ability to utilize available healthcare and maintain their health. The dimensions of access address the specific aspects of healthcare services that impact a patient's decision-making in using available healthcare services, while SDOH focuses on the broader social, economic, and environmental factors that might affect health outcomes.

Community and societal factors, like SDOH, and the dimensions of access are not always considered when developing and implementing health behavior change interventions, potentially limiting their effectiveness and reach (Thompson et al., 2019). These influences might not be immediately apparent, as the connections between these factors, dimensions, and individual behavior can be complex and multifaceted. However, neglecting the impact of SDOH and the dimensions of access on health would mean overlooking significant areas that could hinder or support efforts to modify individual behavior (Thompson et al., 2019).

### *Health Care Access*

Recognizing the significance of SDOH in addressing health disparities and designing effective interventions, it is crucial to examine how these factors impact HPV vaccine uptake. SDOH can affect HPV vaccine uptake in a variety of ways. One of those ways is limited access to healthcare services. Many people in the United States do not get the health care they need

because they do not have a primary care provider or live too far away from healthcare providers. The dimension of accessibility of the five dimensions of access focuses on the importance of geographic accessibility and how it influences an individual's ability to utilize healthcare services (Penchansky & Thomas, 1981). Furthermore, not having health insurance can prevent individuals from seeking preventive healthcare services or getting necessary healthcare (HHS, 2023). Those without insurance, who live too far from healthcare services, or who do not have a healthcare provider are less likely to seek preventive healthcare services like initiating and completing the HPV vaccine series (Albright & Allen, 2018; U.S. DSHS, 2023). This leads to missed opportunities for individuals to obtain preventive healthcare, such as the HPV vaccine, and to clarify any concerns or misconceptions about the vaccine.

***Education Access***

Access to quality education can significantly impact one's health. Individuals with higher levels of education are more likely to have higher health literacy, be healthier, and live longer (HHS, 2023). However, those with lower educational attainment are associated with lower health literacy and tend to participate less in preventive health behaviors like immunizations and cancer screening (Albright & Allen, 2018). Health literacy is a complex phenomenon that encompasses individuals, families, communities, and systems (HHS, 2021). It includes aspects of disease prevention and health promotion, such as materials, environments, and challenges. Health literacy entails skills like reading, understanding, and evaluating information. It requires interpreting instructions, symbols, charts, and diagrams. Being able to assess risks and benefits, make decisions, and take action (HHS, 2021). One's health literacy can directly affect HPV vaccine uptake, as individuals with higher health literacy may be more aware of the benefits of

vaccination and more likely to get immunized. In comparison, those with lower health literacy may lack understanding or have misconceptions about the vaccine, leading to lower uptake.

### *Economic Stability*

Economic stability ensures individuals' overall health and well-being by influencing their access to healthcare, preventive measures, and maintaining a healthy lifestyle (HHS, 2023). Individuals with limited financial resources face numerous barriers to accessing and utilizing healthcare. For example, they may lack adequate health insurance coverage, encounter transportation challenges, or face difficulties taking time off work for medical appointments. Affordability is a crucial dimension of access (Penchansky & Thomas, 1981). Affordability is the relationship between the price of services and the patient's ability and willingness to pay for those services (Penchansky & Thomas, 1981). As a result, individuals with limited financial resources may prioritize other immediate needs over receiving immunizations like the HPV vaccine. Additionally, financial constraints may limit their access to healthcare facilities and providers who can administer immunizations, further contributing to disparities in vaccination rates (HHS, 2023).

### *Neighborhood and Built Environment*

The neighborhood where individuals live, work, learn, and play significantly impacts their health, well-being, and quality of life (HHS, 2023). The presence and accessibility of healthcare facilities within a community can impact how its population participates in preventive healthcare, like receiving the HPV vaccine. Availability, another dimension of access, is the relationship between the types of existing healthcare services within a community and the types of healthcare services needed and used by patients within the community (Penchansky & Thomas, 1981). In communities with limited or distant healthcare facilities, community members

may face challenges accessing preventative health services like immunizations, leading to low uptake rates.

Additionally, those without personal transportation or living in an area with inadequate or unreliable public transportation can find it challenging to reach a healthcare provider to receive preventive healthcare services, like the HPV vaccine. Neighborhood safety concerns can also affect an individual participating in preventive healthcare services like receiving the HPV vaccine. Unsafe communities can make community members less likely to seek healthcare because they perceive their environment as unsafe and feel uncomfortable traveling to see a healthcare provider. The presence or absence of health-promoting infrastructure, such as parks, sidewalks, and recreational facilities, can indirectly influence an individual's overall health. This can impact their ability and willingness to access preventive healthcare services like the HPV vaccine (HHS, 2023).

***Social and Community Context***

An individual's connections and engagements with family, friends, colleagues, and fellow community members can greatly influence their overall health and well-being by molding their beliefs, attitudes, and actions (HHS, 2023). Social norms, cultural beliefs, and misconceptions within a community can influence how an individual participates in preventative health behaviors (Lee et al., 2018; Redd et al., 2022; Zhu et al., 2019). One's social network can facilitate or hinder one's decision to vaccinate against HPV. Community engagement and outreach can impact one's participation in preventive health behaviors (HHS, 2023). Active community engagement, including educational campaigns and outreach efforts, can improve awareness and potentially enhance awareness and understanding of the HPV vaccine benefits.

SDOH significantly affects a person's health behavior patterns, including factors that impact HPV vaccine adoption (HHS, 2023). Elements such as restricted access to healthcare, education, financial stability, local surroundings and infrastructure, and social and communal settings considerably influence an individual's capability and readiness to engage in preventative health measures (HHS, 2023). The five dimensions of access, including accessibility, availability, affordability, acceptability, and accommodation, can provide further insight into how these factors can influence how patients utilize healthcare, including HPV vaccine uptake (Penchansky & Thomas, 1981). It is essential to address these multifaceted factors to create more equitable and effective health interventions that target individual behaviors and the broader social and structural determinants that influence health outcomes. By understanding the unique interplay between SDOH and vaccination rates, targeted strategies may be developed to increase HPV immunization and reduce disparities across different populations.

**Summary**

The prevalence of HPV as a common STD and its potential to cause significant health problems, such as cancer, underscore the critical importance of HPV immunization (CDC, 2022b, 2022c; National Cancer Institute, 2011). Despite its benefits, HPV vaccination rates in Texas remain far below the Healthy People 2030 target (Healthy People 2030, n.d.; Texas Department of State Health Services, 2023). Understanding parental and guardian attitudes, beliefs, and perceptions of access toward HPV infections and the HPV vaccine is crucial for developing effective interventions to increase immunization rates (CDC, 2021c, 2022a). This literature review has provided valuable insights into factors impacting parental attitudes and beliefs about HPV infections and the HPV vaccine. It has also introduced SDOH as a guiding theoretical framework and the dimensions of access so that this study can develop targeted

interventions to improve student vaccination rates by identifying the factors influencing parents' and guardians' attitudes toward HPV immunization.

# Chapter 3: Methodology

The high prevalence of HPV infections and its potential to cause significant health problems, such as cancer, emphasize the critical need for the HPV vaccine (CDC, 2022b, 2022c; National Cancer Institute, 2011). Despite the benefits, HPV immunization rates in Texas are far below the Healthy People 2030 goal of 80% of adolescents who receive the recommended doses of the HPV vaccine (Healthy People 2030, n.d.; DSHS, 2023). The literature review offered valuable insight into factors affecting parental attitudes and beliefs about HPV infections and the HPV vaccine. Moreover, it introduced SDOH as a guiding conceptual framework and factors that can influence parental perception of access that, include accessibility, availability, affordability, acceptability, and accommodation, to help this study develop targeted interventions to improve student vaccination rates by identifying factors influencing parents' and guardians' attitudes toward HPV immunization.

## Purpose

To address the low uptake of the HPV vaccine, this study conducted a community assessment that employed a quantitative, cross-sectional design using an electronic survey to administer a modified version of the CHIAS survey with questions about parental perceptions of access. The modified CHIAS survey assessed if the factors of harms, barriers, effectiveness, and uncertainty provide a measure of HPV immunization attitudes and beliefs among English and Spanish-speaking parents or guardians of adolescent students in grades 6–8 in a large southwest U.S. school district.

At the same time, questions assessing parental perceptions of access were used to assess the factors of acceptability, accessibility, availability, affordability, awareness, and accommodation. Understanding these factors can help examine and develop interventions to

enhance HPV vaccine uptake. Understanding parental attitudes, beliefs, and perceptions of access toward the HPV vaccine is crucial, as parents and guardians make health-based decisions for their children and adolescents. Also, vaccinating a child or adolescent against HPV requires parental consent; therefore, parental acceptability of the HPV vaccine is critical for vaccine uptake (Gowda et al., 2012).

**Project Design**

This study conducted a community assessment using a quantitative, cross-sectional design and an electronic survey to administer a modified version of the CHIAS survey and asked questions about access perceptions. Cross-sectional design studies are popular in organizations, research, and fields that frequently use survey methods (Spector, 2019). In these studies, the outcome and exposure are measured in participants simultaneously (Setia, 2016). Cross-sectional research designs can be used for population-based surveys to assess the prevalence of a specific element being investigated (Setia, 2016). This research design allowed this study to draw associations between parental beliefs, attitudes, perceptions of access toward the HPV vaccine, and uptake of the HPV vaccine, making it well-suited for this study (Setia, 2016).

**Practice Setting**

The setting for this study was a large southwest U.S. public school district. The district comprises nearly 32,000 students. Six middle schools have sixth, seventh, and eighth grades, and two elementary schools have sixth grades. The majority of the population, approximately 78%, is Hispanic or Latino. Over half of the students are economically disadvantaged, and more than 20% have limited English proficiency.

## Target Population

The target population for this study included parents or guardians of grade 6–8 students in the school district. The study used a convenience sample of parents and guardians who speak and read either English or Spanish and have children in sixth, seventh, or eighth grades. This population was selected because students in these grades are typically between 11 and 14 years old, and the ACIP recommends that children aged 11 to 15 receive a two-dose series of the HPV vaccine. Parents or guardians of over 7,000 grade 6–8 students within the school district were eligible for participation in the study. To achieve a 95% confidence level with a margin of error of ±5%, a sample size of 365 completed surveys or more was required (Qualtrics, 2022).

## Collaboration

Collaboration with the school district's External Research Committee was required to complete this study. First, approval from the External Research Committee was sought and given, stipulating that no school district communication channels would be utilized to disseminate information about this study (see Appendix A). Then, a records request was made to the district's Communication Department to gain access to the parent and guardian email addresses of students in grades 6–8. Finally, collaboration with the district's Information Systems department was required to obtain the requested records.

## Instrumentation for Data Collection

The primary instrument used for this study was a modified version of the CHIAS survey developed by McRee et al. (2010). The CHIAS survey provided a standardized tool for assessing parental attitudes toward the HPV vaccine. In the baseline survey, McRee et al. (2010) used 16 items in the scale that measure parental attitudes and beliefs about the HPV vaccine. Almost all items employed a four-point response scale, including "strongly disagree," "somewhat disagree,"

"somewhat agree," and "strongly agree." Responses were coded so that higher values indicated stronger agreement with the statements. Four items assessing the perceived difficulty in finding a provider to administer the HPV vaccine used a three-point response scale labeled "not hard at all," "somewhat hard," and "very hard." These responses were given values of 1, 2.5, and 4, with higher values indicating greater barriers. Two items assessing the vaccine's effectiveness used a four-point response scale labeled "slightly effective," "moderately," "very," and "extremely effective." These responses were coded so that higher values indicated higher perceived effectiveness. In assessing parental intention to vaccinate, four items used a four-point response, including "definitely won't," "probably won't," "probably will," and "definitely will." These responses were coded so higher values would indicate a higher intention to vaccinate. Only 14 items were reassessed in the follow-up survey, excluding the four items that assessed perceived difficulty obtaining the HPV vaccine (McRee et al., 2010).

McRee et al. (2010) used the Kaiser criterion of eigenvalues $\geq 1.0$ and the Cattells scree test to determine which factors to retain. Factors with loadings larger than 0.4 were retained, and a mean score for each factor was calculated to create a single score for each respondent. Cronbach's coefficient $\alpha$ measured the internal reliability of each factor. A test-retest analysis was conducted to assess the reliability of factor scores over time. Test-retest correlations and paired-sample t-tests were performed using data collected on factors at two points in time. Additionally, linear regression was used to examine both bivariate and multivariate associations between factor scores and parental HPV vaccination intention. Data analysis identified four factors: harms, barriers, effectiveness, and uncertainty. All CHIAS factors demonstrated good test-retest reliability and acceptable internal consistency (McRee et al., 2010). Permission (see

Appendix B) was granted to use and modify the survey to make the survey relevant to this study's population.

The patient's perception of access to healthcare is critical because their perception impacts when, where, and how they receive healthcare services (Hoseini-Esfidarjani et al., 2021). Parental and guardian perceptions of access to the HPV vaccine will be assessed utilizing a modified version of the Perceived Access to Health Care Questionnaire developed by Hoseini-Esfidarjani et al. (2021). This questionnaire assessed the dimensions of availability, accessibility, affordability, accommodation, acceptability, and awareness (Hoseini-Esfidarjani et al., 2021). The modified questionnaire included the following questions:

- Accessibility: There is a health center where I can get my child the HPV vaccine that is easily accessible to me.
- Availability: The health center has a supply of the HPV vaccine.
- Acceptability: I trust the statements and education of the healthcare provider (e.g., doctor, nurse, etc.) about the HPV vaccine.
- Affordability: Cost is a serious barrier to vaccinating my child against HPV.
- Accommodation: The working hours of the health center are suitable for me to have my child vaccinated against HPV.
- Awareness: The healthcare workers try to ensure I fully understand the health information provided.

Assessing parental and guardian perceptions of access to the HPV vaccine will enable the detection and elimination of any actual or perceived barriers for parents to vaccinate their children against HPV (Hoseini-Esfidarjani et al., 2021; see Appendix C and D for the English and Spanish Modified CHIAS and Questions of Access).

**Approval and Recruitment**

Data collection began after approval from the Abilene Christian University Institutional Review Board (IRB; see Appendix E) and the school district's External Research Committee. Parents or guardians of sixth, seventh, and eighth-grade students who speak English or Spanish were initially recruited to participate in the study through an email invitation provided in either English or Spanish (see Appendix F). The email provided information that conveyed the purpose of the study, a brief overview of the survey procedure, potential benefits and risks, the voluntary nature of participation, and a link to participate and opt out of the survey. Additionally, reminder emails were sent to parents or guardians who received the initial recruitment email and did not participate in or opt out of the survey (see Appendix G).

