ATTITUDES ABOUT HUMAN PAPILLOMAVIRUS (HPV) VACCINE AMONG PARENTS OF RURAL ADOLESCENTS

by

NATASHA L. UNDERWOOD

(Under the Direction of Jessica L. Muilenburg)

ABSTRACT

The importance of increasing human papillomavirus (HPV) vaccination coverage among adolescents is a public health imperative to prevent unnecessary morbidity and mortality associated with cervical, oropharyngeal and other HPV related cancers and conditions. Despite the availability of two vaccines that protect against 90% of genital warts and 70% of cervical cancers, national HPV vaccination rates remain below the Healthy People 2020 targets of 80% coverage for females and males. The purpose of this study is to investigate human papillomavirus vaccination behavior among rural adolescents in Georgia. Specifically, in an effort to increase HPV vaccination coverage among hard to reach populations, this study aims to understand barriers as well as facilitators to HPV initiation among adolescent males and females

living in rural communities. This study used a cross-sectional survey implemented with parents of adolescents age 10-18 years old in rural communities to measure: 1) parental attitudes, 2) healthcare utilization, 3) subjective norms and 4) cues to action. A step-wise forward logistic regression analyses was conducted to better understand the correlates of HPV vaccination. A majority of the sample was African American (69%, n=131) and female (52%, n=100). The mean age was 14 years old (SD=2.1). Most adolescents were covered by Medicaid insurance (64%, n=123) and less than 2% were uninsured (1.6%, n=3). The final model contained three significant correlates: provider recommendation, social norm score and information exposure score (R^2=0.41, χ^2 (3)=87.3, p<0.001). Results showed that three factors were significant predictors of HPV vaccine uptake: provider recommendation (OR: 23.24; CI [8.94, 60.44]), subjective norms (OR:1.14; CI [1.07,1.21]) and sources of information (OR:0.72; CI: [0.53,0.97]). Future studies should focus on increasing healthcare providers' ability to provide strong recommendations for the HPV vaccine for age appropriate adolescents.

INDEX WORDS: Human papillomavirus, vaccine, adolescents, parental attitudes

ATTITUDES ABOUT HUMAN PAPILLOMAVIRUS (HPV) VACCINE AMONG PARENTS OF RURAL ADOLESCENTS

by

NATASHA L. UNDERWOOD

B.A., Spelman College, 2009

M.P.H., Emory University, 2011

A Dissertation Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment of the Requirements for the Degree

DOCTOR OF PHILOSOPHY

ATHENS, GEORGIA

2017

ATTITUDES ABOUT HUMAN PAPILLOMAVIRUS (HPV) VACCINE AMONG PARENTS OF RURAL ADOLESCENTS

by

NATASHA L. UNDERWOOD

Major Professor: Jessica L. Muilenburg

Committee: Amanda Ferster

James M. Hughes

Carolyn Lauckner

Electronic Version Approved:

Suzanne Barbour
Dean of the Graduate School
The University of Georgia
May 2017

DEDICATION

This dissertation is dedicated to my study participants. I want to sincerely thank you for taking the time to help me reach my dreams. I also dedicate this dissertation to my parents for continuously pushing and motivating me to go further. Thank you!

ACKNOWLEDGEMENTS

This study wouldn't be possible and completed without the help of several key people that I want to thank. I sincerely want to thank my parents, especially my mom for always believing in me and pushing me to achieve my dreams. My family has given me the space and patience I've needed to complete this dissertation. To my husband- thank you for being by my side through this journey. My friends have been instrumental in so, so, so many ways. You have helped me get out and stop thinking about this research when I've needed it, you have checked in on me and sent me the reminders and motivations I've needed to push through, especially at the end of this journey. Your support and encouragement have not gone unnoticed and I truly appreciate it all. I want to thank my committee members for their guidance and help through this process. I have learned so much about being a researcher including my own ability to overcome failure and self-doubt. Thank you for being there and being supportive.

TABLE OF CONTENTS

CHAPTER 1- INTRODUCTION 1

Background and Significance 1

HPV Vaccination among Rural Populations 9

Purpose of the Study 11

Research Questions: 12

Public Health Implications 13

CHAPTER 2- LITERATURE REVIEW 14

Individual and Modifying Factors Influencing HPV Vaccine Uptake 14

Theory Informed Predictors of HPV Vaccine Uptake 18

Missed Opportunities 27

Challenges to HPV Vaccine Completion among Rural Populations 28

Human Papillomavirus Vaccination (HPV) Interventions 29

Theoretical Framework 32

CHAPTER 3- METHODS 39

Approach 39

Survey Pretest 42

Survey Implementation 50

Data Analysis 53

CHAPTER 4- RESULTS 60

Sociodemographic Characteristics and HPV Vaccine Uptake 60

Parental Attitudes 63

Health Care Utilization/ Environmental Context 67

Subjective Norms 69

Provider Recommendation 71

Sources of Information 72

Overall research question 74

CHAPTER 5- DISCUSSION 80

Limitations 87

Implications for Future Research 88

References 91

Appendix A- Consent letter for study participants 114

Appendix B- Rural Parental Attitudes about Human Papillomavirus Vaccination Survey 117

LIST OF TABLES

Table 1- US FDA licensed and approved HPV vaccines for females and males 4

Table 2-County demographic features 41

Table 3-The Human Papillomavirus Vaccination Survey for Black Mothers with Girls Aged 9 to 12 (HPVS-BM) descriptive statistics and Cronbach's alpha of measures of theoretical constructs 45

Table 4-Scale Properties 49

Table 5-Sample Demographics 62

Table 6-HPV Vaccine Uptake 63

Table 7-Parental Attitudes about HPV and the HPV vaccine 65

Table 8-Parent Perception of Healthcare Utilization 67

Table 9- Likelihood of Adolescent Vaccination based on Recommendation from Social Influencers 71

Table 10-Parent Reported Provider Recommendation 72

Table 11-Age of Adolescent when Provider Recommended 72

Table 12-Sources of information from which parents heard about the HPV vaccine 73

Table 13-Most trusted sources of information about the HPV vaccine 74

Table 14-Value of Sources of Information 74

Table 15- Classification Table of the Intercept Only 75

Table 16-Classification of Binary Logistic Forward Regression Models 75

Table 17- Omnibus Tests of Model Coefficients 76

Table 18-Model Summaries 76

Table 19-Results of Hosmer and Lemeshow Test 77

Table 20-Predictors of HPV Vaccine Uptake among Rural Adolescents 77

Table 21-Correlation Matrix 79

LIST OF FIGURES

Figure 1-Theoretical framework including constructs from the Health Belief Model and Theory of Reasoned Action 37

Figure 2-East Central Health District 40

Figure 3-Consort Figure of Surveys 61

Figure 4- Parents' Perception of Other Parents Getting their Child the HPV 70

CHAPTER 1
INTRODUCTION

Background and Significance

The importance of increasing human papillomavirus (HPV) vaccination coverage among adolescents is a public health imperative to prevent unnecessary morbidity and mortality associated with cervical, oropharyngeal and other HPV related cancers and conditions. Despite the availability of two vaccines that protect against 90% of genital warts and 70% of cervical cancers, national HPV vaccination rates remain below the Healthy People 2020 targets of 80% coverage for females and males (U.S. Department of Health and Human Services). In particular, Hispanic and African American women are disproportionately affected by cervical cancer—having higher diagnosis rates and death rates than their White counterparts (Centers for Disease Control and Prevention, 2014b). Human papillomavirus vaccination has the potential to diminish the burden of cervical cancer among women in the United States with increased vaccination rates.

Human papillomavirus (HPV) prevalence

Human papillomaviruses (HPVs) are a family containing more than 200 related viruses (National Cancer Institute, 2015b). Approximately 40 of these HPVs can be spread through direct sexual contact (vaginal, anal and oral), from the skin and mucous membranes of infected people to the skin and mucous membranes of their partners (National Cancer Institute, 2015b). Due to how easily the virus is transmitted, it is the most common sexually transmitted infection

in the United States. About 79 million Americans are currently infected with HPV and there are an estimated 14 million new infections annually (Centers for Disease Control and Prevention, 2014a). Studies using modeling technics estimate that 85% of women and 91% of men will acquire HPV over their lifetime (Chesson, Dunne, Hariri, & Markowitz, 2014).

There are two categories of HPVs-low and high risk types. Low risk HPVs can cause skin warts on or around the genitals, anus, mouth or throat. There are at least 13 high risk types, which can lead to cervical, anal, mouth, throat and other cancers (National Cancer Institute, 2015b). Specifically, HPV type 16 and 18 are high risk types, which are responsible for 70% of cervical cancers (Centers for Disease Control and Prevention, 2012). High risk HPVs are also responsible for 95% of anal cancers, 70% of oropharyngeal cancers (cancer of the throat, base of the tongue and tonsils), 65% of vaginal cancers and 35% of penile cancers (Chaturvedi et al., 2011; Division of STD Prevention, 1999; Smith, Backes, Hoots, Kurman, & Pimenta, 2009). Additional high risk strains include type 31, 33, 45, 52, and 58 (Merck, 2015b).

Most HPV infections will clear from the body over the course of 1-2 years; however, there are persistent, high risk strains that can progress to precancer or cancer (National Cancer Institute, 2015a). Every year, about 12,000 women are diagnosed with HPV associated cervical cancer and 360,000 men and women develop genital warts (Centers for Disease Control and Prevention, 2012). A majority of sexually active adults will acquire a HPV infection; however, there are disparities in HPV vaccination initiation (receiving an initial or first dose) and completion of the HPV vaccine series (receiving 3 vaccine doses over 6 months) (Centers for Disease Control and Prevention, 2015). Human papillomavirus vaccination has the potential to eliminate HPV related cancers; however, HPV vaccination coverage remains low compared to other adolescent vaccinations.

Human Papillomavirus vaccinations

Currently, there are three HPV vaccines available in the United States- Cervarix®, Gardasil® and Gardasil 9® (GlaxoSmithKline Biologicals, 2015; Merck, 2015a). The vaccines are given in three doses over a six month period to protect against HPV infections and HPV related health problems such as genital warts and HPV-associated cancers. Two of the vaccines, Gardasil4® and Gardasil 9®, provide protection against both genital warts and cancers in females and males. These vaccines provide the best protection when administered to adolescent females and males age 11-12 years old, but can be given as early as age 9 and as late as age 26. Gardasil4® was licensed by the FDA in 2006 for use among females 9 through 26; however, it wasn't until 2009 that this vaccine was licensed for use in males aged 9 through 26 years old. Gardasil 9® was licensed in December 2009 for use in females and males and provides protection against five additional cancer causing HPV types than Gardasil4®. Cervarix® is the third available HPV vaccine that also provides protection against high risk HPV types 16 and 18, which cause cervical cancer. This vaccine was first licensed by the FDA for use in females 10 through 25 in October 2009. Table 1 below provides information about each vaccine (GlaxoSmithKline Biologicals, 2015; Merck, 2015a; National Cancer Institute, 2015b).

Table 1- US FDA licensed and approved HPV vaccines for females and males

Quadrivalent HPV Vaccine (HPV4) "Gardasil", Merck	***Nonavalent HPV Vaccine (HPV 9) " Gardasil 9", Merck***	***Bivalent HPV Vaccine (HPV 2) "Cervarix", GlaxoSmithKline***
Protects against HPV types 6, 11, 16, and 18.	Protects against HPV types 6, 11, 16, 18, 31, 33, 45, 52 and 58	Protects against types 16 and 18.
FDA approved in 2006 for females aged 9-26. Approval expanded for males aged 9- 26 in 2009.	FDA approved in 2014 for use in females and males aged 9-15.	FDA approved in 2009 for females age 9-25.
Protects against cervical, vulvar, vaginal and anal cancers, precancerous cervical, vulvar, vaginal and anal lesions and genital warts in females. Protects against HPV caused anal cancers, precancerous anal lesions and genital warts in males.	Protects against cervical, vulvar, vaginal and anal cancers, precancerous cervical, vulvar, vaginal and anal lesions and genital warts in females. Protects against HPV caused anal cancers, precancerous anal lesions and genital warts in males.	Protects against cervical cancer
Efficacy: 98%-100% protection against cervical, vulvar, and vaginal precancers and genital warts in women. 90% vaccine efficacy in genital warts and 75% vaccine efficacy in anal precancer prevention in men	*Efficacy:* 98%-100% protection against cervical, vulvar, and vaginal precancers and genital warts in women. 90% vaccine efficacy in genital warts and 75% vaccine efficacy in anal precancer prevention in men	*Efficacy:* 93% vaccine efficacy in preventing cervical precancer in women

Vaccines recommended for adolescents

In 2006 the Centers for Disease Control and Prevention's Advisory Committee on Immunization Practices (ACIP) recommended all adolescents receive routine vaccination against tetanus, diphtheria and acellular pertussis (Tdap) and quadrivalent meningococcal-conjugate (MCV4), as well as annual vaccination against influenza (Centers for Disease Control and

Prevention, 2014d). In 2006, only female adolescents received recommendation for routine human papillomavirus (HPV) vaccination (Markowitz et al., 2007). In 2009, the quadrivalent HPV vaccine was licensed for males ages 9-26 but the ACIP did not recommend routine vaccination of adolescent males until 2011. In 2014, the U.S. Food and Drug Administration (FDA) approved Gardasil 9® for use in females ages 9-26 and males ages 9-15 (United States Food and Drug Administration, 2014) and the ACIP recommended routine vaccination for males and females using HPV-9 in 2015 (Petrosky, 2015).

The Healthy People 2020 objectives are to achieve vaccination coverage levels of at least 80% for Tdap, MCV4, HPV and annual influenza vaccination (U.S. Department of Health and Human Services). Despite being recommended by the ACIP at the same time, vaccine coverage for Tdap and MCV4 have reached or exceeded the Healthy People 2020 goals, while vaccination coverage for HPV is suboptimal for both female and male adolescents. Many adolescents remain at risk for developing HPV associated conditions such as genital warts and a variety of cancers attributed to infection with high risk HPV types.

Adolescent HPV vaccination coverage in the United States

Human papillomavirus vaccination coverage rates are suboptimal across the nation, especially in comparison to other adolescent recommended vaccines. Currently, meningococcal meningitis (MCV4) and the tetanus, diphtheria, and pertussis (Tdap) vaccines are also recommended for adolescents, yet coverage rates for these vaccines are near or surpassing national targets. According to the Centers for Disease Control and Prevention's 2014 National Immunization Survey- Teen (NIS-Teen), coverage levels for the MCV4 vaccine are 79.3% and 87.6% for the Tdap vaccine. In the same year, only 60.0% of adolescent females and 41.7% of

adolescent males received at least one HPV vaccine dose. Only 39.7% of females and 21.6% for male adolescents finished the three dose completion series (Centers for Disease Control and Prevention, 2015) .

Georgia HPV immunization rates

HPV initiation and series completion among Georgia adolescents has improved over the years. According to the CDC's 2014 National Immunization Survey Teen (NIS-Teen) data, coverage of 13-17 year old females in Georgia initiating the HPV series was 65.4% and 41.2% among males (Centers for Disease Control and Prevention, 2015). Coverage of all three doses among Georgia adolescent females was 47.1% and 21.0% among males (Centers for Disease Control and Prevention, 2015). The Georgia Department of Public Health (DPH) and the Atlanta Metropolitan transit system (MARTA) partnered on a CDC-funded campaign to raise awareness about HPV vaccination. The campaign included billboards and advertising on 50 metro buses, 120 subway trains and 20 bus shelters throughout the city (Georgia Department of Public Health). Despite Georgia's overall improvements in vaccination rates, there are disparities by location within the state. Among adolescents ages 13-17 living outside a Metropolitan Statistical Area (MSA) in Georgia, only 51.5% of females and 51.1% of males received at least one dose of HPV vaccination. Series completion rates in these areas are also lower than national and state levels with only 36.5% among females receiving three doses (Centers for Disease Control and Prevention, 2015). Series completion information for adolescent males living outside a MSA is unavailable.

Racial/ Ethnic and Income disparities in immunization rates

Human papillomavirus vaccine coverage rates for initial HPV dose among African American adolescents are higher than national averages and higher than White adolescent counterparts. National coverage for all females adolescents 13-17 years old are 60.0% compared to 66.4% of African American females and 56.1% of White female adolescents. Coverage of one HPV dose was 66.3% among Hispanic females. Among males 13-17 years old, the 2014 national coverage for one dose of HPV is 41.7% compared to 42.1% of African American males and 36.4% of White males (Centers for Disease Control and Prevention, 2015). Coverage of one HPV dose was 54.2% among Hispanic males. Nationally, Hispanic adolescent females and males had higher vaccination coverage for more than 3 doses than any other racial/ethnic group (46.9% and 27.8%, respectively) (Centers for Disease Control and Prevention, 2015).

The national average for adolescent females 13-17 years old receiving 3 doses of HPV was 39.7% while it was 39.0% among African Americans, 46.9% among Hispanics and 37.5% among Whites. Among males, the national average was only 21.6% while it was 20.4% for African Americans, 27.8% for Hispanics and 18.8% for Whites (Centers for Disease Control and Prevention, 2015). According to the 2014 NIS-teen survey data, in Georgia, African American female adolescents have a higher completion rate (50.6%) compared to White female adolescents (43.4%). Regarding adolescent males in Georgia, 28.2% of African American males received 3 doses compared to 22.3% of their White counterparts (Centers for Disease Control and Prevention, 2015). Information for Hispanic adolescents (male and female) was unavailable.

National data shows that coverage for each HPV vaccine dose was higher among females and males living below the poverty level compared with those living at or above the poverty level. Approximately 67.2% of adolescent females and 51.6% of adolescent males living below

the poverty level received at least 1 dose of HPV compared with 57.7% of females and 39.5% of males at or above the poverty level (Centers for Disease Control and Prevention, 2015).

Burden of HPV associated cancer is disproportionate

Human papillomavirus vaccination has the potential to diminish the burden of cervical cancer among women in the United States with increased vaccination rates. Cervical cancer disproportionately affects African American women, who die at alarmingly higher rates than any other racial/ethnic group (Centers for Disease Control and Prevention, 2014b). About 10 African American women per 100,000 are diagnosed with cervical cancer compared with 11 Hispanic women per 100,000 (Centers for Disease Control and Prevention, 2014b). Despite Hispanic women having higher rates of diagnoses than African American women, they are less likely to die from cervical cancer (2.7 per 100,000 versus 4.4 per 100,000, respectively) (Centers for Disease Control and Prevention, 2014b).

In addition to racial/ethnic disparities, studies indicate that higher cervical cancer incidence and mortality rates are associated with socioeconomic factors such as poverty status, geographic location and educational level (Parikh, Brennan, & Boffetta, 2003; Singh, Miller, Hankey, & Edwards, 2004). One study found that mortality associated with cervical cancer generally increases with increasing poverty and decreasing education levels for women in all racial/ethnic groups (Singh et al., 2004). Geographic location may also influence cervical cancer mortality disparities, especially among minority and marginalized communities. The National Cancer Institute Surveillance, Epidemiology, and End Results (SEER) Program report shows that southern states have 11% to 38% higher cervical cancer death rates than the overall U.S. rate (Howlader et al.). Several factors are associated with cervical cancer morbidity and mortality

disparities including differences in screening and follow-up, clinical treatment and behavioral factors such as number of sexual partners and early age of sexual debut (Downs, Smith, Scarinci, Flowers, & Parham, 2008). In light of these grave disparities and contributing factors, there are effective preventive measures that can be taken. Providing HPV vaccination to adolescents prior to sexual initiation is the most effective way to prevent and protect against cervical cancer. Vaccinating adolescent females with Gardasil 9® provides protection against 90% of HPV strains that cause cervical cancer. Despite the availability of these Federal Drug Administration (FDA) approved vaccinations for HPV, vaccination rates remain low.

HPV Vaccination among Rural Populations

In general, adolescents are less likely to seek preventive care than younger children, who routinely interface with the healthcare system for childhood vaccinations and well-child visits (C. M. Rand et al., 2007). Rural adolescents seek preventive services less often than urban counterparts, even when insurance coverage is equivalent (Mueller, Patil, & Boilesen, 1998; Janice C Probst, Moore, & Baxley, 2005). One study showed that minority, rural adolescents were less likely to have insurance, report a visit to a healthcare provider or have a usual source of care or primary care physician compared to urban, white adolescents (Janice C Probst et al., 2005). There are unique challenges facing rural adolescents including limited access to care due to socioeconomic difficulties and a dearth of healthcare providers due to low recruitment and retention of healthcare staff in rural clinics (Mueller, Ortega, Parker, Patil, & Askenazi, 1999). Many barriers to health care among rural adolescents are due to non-health care related factors such as socioeconomic hardship, low parent education levels and inconsistent living situations (Martin, 2005; Janice C Probst et al., 2005). Rural adolescents are a vulnerable population and it

is important to provide routine preventive services whenever possible, including HPV vaccination.

There are a limited number of studies comparing the HPV vaccination coverage rates among urban and rural populations. One of the few studies by Crosby et al showed that there were no significant differences in HPV vaccine initiation among women attending a rural clinic versus women attending an urban university clinic (Crosby, Casey, Vanderpool, Collins, & Moore, 2011). One important finding that researchers made is that women seeking care at the rural clinic were 7 times more likely than urban clinic women to not return for follow-up doses. Despite initiation rates being similar among urban and rural women seeking care, there are existing barriers that prevented rural clinic women from completing the 3 dose vaccine series. Convenience in receiving two additional doses over an extended period of time is a factor to consider when discussing HPV vaccination among all populations, but especially rural populations where distance to and from the clinic, time taken off work and school to take an adolescent to the clinic are serious considerations.

Increasing communication and awareness about HPV vaccine among rural, minority populations is important. In one study by Bhatta et al, rural adolescents in the Appalachian region were surveyed about HPV vaccine awareness, uptake and communication with parents and healthcare providers. Their findings showed that although 50% of adolescents were aware of the HPV vaccine, less than 20% communicated with their parent and less than 25% communicated with a healthcare provider about the HPV vaccine (Bhatta & Phillips, 2015). A study conducted in a rural, southern region showed that 57% of white women and only 24% of black women had heard of the HPV vaccine (Cates, Brewer, Fazekas, Mitchell, & Smith, 2009). Knowledge and awareness of HPV disease and vaccine has been shown to be a predictor of HPV

vaccine uptake (Bastani et al., 2011; Savas, Fernandez, Jobe, & Carmack, 2012). Increasing knowledge and awareness of HPV vaccine is necessary, especially among minority parents of adolescents, who have lower knowledge and awareness of HPV vaccine compared to white parents of adolescents (Cates et al., 2009; Laz, Rahman, & Berenson, 2013).

