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HPV Vaccination Rates Among Males in Minority Populations

Andrew Lemke
Walden University

Walden University

College of Health Professions

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Andrew Lemke

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Review Committee
Dr. Sriya Krishnamoorthy, Committee Chairperson, Public Health Faculty
Dr. Hope King, Committee Member, Public Health Faculty
Dr. Thomas O'Grady, University Reviewer, Public Health Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
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Abstract

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MS, Touro University Worldwide, 2017

BS, University of Arizona, 2013

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Public Health

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Abstract

Ethnic minorities are less likely to be vaccinated in comparison to White individuals. As a result, Blacks have one of the highest rates of human papillomavirus (HPV)-related complications. The purpose of the quantitative study was to identify significant factors predicting initiation of HPV vaccination in Black male adolescents. The study was based on the constructs of Ajzen's theory of planned behavior and used a cross-sectional design that involved weighted data from the 2018 National Immunization Survey (n=395,067) conducted by the Centers for Disease Control and Prevention. The research questions were based on how factors such as fear, family involvement, sexual activity, healthcare provider recommendations, and personal opinions influence the initiation of HPV vaccine. The statistical analysis involved both descriptive statistics and inferential statistics, using multiple logistic regression. There were statistically significant factors such as fear, family involvement, healthcare provider recommendations, and personal opinions, as well as nonsignificant factors such as sexual activity. The social change potential is to increase awareness about gender-related bias regarding vaccinations and expand knowledge on how social and cultural differences change an individual's perspective. The study can be also used to influence social change in terms of informing healthcare providers that current vaccination programs could expand the potential target audience of HPV vaccines.

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Dedication

I dedicate this dissertation to my family. Thank you all for your support throughout my journey to finish my doctoral degree.

Acknowledgments

I would like to acknowledge that the feedback given by my committee chair Dr. Sriya Krishnamoorthy ("Dr. K"), and my committee member Dr. Hope King has helped me to develop into a future researcher and present a scholarly dissertation project in my field of study. I would also like to acknowledge that my URR Dr. Thomas J. O'Grady also provided some valuable insight that would help my dissertation become a stronger document. Thank you all again for the support and guidance as I developed and completed this doctoral study.

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Chapter 1: Introduction to the Study

The human papillomavirus (HPV) vaccine has not been demonstrated to be a gender-neutral vaccine. The result is that parental guardians' willingness to vaccinate male patients for HPV has significantly been reduced in the United States. The purpose of this quantitative study was to identify significant factors that have led to bias with regard to HPV prevention in male patients, with a focus on Black adolescents. The study can help develop awareness about gender-related bias regarding vaccinations, which refers to not providing the same healthcare opportunities to populations based on gender. The study will also inform healthcare providers that current vaccination programs inaccurately describe the true benefits of HPV vaccines.

This chapter describes the literature pertaining to the current study, the research problem, the purpose and nature of the study, and the associated research questions and hypotheses. The other sections in this chapter include the theoretical framework, definitions of key terms and concepts related to the study, as well as the limitations, scope, and the significance of the study. The chapter ends with a summary.

Background

As of 2015, there was only an estimated 49.8% of males who had initiated the HPV vaccine process and about 28% who completed the recommended doses (Stanley et al., 2018). In another study on HPV vaccine use, compared to 55% of the sampled women who had initiated the vaccine, only 28% of the sampled men also started the process; women were still twice more likely to get vaccinated even after controlling for age, race, and sexual orientation (Preston & Darrow, 2019). Additionally, Choi et al.

(2016) found that 55.6% of the sampled females compared to 27.6% of the sampled males initiated the process, and females were three times as likely to complete the 3-dose vaccine series as compared to males. The reason for the significant difference in vaccine initiation between genders is related to gender bias that has occurred since the development of the HPV vaccine. The initial reason for this gender bias is that the vaccine was originally developed to help females prevent cervical cancer (Cole et al., 2012). Thus, the HPV vaccine was suggested to be given to females in 2006, but it was not suggested for males until 2011 (Boakye et al., 2017).