**Data Collection and Consent**

Informed consent was obtained from participants with a letter of introduction about the questionnaire. Participants had to click on agree or disagree to participate in the study after reading all the information provided and all questions were answered (see Appendix H). Additionally, participants were able to opt out of participation at any time by stopping and exiting the questionnaire. An electronic survey tool was used to collect participant data that utilized a modified version of the CHIAS survey that was adapted to include questions related to the five dimensions of access to healthcare. No identifying or demographic information was collected, allowing participants greater anonymity and confidentiality. Participants had 8 weeks to complete the survey once and were provided reminder emails every 2 weeks of their opportunity to participate in this study.

**Data Storage and Confidentiality**

The collected data were kept strictly confidential and was only accessible to this author. Information was kept secure and private, and all data were stored on a password-protected USB drive, safeguarding it from unauthorized access. This measure demonstrated a commitment to maintaining the highest data protection and participant confidentiality standards throughout the research process. The collected data are being retained following the guidelines and regulations established by the IRB. This ensures compliance with established data retention policies and upholds the highest ethical standards in research. Furthermore, to maintain participant confidentiality and protect their privacy, the data will not be shared with other researchers, ensuring that the information remains secure and accessible only to this author.

**Analysis Plan**

To derive meaningful insight from the collected data, analysis included data collected from the modified CHIAS survey. To explain the relationships among variables and uncover underlying factors in the CHIAS survey items, an exploratory factor analysis using principal component analysis with the oblique rotation method was employed. Factors retained included those that meet the Kaiser criterion of eigenvalues $\geq 1.0$ (Dempsey et al., 2014; McRee et al., 2010). Linear and multivariable regression models were utilized to examine the association between the different factors of harms, barriers, effectiveness, and uncertainty and the influence of the dimensions of access, providing valuable insights into parental decision-making related to HPV vaccination (Dempsey et al., 2014). In all analyses, $p$-values $\leq 0.05$ were considered statistically significant, ensuring a rigorous approach to hypothesis testing.

**Risks and Benefits**

Cross-sectional studies, such as this study, offer several advantages, including being relatively quick and inexpensive to conduct. They can provide valuable information to inform the development of interventions, like interventions aimed at increasing the uptake of the HPV vaccine (Wang & Cheng, 2020). However, there are also some risks associated with this study design. This cross-sectional study could be susceptible to recall bias, as participants might not accurately remember past events or behaviors, and nonresponse bias could arise if certain groups of participants are less likely to participate. Additionally, there is potential for selection bias, as the study relies on a convenience sample, which may not fully represent the overall population and affects the generalizability of the findings (Wang & Cheng, 2020). Despite these limitations, cross-sectional studies can provide important insights into the prevalence and associations between variables, contributing to a better understanding of the factors influencing HPV vaccine uptake.

There was minimal risk anticipated for participants during data collection of this study. Due to the survey discussing topics related to the HPV vaccine, some questions may have caused someone to become upset while answering the questions. However, participants had the option to discontinue the survey if they desired. No personally identifiable data like names or student identification numbers was collected. Furthermore, participation in this study was voluntary. Participants did not receive any direct benefit from participating in this study, and there was no monetary compensation for participation. This study did aim to contribute to the understanding of factors that influence HPV vaccine uptake, which will be used in the development of interventions to hopefully improve vaccination rates and ultimately benefit future populations.

## IRB Approval and Process

This study included human participants and was submitted to the ACU IRB for approval. After receiving approval from the ACU IRB, approval was sought and obtained from the school district's External Research Committee. Adherence to ethical research practices is of utmost importance, and obtaining approval from the relevant authorities ensures that this study meets the required ethical standards. Approval from the school district required completing a Confidentiality Contract and a Request for Research Application. The Confidentiality Contract, Request for Research Application, and a letter of approval from ACU's IRB were submitted to the school district for review by the External Research Committee. The committee then met, and approval was given with the stipulation that no ISD communication channels would be utilized during the study. Furthermore, there were no conflicts of interest.

## Feasibility

This study utilized a cross-sectional design and only required participants to complete the survey instrument once. Participants had to select whether they agreed or disagreed to acknowledge informed consent and move forward with the questionnaire after an introduction letter to the survey. Participants were recruited through an initial recruitment email and reminder emails every 2 weeks over an 8-week period. This study sought to reach a sample size of 365, which was considered achievable and sufficient to address the research questions. Participants voluntarily filled out an online survey. The survey instrument only included self-reported data related to the HPV vaccine and did not include any self-identifying or demographic information, providing participants anonymity and confidentiality. Recruited participants had 8 weeks to complete the survey once. The chosen data analysis methods are appropriate for the study design and data type.

## Chapter Summary

This chapter discusses the methods that were used to conduct this study and includes information on the feasibility of the study, IRB approval, discussion on the risks and benefits of the study, the data analysis plan, the tool used for data collection, collaboration, the targeted population, the practice setting, and the project design. This study used a quantitative cross-sectional research design to collect data using a modified CHIAS survey. Data collected from the CHIAS survey provided information about the attitudes, beliefs, and perceptions of access regarding the HPV vaccine in English- Spanish-speaking parents or guardians of grades 6–8 male and female students in a large southwest U.S. school district. The collected information will then be utilized to inform the development of interventions to improve the uptake of the HPV vaccine. Data and information about parental attitudes, beliefs, and perceptions of access are essential because parents make health-based decisions for their children and adolescents. To vaccinate a child or adolescent against HPV requires parental consent. So, parental acceptability is critical to immunization. These data collection procedures ensured participant anonymity and confidentiality, with data stored securely during the study.

# Chapter 4: Data Analysis and Results

This study was a community assessment to inform clinical practice improvement using a quantitative, cross-sectional design. The study aimed to determine parental perspectives on the HPV vaccine for their sixth through eighth-grade students. An electronic survey tool was used to administer a modified version of the CHIAS survey that was adapted to include questions related to the five dimensions of access to healthcare. The survey was designed to gain insights into participants' attitudes, beliefs, and perceptions of access to the HPV vaccine.

The PICO question addressed was: In English and Spanish-speaking parents or guardians of a large southwest U.S. school district, adolescent male and female sixth, seventh, and eighth-grade students (P), do the factors of harms, barriers, effectiveness, uncertainty, and risk denial in a modified Carolina HPV Immunization Attitudes and Beliefs Scale (CHIAS) survey, incorporating the five dimensions of access (accessibility, availability, affordability, acceptability, and accommodation; I) provide a comprehensive measure of HPV immunization attitudes, beliefs, and access-related factors that can be used for examining and developing interventions to improve HPV immunization uptake (O)? By analyzing the collected data, this chapter seeks to provide evidence-based answers, ultimately offering a comprehensive view of the current attitudes, beliefs, and perceptions of access to the HPV vaccine within the studied population to inform clinical practice improvement.

## Data Analysis Procedures

The data analysis for this study was conducted using a two-pronged approach. Initially, confirmatory factor analysis (CFA) with oblique rotation was utilized to verify the factor structure proposed by the CHIAS model, which hypothesizes that survey items cluster around four key factors: harms, barriers, effectiveness, and uncertainty (Gowda et al., 2012; McRee et

al., 2010). Contrary to expectations, the initial CFA results indicated a misalignment between the observed data and the CHIAS model's proposed factor structure. Despite the lack of perfect alignment with the factors of the CHIAS survey, it is recommended that the four factors, harms, barriers, effectiveness, and uncertainty, be examined because of their theoretical importance (Gowda et al., 2012; Hanson et al., 2019; McRee et al., 2010; VanWormer et al., 2017). Therefore, to validate the reliability of the identified factors, harms, barriers, effectiveness, and uncertainty were evaluated using Cronbach's alpha. Cronbach's alpha is a measure of internal consistency that can be utilized to determine how survey items on a scale measure the same underlying dimensions (Laerd Statistics, 2023). This step ensured that each factor, despite initial misalignment, retained sufficient reliability for subsequent analysis.

Pivoting from the CFA and building upon the reliability analysis, multiple regression models were used to examine the association between the factors of harms, barriers, effectiveness, uncertainty, and parental intention to vaccinate. Multiple regression examines the influence of multiple independent variables on a single dependent variable (Laerd Statistics, 2015). Using multiple regression for analysis provided a nuanced insight into the factor's respective roles in shaping parental vaccination intentions. Additionally, parametric assumptions for multiple regression were verified and included testing for linearity, homoscedasticity, absence of multicollinearity, absence of extreme outliers, and normality of regression residuals (Laerd Statistics, 2015).

The data analysis techniques selected for this study, including CFA and multiple regression models, were chosen to explore the multifaceted influences on parental attitudes toward HPV vaccination. Because the identified survey factors in this study diverged from the CHIAS survey factors, data analysis shifted away from CFA, and the four CHIAS factors were

examined because of their theoretical importance. The harms, barriers, effectiveness, and uncertainty factors were assessed in this study utilizing Cronbach's alpha to confirm their reliability. After establishing the reliability of the factors of harms, barriers, effectiveness, and uncertainty in this study, the data were analyzed using multiple regression models to examine the association between the factors and parental intention to vaccinate. Conducting this data analysis provided an understanding of the factors influencing parental intentions and attitudes toward HPV vaccination.

**Descriptive Data of Sample Population**

The study's population consisted of parents and guardians of adolescents enrolled in grades 6–8 in a large southwest U.S. school district. This population was selected because students in these grades are typically between 11 and 14 years old, and the Advisory Committee on Immunization Practices recommends that children aged 11 to 15 receive a two-dose series of the HPV vaccine. Participants of this study ($N$ = 151) were parents or guardians of students enrolled in grades 6–8 from six different middle schools, two elementary schools, and one K–12 campus in a large southwest U.S. school district. Data on participant characteristics and demographics were not collected to protect participant privacy and anonymity.

**Descriptive Statistics**

Descriptive statistics of the study variables appear in Table 1. The predictor variables included barriers, effectiveness, uncertainty, and harms. The criterion variables included affordability, accessibility, accommodation, availability, awareness, and acceptability. Of the four predictor variables, uncertainty had the greatest mean ($M$ = 2.91, $SD$ = 0.78). This was followed by effectiveness ($M$ = 2.54, $SD$ = 0.84); harms ($M$ = 2.00, $SD$ = 0.64); and barriers ($M$ = 1.78, $SD$ = 0.73). Regarding the criterion variables, availability had the greatest mean ($M$ = 3.24, $SD$ =

0.65). This was followed by accessibility (*M* = 3.23, *SD* = 0.79), acceptability (*M* = 3.15, *SD* = 0.78), awareness (*M* = 3.05, *SD* = 0.82), accommodation (*M* = 2.96, *SD* = 0.85), and affordability (*M* = 1.84, *SD* = 0.95).

**Table 1**

*Descriptive Statistics of Study Variables (*N *= 151)*

| Variable | *M* | *SD* |
|---|---|---|
| Barriers (higher scores indicate more barriers) | 1.78 | .73 |
| Effectiveness (higher scores indicate more perceived effectiveness) | 2.54 | .84 |
| Uncertainty (higher scores indicate less uncertainty) | 2.91 | .78 |
| Harms (higher scores indicate greater perceived harms) | 2.00 | .64 |
| Affordability | 1.84 | .95 |
| Accessibility | 3.23 | .79 |
| Accommodation | 2.96 | .85 |
| Availability | 3.24 | .65 |
| Awareness | 3.05 | .82 |
| Acceptability | 3.15 | .78 |

**Results**

Data analysis was initiated with a confirmatory factor analysis using oblique rotation. An analysis of the eigenvalues revealed four factors with eigenvalues greater than 1. These factors accounted for about 70.96% of the variance. However, an examination of the variance revealed that two factors accounted for most of the variation. Factor 1 accounted for 36.68% of the

variance, factor 2 for roughly 19.18% of the variance, factor 3 for roughly 6.8% of the variance, and factor 4 for 6.27% of the variance. The remaining factors each accounted for less than 6% of the variance. Examining the scree plot suggested that only about four factors be retained (see Figure 1). The factor loadings are presented in Table 2.

**Table 2**

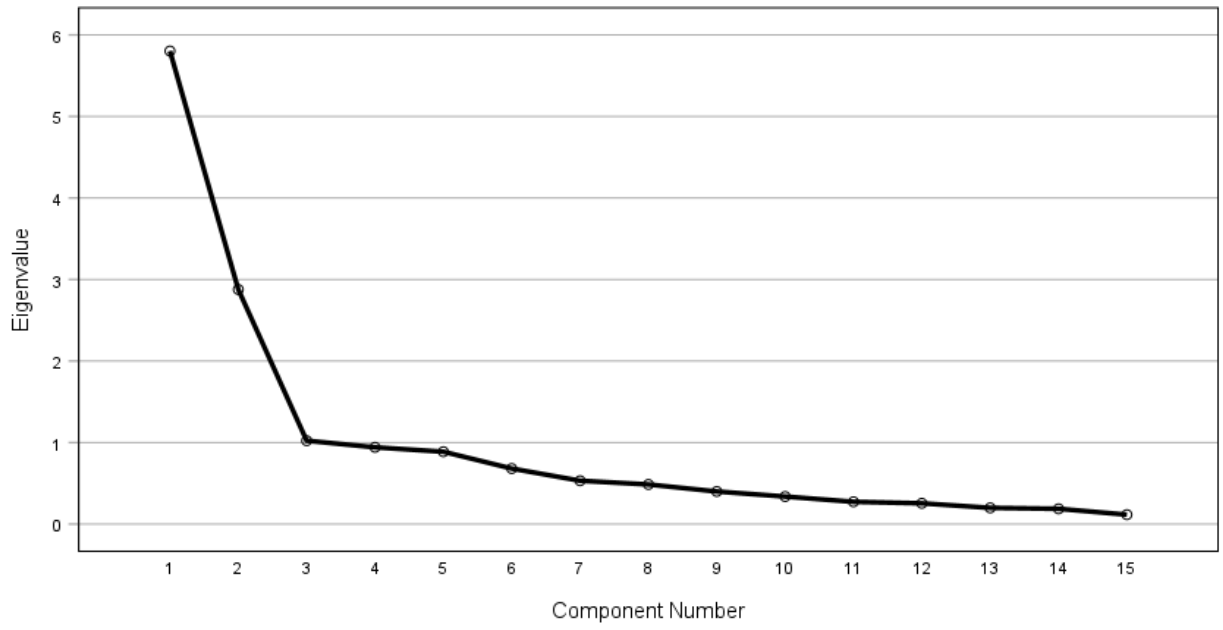
*Total Variance Explained by Exploratory Factor Analysis*

| | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|---|---|---|
| Component | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 5.803 | 38.68 | 38.684 | 5.803 | 38.684 | 38.684 | 4.401 | 29.338 | 29.338 |
| 2 | 2.878 | 19.18 | 57.869 | 2.878 | 19.185 | 57.869 | 3.151 | 21.009 | 50.347 |
| 3 | 1.023 | 6.82 | 64.689 | 1.023 | 6.820 | 64.689 | 1.864 | 12.427 | 62.774 |
| 4 | .942 | 6.27 | 70.966 | .942 | 6.277 | 70.966 | 1.229 | 8.192 | 70.966 |
| 5 | .888 | 5.91 | 76.884 | | | | | | |
| 6 | .681 | 4.54 | 81.425 | | | | | | |
| 7 | .532 | 3.54 | 84.972 | | | | | | |
| 8 | .486 | 3.24 | 88.213 | | | | | | |
| 9 | .400 | 2.66 | 90.877 | | | | | | |
| 10 | .338 | 2.25 | 93.130 | | | | | | |
| 11 | .273 | 1.82 | 94.952 | | | | | | |
| 12 | .255 | 1.69 | 96.651 | | | | | | |
| 13 | .199 | 1.32 | 97.978 | | | | | | |
| 14 | .188 | 1.25 | 99.229 | | | | | | |
| 15 | .116 | 0.77 | 100.000 | | | | | | |

*Note.* Extraction Method: Principal Component Analysis.