Rural populations are a high public health priority to improve HPV vaccine initiation and completion rates to reduce the disparities in cervical cancer incidence. More than 60% of cervical cancers in the US develop in uninsured and underinsured women who live in medically underserved populations due to complex factors linked to poverty, race/ethnicity and health disparities (Sandri et al., 2014; Scarinci et al., 2010). Rural women are less likely to receive routine Pap screenings, which detect cervical cancer (Hopenhayn, King, Christian, Huang, & Christian, 2008; Schootman & Fuortes, 1999). Instead, they often present with late stage invasive cervical cancer than women in more densely populated areas. Human papillomavirus vaccination has the potential to diminish the burden of cervical cancer among women in the United States with increased vaccination rates (Gillison, Chaturvedi, & Lowy, 2008).

Purpose of the Study

Based on the available literature, there is a dearth of information about HPV vaccination among rural adolescents. Available studies solely focus on parental attitudes, beliefs and acceptability of HPV vaccination for their adolescent children. Many of the studies focus on a single sex, usually female adolescents. Some studies have found that rural parents have low levels of awareness and knowledge about HPV vaccination which supports the need for tailored interventions for rural parents of adolescents. Additionally, many of the existing published studies focus on rural parental attitudes and beliefs; however, there are few studies that

specifically investigate vaccine hesitancy and vaccine confidence among rural parents of adolescents. HPV vaccine hesitancy is a barrier contributing to low HPV coverage rates yet little is known about motivating factors. More information is needed to understand vaccine hesitancy among parents of rural adolescents in order to design interventions and communication strategies to address this barrier. There is a vast amount of literature about human papillomavirus vaccination, yet few studies include rural populations in their sample population to offer insight into vaccination behaviors among this vulnerable and understudied population in the U.S.

The purpose of this study is to investigate human papillomavirus vaccination behavior among rural adolescents in Georgia. Specifically, in an effort to increase HPV vaccination coverage among hard to reach populations, this study aims to understand barriers as well as facilitators to HPV initiation among adolescent males and females living outside of Metropolitan Statistical Areas.

Research Questions:

Overall research question:

What demographic and theoretical factors impact HPV vaccine uptake among rural adolescents?

Specific Sub Questions:

1) What are the demographic and socioeconomic factors associated with HPV vaccine uptake among rural adolescents?
2) How do parental attitudes (i.e. perceived susceptibility, perceived severity, perceived benefits, perceived barriers) impact HPV vaccine initiation?

3) How does the environmental context (healthcare utilization) impact HPV vaccine uptake among rural adolescents?

4) What influence does parental subjective norms have on HPV vaccine uptake?

5) What is the relationship between cues to action (sources of information and provider recommendation) and HPV vaccine uptake?

Public Health Implications

The long term objective of this study is to better understand HPV vaccination behaviors and decision-making of rural parents and adolescents. This study is important because it focuses specifically on an understudied, hard to reach population, which has been underrepresented in the human papillomavirus vaccination literature. There is little known about HPV vaccination in rural, racially and socioeconomically diverse populations. Developing an enhanced understanding of vaccination behaviors can inform interventions targeted at increasing HPV vaccination coverage to ultimately reduce morbidity and mortality attributed to vaccine preventable diseases such as cervical cancer.

CHAPTER 2
LITERATURE REVIEW

This review of the literature provides an overview of the theoretical framework used to guide the study and an in-depth analysis of facilitators and barriers to human papillomavirus vaccination among adolescents. Specifically, an overview of literature about contributing factors to vaccine confidence and hesitancy is provided. Information about environmental factors, such as care utilization, which could potentially influence HPV vaccination rates among rural populations is also provided. In Georgia, vaccinations can only be given with parent/guardian consent in most circumstances, so most adolescents would be unable to consent for vaccines on their own (D. S. Chen, L; Daniel, B, , 2012). Thus, parents are influential health decision-makers for adolescents, and it is important to understand parental factors which influence HPV vaccination decision-making to initiate the first dose and completion of all three HPV doses.

Individual and Modifying Factors Influencing HPV Vaccine Uptake

Parental HPV Awareness and Knowledge

Awareness and knowledge about human papillomavirus and the human papillomavirus vaccine were common predictors of HPV vaccine receipt that were measured. Awareness was

often measured by asking respondents "Have you heard of HPV or Human papillomavirus?" or "Have you heard of HPV vaccine or a vaccine for Human papillomavirus?" Awareness of HPV vaccination was found to be one of the strongest predictors of vaccination in one study (Bastani et al., 2011; Savas et al., 2012); however there are racial differences in HPV and HPV vaccine awareness. Both Laz (2013) and Cates (2009) found that awareness of HPV infection and HPV vaccination was lower among minority parents compared to White parents (Cates et al., 2009; Laz et al., 2013). In particular, only 24% of African American parents heard of HPV vaccine compared with 57% of White parents who were aware of the vaccine (Cates et al., 2009).

There are conflicting findings about the strength of HPV vaccine awareness and knowledge as a predictor for vaccination behavior. Human papillomavirus and HPV vaccine knowledge were measured through a variety of questions. Researchers adapted existing questions from standardized HPV surveys such as the Health Information National Trends Survey, the National Health Interview Survey and others (National Cancer Institute, 2005; Yacobi, Tennant, Ferrante, Pal, & Roetzheim, 1999). Overall, African American parents had lower knowledge levels than other racial/ ethnic groups, which is not surprising due to low awareness levels (J. Hughes et al., 2009).

Although knowledge levels were often measured in these studies, one study found that knowledge was not a predictor of HPV vaccination behavior (Fishman, Taylor, Kooker, & Frank, 2014). Fishman's study measured parental baseline knowledge of HPV and the HPV vaccine and followed their adolescents for 12 months. Their results showed that parental knowledge was not associated with or predictive of adolescent HPV vaccine receipt. In other studies where interviews were conducted with parents of daughters, the influence of knowledge on vaccination behavior was not found. Researchers found that despite concerns about being

inadequately informed about HPV and having low knowledge levels about the vaccine to make health decisions, parents still allowed their daughters to be vaccinated (Allen et al., 2010). As critical decision-makers when it comes to adolescent vaccination, we must understand not only influential factors affecting parent decision-making but also design effective interventions that will encourage parents to get their adolescent the HPV vaccine.

Several studies involving parents of adolescents provided descriptions of HPV interventions consisting of educational components. These components were usually a fact sheet, brochure, flyer or video containing information defining HPV, explaining the vaccine and recommended age ranges and gender for vaccination. These studies typically measured parental knowledge, acceptability of HPV vaccination for their adolescent, and/or HPV vaccination attitudes and beliefs among parents. A more detailed discussion of parent level interventions is included later in this chapter.

Age

Age of the adolescent is another individual level factor that the literature has shown to be influential in HPV vaccine uptake. Studies have shown that older adolescents, 13-15 years old and 16-17 years old are more likely to have initiated and completed the HPV vaccine series than 11-12 year olds (Centers for Disease Control and Prevention, 2015; Gilkey, Moss, McRee, & Brewer, 2012; Niccolai, Mehta, & Hadler, 2011). When parents were specifically asked what age they would prefer their child to receive the HPV vaccine, most parents preferred to vaccinate their adolescents at older ages versus the currently recommendation for 11-12 year olds. When physicians offered the HPV vaccine, parents did not completely refuse the vaccine; instead they

delayed vaccination until their child was older (C. Hughes, Jones, Feemster, & Fiks, 2011). Better communication with parents is needed to relay the importance of HPV vaccination recommendation for 11-12 years olds including a robust immune response and initiating protection prior to sexual debut and exposure of disease.

Along with parents preferring HPV vaccination at a later age, studies found that physicians were also likely to delay HPV vaccine recommendation for the 11-12 year old. Perceived obligation to discuss sexuality before recommending HPV vaccine has been associated with not strongly recommending HPV vaccine to 11-12 year olds (Daley et al., 2010; Hofstetter et al., 2014; J. A. Kahn et al., 2005). Daley and colleagues found that factors associated with not strongly recommending the HPV vaccine to younger adolescents aged 11 to 12 included the need to discuss sexuality before recommending the vaccine and reporting of more vaccine refusals among parents of younger versus older adolescents (Daley et al., 2010).

Socioeconomic Factors

There are a variety of socioeconomic factors influencing HPV vaccine initiation and series completion including education level of an adolescent's mother, insurance status and poverty. These studies have mixed results. Data from CDC's Teen National Immunization Survey shows that adolescents living at or above the poverty level are less likely to start the HPV vaccine series compared to their counterparts living below the poverty level (Bednarczyk, Curran, Orenstein, & Omer, 2014; Centers for Disease Control and Prevention, 2015). A consistent pattern of higher HPV vaccine uptake among adolescents living below the poverty level compared to those above the poverty level is unique to the HPV vaccine and requires more in-depth assessments to better understand underlying factors.

The role of insurance and regular access to healthcare is important. In one study by Guerry et al, having seen a provider in the past year was among the strongest associations predicting uptake of one HPV dose among adolescent females living in high risk communities (Guerry et al., 2011). Similarly, Dorell and colleagues found that the lack of a medical home might contribute to lower HPV vaccine coverage rates among adolescent females who were uninsured, received all their vaccines at a public facility or were eligible for the federally funded Vaccines for Children program (C. G. Dorell, Yankey, Santibanez, & Markowitz, 2011). Adolescents who received a routine 11 to 12 year old preventive visit were more likely to initiate the HPV vaccine series (C. G. Dorell et al., 2011; Guerry et al., 2011). Inequities in preventive care impact routine adolescent vaccination and HPV vaccine coverage rates. The role of health insurance is discussed later in this chapter.

Theory Informed Predictors of HPV Vaccine Uptake

Perceived Susceptibility

Perceived susceptibility refers to the belief about the likelihood of getting a HPV infection. Early studies on HPV found that adolescents and young adults perceived themselves at risk of developing a HPV infection (Kymberley K. Bennett, Juli A. Buchanan, & Alisha D. Adams, 2012; Ramirez, 1997; Yacobi et al., 1999). Higher perceived susceptibility was associated with HPV vaccine uptake among parents of adolescent females and college students (Constance W Boehner, Steven R Howe, David I Bernstein, & Susan L Rosenthal, 2003; Krawczyk et al., 2015). Among rural parents, a study by Reiter et al. found that perceived susceptibility was one of the strongest predictors of vaccine initiation (Paul L Reiter, Brewer,

Gottlieb, McRee, & Smith, 2009). Higher perceived susceptibility to HPV infection was also related to higher acceptability of HPV vaccine (C. W. Boehner, S. R. Howe, D. I. Bernstein, & S. L. Rosenthal, 2003; Friedman & Shepeard, 2007; M. A. Gerend & Barley, 2009; M. A. Gerend, Lee, & Shepherd, 2007).

Perceived Severity

Perceived severity refers to HPV associated infections and subsequent health outcomes such as genital warts, cervical cancer or other HPV-associated cancers. In several studies, cervical cancer is believed to be a serious problem; however, perceived severity of HPV infections was not associated with HPV vaccine acceptability or uptake (C. W. Boehner et al., 2003; M. Gerend & Shepherd, 2012; Jessica A Kahn, Rosenthal, Hamann, & Bernstein, 2003; Krawczyk et al., 2015). Measuring the effect of perceived severity on HPV vaccine uptake among rural adolescents is important because more than 60% of cervical cancers in the US develop in uninsured and underinsured women who live in medically underserved populations due to complex factors linked to poverty, race/ethnicity and health disparities (Sandri et al., 2014; Scarinci et al., 2010). Due to the high burden of cervical cancer affecting marginalized and understudied rural populations, it will be interesting to see if perceived severity of HPV infection is a predictor of HPV vaccination behaviors of parents of rural adolescents.

Perceived Benefits and Barriers

Perceived benefits refer to positive outcomes associated with receipt of HPV vaccination. Studies showed that higher benefits are associated with vaccine uptake (Kymberley K. Bennett et al., 2012; de Visser & McDonnell, 2008; Krawczyk et al., 2015). In one study, perceived benefits

were an independent predictor of HPV vaccine acceptability among men (M. A. Gerend & Barley, 2009). Research conducted with parents showed that parental desire to protect children against HPV associated outcome was important in HPV vaccine decision-making (Amanda F. Dempsey, Abraham, Dalton, & Ruffin, 2009; Griffioen et al., 2012; Savas et al., 2012). Specifically, one sentiment expressed by a mother in a study captures some of the findings regarding HPV vaccine providing protection against cervical cancer, " She [daughter's clinician] was explaining how [the vaccine] prevents cervical cancer…that made my decision right there" (Griffioen et al., 2012). Despite parents' beliefs in the benefits of HPV vaccination, concerns about the delivery of the vaccine in adolescents at such a young age delayed some parental uptake of HPV vaccination among their children (Perkins et al., 2014).

Perceived Barriers

Perceived barriers refer to a number of factors including vaccine costs, safety and other factors that inhibit parents from vaccinating their adolescents. Overall, studies show that a lower number of perceived barriers are associated with vaccine uptake (Krawczyk et al., 2015). Among parents, vaccine initiation was lower among parents who had a higher perceived barriers to getting HPV vaccine (Paul L Reiter et al., 2009).

Lack of a physician recommendation

In addition to parents, physicians and health care providers are influential in adolescent healthcare decision-making pertaining to HPV vaccination. Physicians are the most common source of vaccine information (J. C. Hughes, Joan R; Liddon, Nicole; Smith, Jennifer S; Gottlieb,

Sami L; Brewer, Noel T;, 2009; Kennedy, Sapsis, Stokley, Curtis, & Gust, 2011; Perkins et al., 2013). Physician recommendation is key to establishing HPV vaccine efficacy and achieving the Healthy People 2020 goal of HPV vaccine coverage of 80% among adolescent females and males.

Receipt of a physician recommendation was consistently a predictor in HPV vaccination behavior. When surveying parents, a provider recommending HPV vaccine was a key predictor of behavior, and parents were significantly more likely to vaccinate their adolescent (C. Dorell, Yankey, Kennedy, & Stokley, 2013; Guerry et al., 2011). Physician recommendations were facilitators for vaccination receipt; however, when a physician recommendation was not provided to parents, this proved to be a barrier to vaccination. (Donahue, Stupiansky, Alexander, & Zimet, 2014; Liddon, Hood, & Leichliter, 2012). There are numerous healthcare provider factors associated with intention to provide HPV immunization to adolescents including practice characteristics, provider characteristics, knowledge and attitudes toward HPV vaccination, perceptions about peers' vaccination behaviors, and barriers such as vaccine reimbursement costs and parental hesitation and provider communication challenges.

Regarding healthcare provider factors, one of the strongest predictors of HPV vaccination was practice type. Physicians in private practice reported higher vaccination rates than urgent care centers, ambulatory care clinics or medical centers (S. T. Vadaparampil et al., 2013). Physicians who estimated higher numbers of sexually active adolescents in their practice had greater intentions of providing HPV recommendations to their patients (J. A. Kahn et al., 2005). Receiving a physician recommendation is important for adolescent vaccine uptake, especially for the HPV vaccine and improving physician communication to effectively provide strong and routine recommendations is needed (L. M. Gargano et al., 2013; Zimet, 2014).

Vaccine Safety Concerns

Another barrier to HPV vaccination is vaccine safety concerns among parents. The human papillomavirus vaccine is fairly new, licensed for usage in females in 2006 and for males in 2009, which has caused parents to be concerned about the probability of long-term side effects (Centers for Disease Control and Prevention, 2010). Despite numerous trials for both efficacy and safety, parental concerns persist. Parents expressed concerns about administering the vaccine to female adolescents more than administering the vaccine to male adolescents (Berenson & Rahman, 2012; Liddon et al., 2012). Concerns about the lack of vaccine safety information provided proved to be a vaccine barrier (Constantine & Jerman, 2007; P. L. Reiter et al., 2013).

Cues to Action

A cue to action is a factor that facilitates readiness for HPV vaccination. One main cue to action is the receipt of a health care provider recommendation. When measured in studies, receiving a health care provider recommendation was consistently a predictor in HPV vaccination behavior. Physicians were the most common source of vaccine information (J. C. Hughes, Joan R; Liddon, Nicole; Smith, Jennifer S; Gottlieb, Sami L; Brewer, Noel T;, 2009; Kennedy et al., 2011; Perkins et al., 2013). Studies showed that a provider or health care provider recommendation was a key predictor of HPV vaccination behavior; parents receiving a physician recommendation were significantly more likely to vaccinate their child (C. Dorell et al., 2013; L. M. Gargano et al., 2013; Guerry et al., 2011).

Although provider recommendation is a strong predictor of HPV vaccine receipt, health care providers struggle to provide routine and strong recommendations for HPV vaccinations for

patients. Physicians anticipate resistance from parents regarding the HPV vaccine, particularly because of its perceived association with sexual activity (J. C. Hughes, Joan R; Liddon, Nicole; Smith, Jennifer S; Gottlieb, Sami L; Brewer, Noel T;, 2009). Additionally, physicians expressed challenges in communicating with parents why the HPV vaccination is recommended for younger adolescents, who were not yet sexually active (Daley et al., 2010). These physician barriers lead to missed vaccination opportunities, resulting in low HPV vaccine coverage levels. Hofstetter et al (2014) found that 70-76% of unvaccinated adolescents, who had visited a physician in the past year and were eligible to receive the HPV vaccine, experienced a missed vaccination opportunity where they were not offered and did not receive the HPV vaccine (Hofstetter & Rosenthal, 2014).

Subjective Norms

Subjective norms refer to the perceptions of others on the parental decisions regarding HPV vaccine uptake. In one study, subjective norms was found to be the strongest predictor of HPV vaccine intention among college-age women (Kymberley K. Bennett et al., 2012). Belief that others would approve of vaccination was also significantly associated with vaccine intentions among young women (Jessica A Kahn et al., 2003). Perceptions of social norms toward HPV vaccination were also associated with vaccination uptake (Krawczyk et al., 2015). Studies have shown that parents' beliefs and experiences with HPV vaccination have been shaped by interactions with friends, family members, health care providers and media exposure (Griffioen et al., 2012).

Environmental Context

Sources of Information

Sources of information about HPV vaccination are an important point of consideration in assessing parental attitudes and decision-making about vaccinating their adolescent. The HPV vaccine has been a part of public discourse since publication of the ACIP recommendations with a range of positive and negative media messaging about the vaccine (Briones, Nan, Madden, & Waks, 2012; Habel, Liddon, & Stryker, 2009; Kelly, Leader, Mittermaier, Hornik, & Cappella, 2009). Few studies have measured exposure to information sources about HPV vaccine and the impact on HPV vaccine uptake among rural populations. A study by Underwood et al found that sources of information about HPV vaccine are associated with parental attitudes and that parental attitudes are associated with uptake of HPV vaccination among adolescents (N. L. Underwood et al., 2016). Media has the potential to be an influential information tool, especially with the internet becoming one of the most popular places for people to seek health-related information (Pew Research Center, 2009; Viswanath et al., 2006). One qualitative study showed that exposure to media and advertising about HPV vaccination increased their knowledge and awareness about the vaccine (Griffioen et al., 2012). Measuring and assessing the influence of information sources is important to understand the best communication tools that appeal to parents of adolescents and impact vaccine uptake.

Healthcare Factors

Inequities in access to healthcare are a factor in HPV vaccine uptake among adolescents. Penchansky and Thomas identified five dimensions of healthcare access: 1) availability (volume and type of services provided), 2) accessibility (location of health services in the community), 3)

accommodation (the ease of securing appointments), 4) affordability (cost and ability to pay) and 5) acceptability (perceptions about practice characteristics) (Penchansky & Thomas, 1981). Adolescents from rural areas are disadvantaged and have poorer access to care than their urban counterparts. Rural children, in general, are more likely to have experienced gaps in health insurance coverage leaving them uninsured or underinsured (Janice C Probst et al., 2005). Rural job categories, lack of unionization, small employers and lack of full time employment options with healthcare benefits contribute to health insurance coverage gaps among adolescents (Collins, Schoen, Colasanto, & Downey, 2003). These gaps in health insurance coverage are often lengthy creating a state of chronic uninsurance among rural adolescents (Coburn, McBride, & Ziller, 2002). Despite efforts to increase access to healthcare for minors through the State Children's Health Insurance Program (S-CHIP), rural parents may have difficulty enrolling their children in these programs or this coverage may not fully reimburse the cost of all vaccination services, such as the vaccine administrative fee for the healthcare provider (Mueller et al., 1998).

The Vaccines for Children (VFC) program is a federally funded program that provides vaccines to infants, children and adolescents under the age of 19 years old (Centers for Disease Control and Prevention, 2016). Established in 1994 through the Omnibus Budget Reconciliation Act of 1993, the program makes vaccines free to children who may go unvaccinated because of inability to pay. To be eligible for the program, children must be Medicaid eligible, uninsured, underinsured or American Indian or Alaska Native. The VFC program has had tremendous public health benefits in controlling vaccine preventable diseases.

The benefits of the VFC program are well documented throughout the literature. One economic analysis showed that before implementation of the VFC program, vaccine coverage of 1 dose of measles was less than 70% compared to after 1996, where measles vaccine coverage

has exceed Health People goals of 90% coverage (Whitney, 2014). Additionally this study showed that among 78.6 million children born after implementation of the VFC program in 1994, routine vaccination was estimated to prevent 322 million illnesses and 21 million hospitalizations over the course of their lifetime. The VFC program was credited with averting $402 billion in direct costs and $1.5 trillion in societal costs because of illnesses prevented in the birth cohort studied (Whitney, 2014). Other studies have demonstrated that implementation of the VFC program has closed racial disparities in vaccine coverage (Walker, Smith, & Kolasa, 2014). The VFC program is instrumental in providing routine vaccinations such as HPV for adolescents living in rural population, who may be uninsured or underinsured.

Access to care in rural communities is a serious concern. It is estimated that 65% of rural counties experience a whole or partial healthcare professional shortage, and these healthcare professional shortages are more common in rural counties where racial/ethnic minorities represent more than half the population (Janice C. Probst, Moore, Glover, & Samuels, 2004). Traveling long distances to healthcare providers for preventive care versus medical emergencies is a barrier in many rural communities (Mueller et al., 1998). For adolescents, time out of school and the time a parent must take off work to take a child to a healthcare provider is a significant burden. Specifically, for HPV vaccination this must be repeated three times in order to complete the multi-dose series and receive the greatest protection against genital warts and cervical cancer.

In many rural counties, the local health department is the primary source of preventive care. Restricted choice in healthcare providers is an additional barrier (Mueller et al., 1999). Rural residents may avoid seeking care in these locations due to privacy and confidentiality issues.

Missed Opportunities

There are many missed opportunities that pediatricians and family physicians can use to deliver HPV vaccination. Missed opportunities for initiation and completion of the HPV vaccine series are common. Data from the 2012 NIS-Teen data showed that 84% of unvaccinated females 11-17 years old had at least one missed opportunity to initiate HPV vaccination at a visit with a healthcare provider when other vaccinations were given (Hofstetter et al., 2014; Wong, Taylor, Wright, Opel, & Katzenellenbogen, 2013). Adolescents are visiting healthcare providers to receive other vaccinations; however, HPV vaccination is not being given at the same time. Eliminating these missed opportunities will increase HPV vaccine coverage rates and prevent future cases of cervical cancer and genital warts.

Pediatricians and family physicians can improve delivery of HPV vaccination to adolescents in the target age range by decreasing missed opportunities. Physicians are more likely to recommend HPV vaccination for the older adolescents 13 to 17 years old (J. A. Kahn et al., 2005). In one study, pediatricians recommended the HPV vaccine to adolescents 11-12 years old 57% of the time compared to 90% for 13 to 15 year old patients and family physicians recommended the HPV vaccine to 11 to 12 year olds 50% of the time compared to 86% for 13 to 15 year olds (Daley et al., 2010).

Physician anticipated resistance from parents regarding the HPV vaccine, particularly because of its perceived association with sexual activity (J. C. Hughes, Joan R; Liddon, Nicole; Smith, Jennifer S; Gottlieb, Sami L; Brewer, Noel T;, 2009). Additionally, physicians expressed challenges in communicating with parents why the HPV vaccination is recommended for younger adolescents, who were not yet sexually active. These physician barriers lead to missed

vaccination opportunities, resulting in low HPV vaccine coverage levels. Hofstetter et al (2014) found that 70-76% of unvaccinated adolescents, who had visited a physician in the past year and were eligible to receive the HPV vaccine, experienced a missed vaccination opportunity where they were not offered and did not receive the HPV vaccine (Hofstetter et al., 2014). In 2011, researchers found that among unvaccinated but eligible adolescents, there was an average of 3 missed opportunities to initiate HPV vaccine. Decreasing the number of missed opportunities is important to increase HPV vaccine coverage for one dose and completion of the entire series.

Challenges to HPV Vaccine Completion among Rural Populations

There are unique challenges to increase HPV vaccination coverage since this is a multi-dose vaccine which requires three separate visits to a healthcare provider over the course of 6 months. Data from the Centers for Disease Control and Prevention show that Latino and African American adolescent males and females have higher coverage levels of HPV vaccine initiation (one dose) than their White counterparts; however these minority groups have lower three dose coverage levels compared to White adolescents (Centers for Disease Control and Prevention, 2015). Completion of the multi-dose series can be challenging to rural populations where care utilization and access to care are difficult. The National Immunization Survey-Teen shows that female adolescents living in urban areas of Georgia had higher HPV initiation rates (76.5%) compared to female adolescents living in more rural parts of the state (51.5%). Similarly, female adolescents living in more urban parts of Georgia had higher completion rates (61.9%) compared

to adolescent females living in rural communities (36.5%) (Centers for Disease Control and Prevention, 2015).

Utilization of preventive care for adolescents, such as routine HPV vaccination is affected directly by multiple factors. Studies have shown that adolescent healthcare utilization for African American, Latino and youth living in poverty is especially low (Irwin, Adams, Park, & Newacheck, 2009; Rand, Szilagyi, Albertin, & Auinger, 2007; Yu, Bellamy, Schwalberg, & Drum, 2001). Elliot and Larson found that nearly half of youth in rural communities forego preventive care even though they felt it was needed (Elliott & Larson, 2004) . Low utilization of care among rural communities has been attributed to barriers such as cost of care and insurance coverage, issues with confidentiality and trust in healthcare providers and access to healthcare resources and clinics.

Human Papillomavirus Vaccination (HPV) Interventions

There are numerous interventions designed to increase HPV vaccination rates among adolescents. Interventions are typically targeted towards three key decision-makers involved in the HPV vaccine decision-making process: 1) adolescents; 2) parent/guardian and; 3) physician or healthcare provider. Adolescent HPV interventions typically consist of a health education intervention designed to change knowledge, attitudes and beliefs (Barry, 2013; Brawner et al., 2013; L. M. Gargano et al., 2014). Detailed information regarding adolescent interventions is not provided below since in Georgia, adolescents are unable to independently provide consent for HPV vaccination.

Parent Interventions

Parents are critical decision-makers pertaining to adolescent vaccination. In Georgia, parental consent must be obtained before a vaccine is given to a minor (D. S. Chen, L; Daniel, B, , 2012). Since adolescents are unable to consent to vaccination for themselves, it is important to not only understand parental factors, which influence HPV vaccination decision-making but also design effective interventions based on these factors. A majority of studies involving parents of adolescents described HPV interventions consisting of educational components. These components were usually a fact sheet, brochure, flyer or video containing information defining HPV, explaining the vaccine and recommended age ranges and gender for vaccination. These studies typically measured parental knowledge, acceptability of HPV vaccination for their adolescent, and/or HPV vaccination attitudes and beliefs among parents.

HPV vaccine knowledge is a common outcome variable used to measure the effectiveness of HPV educational materials. Studies have shown that HPV knowledge is relatively low among parents of adolescents (Cates et al., 2009; J. C. Hughes, Joan R; Liddon, Nicole; Smith, Jennifer S; Gottlieb, Sami L; Brewer, Noel T;, 2009; Laz et al., 2013). Educational materials about HPV vaccine can be used to increase parental knowledge levels. Several studies evaluating the effectiveness of HPV educational materials involved asking parents to complete pre/post-tests measuring HPV knowledge. Existing research has shown that knowledge increased after parents were exposed to the educational interventions. Although knowledge is commonly used a measure of effectiveness, some researchers suggest changes in parental knowledge levels are insufficient at increasing HPV vaccination rates among adolescents. Specifically, Fishman et al found that parents with higher levels of HPV knowledge were not more likely to obtain HPV vaccination (Fishman et al., 2014).

In addition to HPV knowledge, acceptability and attitudes and beliefs were frequently measured outcomes assessing the effectiveness of HPV interventions. Acceptability was measured by asking parents about their likelihood of allowing their adolescent to receive HPV vaccination (A. F. Dempsey, Zimet, Davis, & Koutsky, 2006). Measurement of HPV attitudes and beliefs were guided by theoretical constructs from the Health Belief Model, Theory of Planned Behavior or Social Cognitive Theory. Examples include assessing parental perceived susceptibility of their adolescent acquiring HPV, perceived barriers to HPV receipt and completion and perceived effectiveness of the HPV vaccine in preventing cervical cancer (among adolescent daughters) (Brawner et al., 2013; Kennedy et al., 2011).

Physician/ Healthcare Provider Interventions

Physician recommendation is an important predictor in adolescent vaccine uptake, especially HPV vaccine initiation (C. Dorell et al., 2013; L. M. Gargano et al., 2013; Guerry et al., 2011). Receiving a strong recommendation for HPV vaccine from a physician or healthcare provider is important for parents (American Academy of Family Physicians, 2014); however, there are inconsistent recommendation practices among physicians likely to see adolescent patients, including family physicians and pediatricians (Susan T. Vadaparampil et al., 2011; Zimet, 2014). Healthcare providers are more likely to recommend HPV vaccination for older adolescents, aged 13-15 years old, rather than those in the recommended age range of 10-12 years old (Daley et al., 2010; J. A. Kahn et al., 2005; Roland, Benard, Greek, Hawkins, & Saraiya, 2014). Some healthcare providers base their recommendations on the assessment of the "riskiness" of certain patients (Perkins et al., 2014). Additionally, studies have found that some healthcare providers are uncertain about how to discuss HPV vaccination with parents of

adolescents and are concerned about parental hesitancy in decision-making, due to HPV's association with sexual activity (Daley et al., 2010; J. C. Hughes, Joan R; Liddon, Nicole; Smith, Jennifer S; Gottlieb, Sami L; Brewer, Noel T;, 2009).

One of the best opportunities to increase adolescent HPV vaccination rates is to increase routine, consistent and strong HPV vaccine recommendations from healthcare providers for all adolescents 10-12 years old (Zimet, 2014). There is a growing body of literature and interventions targeted toward health care providers and healthcare settings to help increase HPV vaccination coverage. Provider interventions are designed to help eliminate missed opportunities, in which vaccine eligible adolescents are seen by providers and receive healthcare services but are not given HPV vaccination.

Theoretical Framework

The Health Belief Model (HBM) was developed in the 1950s to predict the likelihood of individuals participating in programs to prevent and detect disease (Becker, 1975; Rosenstock, Strecher, & Becker, 1988). Although originally developed for use with tuberculosis screening, it has been adapted for used to explain a wide variety of health behaviors including vaccination (M.-F. Chen et al., 2011; Donadiki et al., 2014; L. M. Gargano et al., 2014; M. Gerend & Shepherd, 2012). Adapted for use in medical and public health disciplines, the HBM has its basis in social psychology, which guided the development and selection of constructs included in the theory when it was originally developed. Social psychologists believe in value-expectancy concepts, which consist of two core assumptions pertaining to health related behaviors. Psychologists who developed the HBM assumed that individuals: 1) value avoiding illnesses/getting well and 2) expect that specific health actions will prevent or cure illness

(Glanz, Rimer, & Viswanath, 2008). These core value-expectancy assumptions guided the formation of the Health Belief Model and subsequent constructs.

Findings from prior studies exploring HPV vaccination among diverse populations have used constructs from the Health Belief Model. These constructs have shown that they are useful in explaining intention to receive HPV vaccination or completion of the 3 dose series (K. K. Bennett, J. A. Buchanan, & A. D. Adams, 2012; Donadiki et al., 2014). There are five main HBM constructs that will be used to inform this research study: (1) perceived susceptibility to HPV infection; (2) perceived severity of HPV health outcomes; (3) perceived benefits to HPV vaccination; (4) perceived barriers to HPV vaccination and; (5) cues to action to get HPV vaccine (uptake) and vaccine acceptability (Glanz, Lewis, & Rimer, 1990).

1. **Perceived Susceptibility**[1]- refers to the belief about the likelihood of getting a disease or condition.
2. **Perceived Severity**[1]- beliefs about the seriousness of developing a disease or leaving it untreated. This includes medical consequences as well as social consequences such as stigma.
3. **Perceived Benefits**- feelings about reducing the threat of the disease or illness and possible positive outcomes.
4. **Perceived Barriers**- potential negative aspects of a health action. Barriers may hinder uptake of recommended health behaviors.
5. **Cues to Action**- factors that influence the readiness to act on a specific health behavior.

[1] The combination of perceived susceptibility and perceived severity form the construct, perceived threat.

The Theory of Reasoned Action (TRA) has frequently been used to predict health behaviors, including vaccination (Askelson et al., 2010; M. Gerend & Shepherd, 2012). It was originally designed to better understand the relationship between attitudes, behavior and intentions (Fishbein, 1967). The original theorists, Fishbein and Ajzen, described the critical correspondence needed between attitudes (i.e. about HPV vaccination), subjective norms (i.e. importance of a spouse's opinion about HPV vaccination), behavioral intention, the target (i.e. receipt of a HPV vaccination for adolescent), context (i.e. the health clinic or pediatrician's office), and time (i.e. within the next 6 months) (Ajzen & Fishbein, 1975, 1980). Similar to the Health Belief Model, value-expectancy concepts are rooted in the origin of the Theory of Reasoned Action constructs.

The Theory of Reasoned Action postulates that attitudes and subjective norms lead to behavioral intentions (Ajzen, 1991; Bish, Sutton, & Golombok, 2000; M. Gerend & Shepherd, 2012). These intentions act as a proxy for behavior. A major assumption of the TRA is that individuals are rational beings, who process information and have underlying reasons that determine their motivation to engage or not engage in a behavior (Glanz et al., 2008). There are three main constructs of the Theory of Reasoned Action that are visually represented in Figure 2 (Ajzen, 1991; Glanz et al., 2008).

1. **Behavioral Intention**- direct determinants are an individual's attitude and subjective norms associated with the behavior.
2. **Attitude**- an individual's beliefs about outcomes or attributes of performing the behavior.
3. **Subjective Norms**- an individual's perceptions of how others think the individual should behave, view or respond to the behavior.

In a comparison of the HBM and TRA models used to predict HPV vaccine uptake among young women, subjective norms and self-efficacy were two constructs, which emerged as independent predictors of behavior (M. Gerend & Shepherd, 2012). Additionally, intention was identified as a strong predictor of behavior in several studies (Bish et al., 2000; M. Gerend & Shepherd, 2012). Figure 2 illustrates a comprehensive health behavior framework incorporating core constructs from the Health Belief Model and the Theory of Planned Behavior to explain vaccination behaviors among rural adolescents.

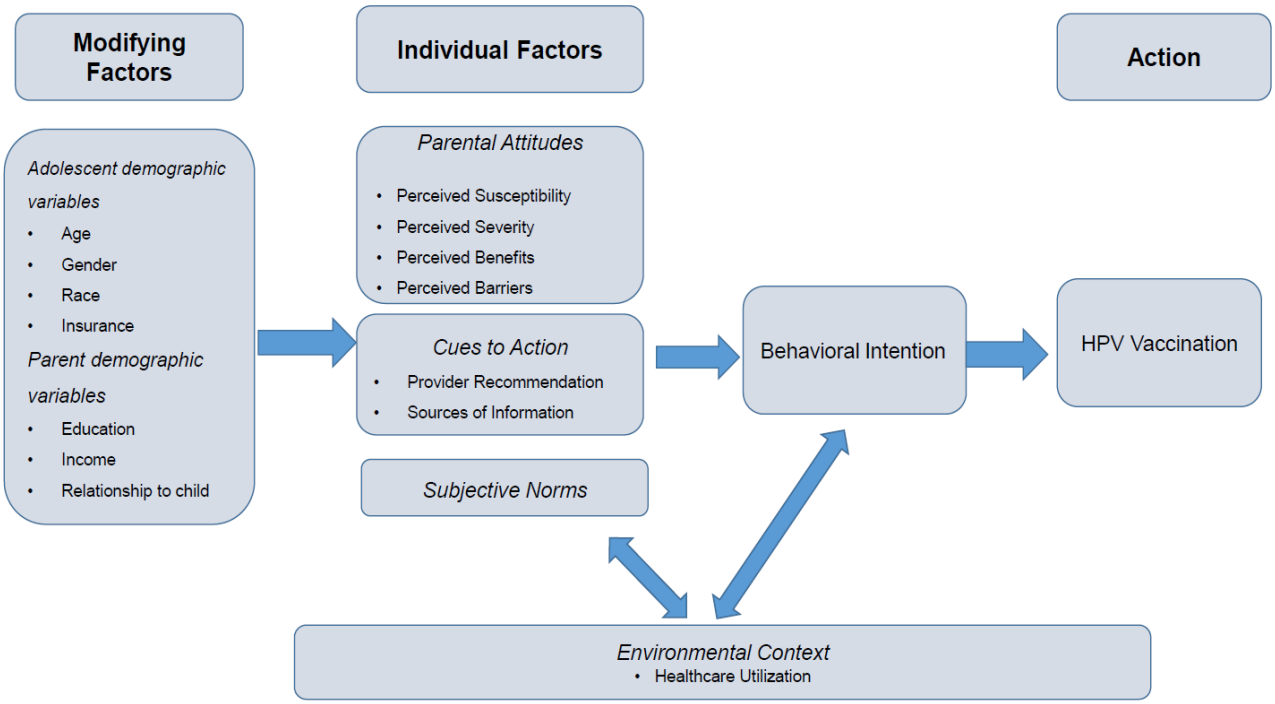
The proposed theoretical model combines select constructs from the Health Belief Model and the Theory of Reasoned Action that complement one another and may best explain HPV vaccination decision-making among parents of rural adolescents. Each theory has its limitations, but combining them creates a stronger model to explain HPV vaccination behaviors. There are notable similarities in the HBM and the TRA. First, both behavior theories predict behavior change at the individual level compared to community or group models of health behavior change (Glanz et al., 1990). Additionally, both theories assume that health behaviors and intentions are rational processes. Cues to action is a HBM construct included in the theoretical framework. Although not formally represented in the TRA, cues to action may be expressed through subjective norms about a specific health behavior, since norms can be influenced by external or environmental triggers (M. Gerend & Shepherd, 2012).

The influence of the environmental context is excluded from both the HBM and TRA. There may be environmental barriers such as healthcare utilization preventing parents from vaccinating their adolescent, which would not be measured if exclusively using HBM or TRA. The TRA does include the social norms context, which can try to indirectly capture some

environmental contextual factors. Environmental context is an external factor that has been added to the theoretical framework to more accurately capture all elements of HPV vaccine decision-making. The environmental context can capture the external factors such as the influence of media, marketing and other information sources or quality and access to healthcare on HPV vaccine decision-making.

Figure 2 illustrates a comprehensive health behavior framework incorporating core constructs from the Health Belief Model and the Theory of Planned Behavior and environmental context to explain vaccination behaviors among rural adolescents. In summary, there are four main theoretical constructs, which will be measured in this study: 1) parental attitudes (perceived susceptibility, perceived severity, perceived barriers, and perceived benefits); 2) cues to action (provider recommendation and sources of information); 3) subjective norms and; 4) environmental context (healthcare utilization).

Figure 1-Theoretical framework including constructs from the Health Belief Model and Theory of Reasoned Action



Chapter Summary

There are large disparities in cervical cancer in the U.S. which greatly affect vulnerable populations such as those living in rural areas, who lack access to routine health care. Barriers such as delays in screening and access to preventive services emphasize the importance of providing HPV vaccination routinely to female and male adolescents in order to decrease the burden of cervical cancer and other HPV associated cancers. HPV vaccination offers one of the most promising strategies for preventing cervical cancer among women, especially those lacking routine screenings or access to follow-up care. The importance of increasing human

papillomavirus (HPV) vaccination coverage among adolescents is a public health imperative to prevent unnecessary morbidity and mortality associated with cervical, oropharyngeal and other HPV related cancers and conditions. Despite the availability of three vaccines that protect against 90% of genital warts and 70% of cervical cancers, national HPV vaccination rates remain below the Healthy People 2020 targets of 80% coverage for females and males. Additional research involving rural populations is needed to develop effective interventions to increase HPV coverage rates. Without research on this population, we lack information about predictors, barriers and communication strategies about HPV vaccine, which are critically important for efforts to increase coverage rates.

CHAPTER 3

METHODOLOGY

Approach

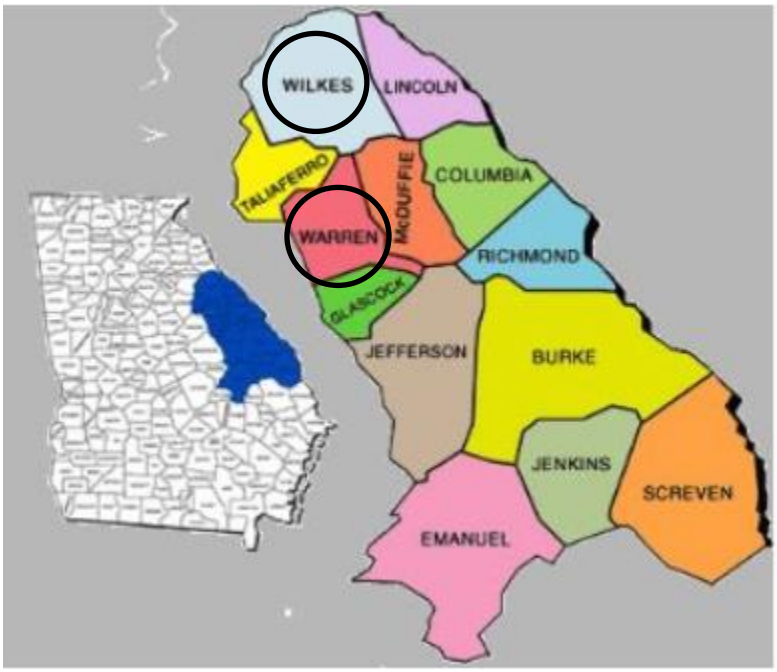
Descriptive information about Georgia and selected counties

Georgia is a racially and socioeconomically diverse state. According to 2010 United States Census data, 30.5% of Georgia's population was African American (national average 12.6%) and 8.8% Latino (national average 16.3%) (United States Census Bureau, 2010a). The East Central Health District is comprised of 13 individual counties and is located in the eastern part of Georgia (see Figure 3). Participants for this study were recruited from two counties within this health district: Warren and Wilkes counties.

The two selected counties have very similar demographic characteristics. Table 2 illustrates sociodemographic characteristics of each county in comparison to the state of Georgia. In Warren county, 60% of the population is African American compared to 42% in Wilkes counties (Georgia Department of Public Health, 2014). The median household income for both counties is roughly $30,000. Socioeconomic characteristics such as poverty, which are linked to health outcomes, exceed the state average of 18.3%. These three counties have an average of approximately 25% of their population living below the poverty line and unemployment rates ranging from 10% to 13% in Wilkes and Warren counties, respectively (Robert Wood Johnson

Foundation & the University of Wisconsin Population Health Institute, 2015; United States Census Bureau, 2010a). Additionally, 18% of Georgia residents under age 65 are without health insurance, which can cover routine vaccinations such as the human papillomavirus vaccine. These rural counties have higher uninsured rates than the state average; 19% and 20% of the populations in Warren and Wilkes counties, respectively, are uninsured (Robert Wood Johnson Foundation & the University of Wisconsin Population Health Institute, 2015).

Figure 2-East Central Health District



According to the County Health Rankings & Roadmaps, which ranks all counties' health outcomes within a state and also health factors relative to other counties within Georgia, Warren and Wilkes counties have poor health factors. Out of 154 counties in Georgia, Warren is ranked

142 and Wilkes is ranked 109 with regard to access to health factors such as clinical care, social and economic factors, and health behaviors (Robert Wood Johnson Foundation & the University of Wisconsin Population Health Institute, 2015). Given these factors, these counties are an ideal location to understand HPV vaccination behaviors among a diverse population of rural parents of adolescents.

Table 2-County demographic features

Description	Georgia	County 1-Warren	County 2-Wilkes
Total Population [+]	10,214,860	5,578	10,076
% African American[+]	32%	60.5%	42%
Median household income[§]	$49,342	$28,929	$30,729
% Unemployment rate[*, ±]	5.4%	13%	10%
% persons living below poverty line[+]	18%	25%	25%
% High school graduates[+]	85%	72%	74%
% Uninsured [*]	18%	19%	20%

[+] Sources: (Georgia Department of Public Health, 2014), [*] (Robert Wood Johnson Foundation & the University of Wisconsin Population Health Institute, 2015), [§] (United States Census Bureau, 2010b), [±] (Georgia Department of Labor, 2016)

Survey Pretest

Measurement of Variables

Independent and dependent variables included on the survey instrument are discussed below. Constructs from the Health Belief Model and Theory of Reasoned Action guided variables included on the survey instrument. Individual questions and response options are provided below. The coding scheme in parentheses, is provided and follows after each response option. Table 4 contains information regarding the construct, instrument used to measure the construct, related sources, and where the original instrument can be located.