**Figure 1**

*Scree Plot for Confirmatory Factor Analysis*




The factor loadings appear in Table 3.

**Table 3**

*Rotated Factor Matrix (Using Confirmatory Principal Components Factors Analysis)*

| | Component | | | |
|---|---|---|---|---|
| Items | 1 | 2 | 3 | 4 |
| I think the HPV vaccine might cause short-term problems, like fever or discomfort. | .541 | .138 | -.135 | .267 |
| The HPV vaccine is being pushed to make money for drug companies and/or doctors. | .781 | -.038 | -.326 | -.038 |
| I think the HPV vaccine might cause health problems in the future. | .826 | -.054 | -.319 | -.015 |
| I think that getting the HPV vaccine makes it more likely for someone to have sex. | .712 | .164 | .303 | -.165 |
| I think the HPV vaccine is safe. | .761 | -.020 | -.396 | -.099 |

| | Component | | | |
|---|---|---|---|---|
| Items | 1 | 2 | 3 | 4 |
| I think my student is too young to get a vaccine for a sexually transmitted infection like HPV. | -.757 | -.127 | .212 | .126 |
| How effective do you think the HPV vaccine is in preventing genital warts? | -.319 | -.097 | .809 | .044 |
| How effective do you think the HPV vaccine is in preventing cervical cancer? | -.529 | -.066 | .680 | .123 |
| I don't have enough information about the HPV vaccine to decide whether to give it to my student. | -.336 | -.237 | .390 | .531 |
| The HPV vaccine is so new that I want to wait a while before deciding if my student should get it. | -.796 | -.211 | .212 | .252 |
| Other parents in my community are getting their students the HPV vaccine. | -.050 | -.121 | .020 | .846 |
| How hard do you think it would be to find a provider or clinic where you can afford the vaccine? | .058 | .907 | -.153 | -.063 |
| How hard do you think it would be to find a provider or clinic that has the vaccine available? | .066 | .907 | -.079 | -.013 |
| I am concerned that the HPV vaccine costs more than I can pay. | .127 | .826 | .028 | -.087 |
| How hard do you think it would be to find a provider or clinic where you don't have to wait long to get an appointment? | .033 | .792 | .010 | -.120 |

Given that the factor analysis shows that the items do not align with the proposed factors for the CHIAS survey, it is recommended that the four factors of harms, barriers, effectiveness, and uncertainty be examined, given their theoretical importance. To confirm the efficacy of this, the reliability of the factors of harms, barriers, effectiveness, and uncertainty were assessed with Cronbach's alpha. The four factors were determined to be reliable (see Table 4).

**Table 4**

*Cronbach's Alpha for the Four Factors*

| Subscale/Factor | Number of items | Cronbach's Alpha |
|---|---|---|
| Barriers | 3 | .88 |
| Effectiveness | 2 | .83 |
| Uncertainty | 4 | .75 |
| Perceived Harms | 6 | .75 |

### *Multiple Regression Models*

Multiple regression models were utilized to examine the association between the different factors and parental intention to vaccinate, providing valuable insights into the key predictors of vaccination intentions (Dempsey et al., 2014). Testing was conducted to verify the parametric assumptions for multiple regression, which included linearity, homoscedasticity, absence of multicollinearity, absence of extreme outliers, and normality of regression residuals. Multiple regression consisted of testing six regression models:

1. Affordability = b0 + b1 Barriers + b2 Effectiveness + b3 Uncertainty + b4 Harms
2. Accessibility = b0 + b1 Barriers + b2 Effectiveness + b3 Uncertainty + b4 Harms
3. Accommodation = b0 + b1 Barriers + b2 Effectiveness + b3 Uncertainty + b4 Harms
4. Availability = b0 + b1 Barriers + b2 Effectiveness + b3 Uncertainty + b4 Harms
5. Awareness = b0 + b1 Barriers + b2 Effectiveness + b3 Uncertainty + b4 Harms
6. Acceptability = b0 + b1 Barriers + b2 Effectiveness + b3 Uncertainty + b4 Harms

### *Testing of Parametric Assumptions*

There was collective linearity and homoscedasticity as assessed by plots of standardized residuals against the predicted values (see Figures 2 through 7).

**Figure 2**

*Scatter Plot of Standardized Residuals Against the Predicted Values (Affordability)*

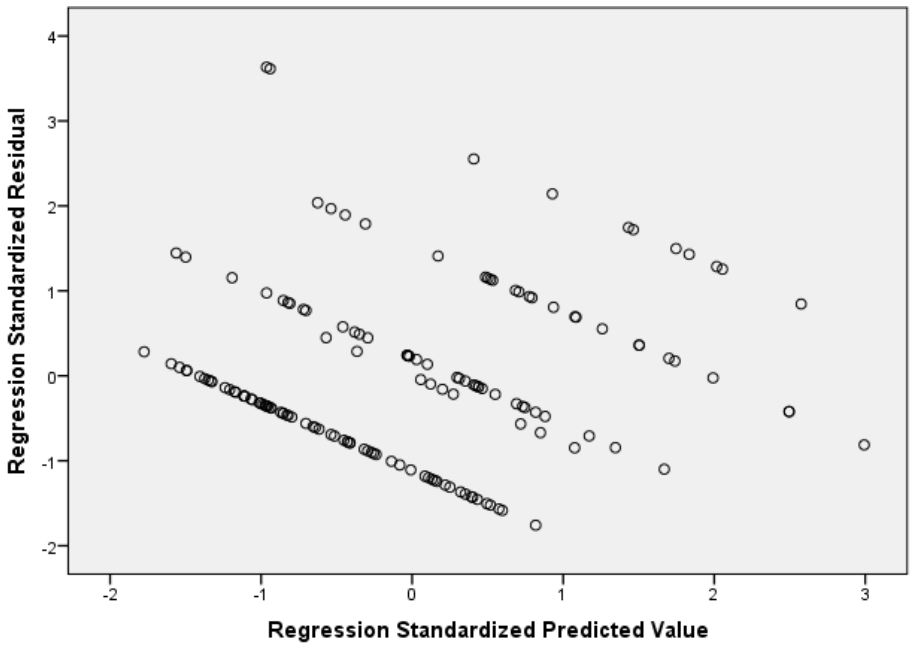



**Figure 3**

*Scatter Plot of Standardized Residuals Against the Predicted Values (Accessibility)*

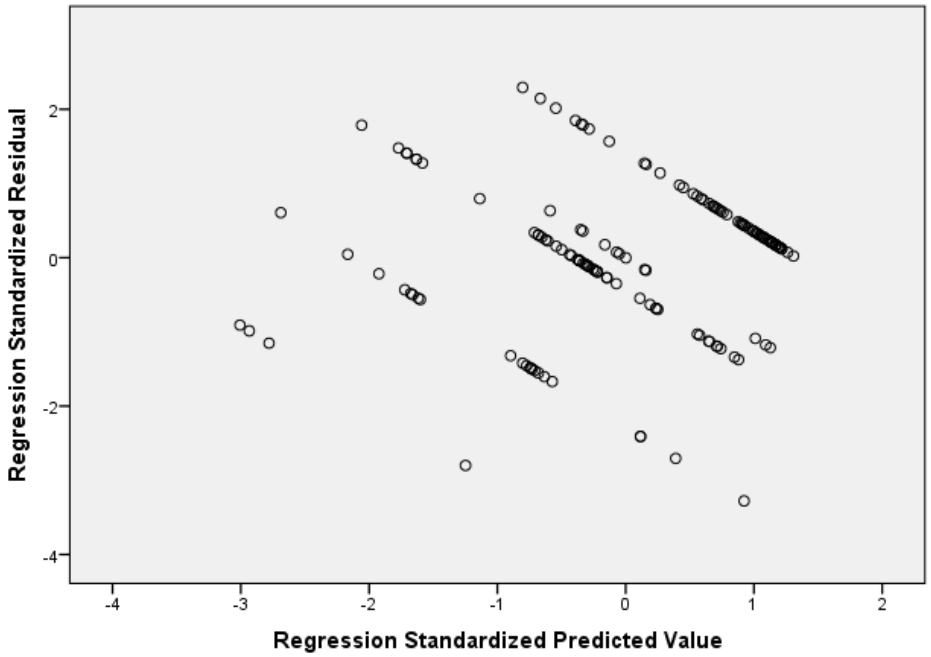


**Figure 4**

*Scatter Plot of Standardized Residuals Against the Predicted Values (Accommodation)*

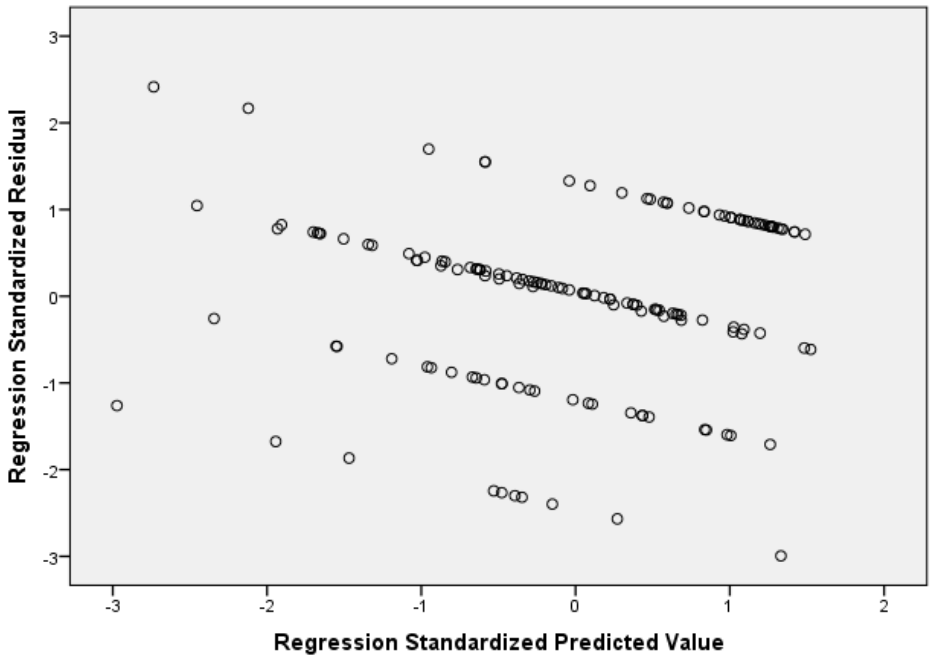



**Figure 5**

*Scatter Plot of Standardized Residuals Against the Predicted Values (Availability)*

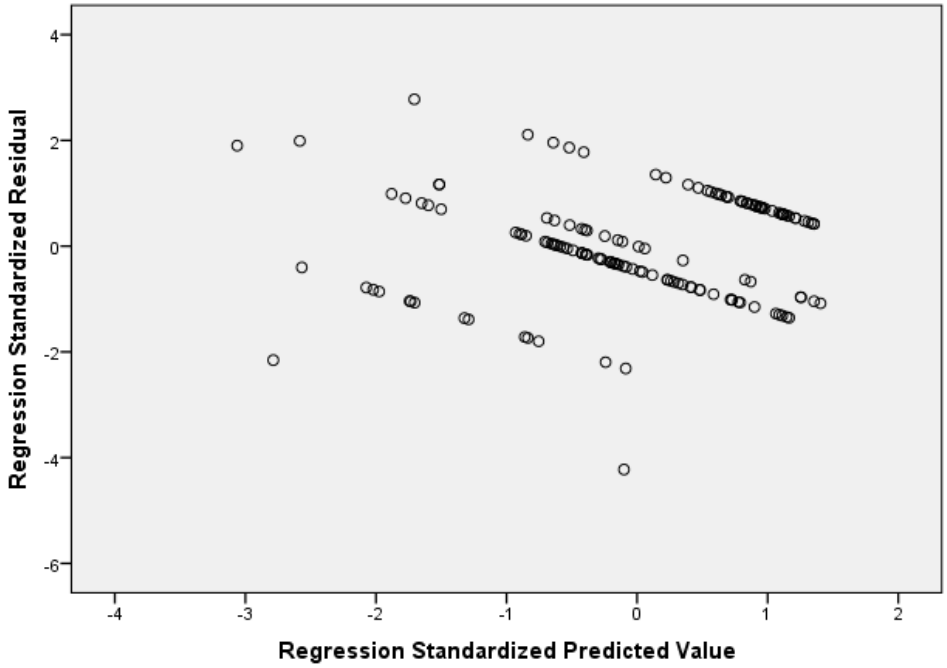


**Figure 6**

*Scatter Plot of Standardized Residuals Against the Predicted Values (Awareness)*