Independent Variables

The four independent factors measured in this study are: 1) parental attitudes; 2) cues to action, 3) subjective norms and 4) environmental context. Demographic information about the adolescent and parent were also measured since this was consistent with the literature. The information below will thoroughly describe the theoretical constructs, demographic variables and items used to measure these four factors.

Demographic Variables

Parents were asked to provide information about their adolescent as well as themselves. Adolescent characteristics that parents provided were age, gender, race/ethnicity of their adolescent and insurance status. Parents were asked, "What is your child's age?" Data from surveys with any age outside of 10-18 years old study criteria range was eliminated before data analysis. Parents were allowed to identify the gender of their child and response options were female (1) or male (0). Race/ ethnicity options included African American (1), Asian (2),

Hispanic/Latino (3), White (4) and other (5). Insurance status was assessed by asking parents, "What type of insurance does your child have?" Response options were Medicaid (1), private insurance/ insurance through an employer (2), No insurance/ uninsured (3), I don't know (4) and other (5). Parents were asked to identify other options.

Parents were also asked to provide information about themselves including their relationship to the child, age, education level, and previous experiences with cervical cancer/abnormal pap smears. Parents were asked, "What is your relationship to the child?" and their response options were father/ male guardian (1), mother/ female guardian (2) or grandparent/ other (3). Education level was determined by asking the highest level of education completed. Response options were 8th grade or less (1), 9th-12th grade (2), High school diploma/ GED (3), completed Associates degree/Technical college (4), 1 or 2 years of college, no degree (5) and College degree or more (6). Parents were asked, "Have you, or anyone close to you, ever had HPV, an abnormal Pap smear (Pap test), genital warts, and/or cervical cancer?" Response options were yes (1), no (0) and I don't know (99).

Parental HPV Attitudes and Beliefs

Parental HPV attitudes and beliefs were measured by finding survey items that specifically measured constructs in the theoretical framework for their study: 1) perceived susceptibility to HPV; 2) perceived severity to HPV; 3) perceived benefits of HPV vaccination; 4) perceived barriers to HPV vaccine uptake; 5) cues to action and; 6) subjective norms about HPV vaccination. The Human Papillomavirus Vaccination Survey for Black Mothers with Girls Aged 9 to 12 (HPVS-BM) is a validated instrument that is the first survey to measure knowledge, attitudes, subjective norms and cultural beliefs relating to Black maternal intentions

to vaccinate their adolescent daughters (Cunningham-Erves, Talbott, O'Neal, Ivankova, & Wallston, 2015). This instrument is the primary tool used to develop the instrument used in this study. The HPVS-BM is described in detail below.

The Human Papillomavirus Vaccination Survey for Black Mothers with Girls Aged 9 to 12 (HPVS-BM)

The Human Papillomavirus Vaccination Survey for Black Mothers with Girls aged 9 to 12 was based on both the Health Belief Model and the Theory of Reasoned Action. Four constructs of the Health Belief Model (perceived susceptibility, perceived severity, perceived benefits and perceived barriers) and three constructs from the Theory of Reasoned Action (behavioral intentions, attitudes and subjective norms) were operationalized and measured by this instrument. The survey consists of 77 items divided into seven sections: 1) Demographics (7 items); 2) Family-consisting of items asking about number and age of additional children in the family (6 items); 3) Knowledge about HPV (10 items); 4) Maternal attitudes and perceptions about HPV and the vaccine (21 items); 5) subjective norms (5 items); 6) information sources (2 items) and; 7) culture (23 items). Selected sections of the HPVS-BM will be used including: 1) Family, 2) maternal attitudes and perceptions about HPV and the vaccine, 3) subjective norms and 4) information sources.

The instrument underwent a two-phased content validity review by a panel of seven experts. Additionally, cognitive interviews were conducted with five participants to test the format of the survey, the items and clarity of directions. Testing for internal consistency showed that Cronbach's alpha's of measures of theoretical constructs were all 0.7 or greater (Cunningham-Erves et al., 2015). A Cronbach's alpha score of 0.7 or greater is an acceptable

rule of thumb demonstrating internal consistency of a scale (Nunnally, Bernstein, & Berge, 1967; Spector, 1992). For the purpose of this study, three items were reverse coded: 1) "I don't have enough information about the HPV vaccine to decide whether to give it to my child"; 2) "I lack trust in the information on the HPV vaccine provided by the physician"; and 3) "I lack trust in the information on the HPV vaccine provided by the pharmaceutical company". For example, one of the original items states, "I don't trust the information on the HPV vaccine provided by the physician". This item was edited to state, "I trust the information on the HPV vaccine provided by the physician". Table 3 highlights the indexes, number of items and Cronbach's alphas.

Table 3-The Human Papillomavirus Vaccination Survey for Black Mothers with Girls Aged 9 to 12 (HPVS-BM) descriptive statistics and Cronbach's alpha of measures of theoretical constructs

Theoretical Construct	**Number of Items**	**Cronbach's Alpha**
Perceived susceptibility[*]	*4*	*0.86*
Perceived Severity[*]	*3*	*0.84*
Perceived benefits[*]	*4*	*0.84*
Perceived barriers[*]	*10*	*0.78*
Subjective norms[±]	*5*	*0.85*

[*] *Constructs from the Health Belief Model;* [±] *Construct from the Theory of Reasoned Action*

Cues to Action

Sources of Information about HPV Vaccine

Cues to action is measured by asking about sources of information about HPV vaccine and provider recommendation. Studies have shown parental attitudes are important determinants of HPV vaccine decision-making (Fishman et al., 2014; J. Hughes et al., 2009; Natasha L

Underwood et al., 2015). Parental attitudes may be influenced by a number of factors, yet there are few recent studies investigating the sources of information that parents encounter pertaining to HPV and HPV vaccination. Parents were asked to select from a list of potential sources of information from which they heard about HPV vaccination. The list included: doctor or healthcare professional, my child's school (including principal, teacher, and counselor), friend, family member, television, radio, internet, newspaper article or magazine, advertisement from a drug company, religious leader or I haven't heard about the HPV vaccine. Respondents also had the option to write in other sources of information. This is a novel item, adapted from previous studies and from the Human Papillomavirus Vaccination Survey for Black Mothers with Girls aged 9 to 12, which was previously discussed (Cunningham-Erves et al., 2015; Lisa M Gargano et al., 2015).

Provider Recommendation

Two items from CDC's Teen National Immunization Survey are adapted to measure if a healthcare provider provided a recommendation for HPV vaccine "Has a doctor or healthcare provider ever recommended that your child receive the HPV vaccine?" Response options are No (0), Yes (1) and I don't know (99). Parents who received a provider recommendation will be asked, "At what age did your child's doctor or healthcare provider recommend that your child receive the HPV vaccine?" to learn more about the timeliness of provider recommendations. Response options include before age 11 (1), 11 or 12 years old (2), 13 or 14 years old (3), 15 or 16 years old (4), 17 or 18 years old (5) and I don't know (6). The response option "I don't know" is treated as missing data and not included in the final analyses.

Environmental Context

Environmental context is measured by understanding healthcare access in this rural population. Measuring healthcare access is an indicator of the environmental construct in the theoretical framework. Penchansky and Thomas' framework of healthcare access consists of 16 items measuring five dimensions: 1) availability (4 items), 2) accessibility (2 items), 3) accommodation (4 items) 4) affordability (3 items) and 5) acceptability (3 items) (Penchansky & Thomas, 1981). Rigorous psychometric testing included establishing discriminant validity to show that participants' perceptions of the five dimensions of healthcare access are independent, and not interrelated. Additionally, construct validity was established and Goodman-Kruskal statistics were calculated. The Goodman-Kruskal statistic measures the proportional reduction in error achieved when one category of a variable is used to predict membership of another categorical variable. This test statistic ranges from zero to one, in which a value of one means that one categorical variable perfectly predicts the other variable (Field, 2009). Results of the Goodman-Kruskal correlation shows a strong association between each factor since all correlations were ≥ 0.8. The goal of including these questions in the instrument is to better understand healthcare utilization in rural communities in regards to immunizations. Since there are fewer providers in rural communities, collecting information about access, utilization and satisfaction of healthcare facilities can influence frequency of use of services such as vaccination.

Dependent Variable

HPV Vaccine Uptake

HPV vaccine uptake (initiation and completion) was the dependent variable measured. This was assessed by asking parents, "Has your child ever received the HPV vaccine?" Response options were yes (1) and no (0). If parents answered yes, they were asked, "If yes, how many doses of the HPV vaccine has your child received?" Response options were 1 (0), 2(1) or 3(2). Questions from the CDC's National Teen Immunization Survey (NIS-Teen) were used to measure HPV vaccine uptake and number of HPV doses received (Centers for Disease Control and Prevention, 2014c). Table 4 provides a summary of theoretical constructs, instruments used, number of items and the response format.

Table 4-Scale Properties

Construct/ Variable	Number of Items	Response Format	Source
Parental Attitudes			
Perceived susceptibility Perceived barriers Perceived benefits Perceived severity	22	5 –Point Likert Strongly disagree Disagree Neutral Agree Strongly Agree	Human Papillomavirus Vaccination Survey for Black Mothers with Girls Aged 9 to 12 & The Carolina HPV Immunization Attitudes and Beliefs Scale *(HPVS-BM) (Cunningham-Erves et al., 2015)* (A. F. Dempsey, Butchart, Singer, Clark, & Davis, 2011; Paul L Reiter et al., 2009)
Cues to Action			
Provider recommendation	2	Categorical	(Centers for Disease Control and Prevention, 2014c)
Sources of information	3	Categorical	*(Cunningham-Erves et al., 2015; N. L. Underwood et al., 2016)*
Subjective Norms			
Social Norms	6	5 –Point Likert Highly unlikely Unlikely Neutral Likely Highly likely	The Carolina HPV Immunization Attitudes and Beliefs Scale & Human Papillomavirus Vaccination Survey for Black Mothers with Girls Aged 9 to 12 *(Cunningham-Erves et al., 2015; McRee, Brewer, Reiter, Gottlieb, & Smith, 2010)*
Environmental Context			
Healthcare Utilization	16	5-Point Likert Very dissatisfied Dissatisfied Neutral Satisfied Very Satisfied	(Penchansky & Thomas, 1981) (McRee et al., 2010)
Location of Vaccine Receipt	1	Categorical	(Centers for Disease Control and Prevention, 2014c)

Survey Pre-testing

Five individuals evaluated the inventory prior to administration. This process serves as a "pretest". Using a convenience sample, this pre-testing phase was used to determine the average time for completion, identify difficulties with skip patterns, wording and use of white space. Participants for this phase were approached by the researcher and asked to volunteer their time to pre-test the instrument. No consent was required, since their answers were not being analyzed. Participants were provided the survey and asked to complete it. Additionally, they were asked to note if there were challenges with understanding words, if the response options were appropriate, if there were too many questions on the page and any other suggestions they had to improve the survey. The researcher noted the start and end time of each participant.

After completing the assessment, the researcher asked the participants for an overall impression of the survey. After overall impressions were shared, the researcher reviewed each page of the survey in detail with the participant to discuss noted suggestions and changes. All comments were compiled into one document and the survey instrument was modified based on the pre-testing feedback from the five participants. After the feedback was incorporated, the final instrument was implemented with a larger sample of rural parents.

Survey Implementation

Recruitment

Each county has an organizer for the non-profit organization Georgia Family Connection (http://gafcp.org/). The goal of this public-private, non-profit organization is to improve the lives of children and families across the state of Georgia. The executive directors in each county

(Warren and Wilkes) were contacted to set up a meeting to discuss this research study and the role of Georgia Family Connections. After attending several of the collaborative meetings, where I met with community members, business owners and other community stakeholders, I was referred to community locations such as schools, libraries, football games etc. to recruit participants to complete the surveys.

To increase participation, parents were allowed to complete the survey in-person and online. Parents were provided a post card with information about the study and contact information for the researcher. The post card had the website/URL information, where parents could complete the survey online. Parents who completed the survey in person were also provided a post card with a link to the online survey. They were allowed to give this post card to another parent, who was interested in participating in the study. The postcard instructed parents to go to the survey website and follow the instructions from there. The online survey automatically screened participants for eligibility. Parents were eligible to participate if: 1) they lived in one of the selected counties; and 2) had a child that was 10-18 years of age. All recruited and referred participants were screened for eligibility before obtaining consent. Parents who completed the online surveys and were not eligible were directed to a thank you screen and exited the survey. Eligible participants were instructed to follow the directions on the screen.

In addition to recruiting parents in person at community locations and online, recruitment efforts were done through the middle and high school in each county. Packets containing 1) a postage paid envelope with return address, 2) a survey for the parent to complete and 3) a consent form for parents to keep for their records were prepared for each student in the middle and high schools. The packets were provided to each school, and school staff were responsible for distributing the surveys to each student to take home to give to their parent. Parents read

through the consent form and opted into the study by returning the survey via mail. Eligibility was assumed since packets were given to students in the target counties (Warren and Wilkes) within the appropriate grade levels (middle and high school). Surveys with students outside of the age range were not included in the analyses.

Informed consent documents were provided to participants and participants read the informed consent document. No written consent was required due to minimal risks of the study. All participants were provided a copy of the consent form to take with them if they completed the survey in person. Participants who completed the surveys online were able to print or save the consent document for their records. Parents also received a consent form with their packets and were instructed to retain it for their records. All informed consent documents were reviewed and approved by the Institutional Review Board at the University of Georgia.

Data Collection

Surveys were distributed to study participants on paper and online. Parents completing the surveys in person were not asked to provide any identifiable information. Participants who completed the survey online or via mail were asked to provide a mailing address for reimbursement purposes. This information was stored separately from survey answers. After completing the surveys, participants were reimbursed with a $10 gift card for their time participating in the study. Data was collected from September 2016 to February 2017.

Data Management

Data were collected through paper surveys and via Qualtrics, a web-based survey tool used by University of Georgia staff, faculty and students to collect data (Georgia, 2013) . In an

effort to minimize problems with the skip patterns, the online survey was tested several times to ensure that the skip patterns worked correctly. Surveys completed in Qualtrics were automatically downloaded into SPSS statistical software. Paper surveys were entered manually. Data were cleaned by visually inspecting values. Additional data cleaning activities included running frequencies to check for missing, incomplete or implausible data.

Data Analysis

Response rate was calculated by dividing the number of completed surveys by the number of students in the two middle and two high schools in the two target counties. A few new indexes were created by summing responses to several items. Specifically, three indexes were created to measure parental attitudes, healthcare utilization and subjective norms. These indexes directly measure constructs in the theoretical framework. The parental attitudes index measured the following Health Belief Model constructs: perceived susceptibility to HPV; 2) perceived severity to HPV; 3) perceived benefits of HPV vaccination; 4) perceived barriers to HPV vaccine uptake perceived. The healthcare utilization index measured the environmental context construct in the theoretical framework and the Theory of Reasoned Action subjective norms construct was measured by the subjective norms index. Each item measuring parental attitudes, healthcare utilization and subjective norms had a five point Likert response option. The codes were unipolar and ranged from 1, indicating "strongly disagree" or "very dissatisfied", 2 indicates "disagree" or "dissatisfied", 0 indicates "neutral", 3 indicates "agree" or "satisfied" and 4 indicates "strongly agree" or "very satisfied" (Spector, 1992). The response option "I don't know" is treated as missing data and not included in the final analyses. For the parental attitudes index, there were

22 individual items contributing to a score ranging from zero to 88. For the healthcare utilization index, there were 17 items contributing to a score ranging from zero to 68. For the subjective norms index, there were six items contributing to a score ranging from zero to 24. Three items measuring parental attitudes were modified to eliminate double negatives to ease participant understanding of the question.

After data collection and entry, some variables were recoded due to low frequencies before being entered into the logistic regression model. Race was a variable that was recoded from originally five categories and was collapsed into three. The three new race categories were African American (1), White (2) and other (3). The other category combined parents who identified their adolescent as multiracial, Hispanic/Latino, Asian or other. Type of insurance was also recoded from originally five categories to three. The three new insurance categories created were Medicaid (1), private insurance (2) and other (3). The other category combined participants who responded that their adolescent had no insurance or they were unsure about the type of insurance their adolescent had. Education was also recoded from five categories to three. New categories created were parents who had a high school diploma/GED or less (1), an Associate's degree or 1-2 years of college but no degree (2) and a college degree or higher (3).

Descriptive statistics assessed the distribution of demographic, and theoretical constructs relating to adolescent HPV vaccination. Frequencies were produced when appropriate.

Logistic Regression

Binary logistic regression is a statistical analyses tool that can be used to predict the probability of binary outcome variables such as vaccine uptake (Field, 2009). Linear regression is an inappropriate statistical test for this research because the outcome variable is categorical

(received a HPV vaccine or did not receive a HPV vaccine), and a linear relationship cannot exist between outcome and predictor variables. In addition, logistic regression can handle a mix of categorical and continuous variables, making it the best statistical tool to use for this research study. Using binary logistic regression for this research study allows for the prediction of the vaccination uptake (vaccinated or unvaccinated) of an adolescent. Components of the logistic regression include the outcome variable (HPV vaccine uptake) and predictor variables (sociodemographic characteristics, healthcare utilization, parental attitudes and environmental context). In binary multiple logistic regression, several predictor variables are entered into the model to predict the logit.

There are several assumptions, which must be met when using binary logistic regression (Field, 2009). There are some specific assumptions to binary logistic regression, which should be noted since the outcome variable is categorical and the goal is to predict the logit.

- Linearity- The assumption of linearity between the outcome and predictor variables is violated. Thus we must use the log of the outcome variable and assume that there is a linear relationship between continuous variables and the logit of the outcome variable. Testing this assumption involves evaluating the significance of the interaction term between the predictor variable and its log transformation (Field, 2009).
- Independence of errors- Violating this assumption produces overdispersion, which occurs when the variance is larger than expected from the logistic regression model. This can be caused when the assumption of independence is violated or variability in success probabilities (Field, 2009).

In a linear regression, the R^2 value assess the amount of variance in the outcome that the model is predicting, we use the R^2 value. As a percentage, this value indicates the percent of the variation in the outcome that can be explained by the model. However, in binary logistic regression, the R^2 value cannot be interpreted in this manner. The R_L^2 value is the Hosmer and Lemeshow's measure and measures how much the fit of the model improves as predictor variables are included (Field, 2009). This R_L^2 value can range between zero, which indicated the predictors are not good at predicting the outcome variable to one, indicating the model predicts the outcome variable perfectly. Since SPSS does not use this measure, the Cox and Snell's or Nagelkerke's R^2 are used. Although not "true" R^2s, the Cox and Snell's (R^2_{CS}) or Nagelkerke's (R^2_N) R^2 can be used to measure the significance of the logistic regression model (Wuensch, 2014). The Cox and Snell's R^2 can be interpreted like R^2 in multiple regression but it will never reach a value of one (Field, 2009; Wuensch, 2014). The Nagelkerke's R^2 can reach a maximum value of one. SPSS produces the Wald statistic as z^2, which is used to determine is a variable is a significant predictor of the outcome (Field, 2009). Another important component in logistic regression is the odds ratio. The odds ratio is an indicators of the change in odds resulting from one unit of change in the predictor variable.

There are multiple methods of logistic regression including hierarchical or blockwise entry, forced entry and stepwise entry. When predictors are uncorrelated, the order of variable entry has minimal effect on the parameters calculated; however, since most predictors are correlated, method of predictor selection matters (Field, 2009). In stepwise forward regression, a base model using only the constant is created. SPSS then searches for predictors based on those the research entered into the procedure. In this study, the following constructs and related indicators were added: sociodemographic characteristics, healthcare utilization, parental attitudes

and environmental context to the stepwise procedure to best predict the logic of the outcome variable (HPV vaccine uptake). If the added predictor, significantly predicts the outcome variable, it is retained in the model and another predictor is added. The model is then reassessed and predictors continue to be added and removed until a model is built with predictors that make a significant contribution to the predictive power of the overall model. There are limitations when using stepwise logistic regression. Mainly the computer selects the predictor variables added and removed from the model. Due to when variables are selected into the model, they may be poor predictors of the outcome variable and thus removed. Stepwise regression is useful in exploratory model building. Since this research is exploratory and being conducted with a novel population, stepwise logistic regression was utilized. To test for influential cases on the model, Cook's distance was calculated to observe if there were any values greater than one (Field, 2009). Cook's distance is a measure of the overall influence of a case on the overall model (Field, 2009). No testing for higher order terms was performed. Multicollinearity among predictor variables was assessed by evaluating the covariance matrix (Field, 2009).

For the purpose of this study ten predictor variables were assessed to test the research questions. The predictor variables were 1. Provider Recommendation, 2. Healthcare Utilization Score, 3. Social Norms Score, 4. Education Level, 5. Insurance, 6. Race, 7. Gender, 8. Information exposure Score, 9. Parent Attitude Score and, 10. Age.

Categorical Variables and Reference Coding

Categorical variables in the logistic regression were dummy coded. The specific categorical variables that were dummy coded were: 1. Provider Recommendation, 2. Education Level, 3. Insurance, 4. Race and, 5. Gender. There were only two categorical options for provider

recommendation (yes or no). The reference group for provider recommendation was no and coded as "0". As previously discussed, the education variable was recoded from five categories to three (a high school diploma or less, 1-2 years of college or an Associate's degree and a college degree or higher). The reference category for the education variable was a high school diploma or less. Similarly, the insurance variable was originally five categories but collapsed into three (Medicaid, private insurance and other). The reference group for the insurance variable in the regression was Medicaid. Race was also a five-category variable then transformed into three categories (African American, White and Other). The reference category for this variable was African American. There were only two categories for the gender variable (female and male), and males were the reference groups. Reference groups were selected based on the literature and previous studies, which used similar reference groups as described above.

All data was analyzed using SPSS and evaluated at the $p=0.05$ significance level for all tests.

Chapter Summary

Based on the available literature, there is a dearth of information about HPV vaccination among rural adolescents. Available studies solely focus on parental attitudes, beliefs and acceptability of HPV vaccination for their adolescent children. Many of the studies also focus on a single sex, usually female adolescents. Many of the studies found that rural parents have low levels of awareness and knowledge about HPV vaccination, which supports the need for tailored interventions for rural parents of adolescents.

My study is guided by a theoretical framework consisting of constructs from the Health Belief Model and the Theory of Reasoned Action to understand HPV vaccination behaviors of

parents of rural adolescents. The Health Belief Model is a common health behavior theory guiding studies that utilized a health behavior theory. Incorporating several constructs from the Theory of Reasoned Action to guide my dissertation is a novel contribution to the field. Binary logistic regression is an ideal test to understand predictors of HPV vaccine uptake among parents of rural adolescents. While chi-square testing allows for the analysis of simple relationships, unfortunately that statistical analysis does not allow for analytics of multiple and complete variables. Binary logistic regression is a way to assess the relationship of multiple predictor variables at once, including categorical and continuous, which chi-square tests cannot.

There is a vast amount of literature about human papillomavirus vaccination. However; few studies include rural populations in their sample population to offer insight into vaccination behaviors among this vulnerable and understudied population in the U.S.

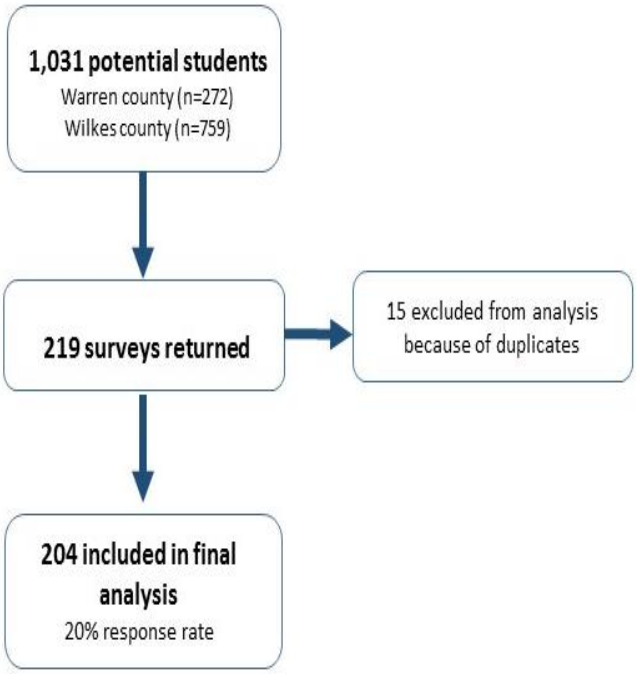
CHAPTER 4

RESULTS

Sociodemographic Characteristics and HPV Vaccine Uptake

The sampling frame totaled 1,031 students. This included 272 total students in Warren county schools (136 in the middle school and 136 in the high school) and 759 in Wilkes county schools (422 in the high school and 337 in the middle school). The total sample size included responses for 219 adolescents yielding a 20% response rate. For parents who completed surveys for multiple children in a middle and/or high school, one survey was selected for inclusion in the data analyses. As stated in the methods section, the survey for the youngest child was retained. The other(s) were discarded yielding a total of 204 surveys analyzed. Figure 3 depicts the final sample analyzed.

Figure 3-Final sample size and response rate



Adolescent Characteristics

Table 5 depicts the sample demographics for the adolescents and their parent. A majority of the sample was African American (69%, n=131) and female (52%, n=100). The mean age was 14 years old (SD=2.1). Most adolescents were covered by Medicaid insurance (64%, n=123) and less than 2% were uninsured (1.6%, n=3).

Parent/Guardian Characteristics

A majority of surveys were completed by mothers of adolescents (80%, n=147). Most adolescents lived in a household with an annual income less than $40,000 (74%, n=141) and 62% of parents/guardians had a high school diploma/GED or less (n=117). Only 21% (n=40) of

parents/guardians in the sample knew someone close to them who had an abnormal pap smear, genital warts and/or cervical cancer.

Table 5-Sample Demographics

Socioeconomic Variables	Percent (n)
Gender	
Female	52% (n=104)
Male	48% (n=95)
Race	
African American	66% (n=132)
White	20% (n=40)
Other	14% (n=27)
Insurance Coverage	
Medicaid	64% (n=127)
Private Insurance	31% (n=61)
Uninsured/ No insurance	4% (n=9)
Relationship of Respondent to Adolescent	
Father	8% (n=16)
Mother	80% (n=154)
Grandparent	12% (n=23)
Total Household Income	
Less than $20,000	42% (n=80)
$20,001-$40,000	32% (n=61)
$40,001-$60,000	10% (n=20)
$60,001-$80,000	9% (n=17)
Over $80,001	7% (n=14)
Parent Education Level	
8th Grade or less	10% (n=19)
9th-12th Grade	19% (n=38)
High School diploma/ GED	32% (n=64)
Completed Associates degree/Technical College	11% (n=22)
1 or 2 years of college- no degree	11% (n=21)
College degree or more	17% (n=33)
History of knowing someone with abnormal pap smear, genital warts, and/or cervical cancer	
Yes	20% (n=40)
No	73(n=143)
Unsure	7% (n=13)

Human Papillomavirus Vaccine Uptake (outcome)

Regarding uptake of the HPV vaccine, 37% (n=81) of parents reported that their adolescent received the HPV vaccine. Of those who reported receiving the HPV vaccine, 27% (n=22) completed the three dose series. Among the parents who reported their adolescent did not receive the HPV vaccine, 43% (n=53) planned to vaccinate their adolescent.

Table 6-HPV Vaccine Uptake

	Percent (n)
HPV Vaccine Uptake	
Yes	37% (n=81)
No	63% (n=137)
Number of Doses	
1	33% (n=27)
2	24% (n=19)
3	27% (n=22)
Unsure	16% (n=13)
If your child did not receive the HPV vaccine, do you plan to get your child vaccinated in the next 12 months?	
Yes	43% (n=53)
No	57% (n=69)

Parental Attitudes

Parental attitude score summed responses from 22 items with a minimum score of zero and a maximum score of 88. The mean parental attitude score was 43.1 (SD= 17.3). Full results from this index are listed in Table 7. Notably, 30% of parents strongly disagreed and 35% disagreed that their child would catch a sexually transmitted disease. Additionally, 29% of parents strongly disagreed and 27% disagreed that their child would get genital warts if they are not vaccinated. Parents had favorable attitudes about the protection provided by the HPV vaccine with more than 60% agreeing or strongly agreeing that the HPV vaccine is a good way to protect

their child's health. Interestingly, only 57% of parents agreed or strongly agreed that the HPV vaccine could prevent their child from getting HPV associated cancers and 53% agreed or strongly agreed that the HPV vaccine could prevent their child from getting genital warts. Regarding attitudes toward their providers, a majority of parents indicated they were satisfied with their ability to access the vaccine and its affordability. Specifically, the majority of parents disagreed or strongly disagreed that it was hard to find a provider or clinic where they could afford the HPV vaccine (63%) and 74% disagreed or strongly disagreed that it was hard to find a provider that was close or easy to get to.

Table 7-Parental Attitudes about HPV and the HPV vaccine

	Strongly Disagree (1)	Disagree (2)	Neutral (0)	Agree (3)	Strongly Agree (4)	Mean (SD)
It is likely that my child will catch HPV if she/he does not receive the HPV vaccine.	21.3%	25.9%	30.6%	16.2%	6.0%	1.5 (1.2)
It is likely that my child will catch a sexually transmitted disease.	30.2%	35.3%	23.3%	7.4%	3.7%	1.4 (1.0)
It is likely that my child will get a cancer associated with HPV (cervical, throat, etc.) if she/he does not get the HPV vaccine.	22.9%	28.4%	31.7%	11.9%	5.0%	1.4 (1.2)
It is likely that my child will get genital warts if she/ he does not get the HPV vaccine.	29.5%	27.2%	29.5%	10.6%	3.2%	1.3 (1.1)
HPV could be a serious threat to my child's health.	14.8%	11.6%	22.7%	35.2%	15.7%	2.1 (1.4)
HPV associated cancer (cervical, throat, etc.) could be a serious threat to my child's health.	13.0%	11.1%	18.5%	38.0%	19.4%	2.3 (1.4)
Genital warts could be a serious threat to my child's health.	13.8%	12.9%	18.4%	35.0%	19.8%	2.2 (1.4)
The HPV vaccine is a good way to protect my child's health.	5.0%	5.0%	24.7%	41.6%	23.7%	2.4 (1.5)
The HPV vaccine could prevent my child from getting certain types of HPV.	4.6%	6.4%	22.9%	46.3%	19.7%	2.4 (1.4)

	Strongly Disagree (1)	Disagree (2)	Neutral (0)	Agree (3)	Strongly Agree (4)	Mean (SD)
The HPV vaccine could prevent my child from getting HPV associated cancers (cervical, throat, etc.).	5.9%	8.7%	27.9%	37.4%	20.1%	2.2 (1.5)
The HPV vaccine could prevent my child from getting genital warts.	6.8%	11.0%	29.2%	36.5%	16.4%	2.0 (1.5)
Getting shots is really scary and/or painful for my child.	15.1%	35.3%	21.6%	20.2%	7.8%	1.8 (1.2)
The HPV vaccine might cause my child lasting health problems	14.9%	34.4%	37.2%	9.3%	4.2%	1.3 (1.2)
My child is too young to get a vaccine for a sexually transmitted disease like HPV	19.7%	44.1%	23.9%	7.0%	5.2%	1.5 (1.1)
I don't have enough information about the HPV vaccine to decide whether to give it to my child.	15.3%	28.4%	25.6%	22.8%	7.9%	1.7 (1.3)
The HPV vaccine is too new to make a decision to decide to vaccinate my child against HPV.	14.4%	31.2%	31.6%	16.7%	6.0%	1.5 (1.3)
I lack trust in the information on the HPV vaccine provided by the doctor or healthcare provider.	15.0%	37.1%	33.8%	11.3%	2.8%	1.3 (1.1)
I lack trust in the information on the HPV vaccine provided by the pharmaceutical company.	14.2%	33.0%	34.4%	13.7%	4.7%	1.4 (1.2)
It is hard to find a provider or clinic where I can afford the vaccine	25.0%	38.4%	30.1%	4.6%	1.9%	1.2 (1.0)
It is hard to find a provider or clinic that is close to me or easy to get to.	27.4%	47.4%	20.5%	3.3%	1.4%	1.4 (0.9)
It is hard to find a provider or clinic with the HPV vaccine.	26.2%	42.5%	27.1%	2.8%	1.4%	1.3 (0.9)
I think the HPV vaccine is unsafe.	17.7%	34.4%	41.9%	2.3%	3.7%	1.1 (1.1)

Health Care Utilization/ Environmental Context

The healthcare utilization score summed responses from 14 items with a minimum score of 0 and a maximum score of 68. The mean healthcare utilization score was 33.7 (standard deviation= 13.3). Overall, parents were satisfied with their healthcare access and utilization. More than 68% of parents indicated they were satisfied or very satisfied with their ability to find a good doctor for their entire family. Almost 68% of parents indicated they were satisfied or very satisfied with their ability to get in touch with their provider. In rural communities, 75% of parents indicated it was easy or very easy to get to their doctor's office and 60% were somewhat confident or very confident in getting good medical care for their family. The following table displays the frequencies of the response options.

Table 8-Parent Perception of Healthcare Utilization

	Very Dissatisfied (1)	Dissatisfied (2)	Neutral (0)	Satisfied (3)	Very Satisfied (4)	Mean (SD)
How satisfied are you with your ability to find one good doctor to treat the whole family?	2.7%	10.9%	17.3%	37.7%	31.4%	2.6 (1.4)
How satisfied are you with your knowledge of where to get healthcare?	1.8%	5.5%	13.2%	50.7%	28.8%	2.8 (1.3)
How satisfied are you with your ability to get medical care in an emergency?	2.7%	7.3%	20.1%	43.8%	26.0%	2.5 (1.4)

	Very Dissatisfied (1)	Dissatisfied (2)	Neutral (0)	Satisfied (3)	Very Satisfied (4)	Mean (SD)
How satisfied are you with how convenient your doctor's offices are to your home?	2.3%	9.2%	22.6%	37.8%	28.1%	2.5 (1.5)
How satisfied are you with how long you have to wait to get an appointment?	3.6%	11.8%	27.3%	38.6%	18.6%	2.2 (1.5)
How satisfied are you with how convenient doctors' office hours are?	2.3%	8.8%	21.7%	44.2%	23.0%	2.5 (1.4)
How satisfied are you with how long you have to wait in the waiting room?	12.5%	20.8%	25.9%	26.4%	14.4%	1.9 (1.4)
How satisfied are you with how easy it is to get in touch with your doctor?	4.1%	7.7%	20.5%	40.9%	26.8	2.5 (1.5)
How satisfied are you with your health insurance?	5.9%	8.7%	20.1%	39.7%	25.6%	2.5 (1.5)
How satisfied are you with the doctor's prices?	6.8%	16.4%	26.0%	31.1%	19.6%	2.1 (1.5)
How satisfied are you with how soon you need to pay the bill?	5.9%	15.5%	31.8%	29.1%	17.7%	1.9 (1.5)
How satisfied are you with the appearance of the doctor's office?	1.8%	3.7%	20.6%	45.9%	28.0%	2.6 (1.4)
How satisfied are you with the neighborhood that their offices are in?	1.8%	0.9%	15.6%	50.0%	31.7%	2.8 (1.3)
How satisfied are you with the other patients you usually see at the doctor's office?	0.5%	0.9%	31.8%	48.6%	18.2%	2.2 (1.6)

	Strongly Disagree (1)	Disagree (2)	Neutral (0)	Agree (3)	Strongly Agree (4)	Mean (SD)
It is hard to find a healthcare provider or clinic where I don't have to wait for a long time to get an appointment for my child to be vaccinated	14.7%	39.0%	25.2%	14.7%	6.4%	1.6 (1.2)
	Very Difficult (1)	Difficult (2)	Neutral (0)	Easy (3)	Very Easy (4)	Mean (SD)
How difficult is it for you to get to your doctor's office?	3.2%	7.3%	13.8%	44.5%	31.2%	2.8 (1.3)
	Very Unconfident (1)	Somewhat unconfident (2)	Neutral (0)	Somewhat Confident (3)	Very Confident (4)	Mean (SD)
All things considered, how much confidence do you have in being able to get good medical care for you and your family when you need it?	8.3%	13.0%	18.1%	28.7%	31.9%	2.5 (1.5)

Subjective Norms

Parents were asked about their perception of other parents vaccinating their adolescents. The social norms score summed responses from six items with a minimum score of 0 and a maximum score of 24. The mean score of the summed items was 11.6 (standard deviation 6.9). When asked about the vaccination behaviors of other parents, a majority of parents in our sample were unsure about their peers (74%) and only 18% of parents agreed or strongly agreed that other parents vaccinated their child for HPV. Parents indicated that they were likely to have their child receive the HPV vaccine if the vaccine was recommended by a doctor or nurse. Specifically, more than 60% of parents were likely or highly likely to have their child receive the

HPV vaccine if the doctor or nurse recommended it. The following figure and tables represent responses for each of the six individual questions.

Figure 4- Parents' Perception of Other Parents Getting their Child the HPV vaccine

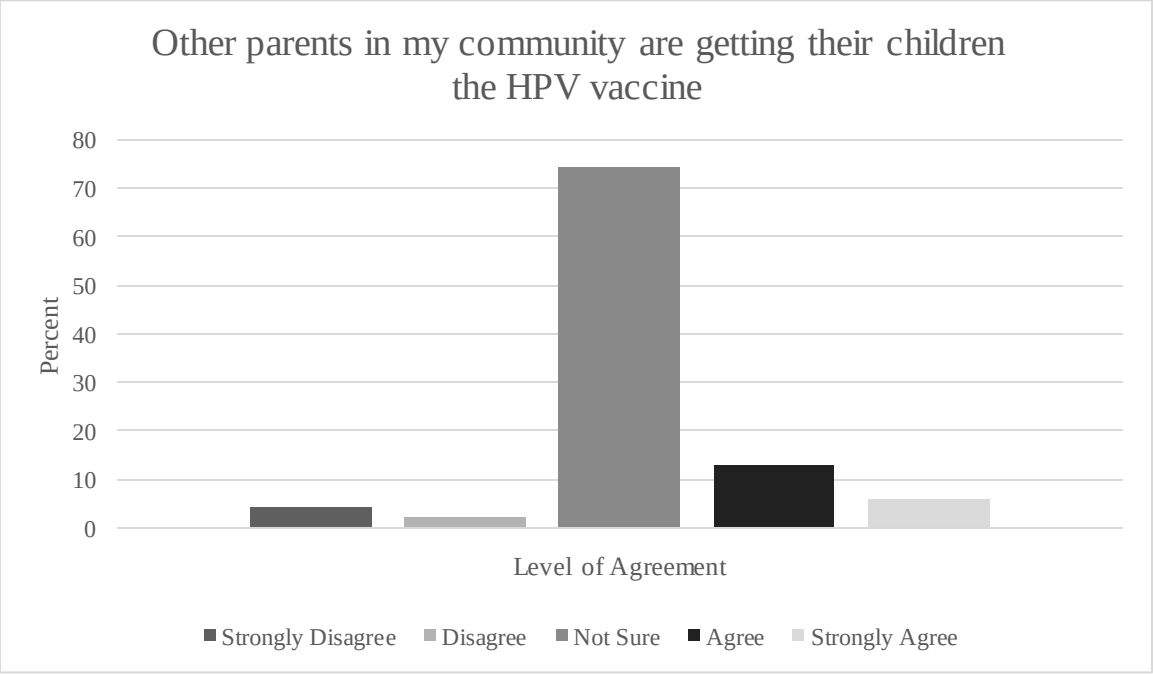


Table 9- Likelihood of Adolescent Vaccination based on Recommendation from Social Influencers

	Highly Unlikely (1)	Unlikely (2)	Neutral (0)	Likely (3)	Highly Likely (4)	Mean (SD)
Doctor recommends	4.6% (n= 10)	6.5% (n=14)	18% (n=39)	34% (n=78)	35% (n=76)	2.7 (1.5)
Nurse recommends	4.1% (n=9)	8.2% (n=18)	21% (n=46)	34% (n=75)	32% (n=71)	2.5 (1.5)
Family Member/ Friend recommends	4.6% (n=10)	12% (n=26)	33% (n=71)	28% (n=61)	23% (n=50)	2.0 (1.6)
Teacher/Principal recommends	6.4% (n=14)	12% (n=26)	32% (n=70)	29% (n=63)	21% (n=46)	2.0 (1.6)
Pastor/Spiritual leader recommends	7% (n=15)	11% (n=25)	38% (n=83)	24% (n=52)	20% (n=44)	1.8 (1.6)

Provider Recommendation

Parents were asked if they received a recommendation from their adolescent's healthcare provider to receive the HPV vaccine. Only 47% (n=101) of parents indicated their adolescent received a provider recommendation. Among parents who received a provider recommendation, a majority received a timely and age appropriate recommendation with 9% (n=9) receiving a recommendation before age 11 and 46% (n=47) receiving a recommendation between age 11-12 years old.

Table 10-Parent Reported Provider Recommendation

	% (n)
Yes	47% (n=101)
No	40% (n=86)
Unsure	13% (n=29)

Table 11-Age of Adolescent when Provider Recommended

Age of Recommendation	% (n)
Before age 11	9% (n=9)
11-12 years old	46% (n=47)
13-14 years old	34% (n=34)
15-16 years old	7% (n=7)
17-18 years old	4% (n=4)
Older than 18 years old	0% (n=0)

Sources of Information

The most common source of information about the HPV vaccine that parents reported was their child's doctor (63%, n=125) followed by television (49%, n=98). When asked about their most trusted source of information about the HPV vaccine, doctor was reported most frequently (n=160) followed by a lack of a trusted source of information (n=13). Thirty-nine percent (n=77) of parents reported that the information they heard about the HPV vaccine had been both positive and negative while 38% (n=75) of parents reported hearing mostly positive information.

Table 12-Sources of information from which parents heard about the HPV vaccine

Information Source	Percent (n)
Doctor	63% (n=125)
Television	49% (n=98)
Internet	24% (n=47)
Newspaper	16% (n=31)
My child's school	13% (n=26)
Advertisement from drug company	12% (n=24)
Radio	10% (n=19)
Friend	8% (n=15)
Family member	7% (n=14)
Religious leader	0.5% (n=1)

Table 13-Most trusted sources of information about the HPV vaccine

Information Source	Percent (n)
Doctor	84% (n=167)
Television	5% (n=10)
Internet	2% (n=4)
Newspaper	2% (n=4)
My child's school	2% (n=3)
Friend	2% (n=3)
Family member	1% (n=2)
Advertisement from drug company	0.5% (n=1)
Radio	0.5% (n=1)
Religious leader	0.5% (n=1)

Table 14-Value of Sources of Information

Value Rating	Percent (n)
Mostly negative	5.5% (n=11)
Mostly positive	38% (n=75)
Both positive and negative	39% (n=77)
Haven't heard anything	18% (n=36)

Overall research question

Table 15 shows the results from the classification table for the intercept only. The classification table shows the sensitivity and specificity of the models. The overall success rate is 57.2% for the base model (intercept only). Table 16 shows that the overall success rate of predicting the outcome increases as significant predictors are added to the model. In the final model (step 3), the overall success rate is 79.5% which is similar to 78.9% in model 1. The sensitivity allows us to correctly classify 77.5% of adolescents who received the HPV vaccine

when the predicted event (HPV vaccine uptake) was observed. The specificity, or percentage of nonoccurrences correctly predicted, is 81% for model 3.

Table 15- Classification Table of the Intercept Only

			Predicted		
			HPV Uptake		Percentage Correct
	Observed		No	Yes	
Intercept	HPV Uptake	No	95	0	100.0
		Yes	71	0	0
	Overall Percentage				57.2

Table 16-Classification of Binary Logistic Forward Regression Models

			Predicted		
			HPV Uptake		Percentage Correct
	Observed		No	Yes	
Model 1	HPV Uptake	No	68	27	71.6
		Yes	8	63	88.7
	Overall Percentage				78.9
Model 2	HPV Uptake	No	77	18	81.1
		Yes	15	56	78.9
	Overall Percentage				80.1
Model 3	HPV Uptake	No	77	18	81.1
		Yes	16	55	77.5
	Overall Percentage				79.5

Table 17- Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Model 1	Step	65.5	1	.000
	Block	65.5	1	.000
	Model	65.5	1	.000
Model 2	Step	16.8	1	.000
	Block	4.9	2	.000
	Model	4.9	2	.000
Model 3	Step	4.9	1	.026
	Block	87.3	3	.000
	Model	21.7	3	.000

Table 18-Model Summaries

Model	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	161.103[a]	.326	.438
2	144.324[a]	.391	.525
3	139.371[a]	.409	.549

Table 17 shows the results of the omnibus tests of model coefficients. The block line shows improvement and evaluates all the variables in the three models. Table 18 depicts the model summary for the three regression models. The -2 Log Likelihood statistic measures how poorly the models predict decisions. Larger values of the log-likelihood statistic represent poor fitting models since there is more unexplained observations while smaller statistics indicate a better model. The -2 Log Likelihood statistic decreases from model 1 to model 2 to model 3, indicating model 3 is a better fit for the data. Both Table 17 and 18 show that the addition of

each new variable (provider recommendation, social norms and information sources) is improving the overall model and explaining the maximum variance.