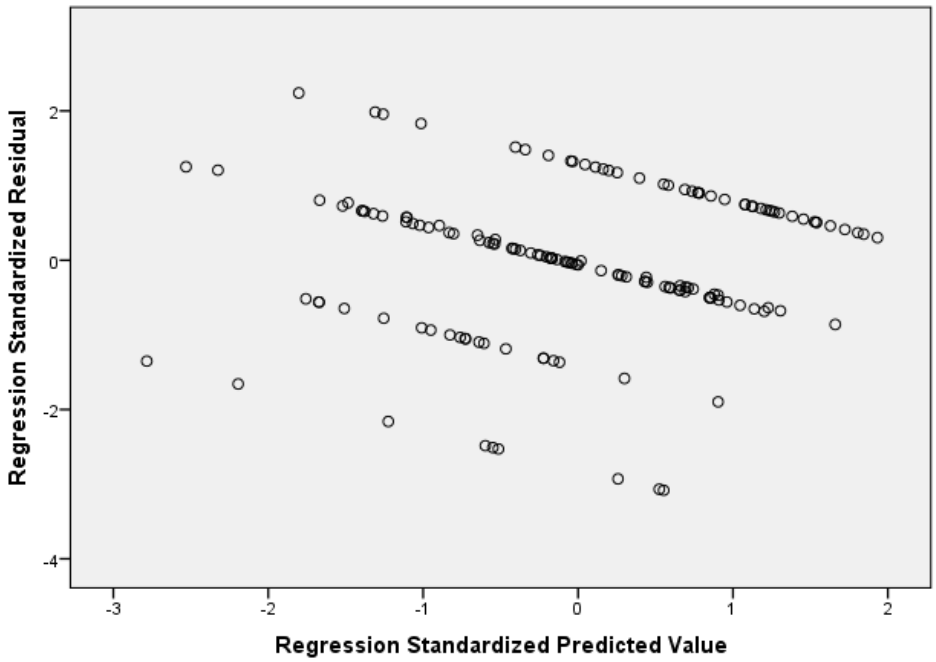
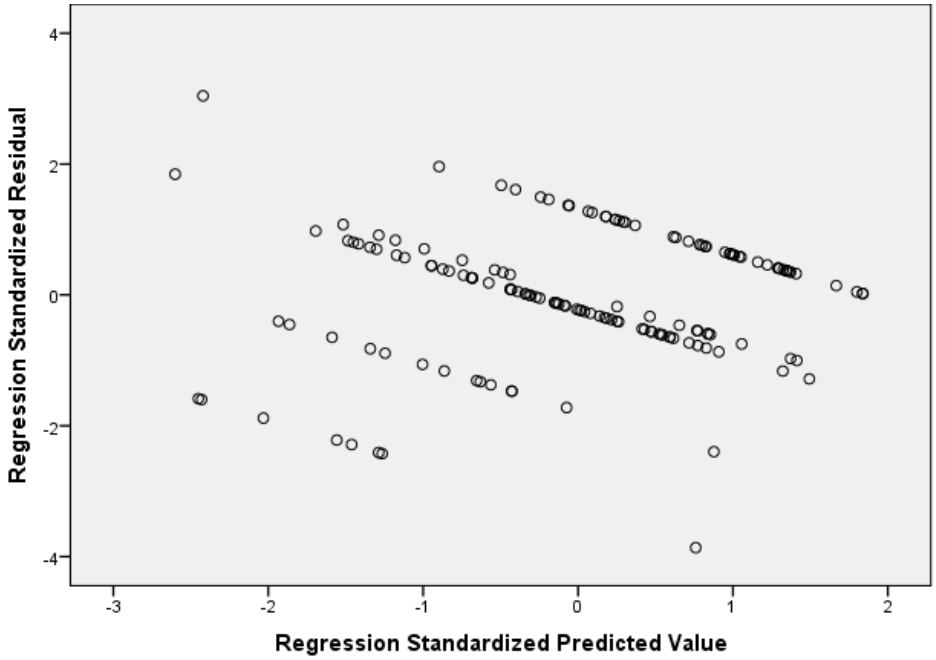



**Figure 7**

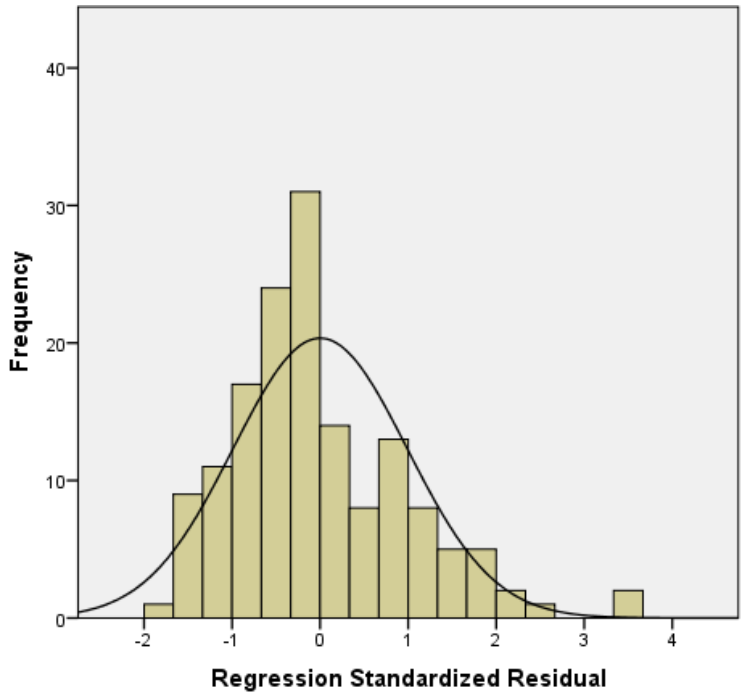
*Scatter Plot of Standardized Residuals Against the Predicted Values (Acceptability)*



There was no evidence of multicollinearity, as assessed by variance inflation factors less than 10. Some data values were more than 1.5 lengths from the edges of the box plots. These values, however, were not extreme outliers (i.e., more than three box lengths), and these cases were kept in the analysis. It is unacceptable to drop an observation because it is an outlier, as these values were legitimate observations (Field, 2018). Each point carries less weight in a large dataset, so an outlier is less worrisome than the same data in a smaller dataset (Field, 2018). The assumption of normality was met, as assessed by visual inspections of histograms of residuals (Figures 8 through 13). The visual inspection was preferred over statistical tests for normality, as those tests are very sensitive to larger sample sizes.

**Figure 8**

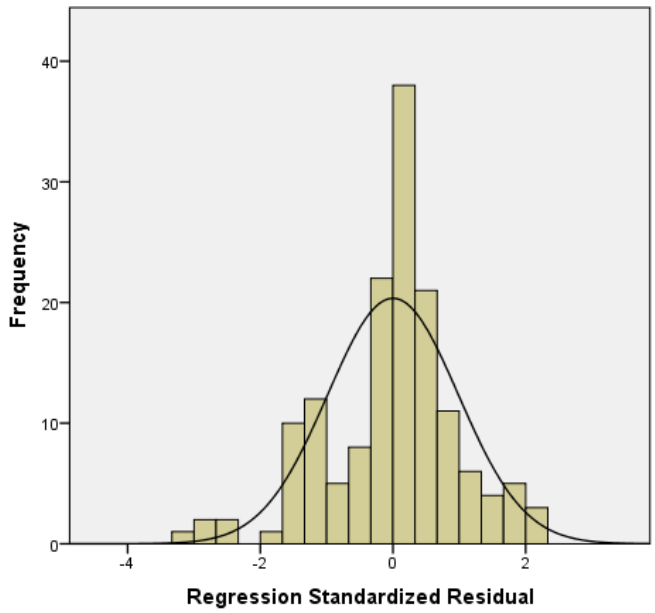
*Histogram of Regression Residuals (Affordability)*




*Note*. *M* = -1.90E-16; *SD* = 0.987; *N* = 151

**Figure 9**

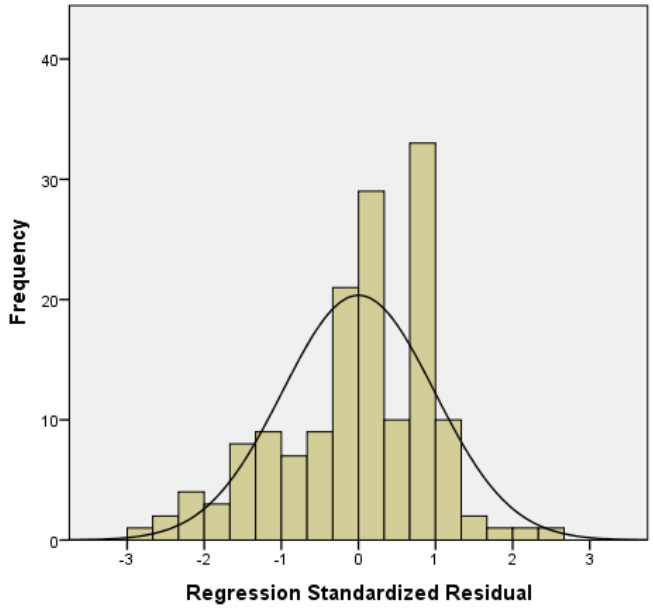
*Histogram of Regression Residuals (Accessibility)*




*Note*. $M$ = 1.24E-16; $SD$ = 0.987; $N$ = 151

**Figure 10**

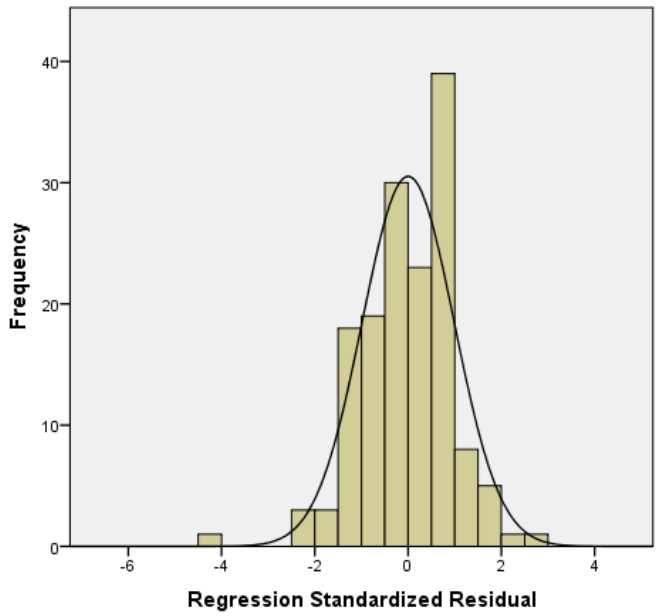
*Histogram of Regression Residuals (Accommodation)*




*Note*. $M$ = 1.05E-16; $SD$ = 0.987; $N$ = 151

**Figure 11**

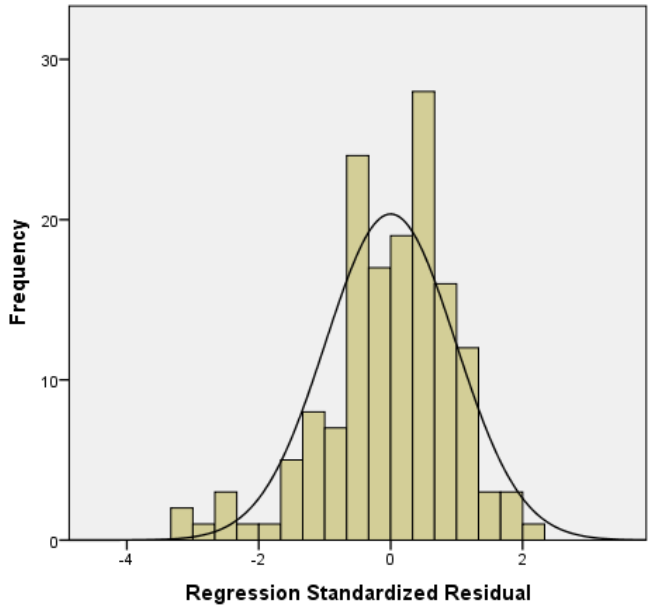
*Histogram of Regression Residuals (Availability)*




*Note*. $M$ = 4.13E-16; $SD$ = 0.987; $N$ = 151

**Figure 12**

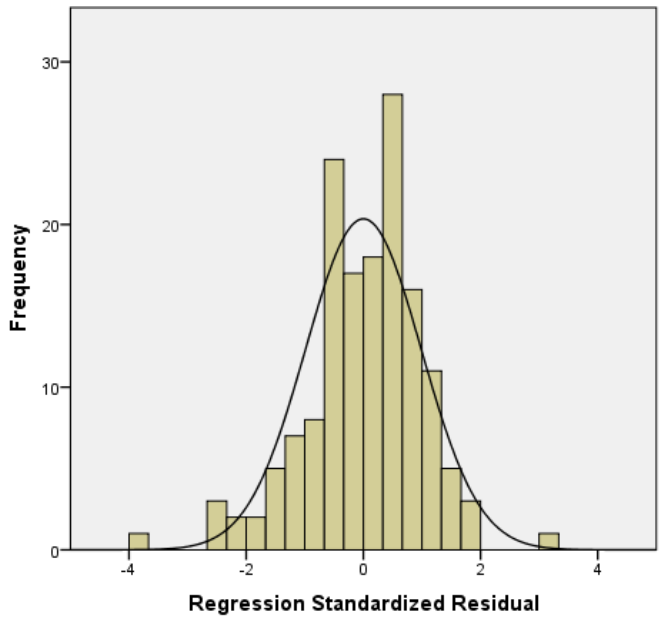
*Histogram of Regression Residuals (Awareness)*




*Note*. $M$ = -1.98E-16; $SD$ = 0.987; $N$ = 151

**Figure 13**

*Histogram of Regression Residuals (Acceptability)*




*Note*. $M$ = -1.40E-16; $SD$ = 0.987; $N$ = 151

***Results of Multiple Regression***

**Regression 1.** Affordability = $b_0$ + $b_1$ Barriers + $b_2$ Effectiveness + $b_3$ Uncertainty + $b_4$ Harms

A multiple regression was conducted to assess the predictive relationship of barriers, effectiveness, uncertainty, and harms on affordability. The overall model was statistically significant, $F(4, 150) = 23.260$, $p < .001$, and accounted for 37.2% of the variability in predicting affordability ($R^2adj = .372$). Out of the four predictors, barriers ($B = 0.729$, $p < .001$) and effectiveness ($B = 0.262$, $p = .003$) were statistically significant. Increases in barriers and effectiveness correspond to an increase in affordability. Uncertainty ($B = -0.206$, $p = .093$) and harms ($B = 0.111$, $p = .448$) were not statistically significant. Table 5 includes this information.

**Table 5**

*Regression Coefficient Table of Barriers, Effectiveness, Uncertainty, and Harms Predicting Affordability**

| Subscale/factor | Unstandardized Coefficients | | Standardized Coefficients | | | Collinearity Statistics |
|---|---|---|---|---|---|---|
| | *B* | *SE* | β | *t* | *p* | VIF |
| (Constant) | .251 | .629 | | 0.398 | .691 | |
| Barriers | .729 | .088 | .557 | 8.299 | .000 | 1.077 |
| Effectiveness | .262 | .088 | .232 | 2.987 | .003 | 1.446 |
| Uncertainty | -.206 | .122 | -.168 | -1.688 | .093 | 2.376 |
| Harms | .111 | .146 | .075 | 0.762 | .448 | 2.320 |

*Note.* $F(4, 150) = 23.260$, $p < .001$; $R^2adj = .372$.