Table 19-Results of Hosmer and Lemeshow Test

Model	Chi-square	df	Sig.
1	.000	0	.
2	15.527	7	.030
3	4.025	7	.777

Table 19 depicts the results from the Hosmer and Lemeshow tests of the null hypothesis that the predictions made by the model fit perfectly with the observed data. A non-significant value ($p > 0.5$) indicates the data fit the model well. For model 3, $p=0.777$ indicates that this model fits the data well.

Table 20-Predictors of HPV Vaccine Uptake among Rural Adolescents

								95% C.I. for O.R.	
		B	S.E.	Wald	df	Sig.	O.R.	Lower	Upper
Model 1	Provider Recommendation	3.0	0.4	46.3	1	0.000	19.8	8.4	46.9
Model 2	Provider Recommendation	2.9	0.5	40.6	1	0.000	19.1	7.7	47.5
	Social Norms	0.1	0	14.8	1	0.000	1.1	1.1	1.2
Model 3	Provider Recommendation	3.1	0.5	41.6	1	0.000	23.2	8.9	60.4
	Social Norms	0.1	0	15.1	1	0.000	1.1	1.1	1.2
	Information Exposure	-0.3	0.2	4.6	1	0.031	0.7	0.5	0.9

A step-wise forward logistic regression analyses was conducted to better understand the correlates of HPV vaccination. The logistic regression model and predictors are presented in

Table 19. This table also contains the odds ratios, Wald test and logistic regression coefficient for each model. Ten predictor variables were entered into the model and three models were produced. The predictor variables were: 1. Provider Recommendation, 2. Healthcare Utilization Score, 3. Social Norms Score, 4. Education Level, 5. Insurance, 6. Race, 7. Gender, 8. Information exposure Score, 9. Parent Attitude Score, and 10. Age.

The final model contained three significant correlates: provider recommendation, social norm score and information exposure score (R^2=0.41, χ^2 (3)=87.3, p<0.001). In this model adolescents who received a provider recommendation were almost 23 times more likely to receive the HPV vaccine compared to adolescents who did not receive a provider recommendation (OR: 23.24; CI [8.94, 60.44]). The Wald statistic was 41.64 (p<0.001). Also as parents reported greater influence of social norms, their adolescents were more likely to receive a dose of the HPV vaccine (OR:1.14; CI [1.07,1.21]). The Wald statistic was 15.15 (p<0.001). However, as parents reported greater exposure to various information sources, the odds of their adolescent receiving the HPV vaccine decreased (OR:0.72; CI: [0.53,0.97]). The Wald statistic was 4.63 (p=0.031). Results from Cook's distance test show that there were no influential cases impacting the model. There was no multicollinearity among predictors as all values were less than 0.8 as shown in Table 21, which is a correlation matrix.

Table 21-Correlation Matrix

		Constant	New Provider Rec	Social Norm Score	New Provider Rec	Social Norm Score	Information Exposure
Model 1	Constant	1.000	-.8				
	Provider Rec	-.8	1.000				
Model 2	Constant	1.000	-.7	-.7			
	Provider Rec	-.7	1.000	.1			
	SocialNormScore	-.745	.1	1.000			
Model 3	Constant	1.000			-.5	-.6	-.3
	Provider Rec	-.5			1.000	.2	-.3
	SocialNormScore	-.6			.2	1.000	-.2
	InformationExposure	-.3			-.3	-.2	1.000

CHAPTER 5

DISCUSSION

It is a public health imperative to prevent unnecessary morbidity and mortality associated with HPV-associated cancers and conditions by increasing HPV vaccination coverage rates in the United States. There are two highly effective HPV vaccines available, which are significantly underutilized. The purpose of this study is to investigate human papillomavirus vaccination behaviors among rural adolescents in Georgia and further add to the knowledge of vaccine predictors. HPV vaccination rates are low among adolescents, especially in Georgia. It is important to better understand predictors of vaccination to develop better interventions. There were four theoretical constructs assessed in this study (parental attitudes, cues to action, subjective norms and environmental context) with various indicators measuring them. Two factors, cues to action and subjective norms were significant predictors of HPV vaccination. The specific indicators were: 1) provider recommendation (cue to action), 2) sources of information (cue to action) and, 3) social norms.

Cues to Action

There were two indicators of cues to action- provider recommendation and sources of information, and both were significant predictors of HPV vaccination among rural adolescents.

Provider Recommendation

Findings from this study indicate that receiving a provider recommendation is the strongest predictor of HPV vaccine uptake among rural adolescents. Parents who indicated their adolescent received a healthcare provider recommendation were 23 times more likely to receive the HPV vaccine. Additionally, 84% of parents indicated that their doctor or healthcare provider was their most trusted source of information for HPV information. This reinforced findings from several studies indicating that strong provider recommendations for HPV vaccination leads to increased uptake of HPV vaccine (Clark, Cowan, Filipp, Fisher, & Stokley, 2016; C. Dorell et al., 2013; Fontenot, Domush, & Zimet, 2015; L. M. Gargano et al., 2013; Holman et al., 2014; Perkins et al., 2014).

Despite the importance of provider recommendations and level of trust parents have in information shared from their doctors, health care providers still struggle with providing consistent and strong recommendations for the HPV vaccine. In this sample, 47% of parents reported receiving a provider recommendation for the HPV vaccine for their adolescent. Other recommended adolescent vaccines such as MCV4 and Tdap are near or exceed Healthy People 2020 goals of 80% coverage while HPV vaccination rates are significantly lower (Centers for Disease Control and Prevention, 2015; U.S. Department of Health and Human Services). One study estimated that HPV vaccination coverage could be as high as 91.3% if the HPV vaccine was given at the same time as other adolescent vaccines (Stokley et al., 2014).

Future interventions should focus on identifying and implementing effective ways to help healthcare providers make strong, routine recommendations for the HPV vaccine in order to increase coverage rates (Zimet, 2014). One starting point is eliminating missed opportunities for vaccinations, where healthcare providers do not view every visit with their adolescent patients as an opportunity for vaccination. In addition to systems level improvements to decrease missed opportunities, provider education and skill building to handle vaccine refusal and discuss HPV with adolescent parents is needed. In one study of an urban safety net hospital, providers were encouraged to "bundle" adolescent vaccines together and present vaccines as required for adolescent health rather than optional (Farmar et al., 2016). Additionally, these providers were given weekly educational meetings on a variety of vaccine related topics. Their results showed that they increased their HPV vaccine coverage among their patients to 90% among females and males, while US coverage levels were 60% for females and 42% for males (Farmar et al., 2016).

Sources of Information

Sources of information about the HPV vaccine were also a significant predictor of HPV uptake among rural adolescents. Results from the logistic regression showed that as parental information sources increased, the odds of reporting their adolescent receiving the HPV vaccine declined. Additionally, this study found that participants heard about HPV vaccine from a wide range of sources including family members and friends, healthcare providers, the internet and various types of broadcast media. A majority of the sample heard about HPV vaccine from their doctor or from television, which is comparable to previous studies (N. L. Underwood et al., 2016). Additionally, doctors or healthcare providers were identified by 84% of the sample as the most trusted source of information about the HPV vaccine. It is crucial for future interventions to

focus on healthcare providers. Parents of adolescents have great trust in their healthcare provider to provide the best and most useful health information for their children.

The information that parents heard about the HPV vaccine was mostly positive (38%) or neutral (39%). There is room for improvement to increase the positive associations and messaging related to the HPV vaccine. This may be due to several factors including what the source of information was and the positive or negative messaging from the source of information. Further investigation into the relationship between sources of information and HPV vaccine uptake is warranted. Specifically, additional testing can be done to investigate whether specific information sources, such as broadcast media, is associated with vaccine uptake. Content analyses are an additional opportunity to explore messaging materials and what influence it has on parental attitudes and ultimately HPV vaccine uptake. Additionally, investigating the value associated with the information sources and vaccine uptake can be performed. Previous studies have evaluated the mediating relationship of information source on parental attitudes and vaccine uptake and have found positive relationships (N. L. Underwood et al., 2016). Future testing can evaluate the relationship between these theoretical factors.

Social Norms

Parent social norms and beliefs in the vaccination behaviors of other parents was a significant predictor of HPV vaccine uptake in this study. Reshaping social norms can be one method of increasing HPV vaccine uptake. Studies have shown that promoting behaviors of others can provide a social nudge in the right direction (Goldstein et al., 2008; Hershey, Asch, Thumasathit, Meszaros, & Waters, 1994). For example, university health service staff convinced students to get vaccinated for influenza by promoting messaging on campus that a large

proportion of fellow students also received the vaccine (Hershey et al., 1994). However, one challenge with using social norms to promote vaccine uptake is the private nature of vaccination behaviors, which typically occurs in a healthcare providers' office and is generally a routine behavior (Buttenheim & Asch, 2013). Development of creative ideas and ways to visibly display vaccination behaviors and promote social norms in favor of vaccination is an area for future exploration.

The results of this study also showed that parents were likely or highly likely to vaccinate their adolescent if a doctor or nurse recommended the HPV vaccine. Almost 50% of parents were likely or highly likely to give their adolescent the HPV vaccine if their child's teacher or principal recommended the vaccine. Leveraging use of school administrators and school systems can be an opportunity to increase HPV vaccination uptake among adolescents. School mandates are one means of doing so. Among school-aged populations, school immunization laws and mandates have had tremendous impact on vaccine-preventable diseases in the United States (Orenstein & Hinman, 1999).

School mandates for HPV vaccination are limited and exist only in the District of Columbia, Virginia and Rhode Island (National Conference of State Legislatures, 2009). Studies evaluating the impact of HPV vaccine coverage rates prior to and after the mandates found no significant change in uptake in Virginia (Cuff et al.; Pierre-Victor et al., 2016). A similar study found no significant change in HPV vaccine uptake when comparing states with HPV vaccine mandates to other states without a mandate (Perkins, Lin, Wallington, & Hanchate, 2016). Modeling of the impact of school mandates on HPV vaccination coverage levels show that to achieve a 70% coverage level for adolescents, it would take 8 years after vaccine availability (A. F. Dempsey & Mendez, 2010). Comparatively, it would take 23 years after vaccine availability

to reach 70% coverage without a mandate (A. F. Dempsey & Mendez, 2010). Development of a variety of tools and strategies beyond school mandates to promote social norms toward HPV vaccination uptake are needed.

Parental Attitudes

Among this sample, parental attitudes were not a significant factor predicting vaccine uptake. This may indicate that parental attitudes are not as important to HPV vaccine uptake as previously thought. Previous studies have demonstrated the association between HPV vaccine uptake and parental attitudes (C. Hughes et al., 2011; Natasha L Underwood et al., 2015) with more favorable attitudes leading to increased odds of vaccine uptake or intention to vaccinate. One reason parental attitudes may not be a significant predictor among this sample is the selection of instrument used to measure parental attitudes. Items from the Human Papillomavirus Vaccination Survey for Black Mothers with Girls Aged 9 to 12 (HPVS-BM) was used to measure parental attitudes and was a rigorously tested instrument. This validated instrument was designed to measure knowledge, attitudes, subjective norms and cultural beliefs relating to Black maternal intentions to have their adolescent daughters vaccinated. Items from the HPVS-BM were used in this study with a sample of rural, racially diverse parents and may not have operated as intended. The sample in this study included parents and guardians who were not only mothers but also fathers and grandparents. This sample also included parents and adolescents, who were of various racial and ethnic backgrounds. Parents/guardians answered the survey for not only their daughters, but also sons and grandchildren.

This instrument was selected because it closely aligned to the theoretical framework including constructs from the Health Belief Model and the Theory of Reasoned Action, which

guided the current study. The HPVS-BM includes four constructs from the Health Belief Model and three constructs from the Theory of Reasoned Action. Both the Health Belief Model and Theory of Reasoned Action are used widely in the field of vaccination and specifically for HPV vaccination to measure parental attitudes (Brawner et al., 2013; Brewer & Fazekas, 2007; L. M. Gargano et al., 2014; L.M. Gargano et al., 2011; Gowda et al., 2012; Sales et al., 2011).

Environmental Context

Healthcare Utilization

Measurement of healthcare utilization was a novel aspect of this study, and it was not a significant predictor of HPV vaccine uptake. Previous studies in this field have not explored the extent of healthcare utilization among adolescents, especially adolescents in rural settings, to understand the impact on HPV vaccination behaviors. Overall, parents in the study were satisfied with their healthcare providers and options available in the community. Despite being in a rural environment, only 10% of parents indicated it was very difficult or difficult to get to their healthcare provider.

One challenge with measuring healthcare utilization is the lack of modern scales and survey instruments. Penchansky and Thomas' concept of access and satisfaction with healthcare instrument was developed in 1981. A review of the literature prior to instrument development for this study provided no modern scales appropriate for this study. Instead, the field has shifted to use of Geographic Information Systems (GIS) to illustrate the proximity and physical locations of provider offices to communities (Higgs, 2004; McGrail & Humphreys, 2009). Use of a more modern and current scale may yield different results.

Limitations

This study has several limitations. First, the results of the study are limited to two rural counties in Georgia and are not representative of all rural communities or generalizable to other geographic areas and populations. The response rate for participation in the study was low. Attempts to minimize parent burden and increase participation were made such as providing a postage paid envelope with a return address. Additionally, written consent forms were not required due to the minimal level of risk involved in the study. Multiple means for completing the survey (online and paper) were offered as well. Although the response rate was only 20%, the low response rate is comparable to similar school-based studies that require "active" parental consent or participation, in which parents must return the survey or consent form to participate (Esbensen, Melde, Taylor, & Peterson, 2008; Ji, Pokorny, & Jason, 2004; McMorris et al., 2004).

Another limitation involves self-reported vaccination status of adolescents by their parents. In one study, there were high levels of inaccuracy between actual HPV vaccination history and self-report of HPV vaccine uptake where both mothers and adolescents had poor recall of HPV vaccination status (Stupiansky, Zimet, Cummings, Fortenberry, & Shew, 2012). Underreporting vaccination status could potentially affect the results and predictors of HPV vaccination among parents of rural adolescents. Indexes on the survey used in this study were combined from other instruments, which were independently tested. Combining indexes may alter the results since they were not used as originally designed. Neutral was coded as zero in this study, which is a unique way of coding the data. Higher order terms, or interaction effects, was not assessed and is a limitation of stepwise regression. This is important due to the nature of the vaccine and the importance that gender plays. Also, parents who participated in the study may

differ in important ways from parents who did not participate in the study. Data were not collected on parents who were eligible to participate and elected not to participate in the study.

Implications for Future Research

Research in this field continues to develop and one consistent predictor of HPV vaccine uptake remains provider recommendation. In this field, focusing on provider factors will become increasingly important to increase HPV vaccine uptake among adolescents. There are a variety of individual parental factors which are associated with HPV vaccination uptake in the literature, and some studies have produced conflicting results. One such factor is parental attitudes about the HPV vaccine. This study showed that parental attitudes were not a significant predictor of HPV vaccination, reinforcing the need for strong provider recommendation rather than an emphasis on changing parental attitudes.

One burden associated with the HPV vaccine was the need for three doses to complete the vaccine series. In October 2016, the Centers for Disease Control and Prevention's Advisory Committee on Immunization Practices recommended a two dose vaccine schedule for adolescents 9 to 14 years old (Meites, Kempe, & Markowitz, 2016). The three dose schedule remains for adolescents and young adults starting the vaccine series between ages 15 and 26 years old. Available research shows that the two dose vaccine schedule will have the same efficacy as the three dose schedule when the HPV vaccine is initiated before an adolescent is 15 years old (Centers for Disease Control and Prevention Advisory Committee on Immunization Practices, 2016). The previously recommended three dose HPV vaccine schedule involved receiving the vaccine at initiation (day 0), and two months and six months later while the new two dose schedule requires vaccination at initiation (day 0) and a second dose 6-12 months later

(Meites et al., 2016). Eliminating an extra visit to a healthcare provider has the potential to decrease the burden on adolescents and parents resulting in less time taken off from work and school to attend appointments. The recommendations are too recent for existing studies to evaluate the impact of the two dose schedule on HPV vaccination coverage rates, but future studies should be mindful of this new recommendation. An initial study evaluating parental attitudes toward the nine-valent HPV showed that parents are optimistic that the vaccine covers more types of HPV strains than previous vaccines (Fontenot et al., 2015).

Conclusions

The strongest predictors of HPV vaccination uptake among parents of rural adolescents were: 1) provider recommendation; 2) social norms and; 3) sources of information. This reinforces several themes found in existing literature. Specifically, the evidence above shows that healthcare providers are a trusted source of information and receiving a healthcare provider's recommendation for HPV vaccine is associated with HPV vaccine uptake. Researchers must harness these results to design interventions to assist healthcare providers with providing better, stronger and more consistent recommendations for adolescents. Interventions should focus on building confidence among providers to discuss the HPV vaccine in a "bundle" or in combination with other recommended adolescent vaccines and present the HPV vaccine as required and not recommended. The role of healthcare providers in increasing HPV vaccine coverage rates cannot be emphasized strongly enough. Developing ways to decrease missed opportunities at clinics and hospitals for adolescents to receive the vaccine is crucial. Additionally, this field needs dedicated research to developing ways to support and provide

healthcare providers with ways to discuss HPV vaccine in conjunction with other adolescent vaccines to increase coverage levels and decrease HPV-associated conditions.

REFERENCES

Ajzen, I. (1991). Theories of Cognitive Self-RegulationThe theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211. doi:http://dx.doi.org/10.1016/0749-5978(91)90020-T

Ajzen, I., & Fishbein, M. (1975). Belief, attitude, intention and behavior: An introduction to theory and research: Reading, MA: Addison-Wesley.

Ajzen, I., & Fishbein, M. (1980). Understanding attitudes and predicting social behaviour.

Allen, J. D., Othus, M. K., Shelton, R. C., Li, Y., Norman, N., Tom, L., & del Carmen, M. G. (2010). Parental decision making about the HPV vaccine. *Cancer Epidemiol Biomarkers Prev, 19*(9), 2187-2198. doi:10.1158/1055-9965.epi-10-0217

American Academy of Family Physicians. (2014). Strong Recommendation to Vaccinate Aganist HPV is Key to Boosting Uptake- Reassure Parents that Vaccine is Safe, Effective, Important. Retrieved from http://www.aafp.org/news/health-of-the-public/20140212hpv-vaccltr.html

Askelson, N. M., Campo, S., Lowe, J. B., Smith, S., Dennis, L. K., & Andsager, J. (2010). Using the Theory of Planned Behavior to Predict Mothers' Intentions to Vaccinate Their Daughters Against HPV. *The Journal of School Nursing, 26*(3), 194-202. doi:10.1177/1059840510366022

Barry, D. (2013). *Increasing Knowledge About HPV and the HPV Vaccine Amongst Adolescents and Adults Through a School-Based Setting: A Capstone Project*. (Doctor of Nursing Practice), University of Massachusetts-Amherts, http://scholarworks.umass.edu/cgi/viewcontent.cgi?article=1030&context=nursing_dnp_capstone. Retrieved from http://scholarworks.umass.edu/cgi/viewcontent.cgi?article=1030&context=nursing_dnp_capstone

Bastani, R., Glenn, B. A., Tsui, J., Chang, L. C., Marchand, E. J., Taylor, V. M., & Singhal, R. (2011). Understanding Suboptimal Human Papillomavirus Vaccine Uptake Among Ethnic Minority Girls. *Cancer Epidemiology Biomarkers & Prevention, 20*(7), 1463-1472. doi:10.1158/1055-9965.epi-11-0267

Becker, M. H. (1975). Sociobehavioral determinants of compliance with health and medical care recommendations. *Medical care, 13*(1), 10.

Bednarczyk, R. A., Curran, E. A., Orenstein, W. A., & Omer, S. B. (2014). Health disparities in human papillomavirus vaccine coverage: Trends analysis from the national immunization survey-teen, 2008-2011. *Clinical Infectious Diseases, 58*(2), 238-241.

Bennett, K. K., Buchanan, J. A., & Adams, A. D. (2012). Social-cognitive predictors of intention to vaccinate against the human papillomavirus in college-age women. *J Soc Psychol, 152*(4), 480-492. doi:10.1080/00224545.2011.639408

Bennett, K. K., Buchanan, J. A., & Adams, A. D. (2012). Social-Cognitive Predictors of Intention to Vaccinate Against the Human Papillomavirus in College-Age Women. *J Soc Psychol, 152*(4), 480-492. doi:10.1080/00224545.2011.639408

Berenson, A. B., & Rahman, M. (2012). Gender differences among low income women in their intent to vaccinate their sons and daughters against human papillomavirus infection. *J Pediatr Adolesc Gynecol, 25*(3), 218-220. doi:10.1016/j.jpag.2012.01.003

Bhatta, M. P., & Phillips, L. (2015). Human Papillomavirus Vaccine Awareness, Uptake, and Parental and Health Care Provider Communication Among 11- to 18-Year-Old Adolescents in a Rural Appalachian Ohio County in the United States. *The Journal of Rural Health, 31*(1), 67-75. doi:10.1111/jrh.12079

Bish, A., Sutton, S., & Golombok, S. (2000). Predicting uptake of a routine cervical smear test: A comparison of the health belief model and the theory of planned behaviour. *Psychology & Health, 15*(1), 35-50. doi:10.1080/08870440008400287

Boehner, C. W., Howe, S. R., Bernstein, D. I., & Rosenthal, S. L. (2003). Viral sexually transmitted disease vaccine acceptability among college students. *Sex Transm Dis, 30*(10), 774-778. doi:10.1097/01.olq.0000078823.05041.9e

Boehner, C. W., Howe, S. R., Bernstein, D. I., & Rosenthal, S. L. (2003). Viral sexually transmitted disease vaccine acceptability among college students. *Sexually Transmitted Diseases, 30*(10), 774-778.

Brawner, B. M., Baker, J. L., Voytek, C. D., Leader, A., Cashman, R. R., Silverman, R., . . . Frank, I. (2013). The development of a culturally relevant, theoretically driven HPV prevention intervention for urban adolescent females and their parents/guardians. *Health Promot Pract, 14*(4), 624-636. doi:10.1177/1524839912462389

Brewer, N. T., & Fazekas, K. I. (2007). Predictors of HPV vaccine acceptability: A theory-informed, systematic review. *Preventive Medicine, 45*(2–3), 107-114. doi:http://dx.doi.org/10.1016/j.ypmed.2007.05.013

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

Buttenheim, A. M., & Asch, D. A. (2013). Making vaccine refusal less of a free ride. *Hum Vaccin Immunother, 9*(12), 2674-2675. doi:10.4161/hv.26676

Cates, J. R., Brewer, N. T., Fazekas, K. I., Mitchell, C. E., & Smith, J. S. (2009). Racial differences in HPV knowledge, HPV vaccine acceptability, and related beliefs among rural, southern women. *J Rural Health, 25*(1), 93-97. doi:10.1111/j.1748-0361.2009.00204.x

Centers for Disease Control and Prevention. (2010). FDA licensure of quadrivalent human papillomavirus vaccine (HPV4, Gardasil) for use in males and guidance from the Advisory Committee on Immunization Practices (ACIP). *MMWR. Morbidity and mortality weekly report, 59*(20), 630.