**Regression 2.** Accessibility = $b_0$ + $b_1$ Barriers + $b_2$ Effectiveness + $b_3$ Uncertainty + $b_4$ Harms

A multiple regression was conducted to assess the predictive relationship of barriers, effectiveness, uncertainty, and harms on accessibility. The overall model was statistically significant, $F(4, 150) = 43.388$, $p < .001$, and accounted for 53.1% of the variability in predicting affordability ($R^2adj = .531$). The predictor barriers ($B = - 0.771$, $p < .001$) were statistically significant among the four predictors. Increases in barriers corresponded to a decrease in accessibility. Effectiveness ($B = 0.034$, $p = .585$), uncertainty ($B = -0.035$, $p = .685$), and harms ($B = -0.108$, $p = .303$) were not statistically significant (see Table 6).

**Table 6**

*Regression Coefficient Table of Barriers, Effectiveness, Uncertainty, and Harms Predicting Accessibility*

| Subscale/factor | Unstandardized Coefficients | | Standardized Coefficients | | | Collinearity Statistics |
|---|---|---|---|---|---|---|
| | *B* | *SE* | β | *t* | *p* | VIF |
| (Constant) | 4.836 | .450 | | 10.737 | .000 | |
| Barriers | -.771 | .063 | -.712 | -12.269 | .000 | 1.077 |
| Effectiveness | .034 | .063 | .037 | 0.548 | .585 | 1.446 |
| Uncertainty | -.035 | .087 | -.035 | -0.406 | .685 | 2.376 |
| Harms | -.108 | .105 | -.088 | -1.034 | .303 | 2.320 |

*Note.* $F(4, 150) = 43.388$, $p < .001$; $R^2adj = .531$

**Regression 3.** Accommodation = $b_0$ + $b_1$ Barriers + $b_2$ Effectiveness + $b_3$ Uncertainty + $b_4$ Harms

A multiple regression was conducted to assess the predictive relationship of barriers, effectiveness, uncertainty, and harms on accommodation. The overall model was statistically significant, $F(4, 150) = 6.083$, $p < .001$, and accounted for 11.9% of the variability in predicting affordability ($R^2adj = .119$). The predictor barriers (B = - 0.379, p < .001) were statistically significant among the four predictors. Increases in barriers corresponded to a decrease in accommodation Effectiveness ($B = 0.036$, $p = .695$), uncertainty ($B = 0.154$, $p = .23$), and harms ($B = 0.049$, $p = .753$) were not statistically significant (see Table 7).

**Table 7**

*Regression Coefficient Table of Barriers, Effectiveness, Uncertainty, and Harms Predicting Accommodation*

| Subscale/factor | Unstandardized Coefficients | | Standardized Coefficients | | | Collinearity Statistics |
|---|---|---|---|---|---|---|
| | *B* | *SE* | β | *t* | *p* | VIF |
| (Constant) | 2.992 | .665 | | 4.497 | .000 | |
| Barriers | -.379 | .093 | -.325 | -4.081 | .000 | 1.077 |
| Effectiveness | .036 | .093 | .036 | 0.393 | .695 | 1.446 |
| Uncertainty | .154 | .129 | .141 | 1.196 | .233 | 2.376 |
| Harms | .049 | .155 | .037 | 0.315 | .753 | 2.320 |

*Note.* $F(4, 150) = 6.083$, $p < .001$; $R^2adj = .119$

**Regression 4.** Availability = $b_0$ + $b_1$ Barriers + $b_2$ Effectiveness + $b_3$ Uncertainty + $b_4$ Harms

A multiple regression was conducted to assess the predictive relationship of barriers, effectiveness, uncertainty, and harms on availability. The overall model was statistically significant, $F(4, 150) = 22.241$, $p < .001$, and accounted for 36.2% of the variability in predicting availability ($R^2adj = .362$). Among the four predictors, barriers ($B = - 0.533$, $p < .001$) were statistically significant. Increases in barriers corresponded to a decrease in availability. Effectiveness ($B = 0.089$, $p = .143$), uncertainty ($B = 0.016$, $p = .852$), and harms ($B = 0.034$, $p = .734$) were not statistically significant (see Table 8).

**Table 8**

*Regression Coefficient Table of Barriers, Effectiveness, Uncertainty, and Harms Predicting Availability*

| Subscale/factor | Unstandardized Coefficients | | Standardized Coefficients | | | Collinearity Statistics |
|---|---|---|---|---|---|---|
| | *B* | *SE* | β | *t* | *p* | VIF |
| (Constant) | 3.847 | .435 | | 8.837 | .000 | |
| Barriers | -.533 | .061 | -.594 | -8.777 | .000 | 1.077 |
| Effectiveness | .089 | .061 | .116 | 1.472 | .143 | 1.446 |
| Uncertainty | .016 | .084 | .019 | 0.187 | .852 | 2.376 |
| Harms | .034 | .101 | .034 | 0.341 | .734 | 2.320 |

*Note.* $F(4, 150) = 22.241$, $p < .001$; $R^2adj = .362$

**Regression 5.** Awareness = $b_0$ + $b_1$ Barriers + $b_2$ Effectiveness + $b_3$ Uncertainty + $b_4$ Harms

A multiple regression was conducted to assess the predictive relationship of barriers, effectiveness, uncertainty, and harms on awareness. The overall model was statistically significant, $F(4, 150) = 10.085$, $p < .001$, and accounted for 19.5% of the variability in predicting awareness ($R^2adj = .195$). Out of the four predictors, effectiveness ($B = 0.209$, $p = .015$), and harms ($B = -0.299$, $p = .037$) were statistically significant. Increases in effectiveness corresponded to an increase in awareness, whereas an increase in harms resulted in a decrease in awareness. Barriers ($B = -0.096$, $p = .263$) and uncertainty ($B = 0.064$, $p = .588$) were not statistically significant (see Table 9).

**Table 9**

*Regression Coefficient Table of Barriers, Effectiveness, Uncertainty, and Harms Predicting Awareness*

| Subscale/factor | Unstandardized Coefficients | | Standardized Coefficients | | | Collinearity Statistics |
|---|---|---|---|---|---|---|
| | *B* | *SE* | β | *t* | *p* | VIF |
| (Constant) | 3.097 | .612 | | 5.060 | .000 | |
| Barriers | -.096 | .085 | -.085 | -1.123 | .263 | 1.077 |
| Effectiveness | .209 | .085 | .216 | 2.452 | .015 | 1.446 |
| Uncertainty | .064 | .118 | .061 | 0.543 | .588 | 2.376 |
| Harms | -.299 | .142 | -.234 | -2.100 | .037 | 2.320 |

*Note.* $F(4, 150) = 10.085$, $p < .001$; $R^2adj = .195$

**Regression 6.** Acceptability = $b_0$ + $b_1$ Barriers + $b_2$ Effectiveness + $b_3$ Uncertainty + $b_4$ Harms

A multiple regression was conducted to assess the predictive relationship of barriers, effectiveness, uncertainty, and harms on acceptability. The overall model was statistically significant, $F(4, 150) = 18.882$, $p < .001$, and accounted for 32.3% of the variability in predicting awareness ($R^2adj = .323$). Out of the four predictors, effectiveness ($B = 0.226$, $p = .003$) and harms ($B = -0.499$, $p < .001$) were statistically significant. Increases in effectiveness correspond to an increase in acceptability, whereas an increase in harms results in a decrease in acceptability. Barriers ($B = 0.010$, $p = .890$) and uncertainty ($B = 0.022$, $p = .833$) were not statistically significant (see Table 10).

**Table 10**

*Regression Coefficient Table of Barriers, Effectiveness, Uncertainty, and Harms Predicting Acceptability*

| Subscale/factor | Unstandardized Coefficients | | Standardized Coefficients | | | Collinearity Statistics |
|---|---|---|---|---|---|---|
| | *B* | *SE* | β | *t* | *p* | VIF |
| (Constant) | 3.486 | .540 | | 6.457 | .000 | |
| Barriers | .010 | .075 | .010 | 0.138 | .890 | 1.077 |
| Effectiveness | .226 | .075 | .244 | 3.014 | .003 | 1.446 |
| Uncertainty | .022 | .105 | .022 | 0.211 | .833 | 2.376 |
| Harms | -.499 | .126 | -.407 | -3.973 | .000 | 2.320 |

*Note.* $F(4, 150) = 18.882$, $p < .001$; $R^2adj = .323$

## Chapter Summary

The main data analysis of this study included six multiple linear regression models that were assessed to measure the extent to which barriers, effectiveness, uncertainty, and harms predict affordability, accessibility, accommodation, availability, awareness, and acceptability. Regarding affordability, barriers ($B = 0.729$, $p < .001$), and effectiveness ($B = 0.262$, $p = .003$) were significant. Increases in barriers and effectiveness correspond to an increase in affordability. Uncertainty ($B = -0.206$, $p = .093$) and harms ($B = 0.111$, $p = .448$) were not statistically significant. For accessibility, barriers ($B = - 0.771$, $p < .001$) were statistically significant. Increases in barriers corresponded to a decrease in accessibility. Effectiveness ($B = 0.034$, $p = .585$), uncertainty ($B = -0.035$, $p = .685$), and harms ($B = -0.108$, $p = .303$), were not statistically significant.

Barriers ($B$ = - 0.379, $p$ < .001) were statistically significant regarding accommodation. Increases in barriers corresponded to a decrease in accommodation. Effectiveness ($B$ = 0.036, $p$ = .695), uncertainty ($B$ = 0.154, $p$ = .23), and harms ($B$ = 0.049, $p$ = .753), were not statistically significant. Barriers ($B$ = - 0.533, $p$ < .001) were statistically significant regarding availability. Increases in barriers corresponded to a decrease in availability. Effectiveness ($B$ = 0.089, $p$ = .143), uncertainty ($B$ = 0.016, $p$ = .852), and harms ($B$ = 0.034, $p$ = .734), were not statistically significant. For awareness, effectiveness ($B$ = 0.209, $p$ = .015), and harms ($B$ = -0.299, $p$ = .037) were statistically significant. Increases in effectiveness corresponded to an increase in awareness, whereas an increase in harms results in a decrease in awareness. Barriers ($B$ = -0.096, $p$ = .263) and uncertainty ($B$ = 0.064, $p$ = .588) were not statistically significant. Lastly, regarding acceptability, effectiveness ($B$ = 0.226, $p$ = .003) and harms ($B$ = -0.499, $p$ < .001) were statistically significant. Increases in effectiveness correspond to an increase in acceptability, whereas an increase in harms results in a decrease in acceptability. Barriers *(*$B$ = 0.010, $p$ = .890) and uncertainty ($B$ = 0.022, $p$ = .833) were not statistically significant.

The data analysis in this chapter has meticulously outlined the relationship between barriers, effectiveness, uncertainty, and harms and their impact on the six dimensions of health intervention, including affordability, accessibility, accommodation, availability, awareness, and acceptability, through the lens of multiple linear regression models. The significant predictors identified emphasize the nuanced relationship of factors influencing the effectiveness of health interventions. While other variables did not emerge as significant predictors in some dimensions, their roles highlight the complexity of healthcare delivery and intervention uptake. This analysis deepens our understanding of the multifaceted barriers and facilitators to health intervention

success. It sets a solid foundation for developing interventions to help increase the uptake of HPV vaccinations.

# Chapter 5: Discussion, Conclusions, and Recommendations

Nationally, in Texas, and especially in the large southwest U.S. school district where this study was conducted, the low HPV vaccination rates pose a significant public health concern. This concern is heightened by the association of HPV infections with conditions such as genital warts and precancerous and cancerous cell changes, which are linked to six different types of cancer (CDC, 2021c, 2022c). To address this issue, this project sought to understand parental perspectives on the HPV vaccine for their sixth through eighth-grade students by completing a community assessment to inform clinical practice improvement. This community assessment utilized a modified CHIAS survey. It incorporated questions regarding the five dimensions of access to examine the attitudes, beliefs, and access-related factors parents and guardians have toward the HPV vaccine and identify specific factors contributing to low HPV immunization rates within the community. In addition, this study aimed to utilize the collected data to develop targeted interventions and strategies to increase HPV immunization rates among the students in the school district. This chapter discusses this project's findings, strengths and limitations, implications, recommendations, and dissemination of the results.

## Summary of the Project

This project aimed to understand better the attitudes, beliefs, and perceptions of access in English and Spanish-speaking parents and guardians of adolescent students in grades 6–8 in a large southwest U.S. school district to the HPV vaccine, so that targeted interventions and strategies can be developed to address the low uptake and completion of the HPV vaccine series. Many factors influence HPV vaccine uptake, including factors that stem from parental attitudes and beliefs and include items like social influences, religion, culture, vaccine safety concerns, potential side effects, inadequate healthcare provider recommendations, and limited knowledge

(Alarcao & Zdravkova, 2022; Niu et al., 2020; O'Leary et al., 2018; Rositch et al., 2022; Szilagyi et al., 2020; Thompson et al., 2019). These factors can influence parental attitudes and beliefs and significantly impact whether they vaccinate their child against HPV (Gowda et al., 2012). Additionally, patient perception of healthcare services provided can influence their choice to utilize accessible healthcare services (Hoseini-Esfidarjani et al., 2021). This perception can also affect how and if a parent chooses to vaccinate their child against HPV. So, understanding their attitudes, beliefs, and perceptions of access is essential because the HPV vaccine can protect against HPV infections and subsequent health issues like cancer, especially when administered before the start of sexual activity (CDC, 2022a).

This project was a community assessment to inform clinical practice improvement that employed a quantitative, cross-sectional design using an electronic survey to administer a modified CHIAS survey that incorporated questions regarding the five dimensions of access to understand better parent and guardian attitudes, beliefs, and perceptions of access. The CHIAS survey was explicitly designed to investigate parental attitudes and beliefs and their association with parental intention to vaccinate against HPV (McRee et al., 2010). The additional questions included in this project's survey looked at the factors associated with the uptake of a new vaccine: Accessibility, Availability, Affordability, Acceptability, and Accommodation, as defined by Penchansky and Thomas (1981). Furthermore, social determinants of health (SDOH) were utilized as a framework to guide this study in better understanding critical determinants influencing HPV immunization uptake.