Centers for Disease Control and Prevention. (2012). Human papillomavirus-associated cancers - United States, 2004-2008. *MMWR Morb Mortal Wkly Rep, 61*, 258-261.

Centers for Disease Control and Prevention. (2014a). Genital HPV Infection-Fact Sheet. Retrieved from http://www.cdc.gov/std/hpv/stdfact-hpv.htm

Centers for Disease Control and Prevention. (2014b). HPV-Associated Cervical Cancer Rates by Race and Ethnicity Retrieved from http://www.cdc.gov/cancer/hpv/statistics/cervical.htm

Centers for Disease Control and Prevention. (2014c). NIS-TEEN Hard Copy Questionnaire. Retrieved from http://www.cdc.gov/vaccines/imz-managers/nis/downloads/questionnaire-teen.pdf

Centers for Disease Control and Prevention. (2014d). Preteen and Teen Vaccines. Retrieved from http://www.cdc.gov/vaccines/who/teens/for-preteens-teens.html

Centers for Disease Control and Prevention. (2015). *2014 National Immunization Survey-Teen Vaccination Coverage Table Data* Atlanta, Georgia Retrieved from http://www.cdc.gov/vaccines/imz-managers/coverage/nis/teen/index.html.

Centers for Disease Control and Prevention. (2016). The VFC Program: At a Glance Retrieved from http://www.cdc.gov/vaccines/programs/vfc/about/index.html

Centers for Disease Control and Prevention Advisory Committee on Immunization Practices. (2016). Grading of Recommendations Assessment, Development and Evaluation (GRADE) of a 2-dose schedule for human papillomavirus (HPV) vaccination Retrieved from https://www.cdc.gov/vaccines/acip/recs/grade/hpv-2-dose.html

Chaturvedi, A. K., Engels, E. A., Pfeiffer, R. M., Hernandez, B. Y., Xiao, W., Kim, E., . . . Gillison, M. L. (2011). Human papillomavirus and rising oropharyngeal cancer incidence in the United States. *J Clin Oncol, 29*(32), 4294-4301. doi:10.1200/jco.2011.36.4596

Chen, D. S., L; Daniel, B, . (2012). The HPV Vaccine and Parental Consent. *American Medical Association Journal of Ethics, 14*(1), 5-12.

Chen, M.-F., Wang, R.-H., Schneider, J. K., Tsai, C.-T., Jiang, D. D.-S., Hung, M.-N., & Lin, L.-J. (2011). Using the Health Belief Model to Understand Caregiver Factors Influencing Childhood Influenza Vaccinations. *Journal of Community Health Nursing, 28*(1), 29-40. doi:10.1080/07370016.2011.539087

Chesson, H. W., Dunne, E. F., Hariri, S., & Markowitz, L. E. (2014). The estimated lifetime probability of acquiring human papillomavirus in the United States. *Sex Transm Dis, 41*(11), 660-664. doi:10.1097/olq.0000000000000193

Clark, S. J., Cowan, A. E., Filipp, S. L., Fisher, A. M., & Stokley, S. (2016). Parent Perception of Provider Interactions Influences HPV Vaccination Status of Adolescent Females. *Clin Pediatr (Phila), 55*(8), 701-706. doi:10.1177/0009922815610629

Coburn, A. F., McBride, T. D., & Ziller, E. C. (2002). Patterns of health insurance coverage among rural and urban children. *Medical Care Research and Review, 59*(3), 272-292.

Collins, S. R., Schoen, C., Colasanto, D., & Downey, D. A. (2003). On the Edge: Low-Wage Workers and Their Health Insurance Coverage. *The Commonwealth Fund, New York, NY.*

Constantine, N. A., & Jerman, P. (2007). Acceptance of Human Papillomavirus Vaccination among Californian Parents of Daughters: A Representative Statewide Analysis. *Journal of Adolescent Health, 40*(2), 108-115. doi:http://dx.doi.org/10.1016/j.jadohealth.2006.10.007

Crosby, R. A., Casey, B. R., Vanderpool, R., Collins, T., & Moore, G. R. (2011). Uptake of free HPV vaccination among young women: a comparison of rural versus urban rates. *The Journal of Rural Health, 27*(4), 380-384.

Cuff, R. D., Buchanan, T., Pelkofski, E., Korte, J., Modesitt, S. P., & Pierce, J. Y. Rates of human papillomavirus vaccine uptake amongst girls five years after introduction of statewide mandate in Virginia. *American Journal of Obstetrics & Gynecology, 214*(6), 752.e751-752.e756. doi:10.1016/j.ajog.2016.03.022

Cunningham-Erves, J., Talbott, L. L., O'Neal, M. R., Ivankova, N. V., & Wallston, K. A. (2015). Development of a Theory-based, Sociocultural Instrument to Assess Black Maternal Intentions to Vaccinate Their Daughters Aged 9 to 12 Against HPV. *J Cancer Educ*. doi:10.1007/s13187-015-0867-3

Daley, M. F., Crane, L. A., Markowitz, L. E., Black, S. R., Beaty, B. L., Barrow, J., . . . Kempe, A. (2010). Human papillomavirus vaccination practices: a survey of US physicians 18 months after licensure. *Pediatrics, 126*(3), 425-433. doi:10.1542/peds.2009-3500

de Visser, R., & McDonnell, E. (2008). Correlates of parents' reports of acceptability of human papilloma virus vaccination for their school-aged children. *Sex Health, 5*(4), 331-338.

Dempsey, A. F., Abraham, L. M., Dalton, V., & Ruffin, M. (2009). Understanding the Reasons Why Mothers Do or Do Not Have Their Adolescent Daughters Vaccinated Against Human Papillomavirus. *Annals of epidemiology, 19*(8), 531-538. doi:10.1016/j.annepidem.2009.03.011

Dempsey, A. F., Butchart, A., Singer, D., Clark, S., & Davis, M. (2011). Factors associated with parental intentions for male human papillomavirus vaccination: results of a national survey. *Sex Transm Dis, 38*(8), 769-776. doi:10.1097/OLQ.0b013e318211c248

Dempsey, A. F., & Mendez, D. (2010). Examining future adolescent human papillomavirus vaccine uptake, with and without a school mandate. *J Adolesc Health, 47*(3), 242-248, 248.e241-248.e246. doi:10.1016/j.jadohealth.2009.12.009

Dempsey, A. F., Zimet, G. D., Davis, R. L., & Koutsky, L. (2006). Factors that are associated with parental acceptance of human papillomavirus vaccines: a randomized intervention study of written information about HPV. *Pediatrics, 117*(5), 1486-1493. doi:10.1542/peds.2005-1381

Division of STD Prevention. (1999). *Prevention of Genital HPV Infection and Sequelae: Report of an External Consultants' Metting*. Retrieved from Atlanta, Georgia: http://www.cdc.gov/std/hpv/HPVSupplement99.pdf

Donadiki, E. M., Jiménez-García, R., Hernández-Barrera, V., Sourtzi, P., Carrasco-Garrido, P., López de Andrés, A., . . . Velonakis, E. G. (2014). Health Belief Model applied to non-compliance with HPV vaccine among female university students. *Public Health, 128*(3), 268-273. doi:http://dx.doi.org/10.1016/j.puhe.2013.12.004

Donahue, K. L., Stupiansky, N. W., Alexander, A. B., & Zimet, G. D. (2014). Acceptability of the human papillomavirus vaccine and reasons for non-vaccination among parents of adolescent sons. *Vaccine, 32*(31), 3883-3885. doi:10.1016/j.vaccine.2014.05.035

Dorell, C., Yankey, D., Kennedy, A., & Stokley, S. (2013). Factors that influence parental vaccination decisions for adolescents, 13 to 17 years old: National Immunization Survey-Teen, 2010. *Clin Pediatr (Phila), 52*(2), 162-170. doi:10.1177/0009922812468208

Dorell, C. G., Yankey, D., Santibanez, T. A., & Markowitz, L. E. (2011). Human Papillomavirus Vaccination Series Initiation and Completion, 2008–2009. *Pediatrics, 128*(5), 830-839. doi:10.1542/peds.2011-0950

Downs, L. S., Smith, J. S., Scarinci, I., Flowers, L., & Parham, G. (2008). The disparity of cervical cancer in diverse populations. *Gynecologic Oncology, 109*(2, Supplement), S22-S30. doi:http://dx.doi.org/10.1016/j.ygyno.2008.01.003

Elliott, B. A., & Larson, J. T. (2004). Adolescents in mid-sized and rural communities: Foregone care, perceived barriers, and risk factors. *Journal of Adolescent Health, 35*(4), 303-309. doi:http://dx.doi.org/10.1016/j.jadohealth.2003.09.015

Esbensen, F.-A., Melde, C., Taylor, T. J., & Peterson, D. (2008). Active Parental Consent in School-Based Research: How Much Is Enough and How Do We Get It? *Evaluation Review, 32*(4), 335-362. doi:10.1177/0193841x08315175

Farmar, A. M., Love-Osborne, K., Chichester, K., Breslin, K., Bronkan, K., & Hambidge, S. J. (2016). Achieving High Adolescent HPV Vaccination Coverage. *Pediatrics, 138*(5). doi:10.1542/peds.2015-2653

Field, A. (2009). *Discovering statistics using SPSS*: Sage publications.

Fishbein, M. E. (1967). Readings in attitude theory and measurement.

Fishman, J., Taylor, L., Kooker, P., & Frank, I. (2014). Parent and Adolescent Knowledge of HPV and Subsequent Vaccination. *Pediatrics, 134*(4), e1049-e1056. doi:10.1542/peds.2013-3454

Fontenot, H. B., Domush, V., & Zimet, G. D. (2015). Parental Attitudes and Beliefs Regarding the Nine-Valent Human Papillomavirus Vaccine. *J Adolesc Health, 57*(6), 595-600. doi:10.1016/j.jadohealth.2015.09.003

Friedman, A. L., & Shepeard, H. (2007). Exploring the knowledge, attitudes, beliefs, and communication preferences of the general public regarding HPV: findings from CDC focus group research and implications for practice. *Health Educ Behav, 34*(3), 471-485. doi:10.1177/1090198106292022

Gargano, L. M., Herbert, N. L., Painter, J. E., Sales, J. M., Morfaw, C., Rask, K., . . . Hughes, J. M. (2013). Impact of a physician recommendation and parental immunization attitudes on receipt or intention to receive adolescent vaccines. *Hum Vaccin Immunother, 9*(12), 2627-2633. doi:10.4161/hv.25823

Gargano, L. M., Herbert, N. L., Painter, J. E., Sales, J. M., Vogt, T. M., Morfaw, C., . . . Hughes, J. M. (2014). Development, Theoretical Framework, and Evaluation of a Parent and Teacher-Delivered Intervention on Adolescent Vaccination. *Health Promot Pract*, 556-567. doi:10.1177/1524839913518222

Gargano, L. M., Pazol, K., Sales, J. M., Painter, J. E., Morfaw, C., Jones, L. M., . . . Wingood, G. M. (2011). Multicomponent interventions to enhance influenza vaccine delivery to adolescents. *Pediatrics, 128*(5), e1092-e1099.

Gargano, L. M., Underwood, N. L., Sales, J. M., Seib, K., Morfaw, C., Murray, D., . . . Hughes, J. M. (2015). Influence of sources of information about influenza vaccine on parental attitudes and adolescent vaccine receipt. *Hum Vaccin Immunother, 11*(7), 1641-1647.

Georgia Department of Labor. (2016). Department of Labor Retrieved from http://dol.georgia.gov/

Georgia Department of Public Health. HPV Vaccination. Retrieved from https://dph.georgia.gov/hpv-vaccination

Georgia Department of Public Health. (2014). *East Central Health District Annual Report Fiscal Year 2013-2014*. Retrieved from http://ecphd.com/wp-content/uploads/2015/12/ECPHDAnnualReport-FY-2013-14-FINAL-2-13-2015.pdf.

Georgia, U. o. (2013). Free Qualtrics survey tool available Retrieved from http://eits.uga.edu/stories/free_qualtrics_survey_tool_available/

Gerend, M., & Shepherd, J. (2012). Predicting Human Papillomavirus Vaccine Uptake in Young Adult Women: Comparing the Health Belief Model and Theory of Planned Behavior. *Annals of Behavioral Medicine, 44*(2), 171-180. doi:10.1007/s12160-012-9366-5

Gerend, M. A., & Barley, J. (2009). Human papillomavirus vaccine acceptability among young adult men. *Sexually Transmitted Diseases, 36*(1), 58-62.

Gerend, M. A., Lee, S. C., & Shepherd, J. E. (2007). Predictors of human papillomavirus vaccination acceptability among underserved women. *Sexually Transmitted Diseases, 34*(7), 468-471.

Gilkey, M. B., Moss, J. L., McRee, A.-L., & Brewer, N. T. (2012). Do correlates of HPV vaccine initiation differ between adolescent boys and girls? *Vaccine, 30*(41), 5928-5934. doi:http://dx.doi.org/10.1016/j.vaccine.2012.07.045

Gillison, M. L., Chaturvedi, A. K., & Lowy, D. R. (2008). HPV prophylactic vaccines and the potential prevention of noncervical cancers in both men and women. *Cancer, 113*(S10), 3036-3046. doi:10.1002/cncr.23764

Glanz, K., Lewis, F. M., & Rimer, B. K. (1990). *Health behavior and health education: Theory, research, and practice*: Jossey-Bass San Francisco.

Glanz, K., Rimer, B. K., & Viswanath, K. (2008). *Health behavior and health education: theory, research, and practice*: John Wiley & Sons.

GlaxoSmithKline Biologicals. (2015). Cervarix. Retrieved from https://www.gsksource.com/pharma/content/dam/GlaxoSmithKline/US/en/Prescribing_Information/Cervarix/pdf/CERVARIX-PI-PIL.PDF

Goldstein, N., xa, J, Cialdini, R., xa, B, . . . Mary Frances Luce served as associate editor for this, a. (2008). A Room with a Viewpoint: Using Social Norms to Motivate Environmental Conservation in Hotels. *Journal of Consumer Research, 35*(3), 472-482. doi:10.1086/586910

Gowda, C., Carlos, R. C., Butchart, A. T., Singer, D. C., Davis, M. M., Clark, S. J., & Dempsey, A. F. (2012). CHIAS: a standardized measure of parental HPV immunization attitudes and beliefs and its associations with vaccine uptake. *Sex Transm Dis, 39*(6), 475-481. doi:10.1097/OLQ.0b013e318248a6d5

Griffioen, A. M., Glynn, S., Mullins, T. K., Zimet, G. D., Rosenthal, S. L., Fortenberry, J. D., & Kahn, J. A. (2012). Perspectives on Decision Making About Human Papillomavirus

Vaccination Among 11- to 12-Year-Old Girls and Their Mothers. *Clinical Pediatrics, 51*(6), 560-568. doi:10.1177/0009922812443732

Guerry, S. L., De Rosa, C. J., Markowitz, L. E., Walker, S., Liddon, N., Kerndt, P. R., & Gottlieb, S. L. (2011). Human papillomavirus vaccine initiation among adolescent girls in high-risk communities. *Vaccine, 29*(12), 2235-2241. doi:10.1016/j.vaccine.2011.01.052

Habel, M. A., Liddon, N., & Stryker, J. E. (2009). The HPV vaccine: a content analysis of online news stories. *Journal of women's health, 18*(3), 401-407.

Hershey, J. C., Asch, D. A., Thumasathit, T., Meszaros, J., & Waters, V. V. (1994). The Roles of Altruism, Free Riding, and Bandwagoning in Vaccination Decisions. *Organizational Behavior and Human Decision Processes, 59*(2), 177-187. doi:http://dx.doi.org/10.1006/obhd.1994.1055

Higgs, G. (2004). A literature review of the use of GIS-based measures of access to health care services. *Health Services and Outcomes Research Methodology, 5*(2), 119-139.

Hofstetter, A. M., & Rosenthal, S. L. (2014). Factors impacting HPV vaccination: lessons for health care professionals. *Expert Rev Vaccines, 13*(8), 1013-1026. doi:10.1586/14760584.2014.933076

Hofstetter, A. M., Stockwell, M. S., Al-Husayni, N., Ompad, D., Natarajan, K., Rosenthal, S. L., & Soren, K. (2014). HPV vaccination: are we initiating too late? *Vaccine, 32*(17), 1939-1945. doi:10.1016/j.vaccine.2014.01.084

Holman, D. M., Benard, V., Roland, K. B., Watson, M., Liddon, N., & Stokley, S. (2014). Barriers to human papillomavirus vaccination among US adolescents: a systematic review of the literature. *JAMA Pediatr, 168*(1), 76-82. doi:10.1001/jamapediatrics.2013.2752

Hopenhayn, C., King, J. B., Christian, A., Huang, B., & Christian, W. J. (2008). Variability of cervical cancer rates across 5 Appalachian states, 1998-2003. *Cancer, 113*(10 Suppl), 2974-2980. doi:10.1002/cncr.23749

Howlader, N., Noone, A., Krapcho, M., Garshell, J., Miller, D., Altekruse, S., . . . Cronin, K. e. *SEER Cancer Statistics Review, 1975-2012*. Retrieved from Bethesda, Maryland: http://seer.cancer.gov/csr/1975_2012/

Hughes, C., Jones, A., Feemster, K., & Fiks, A. (2011). HPV vaccine decision making in pediatric primary care: a semi-structured interview study. *BMC Pediatr, 11*, 74.

Hughes, J., Cates, J. R., Liddon, N., Smith, J. S., Gottlieb, S. L., & Brewer, N. T. (2009). Disparities in how parents are learning about the human papillomavirus vaccine. *Cancer Epidemiol Biomarkers Prev, 18*(2), 363-372. doi:10.1158/1055-9965.epi-08-0418

Hughes, J. C., Joan R; Liddon, Nicole; Smith, Jennifer S; Gottlieb, Sami L; Brewer, Noel T;. (2009). Disparities in How Parents Are Learning about the Human Papillomavirus Vaccine. *Cancer Epidemiology Biomarkers & Prevention, 18*(2), 363-372. doi:10.1158/1055-9965.epi-08-0418

Irwin, C. E., Adams, S. H., Park, M. J., & Newacheck, P. W. (2009). Preventive Care for Adolescents: Few Get Visits and Fewer Get Services. *Pediatrics, 123*(4), e565-e572.

Ji, P. Y., Pokorny, S. B., & Jason, L. A. (2004). Factors Influencing Middle and High Schools' Active Parental Consent Return Rates. *Evaluation Review, 28*(6), 578-591. doi:10.1177/0193841x04263917

Kahn, J. A., Rosenthal, S. L., Hamann, T., & Bernstein, D. I. (2003). Attitudes about human papillomavirus vaccine in young women. *International Journal of STD & AIDS, 14*(5), 300-306. doi:10.1258/095646203321605486

Kahn, J. A., Zimet, G. D., Bernstein, D. I., Riedesel, J. M., Lan, D., Huang, B., & Rosenthal, S. L. (2005). Pediatricians' intention to administer human papillomavirus vaccine: the role of practice characteristics, knowledge, and attitudes. *J Adolesc Health, 37*(6), 502-510. doi:10.1016/j.jadohealth.2005.07.014

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

Kennedy, A., Sapsis, K. F., Stokley, S., Curtis, C. R., & Gust, D. (2011). Parental attitudes toward human papillomavirus vaccination: evaluation of an educational intervention, 2008. *J Health Commun, 16*(3), 300-313. doi:10.1080/10810730.2010.532296

Krawczyk, A., Knauper, B., Gilca, V., Dube, E., Perez, S., Joyal-Desmarais, K., & Rosberger, Z. (2015). Parents' decision-making about the human papillomavirus vaccine for their daughters: I. Quantitative results. *Hum Vaccin Immunother, 11*(2), 322-329. doi:10.1080/21645515.2014.1004030

Laz, T. H., Rahman, M., & Berenson, A. B. (2013). Human papillomavirus vaccine uptake among 9-17 year old males in the United States: the National Health Interview Survey, 2010. *Hum Vaccin Immunother, 9*(4), 874-878. doi:10.4161/hv.23190

Liddon, N. C., Hood, J. E., & Leichliter, J. S. (2012). Intent to receive HPV vaccine and reasons for not vaccinating among unvaccinated adolescent and young women: Findings from the 2006–2008 National Survey of Family Growth. *Vaccine, 30*(16), 2676-2682. doi:http://dx.doi.org/10.1016/j.vaccine.2012.02.007

Markowitz, L., Dunne, E., Saraiya, M., Lawson, H., Chesson, H., & Unger, E. (2007). Quadrivalent Human Papillomavirus Vaccine: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Recomm Rep, 56*(RR-2), 1 - 24.

Martin, A. P., Janice; Moore, Charity; Patterson, Daniel; Elder, Keith. (2005). *Trends in Unisurance among Rural Minority Children*. Retrieved from http://rhr.sph.sc.edu/report/(4-2)%20Trends%20in%20Uninsurance%20among%20Rural%20Minority%20Children.pdf

McGrail, M. R., & Humphreys, J. S. (2009). Measuring spatial accessibility to primary care in rural areas: improving the effectiveness of the two-step floating catchment area method. *Applied Geography, 29*(4), 533-541.

McMorris, B. J., Clements, J., Evans-Whipp, T., Gangnes, D., Bond, L., Toumbourou, J. W., & Catalano, R. F. (2004). A Comparison of Methods to Obtain Active Parental Consent for an International Student Survey. *Evaluation Review, 28*(1), 64-83. doi:10.1177/0193841x03257532

McRee, A.-L., Brewer, N. T., Reiter, P. L., Gottlieb, S. L., & Smith, J. S. (2010). The Carolina HPV Immunization Attitudes and Beliefs Scale (CHIAS): scale development and associations with intentions to vaccinate. *Sexually Transmitted Diseases, 37*(4), 234-239.

Meites, E., Kempe, A., & Markowitz, L. E. (2016). Use of a 2-Dose Schedule for Human Papillomavirus Vaccination - Updated Recommendations of the Advisory Committee on Immunization Practices. *MMWR Morb Mortal Wkly Rep, 65*(49), 1405-1408. doi:10.15585/mmwr.mm6549a5

Merck. (2015a). About Gardasil Retrieved from http://www.gardasil.com/about-gardasil/about-gardasil/

Merck. (2015b). About Gardasil. Retrieved from http://www.gardasil.com/about-gardasil/about-gardasil/

Mueller, K. J., Ortega, S. T., Parker, K., Patil, K., & Askenazi, A. (1999). Health status and access to care among rural minorities. *J Health Care Poor Underserved, 10*(2), 230-249.

Mueller, K. J., Patil, K., & Boilesen, E. (1998). The role of uninsurance and race in healthcare utilization by rural minorities. *Health Services Research, 33*(3 Pt 1), 597.

National Cancer Institute. (2005). *Health Information National Trends Survey Instrument 2010*. Betheseda, MD.

National Cancer Institute. (2015a). Human Papillomavirus (HPV) Vaccines. Retrieved from http://www.cancer.gov/about-cancer/causes-prevention/risk/infectious-agents/hpv-vaccine-fact-sheet#q5

National Cancer Institute. (2015b). Human Papillomavirus (HPV) Vaccines. Retrieved from http://www.cancer.gov/about-cancer/causes-prevention/risk/infectious-agents/hpv-vaccine-fact-sheet#q5

National Conference of State Legislatures. (2009). HPV Vaccine Policies Retrieved from http://www.ncsl.org/research/health/hpv-vaccine-state-legislation-and-statutes.aspx

Niccolai, L. M., Mehta, N. R., & Hadler, J. L. (2011). Racial/Ethnic and poverty disparities in human papillomavirus vaccination completion. *Am J Prev Med, 41*(4), 428-433. doi:10.1016/j.amepre.2011.06.032

Nunnally, J. C., Bernstein, I. H., & Berge, J. M. t. (1967). *Psychometric theory* (Vol. 226): McGraw-Hill New York.

Orenstein, W. A., & Hinman, A. R. (1999). The immunization system in the United States - the role of school immunization laws. *Vaccine, 17 Suppl 3*, S19-24.

Parikh, S., Brennan, P., & Boffetta, P. (2003). Meta-analysis of social inequality and the risk of cervical cancer. *Int J Cancer, 105*(5), 687-691. doi:10.1002/ijc.11141

Penchansky, R., & Thomas, J. W. (1981). The concept of access: definition and relationship to consumer satisfaction. *Medical care, 19*(2), 127-140.

Perkins, R. B., Clark, J. A., Apte, G., Vercruysse, J. L., Sumner, J. J., Wall-Haas, C. L., . . . Pierre-Joseph, N. (2014). Missed opportunities for HPV vaccination in adolescent girls: a qualitative study. *Pediatrics, 134*(3), e666-674. doi:10.1542/peds.2014-0442

Perkins, R. B., Lin, M., Wallington, S. F., & Hanchate, A. D. (2016). Impact of school-entry and education mandates by states on HPV vaccination coverage: Analysis of the 2009-2013 National Immunization Survey-Teen. *Hum Vaccin Immunother, 12*(6), 1615-1622. doi:10.1080/21645515.2016.1150394

Perkins, R. B., Tipton, H., Shu, E., Marquez, C., Belizaire, M., Porter, C., . . . Pierre-Joseph, N. (2013). Attitudes toward HPV vaccination among low-income and minority parents of sons: a qualitative analysis. *Clin Pediatr (Phila), 52*(3), 231-240. doi:10.1177/0009922812473775

Petrosky, E. B., Joseph A.; Hariri, Susan; Chesson, Harrell; Curtis, Robinette; Saraiya,Mona; Unger, Elizabeth; Markowitz, Lauri. (2015). *Use of 9-Valent Human Papillomavirus (HPV) Vaccine: Updated HPV Vaccination Recommentdations of the Advisory Committee on Immunization Practices*. Centers for Disease Control and Prevention, Retrieved from http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6411a3.htm.

Pew Research Center. (2009). *The Social Life of Health Information*. Retrieved from http://www.pewinternet.org/2009/06/11/the-social-life-of-health-information/

Pierre-Victor, D., Page, T. F., Trepka, M. J., Stephens, D. P., Li, T., & Madhivanan, P. (2016). Impact of Virginia's School-Entry Vaccine Mandate on Human Papillomavirus Vaccination Among 13-17-Year-Old Females. *J Womens Health (Larchmt)*. doi:10.1089/jwh.2016.5869

Probst, J. C., Moore, C. G., & Baxley, E. G. (2005). Update: health insurance and utilization of care among rural adolescents. *The Journal of Rural Health, 21*(4), 279-287.

Probst, J. C., Moore, C. G., Glover, S. H., & Samuels, M. E. (2004). Person and Place: The Compounding Effects of Race/Ethnicity and Rurality on Health. *Am J Public Health, 94*(10), 1695-1703.

Ramirez, J. R., Debbie; Clayton, Lisa; Kanowitz, Saul; Moscocki, Anna-Barbara. (1997). Genital human papillomavirus infections: knowledge, perception of risk, and actual risk in a nonclinic population of young women. *Journal of Women's Health, 6*(1), 113-121.

Rand, C. M., Shone, L. P., Albertin, C., Auinger, P., Klein, J. D., & Szilagyi, P. G. (2007). National health care visit patterns of adolescents: Implications for delivery of new adolescent vaccines. *Archives of Pediatrics & Adolescent Medicine, 161*(3), 252-259. doi:10.1001/archpedi.161.3.252

Rand, C. M., Szilagyi, P. G., Albertin, C., & Auinger, P. (2007). Additional Health Care Visits Needed Among Adolescents for Human Papillomavirus Vaccine Delivery Within Medical Homes: A National Study. *Pediatrics, 120*(3), 461-466.

Reiter, P. L., Brewer, N. T., Gottlieb, S. L., McRee, A.-L., & Smith, J. S. (2009). Parents' health beliefs and HPV vaccination of their adolescent daughters. *Social science & medicine, 69*(3), 475-480.

Reiter, P. L., McRee, A. L., Pepper, J. K., Gilkey, M. B., Galbraith, K. V., & Brewer, N. T. (2013). Longitudinal predictors of human papillomavirus vaccination among a national sample of adolescent males. *Am J Public Health, 103*(8), 1419-1427. doi:10.2105/ajph.2012.301189

Robert Wood Johnson Foundation & the University of Wisconsin Population Health Institute. (2015). 2015 County Health Rankings: Georgia. Retrieved from http://www.countyhealthrankings.org/sites/default/files/state/downloads/CHR2015_GA_0.pdf

Roland, K. B., Benard, V. B., Greek, A., Hawkins, N. A., & Saraiya, M. (2014). Primary care providers human papillomavirus vaccine recommendations for the medically underserved: a pilot study in U.S. Federally Qualified Health Centers. *Vaccine, 32*(42), 5432-5435. doi:10.1016/j.vaccine.2014.07.098

Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1988). Social Learning Theory and the Health Belief Model. *Health Education & Behavior, 15*(2), 175-183. doi:10.1177/109019818801500203

Sales, J. M., Painter, J. E., Pazol, K., Gargano, L. M., Orenstein, W., Hughes, J. M., & DiClemente, R. J. (2011). Rural parents' vaccination-related attitudes and intention to vaccinate middle and high school children against influenza following educational influenza vaccination intervention. *Human vaccines, 7*(11), 1146-1152.

Sandri, K. J., Verdenius, I., Bartley, M. J., Else, B. M., Paynter, C. A., Rosemergey, B. E., . . . Harper, D. M. (2014). Urban and rural safety net health care system clinics: no disparity in HPV4 vaccine completion rates. *PLoS One, 9*(5), e96277. doi:10.1371/journal.pone.0096277

Savas, L. S., Fernandez, M. E., Jobe, D., & Carmack, C. C. (2012). Human papillomavirus vaccine: 2-1-1 helplines and minority parent decision-making. *Am J Prev Med, 43*(6 Suppl 5), S490-496. doi:10.1016/j.amepre.2012.09.003

Scarinci, I. C., Garcia, F. A. R., Kobetz, E., Partridge, E. E., Brandt, H. M., Bell, M. C., . . . Castle, P. E. (2010). Cervical cancer prevention. *Cancer, 116*(11), 2531-2542. doi:10.1002/cncr.25065

Schootman, M., & Fuortes, L. J. (1999). Breast and cervical carcinoma: the correlation of activity limitations and rurality with screening, disease incidence, and mortality. *Cancer, 86*(6), 1087-1094.

Singh, G. K., Miller, B. A., Hankey, B. F., & Edwards, B. K. (2004). Persistent area socioeconomic disparities in US incidence of cervical cancer, mortality, stage, and survival, 1975–2000. *Cancer, 101*(5), 1051-1057.

Smith, J. S., Backes, D. M., Hoots, B. E., Kurman, R. J., & Pimenta, J. M. (2009). Human papillomavirus type-distribution in vulvar and vaginal cancers and their associated precursors. *Obstetrics & Gynecology, 113*(4), 917-924.

Spector, P. E. (1992). *Summated rating scale construction: An introduction*: Sage.

Stokley, S., Jeyarajah, J., Yankey, D., Cano, M., Gee, J., Roark, J., . . . Markowitz, L. (2014). Human papillomavirus vaccination coverage among adolescents, 2007-2013, and postlicensure vaccine safety monitoring, 2006-2014--United States. *MMWR Morb Mortal Wkly Rep, 63*(29), 620-624.

Stupiansky, N. W., Zimet, G. D., Cummings, T., Fortenberry, J. D., & Shew, M. (2012). Accuracy of self-reported human papillomavirus vaccine receipt among adolescent girls

and their mothers. *J Adolesc Health, 50*(1), 103-105. doi:10.1016/j.jadohealth.2011.04.010

U.S. Department of Health and Human Services. Healthy People 2020, Immunization and Infectious Diseases. Retrieved from http://www.healthypeople.gov/topicsobjectives2020/objectiveslist.aspx?topicId=23

Underwood, N. L., Gargano, L. M., Jacobs, S., Seib, K., Morfaw, C., Murray, D., . . . Sales, J. M. (2016). Influence of Sources of Information and Parental Attitudes on Human Papillomavirus Vaccine Uptake among Adolescents. *J Pediatr Adolesc Gynecol*. doi:10.1016/j.jpag.2016.05.003

Underwood, N. L., Weiss, P., Gargano, L. M., Seib, K., Rask, K. J., Morfaw, C., . . . Sales, J. M. (2015). Human papillomavirus vaccination among adolescents in Georgia. *Hum Vaccin Immunother*, 00-00. doi:10.1080/21645515.2015.1035848

United States Census Bureau. (2010a). QuickFacts:Georgia. Retrieved from http://www.census.gov/quickfacts/table/PST045214/13,00

United States Census Bureau. (2010b). State & County Quick Facts: Richmond County, Georgia Retrieved from http://quickfacts.census.gov/qfd/states/13/13245.html

United States Food and Drug Administration. (2014). FDA approves Gardasil 9 for prevention of certain cancers caused by five additional types of HPV Retrieved from http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm426485.htm

Vadaparampil, S. T., Kahn, J. A., Salmon, D., Lee, J.-H., Quinn, G. P., Roetzheim, R., . . . Giuliano, A. R. (2011). Missed clinical opportunities: Provider recommendations for HPV vaccination for 11–12 year old girls are limited. *Vaccine, 29*(47), 8634-8641. doi:http://dx.doi.org/10.1016/j.vaccine.2011.09.006

Vadaparampil, S. T., Staras, S. A., Malo, T. L., Eddleton, K. Z., Christie, J., Rodriguez, M., . . . Shenkman, E. A. (2013). Provider factors associated with disparities in human papillomavirus vaccination among low-income 9- to 17-year-old girls. *Cancer, 119*(3), 621-628. doi:10.1002/cncr.27735

Viswanath, K., Breen, N., Meissner, H., Moser, R. P., Hesse, B., Steele, W. R., & Rakowski, W. (2006). Cancer knowledge and disparities in the information age. *J Health Commun, 11 Suppl 1*, 1-17. doi:10.1080/10810730600977517

Walker, A. T., Smith, P. J., & Kolasa, M. (2014). Reduction of racial/ethnic disparities in vaccination coverage, 1995–2011. *MMWR Surveill Summ, 63*(suppl 1), 7-12.

Whitney, C. Z., Fangjun; Singleton, James; Schuchat, Anne. (2014). Benefits from Immunization during the Vaccines for Children Program Era--United States, 1994-2013. *Morbidity and Mortality Weekly Report, 63*(16), 352-355.

Wong, C. A., Taylor, J. A., Wright, J. A., Opel, D. J., & Katzenellenbogen, R. A. (2013). Missed Opportunities for Adolescent Vaccination, 2006–2011. *Journal of Adolescent Health, 53*(4), 492-497. doi:http://dx.doi.org/10.1016/j.jadohealth.2013.05.009

Wuensch, K. L. (2014). Binary logistic regression with SPSS. *Retrieved March, 18*, 2015.

Yacobi, E., Tennant, C., Ferrante, J., Pal, N., & Roetzheim, R. (1999). University students' knowledge and awareness of HPV. *Prev Med, 28*(6), 535-541. doi:10.1006/pmed.1999.0486

Yu, S. M., Bellamy, H. A., Schwalberg, R. H., & Drum, M. A. (2001). Factors associated with use of preventive dental and health services among U.S. adolescents1. *Journal of Adolescent Health, 29*(6), 395-405. doi:http://dx.doi.org/10.1016/S1054-139X(01)00252-X

Zimet, G. D. (2014). Health care professionals and adolescent vaccination. *Hum Vaccin Immunother, 10*(9), 2629-2630. doi:10.4161/hv.28525

Appendix A- Consent letter for study participants

Consent Letter- Keep for your records

September 13, 2016

Dear Parent/ Legal Guardian:

I am a graduate student under the direction of Professor Jessica Muilenburg in the Department of Health Promotion and Behavior in the College of Public Health at The University of Georgia. I invite you to participate in a research study entitled *Attitudes about Human Papillomavirus (HPV) Vaccine among Parents of Adolescents*. The purpose of this study is to understand reasons why parents get their pre-teen or teen the first dose of the HPV vaccination and why they get all three doses of the vaccine.

Participation in this study requires that you are: 1) A parent or legal guardian of a pre-teen or teen 10-18 years old, and 2) reside in Warren or Wilkes counties.

Your participation will involve completion of a survey, which will ask about your attitudes, beliefs and behaviors regarding human papillomavirus (HPV) vaccination and should only take about 10 minutes. **Your involvement in the study is voluntary, and you may choose not to participate or to stop at any time without penalty or loss of benefits to which you are**

otherwise entitled. If you decide to stop or withdraw from the study, the information/data collected from or about you up to the point of your withdrawal will be kept as part of the study and may continue to be analyzed.

All information collected will be kept confidential. Paper surveys will remain in a locked cabinet and destroyed after data analysis is complete. Surveys completed online will be stored on a password protected computer and deleted after data analysis is complete. Natasha Underwood, the primary researcher and Jessica Muilenburg, faculty advisor, will be the only two people with access to your information. If identifying information is collected, this information will be stored in a separate locked cabinet from completed surveys. The results of the research study may be published, but your name or any identifying information will not be used. In fact, the published results will be presented in summary form only.

The findings from this project may provide information on ways to increase HPV vaccination rates among pre-teens and teens to decrease cervical cancer and genital warts caused by the human papillomavirus. There are no known risks or discomforts associated with this research. You will receive a $10 gift card as reimbursement for your time.

If you have any questions about this research project, please feel free to call me Natasha Underwood at (617) 838-5369 or Jessica Muilenburg at (706) 542-4365 or send an e-mail to nherber@uga.edu. Questions or concerns about your rights as a research participant should be directed to The Chairperson, University of Georgia Institutional Review Board, 609 Boyd GSRC, Athens, Georgia 30602; telephone (706) 542-3199; email address irb@uga.edu.

By completing and returning this questionnaire in the envelope provided, you are agreeing to participate in the above described research project.

Thank you for your consideration! Please keep this letter for your records.

Sincerely,

Natasha Underwood

Appendix B- Rural Parental Attitudes about Human Papillomavirus Vaccination Survey

Adolescent Characteristics

How old is your child?

_____ years old

What is the gender of your child?

Female

Male

What is the race/ethnicity of your child?

African American/ Black

Asian

Hispanic/ Latino

White

Other

What type of insurance does your child have?

Medicaid

PeachCare for Kids

Private insurance/ insurance through an employer

No insurance/ uninsured

I don't know

Other _____

Parental Characteristics

What is your relationship to the child?

Father/ male guardian

Mother/ female guardian

Grandparent/ Other

What is your TOTAL household income (before taxes)?

Less than $20,000

$20,001-$40,000

$40,001-$60,000

$60,001-$80,000

Over $80,000

What is the highest level of education you have completed?

8th grade or less

9-12th grade

High school diploma/ GED

Completed Associates degree/ technical college

1 or 2 years of college, no degree

College degree or more

Have you or anyone close to you, ever had HPV, an abnormal Pap smear (pap test), genital warts, and/or cervical cancer?

Yes

No

I don't know

	Very Dissatisfied	**Dissatisfied**	**Neutral**	**Satisfied**	**Very Satisfied**
How satisfied are you with your ability to find one good doctor to treat the whole family?					
How satisfied are you with your knowledge of where to get healthcare?					
How satisfied are you with your ability to get medical care in an emergency?					
How satisfied are you with how convenient your physician's offices are to your home?					
How satisfied are you with how long you have to wait to get an appointment?					
How satisfied are you with how convenient physicians' office hours are?					
How satisfied are you with how long you have to wait in the waiting room?					
How satisfied are you with how easy it is to get in touch with your physician?					
How satisfied are you with your health insurance?					
How satisfied are you with the doctor's prices?					
How satisfied are you with how soon you need to pay the bill?					
How satisfied are you with the appearance of the doctor's office?					
How satisfied are you with the neighborhood that their offices are in?					
How satisfied are you with the other patients you usually see at the doctor's office?					

It is hard to find a provider or clinic where I don't have to wait for a long time to get an appointment for my child to be vaccinated.

Strongly Disagree

Disagree

Not sure

Agree

Strongly Agree

How difficult is it for you to get to your physician's office?

Very Difficult

Difficult

Neutral

Easy

Very Easy

All things considered, how much confidence do you have in being able to get good medical care for you and your family when you need it?

Very unconfident

Unconfident

Neutral

Confident

Very Confident

Where has your child received vaccines in the past? Select all that apply

Their regular doctor/ pediatrician

Emergency room

Health department

A clinic or health Centers for Disease Control and Prevention

A hospital based clinic

While they were hospitalized

Pharmacy, drug store or supermarket pharmacy

Workplace

School clinic- elementary, middle or high school

Mall/ shopping center

Community outreach event

Other_____

Parental Attitudes

	Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
It is likely that my child will catch HPV if she/he does not receive the HPV vaccine.					
It is likely that my child will catch a sexually transmitted disease.					
It is likely that my daughter will get cervical cancer if she does not get the HPV vaccine.					
It is likely that my child will get genital warts if she/ he does not get the HPV vaccine.					
HPV could be a serious threat to my child's health					
Cervical cancer could be a serious threat to my daughter's health					
Genital warts could be a serious threat to my child's health					
The HPV vaccine is a good way to protect my child's health					
The HPV vaccine could prevent my child from getting certain types of HPV.					
The HPV vaccine could prevent my daughter from getting cervical cancer.					
The HPV vaccine could prevent my child from getting genital warts.					

Has a doctor or *healthcare provider ever recommended* that your child receive the HPV vaccine?

No

Yes

I don't know

At what age did your child's doctor or healthcare provider recommend that your child receive the HPV vaccine?

Before age 11

11 or 12 years old

13 or 14 years old

15 or 16 years old

17 or 18 years old

After 18 years

HPV Decision Making and Subjective Norms

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

Strongly Disagree

Disagree

Not sure

Agree

Strongly Agree

	Highly Unlikely	**Unlikely**	**Neutral**	**Likely**	**Highly Likely**
If your doctor recommends the HPV vaccine, how likely is it that your child will get it?					
If your public or community health nurse recommends the HPV vaccine, how likely is it that your child will get it?					
If your friends or family recommend the HPV vaccine, how likely is it that your child will get it?					
If your child's teacher or principal recommend the HPV vaccine, how likely is it that your child will get it?					
If your pastor/ priest/rabbi/ spiritual leader approves the HPV vaccine, how likely is it that your child will get it?					

Sources of Information about HPV Vaccine

Please identify any sources of information that you have heard about the HPV vaccine from?

Doctor or healthcare professional

My child's school (including principal, teacher, counselor, etc)

Friend

Family member

Television

Radio

Internet

Newspaper article or magazine

Advertisement from a drug company

Religious leader

I haven't heard about the HPV vaccine

Other_____

Has the information you heard about the HPV vaccine been?

Mostly negative

Mostly positive

Both positive and negative

Haven't heard anything

What is you most trusted source of information for the HPV vaccine **(Please mark ONLY ONE)**

Doctor or healthcare professional

My child's school (including principal, teacher, counselor, etc)

Friend

Family member

Television

Radio

Internet

Newspaper article or magazine

Advertisement from a drug company

Religious leader

I haven't heard about the HPV vaccine

Other_____

Parental Attitudes

	Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
Getting shots is really scary and/or painful for my child.					
The HPV vaccine might cause my child lasting health problems					
My child is too young to get a vaccine for a sexually transmitted disease like HPV					
I have enough information about the HPV vaccine to decide whether to give it to my child (MODIFIED)					
The HPV vaccine is too new to make a decision to decide to vaccinate my child against HPV.					
I trust the information on the HPV vaccine provided by the physician. (MODIFIED)					
I trust the information on the HPV vaccine provided by the pharmaceutical company.(MODIFIED)					
It is hard to find a provider of clinic where I can afford the vaccine					
It is hard to find a provider or clinic that is close to me or easy to get to.					
It is hard to find a provider or clinic with the HPV vaccine.					
I think the HPV vaccine is unsafe.					

HPV Vaccine Uptake

19. Has your child ever received the HPV Vaccine?

No *(if no, skip to question #21)*

Yes

Unsure

If yes, how many HPV shots did your child receive?

1 dose

2 doses

3 doses

Unsure

Where has your child received the HPV vaccine? Select all that apply

Their regular doctor/ pediatrician

Emergency room

Health department

A clinic or health Centers for Disease Control and Prevention

A hospital based clinic

While they were hospitalized

Pharmacy, drug store or supermarket pharmacy

Workplace

School clinic- elementary, middle or high school

Mall/ shopping center

Community outreach event

Other_____

If no, do you plan to get your child the HPV vaccine in the next 12 months?

No (*if no, skip to question #22*)

Yes

If no, what is/are the main reason(s) your child will NOT receive the HPV vaccine in the next 12 months?

Provider did not recommend the HPV vaccine for my child

Did not know the HPV vaccine was recommended for my child

The HPV vaccine is not needed

My child's school does not require the HPV vaccine

Concerned about safety issues

My child is not old enough to receive the vaccine

Costs- My child's insurance will not cover the vaccine/ my child is uninsured

The vaccine will hurt

Intended to complete, but have not done it yet

HPV vaccine is unavailable at my child's doctor's office

Difficulty getting to my child's doctor's office or making an appointment

I am concerned that giving my child the HPV vaccine will increase sexual activity

My teen does not need the HPV vaccine because he/ she is not sexually active

Other _____

Thank you for completing the survey.