**Major Findings**

Data analysis was conducted utilizing a two-pronged approach that started with a Confirmatory Factor Analysis (CFA) with an oblique rotation to verify the factor structure

proposed by the CHIAS model, which hypothesizes that the survey items cluster around four key factors: harms, barriers, effectiveness, and uncertainty (Gowda et al., 2012; McRee et al., 2010). However, the initial CFA results indicated a misalignment between the observed data and the original CHIAS factors structures. Even though there was a misalignment of factors between the original CHIAS factors and the observed data, it is recommended that the original factors be assessed for reliability, given their theoretical importance (Gowda et al., 2012; Hanson et al., 2019; McRee et al., 2010; VanWormer et al., 2017). To assess the reliability of the factors of harms, barriers, effectiveness, and uncertainty were assessed with Cronbach's alpha and were determined to be reliable (see Table 3).

Building on the reliability analysis of the CHIAS factors, six multiple regression models were used to measure the extent to which barriers, effectiveness, uncertainty, and harms predict affordability, accessibility, accommodation, availability, awareness, and acceptability. Regarding affordability, barriers ($B = 0.729$, $p < .001$), and effectiveness ($B = 0.262$, $p = .003$) were significant. Increases in barriers and effectiveness correspond to an increase in affordability. For accessibility, barriers ($B = - 0.771$, $p < .001$) were statistically significant. Increases in barriers corresponded to a decrease in accessibility. Barriers ($B = - 0.379$, $p < .001$) were statistically significant regarding accommodation. Increases in barriers corresponded to a decrease in accommodation. Additionally, barriers ($B = - 0.533$, $p < .001$) were statistically significant regarding availability. Increases in barriers corresponded to a decrease in availability. For awareness, effectiveness ($B = 0.209$, $p = .015$), and harms ($B = -0.299$, $p = .037$) were statistically significant. Increases in effectiveness corresponded to an increase in awareness, whereas an increase in harms results in a decrease in awareness. Lastly, regarding acceptability, effectiveness ($B = 0.226$, $p = .003$) and harms ($B = -0.499$, $p < .001$) were statistically significant.

Increases in effectiveness correspond to an increase in acceptability, whereas an increase in harms results in a decrease in acceptability.

**Interpretation of Findings**

This practice project built upon the foundational research of McRee et al. (2010), who established the Carolina HPV Immunization Attitudes and Beliefs Scale (CHIAS), identifying four key psychosocial factors in parental intentions to vaccinate their children against HPV. McRee et al. CHIAS survey suggested that parental decisions regarding HPV immunization are influenced by four principal factors: harms, barriers, effectiveness, and uncertainty. The data analysis for this study started with Confirmatory Factor Analysis (CFA), which showed a misalignment with the original CHIAS theoretical constructs. However, both studies found that the harms, barriers, effectiveness, and uncertainty factors are reliable. The reliability of the CHIAS factors across different datasets strengthens the credibility of the CHIAS factors. It provides a solid foundation for drawing meaningful insights and making well-informed decisions pertaining to parental perceptions about the HPV vaccine.

Six multiple regression models were utilized to assess the CHIAS factors' alignment with the observed data to determine how harms, barriers, effectiveness, and uncertainty predict various dimensions of affordability, accessibility, accommodation, availability, awareness, and acceptability. Interestingly, parents and guardians who perceived an increase in barriers to the HPV vaccine reported a decrease in vaccine availability, meaning healthcare providers had fewer resources to meet their needs; a decrease in accommodation, indicating there is a misalignment between healthcare services and their personal needs and preferences; and a reduction in accessibility, reflecting the challenges that parents and guardians physically experience in reaching healthcare services. Surprisingly, these individuals also noted that the HPV vaccine is

affordable. Furthermore, those who perceived the HPV vaccine to be effective and protect against genital warts, precancerous cell changes, and cancer thought the HPV vaccine was affordable and demonstrated awareness and knowledge about the vaccine. Additionally, these individuals experienced a higher degree of comfortability with the HPV vaccine and their healthcare provider. Those who perceived potential harm from the HPV vaccine experienced a lower degree of comfortability with the HPV vaccine and their healthcare provider, as well as having less knowledge and awareness about the HPV vaccine.

These results are similar to the seminal work of McRee et al. (2010), which indicated that parents and guardians with higher intentions to vaccinate had more positive beliefs in vaccine effectiveness, lower perceived harms, experienced fewer barriers, and less uncertainty about the HPV vaccine. These similarities underscore the relevance of CHIAS factors in understanding parental perceptions toward the HPV vaccine. However, the CFA misalignment with the original CHIAS construct could suggest that parental perceptions may have evolved or that the demographic and sociocultural context of the surveyed population has shifted. Additionally, the misalignment could be due to variations in interpretations of vaccine-related information, changes in healthcare delivery, and increased public discussion about the HPV vaccine, which could influence contemporary parental attitudes differently than in the past. The finding of increased affordability despite perceived barriers indicates that financial considerations may not be the primary deterrent in vaccine uptake, as previously thought. This may be due to healthcare initiatives or the broader availability of vaccine-related information, which may offer a new dimension to parental vaccine acceptance and hesitancy. This offers a greater understanding of the complex nature of parental HPV vaccine acceptance and hesitancy.

**Project Strengths and Limitations**

The strength of this project lies in the methodology. The methodological approach utilized a quantitative cross-sectional design to administer a modified version of the CHIAS survey with additional questions that look into parents' and guardians' perceptions of access. This approach allowed for a nuanced examination of the CHIAS factors of harms, barriers, effectiveness, and uncertainty while providing a comprehensive understanding of how parental perceptions influence various dimensions of healthcare engagement, including affordability, accessibility, accommodation, availability, awareness, and acceptability. This nuanced examination and comprehensive understanding can then inform clinical practice improvement and hopefully increase the rate of HPV immunization among students from the school district where this project took place.

The study was conducted to provide a comprehensive understanding of parental or guardian attitudes and beliefs toward the HPV vaccine and its uptake. However, there were limitations to this study. The study was dependent upon the number of participants willing to participate. Also, the sample of participants was limited to parents and guardians of grades 6–8 students in a large southwest U.S. school district. These limitations could have caused a potential response bias in the results and may not make the results generalizable to other populations. Additionally, this study relied on participants' self-reported data, which may have a bias and may not accurately reflect the parent or guardian's actual attitudes, beliefs, or intentions toward the uptake of the HPV vaccine for their student. Furthermore, this survey was limited to one region in a southwestern state, and the information may not be consistent with other regions of the state or country. These limitations were considered while analyzing, reviewing, and interpreting the collected data.

## Implications

The strengths of the methodology of this study and the insight garnered from the nuanced examination of the CHIAS factors, alongside acknowledging the limitations of this study, broader implications of this study's findings can be explored. Despite the constraints posed by the sample selection and the reliance on self-reported data, the depth of understanding achieved regarding parental perceptions and healthcare engagement presents a valuable opportunity for developing interventions. This comprehensive understanding provides a unique opportunity to develop targeted interventions aimed not only at increasing the initiation of the HPV vaccine series but also at ensuring its completion among eligible populations.

### *Nursing Practice Implications*

As frontline healthcare providers, nurses, especially school nurses, are uniquely positioned to identify and mitigate perceived and actual barriers patients and families have to healthcare challenges, like HPV vaccine uptake. School nurses can provide tailored education and empathetic communication while leveraging their access to adolescents and their families within the educational system to increase the HPV vaccination rate among this key demographic significantly. This project's findings can help school nurses leverage their position and nursing practice to increase HPV vaccination rates among students through increasing parental awareness about the HPV vaccine and providing interventions that improve vaccine accessibility and accommodations.

This project's findings provide insight into the effectiveness of the HPV vaccine as a factor for parental awareness and acceptability, provides a solid basis for school nurses to develop and implement tailored educational programs. Tailored educational programs should address common misconceptions and highlight the vaccine's effectiveness in preventing certain

cancers and genital warts. Additionally, school nurses can change their practice by shifting the focus from merely providing information about the HPV vaccine to having meaningful conversations with parents and students. This approach fosters an environment where vaccine hesitancy can be openly discussed while addressing parental concerns about the HPV vaccine. That will hopefully lead to increased vaccine acceptance and uptake.

The findings related to parental perceptions of barriers affecting accessibility and accommodation underscore school nurses' need to advocate for and implement flexible vaccination programs within the school setting. Organizing school-based vaccine clinics or partnering with local healthcare providers to make the HPV vaccine more accessible to students at school can reduce a logistical barrier to vaccination. The vaccine clinics should ensure that they are scheduled at a convenient time and communicated effectively to parents and guardians. By doing this, school nurses can significantly improve vaccination rates and enhance public health efforts.

### *Theoretical Implications*

The findings of this project also validated the CHIAS factors of harms, barriers, effectiveness, and uncertainty across diverse data sets, not only reinforce the reliability of these measures but also invites a deeper investigation into how they intersect with the broader framework of social determinants of health (SDOH). The consistency found in the CHIAS factors from this project's findings and the seminal work of McRee et al. (2010) underscores the robustness of these factors, which can be utilized as a lens to examine the complexity of health behaviors, such as HPV vaccine uptake. When considered in the context of SDOH, these factors gain additional depth, highlighting how external socioeconomic conditions directly influence individual health decisions and outcomes.

For instance, the CHIAS factor of barriers can be linked to social determinants like economic stability and access to healthcare services. Understanding that these barriers are not merely individual or familial challenges but are also shaped by broader social and economic structures helps contextualize the need for interventions sensitive to these SDOHs. Similarly, the CHIAS factor of effectiveness reflects the belief in the vaccine's efficacy, which can also be influenced by the level of education and access to accurate health information, which are critical social determinants. This insight into the parental perception of effectiveness suggests that targeted educational interventions must address disparities in health literacy and access to reliable information. This insight proves that school nurses are uniquely positioned to leverage their access to adolescent students and their families to remove barriers and overcome SDOH. Moreover, the CHIAS factors of harms and uncertainty can also be significantly impacted by social and community contexts, including cultural beliefs and social norms surrounding healthcare and vaccination. Knowing this, targeted interventions aimed at increasing HPV vaccine uptake must also address parents' concerns at the individual level and consider the broader socio-cultural environment that shapes these perceptions.

This project's findings, when viewed through the lens of SDOH, provide a compelling argument for the development of targeted multifaceted public health strategies. These strategies should not only address the CHIAS factors that directly influence parental perceptions of HPV vaccine uptake but also the underlying SDOH that shapes those influences. By considering the SDOH that shapes the influence of CHIAS factors, school nurses can tailor interventions to meet the needs of students and families to enhance the acceptability and uptake of the HPV vaccine. Thus, school nurses can contribute to public health equity and ensure students' positive health outcomes.

## Recommendations

Recognizing the dynamic nature of healthcare and the pivotal role the profession of nursing plays in navigating change. The following recommendations aim to extend the reach and relevance of this study's findings. By outlining strategic directions for future projects and research and explaining steps for sustainable practice change, this project hopes to contribute to the ongoing advancement of nursing practice and positive patient outcomes.

### *Recommendations for Future Projects and Researchers*

This project's findings could be further understood by future research evaluating how targeted educational interventions, specifically designed to address misconceptions and fears surrounding HPV vaccine uptake, can impact outcomes using a pre-/postintervention study to measure vaccine uptake rates, parental perceptions, and knowledge levels. This type of study would be initiated by collecting data from a pre-intervention survey, implementing an educational program, and conducting a follow-up survey. This would provide an understanding of the effectiveness of educational intervention. This project would advance patient outcomes by directly increasing HPV vaccination rates and enhancing informed decision-making among parents and adolescents.

Additionally, to further understand how barriers and facilitators influence HPV vaccine uptake, future projects should investigate the effectiveness of HPV vaccination programs across different demographic and socio-economic groups. One could utilize a mixed-methods approach combining quantitative surveys with qualitative interviews to provide a comprehensive understanding of these dynamics. Data on vaccination rates, perceived barriers, and facilitators to vaccination, alongside personal narratives, would enrich the understanding of vaccine uptake

challenges. Such studies would advance healthcare by tailoring interventions to diverse populations' needs, ensuring equity in vaccine access and acceptance.

Future research should also explore how SDOH influences HPV vaccine uptake and how interventions can be optimized to address these determinants. To complete this type of research would require a longitudinal study that would track the efficacy of SDOH-informed intervention strategies over time. Researchers would need to collect data on vaccination rates, socioeconomic factors, and access to healthcare services. This type of study would advance healthcare by ensuring intervention strategies to increase vaccine uptake were inclusive and effective across different socioeconomic levels.

Furthermore, future research should investigate the impact of the school nurses' role in vaccine education and advocacy. This could highlight the effectiveness of school nurse practices and identify areas for improvement. To offer a holistic approach and understanding of the impact of school nurses, researchers could utilize a mixed-methods approach that incorporates quantitative surveys about vaccination rates and qualitative assessment of school nurse-led initiatives. This type of project would advance healthcare by reinforcing the critical role of school nurses in public health efforts, potentially leading to policy recommendations that enhance their capacity to support students in the educational setting.

### *Recommendations for Sustainability*

Ensuring the sustainability of this project in increasing HPV vaccination rates requires the development and implementation of educational programs and the organization of vaccine clinics as a standard of practice among all the schools within the local school district. Effectively doing this will require collaboration with district administrators, local healthcare providers who can provide vaccines, and school organizations like parent-teacher associations to develop,

advocate for, and adopt these nursing practices. The aim is to embed successful vaccination strategies into the fabric of school health services, ensuring they are not transient projects but ongoing efforts. This approach ensures that the progress made in increasing vaccination rates continues.

Additionally, creating and maintaining strong partnerships between schools, healthcare providers, and community organizations is essential for the project to have a lasting impact. Having these partnerships serves multiple purposes. They ensure a steady supply of vaccines and support for educational initiatives. Furthermore, they facilitate easy access to vaccination services for students. Involving a wide array of stakeholders, including local health departments, community health centers, and parent groups, in ongoing discussions about sustaining these efforts is crucial. Such a collaborative approach bolsters the project's initiatives with diverse resources and perspectives and embeds them within a community-wide framework for health promotion. By fostering a coalition of support, these partnerships help to sustain and expand the reach of HPV vaccination efforts, making a lasting difference in public health outcomes.

**Plan for Dissemination**

Sharing the outcomes and the intervention strategies of this project is crucial not only for recognizing the contributions made but also for potentially inspiring similar initiatives. Dissemination of this project’s findings across various platforms and to broad audiences will amplify the impact of this work beyond the local school district, reaching stakeholders in nursing, public health, and educational institutions. The results of this project will be disseminated through multiple channels to ensure they reach a diverse audience. This project’s findings were presented at the 2024 Alpha Chi National Convention, which attracts scholars from various disciplines, offering a prime opportunity to showcase the interdisciplinary

significance of this project. Additionally, this project will be presented in July at the Region 18 Texas School Nurse Organization conference. This venue will provide an opportunity to share this project's insights with school nursing professionals and directly engage with school nurses who can implement similar strategies in their school districts.

Formal and informal electronic dissemination avenues will be explored to extend the reach of this project's findings. This includes submitting a detailed project report to peer-reviewed journals such as the *Journal of School Nursing and Public Health Nursing*, which are well-regarded platforms read by professionals interested in school health services and public health interventions. The choice of journals will be guided by their focus on evidence-based practice and public health policy, ensuring our findings reach an audience keen on translating research into practice. Furthermore, other opportunities will be actively pursued, including podium or poster presentations at regional, state, or national meetings relevant to public health, nursing, and school health services. This allows for direct engagement with peers and opens up discussions for future collaborations and initiatives. Presenting this project’s findings to the local health department and local community meetings will also be leveraged to engage with a broader audience. Including educators, parents, and local health policymakers, ensuring the project's implications are communicated widely and effectively.

**Conclusion and Contributions to the Profession of Nursing Practice**

Concluding this project, this author reflects on its contributions to the profession of nursing practice, particularly in the context of school nursing and public health. Using a quantitative, cross-sectional design to conduct a community assessment has provided valuable insights into parental perspectives on the HPV vaccine for sixth through eighth-grade students in a large southwest U.S. school district. By adapting and expanding the CHIAS survey to

encompass questions related to the five dimensions of access to healthcare, this project has illuminated the complex connections of attitudes, beliefs, and perceived barriers to HPV vaccination. Such an understanding enriches our grasp of the factors influencing vaccine uptake, enabling school nurses to tailor interventions more effectively to the community's needs and concerns.

Furthermore, this project underscores the critical role school nurses play in public health advocacy, education, and the implementation of vaccination programs. The study empowers school nurses and public health practitioners to engage in more targeted communication and education efforts by identifying specific areas of concern and opportunity within parental perceptions. These efforts are crucial for improving vaccine uptake rates, addressing vaccine hesitancy, and enhancing public health outcomes. The findings and strategies developed through this project contribute significantly to the nursing profession by offering evidence-based insights for practice improvement, highlighting the pivotal role of school nurses in advancing healthcare access and reinforcing the importance of community-focused interventions in school and public health.

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# Appendix A: ISD External Research Committee Approval

[redacted] **M.Ed., Ph.D.**
Director of Research and Evaluation
[redacted]

[redacted]

Greetings Ms. Rhodes:

The [redacted] External Research Review Committee (ERRC) has **reviewed and approved** the External Data Request and/or Research Study application titled "Parental Views on HPV Vaccination."

Now that your data request/research has been approved by the ERRC, **you may proceed with your data collection, with the understanding that no [redacted] communication channels will be used.** Your contact for the records request is [redacted]

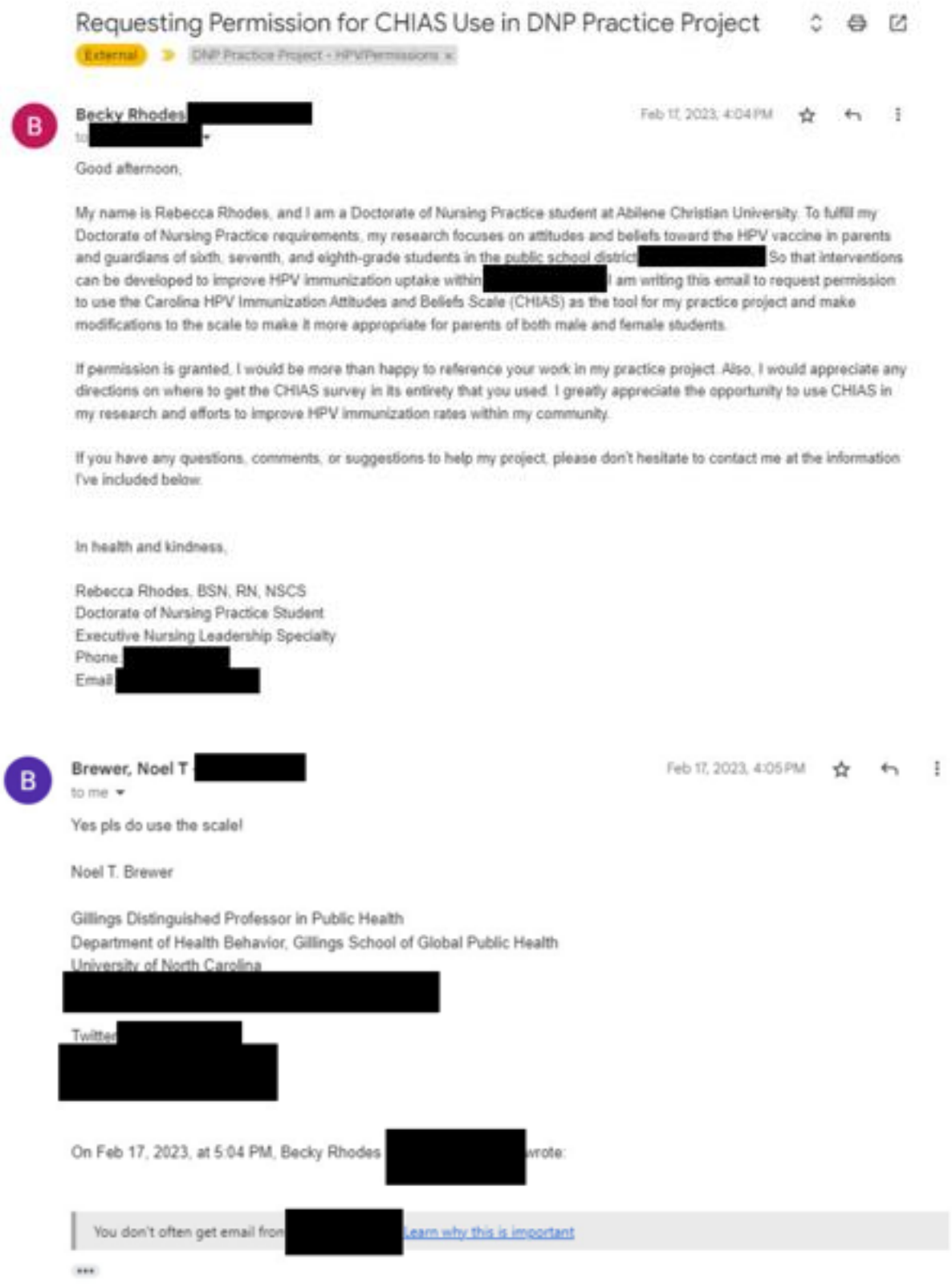
When your research is complete, please follow the data destruction procedures written in your approved External Data Request and/or Research Study application. **After the data have been destroyed**, please complete and submit the Certification of Data Destruction form to me, found here.

I look forward to seeing the results of your research! Please do not hesitate to contact me with any questions you may have.

Kind regards,

[redacted]
[redacted] **M.Ed., Ph.D.**
Director of Research and Evaluation

## Appendix B: Permission to Use Modified CHIAS Survey



Requesting Permission for CHIAS Use in DNP Practice Project

External

DNP Practice Project - HPVPermissions x

**Becky Rhodes** [redacted]
to [redacted]

Feb 17, 2023, 4:04 PM

Good afternoon,

My name is Rebecca Rhodes, and I am a Doctorate of Nursing Practice student at Abilene Christian University. To fulfill my Doctorate of Nursing Practice requirements, my research focuses on attitudes and beliefs toward the HPV vaccine in parents and guardians of sixth, seventh, and eighth-grade students in the public school district [redacted] So that interventions can be developed to improve HPV immunization uptake within [redacted] I am writing this email to request permission to use the Carolina HPV Immunization Attitudes and Beliefs Scale (CHIAS) as the tool for my practice project and make modifications to the scale to make it more appropriate for parents of both male and female students.

If permission is granted, I would be more than happy to reference your work in my practice project. Also, I would appreciate any directions on where to get the CHIAS survey in its entirety that you used. I greatly appreciate the opportunity to use CHIAS in my research and efforts to improve HPV immunization rates within my community.

If you have any questions, comments, or suggestions to help my project, please don't hesitate to contact me at the information I've included below.

In health and kindness,

Rebecca Rhodes, BSN, RN, NSCS
Doctorate of Nursing Practice Student
Executive Nursing Leadership Specialty
Phone [redacted]
Email [redacted]

**Brewer, Noel T** [redacted]
to me

Feb 17, 2023, 4:05 PM

Yes pls do use the scale!

Noel T. Brewer

Gillings Distinguished Professor in Public Health
Department of Health Behavior, Gillings School of Global Public Health
University of North Carolina
[redacted]

Twitter [redacted]

On Feb 17, 2023, at 5:04 PM, Becky Rhodes [redacted] wrote:

You don't often get email from [redacted] Learn why this is important

...

**Becky Rhodes** [redacted]
to Noel

Feb 17, 2023, 4:08 PM

Thank you so much!

In health and kindness,

Rebecca Rhodes, BSN, RN, NSCS
Doctorate of Nursing Practice Student
Executive Nursing Leadership Specialty

## Appendix C: English Modified CHIAS and Questions of Access

1. I think the HPV vaccine might cause short-term problems, like fever or discomfort.

   □ Strongly disagree □ Somewhat disagree □ somewhat agree □ strongly agree

2. The HPV vaccine is being pushed to make money for drug companies and/or doctors.

   □ Strongly disagree □ Somewhat disagree □ somewhat agree □ strongly agree

3. I think the HPV vaccine might cause health problems in the future.

   □ Strongly disagree □ Somewhat disagree □ somewhat agree □ strongly agree

4. I think that getting the HPV vaccine makes it more likely for someone to have sex.

   □ Strongly disagree □ Somewhat disagree □ somewhat agree □ strongly agree

5. I think the HPV vaccine is safe.

   □ Strongly disagree □ Somewhat disagree □ somewhat agree □ strongly agree

6. I think my student is too young to get a vaccine for a sexually transmitted infection like HPV.

   □ Strongly disagree □ Somewhat disagree □ somewhat agree □ strongly agree

7. How effective do you think the HPV vaccine is in preventing genital warts?

   □ Slightly effective □ Moderately effective □ Very effective □ Extremely effective

8. How effective do you think the HPV vaccine is in preventing cervical cancer?

   □ Slightly effective □ Moderately effective □ Very effective □ Extremely effective

9. I don't have enough information about the HPV vaccine to decide whether to give it to my student.

   □ Strongly disagree □ Somewhat disagree □ somewhat agree □ strongly agree

10. The HPV vaccine is so new that I want to wait a while before deciding if my student should get it.

    □ Strongly disagree □ Somewhat disagree □ somewhat agree □ strongly agree

11. Other parents in my community are getting their students the HPV vaccine.

    □ Strongly disagree □ Somewhat disagree □ somewhat agree □ strongly agree

12. How hard do you think it would be to find a provider or clinic where you can afford the vaccine?

    □ Very hard □ Somewhat hard □ Somewhat easy □ Very easy

13. How hard do you think it would be to find a provider or clinic that has the vaccine available?

    □ Very hard □ Somewhat hard □ Somewhat easy □ Very easy

14. I am concerned that the HPV vaccine costs more than I can pay.

    □ Strongly disagree □ Somewhat disagree □ somewhat agree □ strongly agree

15. Cost is a serious barrier to vaccinating my child against HPV.

    □ Strongly disagree □ Somewhat disagree □ somewhat agree □ strongly agree

16. How hard do you think it would be to find a provider or clinic where you don't have to wait long to get an appointment?

    □ Very hard □ Somewhat hard □ Somewhat easy □ Very easy

17. There is a health center where I can get my child the HPV vaccine that is easily accessible to me.

    □ Strongly disagree □ Somewhat disagree □ somewhat agree □ strongly agree

18. The working hours of the health center are suitable for me to have my child vaccinated against HPV.

    □ Strongly disagree □ Somewhat disagree □ somewhat agree □ strongly agree

19. The health center has a supply of the HPV vaccine.

    □ Strongly disagree □ Somewhat disagree □ somewhat agree □ strongly agree

20. The healthcare workers try to ensure I fully understand the health information provided.

□ Strongly disagree □ Somewhat disagree □ somewhat agree □ strongly agree

21. I trust the statements and education of the healthcare provider (doctor, nurse, etc.) about the HPV vaccine.

□ Strongly disagree □ Somewhat disagree □ somewhat agree □ strongly agree

## Appendix D: Spanish Modified CHIAS and Questions of Access

1. Creo que la vacuna contra el VPH podría causar problemas a corto plazo, como fiebre o malestar.

   □ Totalmente en desacuerdo □ En Desacuerdo □ Totalmente de acuerdo □ De Acuerdo

2. Se está presionando la vacuna contra el VPH para ganar dinero para las compañías farmacéuticas y/o los médicos.

   □ Totalmente en desacuerdo □ En Desacuerdo □ Totalmente de acuerdo □ De Acuerdo

3. Creo que la vacuna contra el VPH podría causar problemas de salud en el futuro.

   □ Totalmente en desacuerdo □ En Desacuerdo □ Totalmente de acuerdo □ De Acuerdo

4. Creo que recibir la vacuna contra el VPH hace que sea más probable que alguien tenga relaciones sexuales.

   □ Totalmente en desacuerdo □ En Desacuerdo □ Totalmente de acuerdo □ De Acuerdo

5. Creo que la vacuna contra el VPH es segura.

   □ Totalmente en desacuerdo □ En Desacuerdo □ Totalmente de acuerdo □ De Acuerdo

6. Creo que mi estudiante es demasiado joven para recibir una vacuna contra una infección de transmisión sexual como el VPH.

   □ Totalmente en desacuerdo □ En Desacuerdo □ Totalmente de acuerdo □ De Acuerdo

7. ¿Qué tan efetcivo crees que es la vacuna contra el VPH para prevenir las verrugas genitales?

   □ Ligeramente Eficaz □ Moderadamente Eficaz □ Muy Eficaz □ Extremadamente Eficaz

8. ¿Qué tan efetcivo crees que es la vacuna contra el VPH para prevenir el cáncer de cuello uterino?

   □ Ligeramente eficaz □ Moderadamente eficaz □ Muy eficaz □ Extremadamente eficaz

9. Tengo suficiente información sobre la vacuna contra el VPH para decidir si permito que mi estudiante la reciba.

   □ Totalmente en desacuerdo □ En Desacuerdo □ Totalmente de acuerdo □ De Acuerdo

10. La vacuna contra el VPH es tan nueva que quiero esperar un tiempo antes de decidir si mi estudiante debe recibirla.

    □ Totalmente en desacuerdo □ En Desacuerdo □ Totalmente de acuerdo □ De Acuerdo

11. ¿Qué tan difícil cree que sería encontrar un proveedor o clínica donde pueda pagar por la vacuna?

    □ Muy difícil □ Algo difícil □ Algo fácil □ Muy fácil

12. ¿Qué tan difícil cree que sería encontrar un proveedor o clínica que tenga la vacuna disponible?

    □ Muy difícil □ Algo difícil □ Algo fácil □ Muy fácil

13. ¿Qué tan difícil cree que sería encontrar un proveedor o clínica que tenga la vacuna disponible?

    □ Muy difícil □ Algo difícil □ Algo fácil □ Muy fácil

14. Me preocupa que la vacuna contra el VPH cueste más de lo que puedo pagar.

    □ Totalmente en desacuerdo □ En Desacuerdo □ Totalmente de acuerdo □ De Acuerdo

15. El costo es un problema para vacunar a mi hija/hijo contra el VPH.

    □ Totalmente en desacuerdo □ En Desacuerdo □ Totalmente de acuerdo □ De Acuerdo

16. ¿Qué tan difícil crees que sería encontrar un proveedor o clínica donde no tengas que esperar mucho para obtener una cita?

    □ Muy difícil □ Difícil □ Muy fácil □ Fácil

17. Hay un centro de salud donde puedo vacunar a mi hija/hijo contra el VPH que esta fácilmente accesible para mí.

    □ Totalmente en desacuerdo □ En Desacuerdo □ Totalmente de acuerdo □ De Acuerdo

18. Las horas de trabajo del centro de salud son adecuadas para que mi hija/hijo sea vacunado contra el VPH.

    □ Totalmente en desacuerdo □ En Desacuerdo □ Totalmente de acuerdo □ De Acuerdo

19. El centro de salud tiene un suministro de la vacuna contra el VPH.

    □ Totalmente en desacuerdo □ En Desacuerdo □ Totalmente de acuerdo □ De Acuerdo

20. Los trabajadores de la salud tratan de asegurarse de que entiendo completamente la información de salud proporcionado.

    □ Totalmente en desacuerdo □ En Desacuerdo □ Totalmente de acuerdo □ De Acuerdo

21. Confío en las declaraciones y la educación del proveedor de atención médica (médico, enfermera, etc.) sobre la vacuna contra el VPH.

    □ Totalmente en desacuerdo □ En Desacuerdo □ Totalmente de acuerdo □ De Acuerdo

## Appendix E: Abilene Christian University IRB Approval

myACU powered by Google

Becky Rhodes [redacted]

**IRB-2023-180 - Initial: Initial - Exempt – ACU**

4 messages

do-not-reply@cayuse.com <do-not-reply@cayuse.com> Wed, Aug 16, 2023 at 11:30 AM
To: [redacted]

**Date:** August 16, 2023

**PI:** Rebecca Rhodes

**Department:** ONL-Online Student, 17260-Doctor of Nursing

**Re:** Initial - IRB-2023-180

*Parental Views on HPV Vaccination*

The Abilene Christian University Institutional Review Board has rendered the decision below for *Parental Views on HPV Vaccination*. The administrative check-in date is --.

**Decision:** Exempt

**Category:** Category 2.(i). Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met:
The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects;

**Research Notes:**

**Additional Approvals/Instructions:**

If at any time the details of this project change, please resubmit to the IRB so the committee can determine whether or not the exempt status is still applicable. All approval letters and study documents are located within the Study Details in Cayuse IRB.

The following are all responsibilities of the Primary Investigator (PI). Violation of these responsibilities may result in suspension or termination of research by the Institutional Review Board. If the Primary Investigator is a student and fails to fulfil any of these responsibilities, the Faculty Advisor then becomes responsible for completing or upholding any and all of the following:

- When the research is completed, inform the Office of Research and Sponsored Programs. If your study is Exempt, Non-Research, or Non-Human Research, email orsp@acu.edu to indicate that the research has finished.
- According to ACU policy, research data must be stored on ACU campus (or electronically) for 3 years from inactivation of the study, in a manner that is secure but accessible should the IRB request access.
- It is the Investigator's responsibility to maintain a general environment of safety for all research participants and all members of the research team. All risks to physical, mental, and emotional well-being as well as any risks to confidentiality should be minimized.

For additional information on the policies and procedures above, please visit the IRB website
http://www.acu.edu/community/offices/academic/orsp...
or email orsp@acu.edu with your questions.

## Appendix F: Initial Participant-Facing Recruitment Email Scripts

**English Version:**

Subject: Your Help is Needed for a Health Study on the HPV Vaccine

Dear Parents and Guardians,

I hope this message finds you well. I am a Doctor of Nursing Practice student at Abilene Christian University. I am doing a project about the HPV vaccine, which helps protect kids from certain types of cancer. I am trying to understand why some parents choose to get this vaccine for their kids and why some do not.

I need your help to understand this better. If you have a 6th, 7th, or 8th grade student, could you please take some time to fill out a survey for my study? It's not a test - there are no right or wrong answers. I want to learn more about what you think about this vaccine.

The survey will take less than 10 minutes to finish. Anything you share will stay private and only be used for this project. If you decide to start the survey and change your mind, that is fine.

Follow this link to the consent form and survey: [Insert link to survey]

I would appreciate your help with this project. Your thoughts are important and can help me learn how to better protect our young people from getting sick in the future. Feel free to reach out if you have any questions or need more information about the project.

Thank you for considering participating. Your help would mean a lot to me and could make a big difference.

In health and kindness,

Becky Rhodes, BSN, RN, NCSN
Doctor of Nursing Practice student
Abilene Christian University
xxx-xxx-xxxx
xxxxxx@acu.edu

**Spanish Version:**

Subject: Se Necesita su Ayuda para un Estudio de Salud sobre la Vacuna contra el VPH

Estimados padres y tutores,

Espero que este mensaje les encuentre bien. Soy estudiante de Doctorado en Práctica de Enfermería en la Universidad Abilene Christian. Estoy realizando un proyecto sobre la vacuna contra el VPH, la cual ayuda a proteger a los niños de ciertos tipos de cáncer. Estoy tratando de entender por qué algunos padres eligen vacunar a sus hijos contra el VPH y por qué otros no.

Necesito su ayuda para entender esto mejor. Si tiene un estudiante en el 6º, 7º y 8º grado, ¿podría tomarse un tiempo para completar una encuesta para mi estudio? No es un examen - no hay respuestas correctas o incorrectas. Solo quiero aprender más sobre lo que piensa acerca de esta vacuna.

La encuesta tardará menos de 10 minutos en completarse. Todo lo que comparta permanecerá privado y solo se utilizará para este proyecto. Si decide comenzar la encuesta y luego cambia de opinión, eso está perfectamente bien.

Siga este enlace al formulario de consentimiento y encuesta: [Insert link to survey]

Realmente agradecería su ayuda con este proyecto. Sus pensamientos son importantes y pueden ayudarme a aprender cómo proteger mejor a nuestros jóvenes para que no se enfermen en el futuro. Si tiene alguna pregunta o necesita más información sobre el proyecto, no dude en comunicarse.

Gracias por considerar la participación. Su ayuda significaría mucho para mí y podría marcar una gran diferencia.

En salud y la amabilidad,

Becky Rhodes, BSN, RN, NCSN
Estudiante de Doctorado en Práctica de Enfermería
Universidad Abilene Christian
xxx-xxx-xxxx
xxxxx@acu.edu

## Appendix G: Reminder Participant-Facing Recruitment Email Scripts

**English Version:**

Subject: Reminder Your Help is Needed for a Health Study on the HPV Vaccine

Hello Parents and Guardians,

I hope this message finds you well. I am a Doctor of Nursing Practice student at Abilene Christian University. I am writing to remind you that I am doing a project about the HPV vaccine, which helps protect kids from certain types of cancer.

I want to understand why some parents choose to get this shot for their kids and why some don't. That's why I need your help! If you have a kid in 6th, 7th, or 8th grade, please take a few minutes to fill out this survey for my study. Remember, it's not a test. There are no right or wrong answers. I want to know what you think about this shot.

Follow this link to the consent form & survey: [Insert link to survey]

The survey will take less than 10 minutes to finish. Anything you share will stay private and only be used for this project. If you decide to start the survey and change your mind, that is fine.

If you've already filled out the survey, thank you so much! If you haven't yet, I'd appreciate it if you could take a few minutes to do so. Your thoughts can help me learn how to keep our kids healthy.

If you have any questions or want to know more about the project, feel free to reach out to me.

Thank you for considering helping out. It really would mean a lot to me!

In health and kindness,

Becky Rhodes, BSN, RN, NCSN
Doctor of Nursing Practice student
Abilene Christian University
xxx-xxx-xxxx
xxxxxx@acu.edu

**Spanish Version:**

Subject: Recordatorio: Se necesita su ayuda para un estudio de salud sobre la vacuna contra el VPH

Hola padres y tutores,

Espero que este mensaje les encuentre bien. Soy estudiante de Doctorado en Práctica de Enfermería en la Universidad Cristiana de Abilene. Les escribo para recordarles que estoy realizando un proyecto sobre la vacuna contra el VPH, que ayuda a proteger a los niños de ciertos tipos de cáncer.

Quiero entender por qué algunos padres eligen vacunar a sus hijos contra el VPH y por qué otros no lo hacen. ¡Es por eso que necesito su ayuda! Si tienen un hijo en 6º, 7º u 8º grado, por favor tómense unos minutos para completar esta encuesta para mi estudio. Recuerden, no es un examen. No hay respuestas correctas o incorrectas. Quiero saber lo que piensan sobre esta vacuna.

Siga este enlace al formulario de consentimiento y encuesta: [Insert link to survey]

Completar la encuesta tomará menos de 10 minutos. Cualquier cosa que compartan permanecerá privada y solo se utilizará para este proyecto. Si deciden comenzar la encuesta y cambiar de opinión, está bien.

Si ya han completado la encuesta, ¡muchas gracias! Si aún no lo han hecho, agradecería que se tomaran unos minutos para hacerlo. Sus pensamientos pueden ayudarme a aprender cómo mantener a nuestros niños sanos.

Si tienen alguna pregunta o desean saber más sobre el proyecto, no duden en comunicarse conmigo.

Gracias por considerar ayudar. ¡Realmente significaría mucho para mí!

En salud y la amabilidad,

Becky Rhodes, BSN, RN, NCSN
Estudiante de Doctorado en Práctica de Enfermería
Universidad Abilene Christian
xxx-xxx-xxxx
xxxxxxx@acu.edu

## Appendix H: Informed Consent

# Introduction: Parental Views on HPV Vaccination

You may be able to take part in a research study. This form provides important information about that study, including the risks and benefits to you as a potential participant. Please read this form carefully and ask the researcher any questions that you may have about the study. You can ask about research activities and any risks or benefits you may experience. You may also wish to discuss your participation with others, such as your doctor or family member.
Your participation in this research is entirely voluntary. You may refuse to participate or stop your participation at any time and for any reason without any penalty or loss of benefits to which you are otherwise entitled.

**PURPOSE AND DESCRIPTION:**

You are invited to participate in a study run by Rebecca Rhodes, BSN, RN, NCSN, a Doctor of Nursing Practice student at ACU. This study is about understanding parents' feelings about the HPV vaccine.

HPV is short for Human Papillomavirus, a common infection that can sometimes cause cancer. A vaccine can protect against HPV, but not everyone is getting it. We want to know what parents think about this vaccine and if anything makes it difficult for them to vaccinate their kids.

We hope to learn how parents feel about the HPV vaccine and what might be stopping some parents from vaccinating their kids. With this information, we can come up with better ways to help more kids get vaccinated against HPV. This is important because the HPV vaccine can help protect kids from certain types of cancer in the future.

To participate in this study, you are required to be:

- At least 18 years old; and
- A parent or guardian of an xxxxxxxxxx ISD 6th, 7th, or 8th grader; and
- Can read English or Spanish.

Participation should take approximately 8 minutes to answer all the survey questions.

Your participation in this study is entirely voluntary. You may refuse to take part in the research or exit the survey at any time without penalty. You may skip any question you do not wish to answer for any reason.

**RISKS & BENEFITS:**

There are risks to taking part in this research study. Below is a list of the foreseeable risks, including the seriousness of those risks and how likely they are to occur:

- There is the risk that you may find some of the questions to be sensitive; or
- There is the risk that some questions may cause emotional discomfort;
- The survey questions ask about the HPV vaccine; and
- Some of the survey questions ask about the subject of sexual health and behaviors;
- There is the risk of breach of confidentiality;

- The possible risks or discomforts of the study are minimal, less likely to occur, and not serious. You may feel a little uncomfortable or embarrassed answering sensitive in-nature survey questions.

There are no expected benefits: You may not experience any personal benefits from participating in this study. However, your responses may help us learn more about parents' views about HPV vaccination.

**PRIVACY & CONFIDENTIALITY:**

Any information you provide will be confidential to the extent allowable by law. Some identifiable data may have to be shared with individuals outside of the study team, such as ACU Institutional Review Board members or individuals affiliated with xxxxxxxxx ISD. Otherwise, your confidentiality will be protected by keeping the information collected confidential and only accessible to the primary researcher. Your information will be stored initially with SurveyMonkey.com in a password-protected electronic format. Data will later be downloaded and stored on a password-protected USB drive. Also, we won't collect any information in this study that could personally identify you, like name, email address, ID address, and user name/online identifiers. Your privacy is a top priority.

The primary risk with this study is a breach of confidentiality. However, we have taken steps to minimize this risk. We will not be collecting any personal identification data during the survey. However, Qualtrics may collect information from your computer. You may read their privacy statements here: https://www.qualtrics.com/privacy-statement/.

**CONTACTS:**

If you have questions about the research study, the lead researcher is Rebecca Rhodes, BSN, RN, NCSN, and may be contacted at xxx-xxx-xxxx or by email at xxxxx@acu.edu. If you are unable to reach the lead researcher or wish to speak to someone other than the lead researcher, you may contact Dr. Faisal Aboul-Enein, DrPH, MSN, RN, FNP-BC, FRSPH, FACHE, FNAP at xxxxx@acu.edu. If you have concerns about this study, believe you may have been injured because of this study, or have general questions about your rights as a research participant, you may contact ACU's Executive Director of Research, Qi Hang, at xxxxxx@acu.edu

# Additional Information

365 participants are to be enrolled in the study.

Your participation may be ended early by the researchers for certain reasons. For example, we may end your participation if you no longer meet study requirements, the researchers believe it is no longer in your best interest to continue participating, you do not follow the instructions provided by the researchers, or the study is ended. You will be contacted by the researchers and given further instructions in the event that you are removed from the study.

# Consent Signature Section

Please click a button below if you agree or disagree to participate in this study. Click only after you have read all of the information provided and your questions have been answered to your satisfaction. If you

wish to have a copy of this consent form, you may print it now. You do not waive any legal rights by consenting to this study.

○ I agree

○ I disagree