The current study focused on racial minorities due to a similar issue in that compared to White, other ethnic groups are significantly less likely to get the HPV vaccine (De & Budhwani, 2017; Niccolai et al., 2011; Polonijo & Carpiano, 2013). Research has indicated that males and racial/ethnic minorities are significantly less likely to have knowledge of the HPV vaccine (Osazuwa-Peters et al., 2017). In a study on vaccine rates, Caucasian males had a 56% immunization rate, yet the second highest racial group, Hispanic males, had only a 18% immunization rate (Fuller & Hinyard, 2017). Further research has shown that Black men were 34.8% and Hispanic men were 43.6% less likely to have heard about the HPV vaccine when compared to White men (Cooper et al., 2017). A final example is a study that showed statistical significance in terms of racial minorities being more willing to vaccinated than Whites for HPV, but their circumstances made it impractical to get the vaccine (Polonijo et al., 2016). Therefore, both gender and race have significantly impacted HPV vaccination initiation

rates. These studies also support that both gender bias and bias related to racial minorities continue to be an issue as it relates to understanding the benefits of the HPV vaccine.

There is a clear gap in the literature as it relates to factors that have led to the bias. As a result, this study provided insight into the factors that have led to the significant differences between men and women in terms of HPV vaccination adherence with a focus on Black males. The results can also provide information to future researchers on factors that should be considered to increase current HPV vaccination rates in males. The potential practical application is that healthcare providers could improve how vaccinations are being presented to their patients to increase adherence to this preventative measure.

Problem Statement

HPV will affect about 14 million people and leads to an estimated 19,400 women and 12,100 men getting cancer each year (Centers for Disease Control and Prevention [CDC], 2019a). Vaccines have been developed to reduce the prevalence of HPV-related complications up to 86% (CDC, 2019b), yet the disease continues to be a current public health concern. Researchers have suggested that the HPV vaccine is not advertised as a gender-neutral vaccine. As of 2014, 60.0% of girls began the 3-dose HPV vaccine series compared to 41.7% of boys in the United States (North & Niccolai, 2016). Females are also more knowledgeable than males about HPV and its related complications (Osazuwa-Peters et al., 2017), and research has shown that only 13.6% of physicians recommended the HPV vaccine to male patients (Wheldon et al., 2018). Further, both racial minorities and men have statistically lower rates of HPV vaccine initiation (De & Budhwani, 2017).

To fill the gap in the literature, the current study will provide insight into factors that have led to gender-related bias as it relates to parental guardians believing HPV vaccinations are unnecessary for male patients. The study will also establish a foundation for future research on increasing HPV vaccine initiation in the United States.

Purpose of Study

The purpose of the study was to identify significant factors that have led to bias with regard to HPV prevention in male patients, with a focus on Black male adolescents ages 13 to 17. A quantitative cross-sectional observational study design was utilized as the research method and design, which fit the study's purpose on identifying possible relationships and connections. Other researchers have also used this design for HPV research (Catalano et al., 2017; Clark et al., 2016; Fu et al., 2019; Hertweck et al., 2012; Johnson & Ogletree, 2017; Preston & Darrow, 2019). Therefore, this research methodology and design are commonly associated with HPV-related studies.

Research Questions and Hypotheses

Research Question 1: What is the association between the influence of family members and vaccination requirements to go to school and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age?

$H_0$1: There is no association between the influence of family members and vaccination requirements to go to school and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age.

H_a1: There is an association between association between the influence of family members and vaccination requirements to go to school and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age.

Research Question 2: What is the association between sexual activity and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age?

H_02: There is no association between sexual activity and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age.

H_a2: There is an association between sexual activity and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age.

Research Question 3: What is the association between feeling fear, being a newer vaccine, lack of knowledge on the vaccine, as well as the recommendation provided by a healthcare provider and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age?

H_03: There is no association between feeling fear, being a newer vaccine, lack of knowledge on the vaccine, as well as the recommendation provided by a healthcare provider and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age.

H_a3: There is an association between feeling fear, being a newer vaccine, lack of knowledge on the vaccine, as well as the recommendation provided by a healthcare provider and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age.

Research Question 4: What is the association between the adolescent's beliefs about the vaccine's necessity, safeness, and effectiveness and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age?

$H_0$4: There is no association between the adolescent's beliefs about the vaccine's necessity, safeness, and effectiveness and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age.

H_a4: There is an association between the adolescent's beliefs about the vaccine's necessity, safeness, and effectiveness and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age.

Theoretical Framework

The Theory of Planned Behavior

The theory of planned behavior (TPB) was developed by Icek Ajzen as the extension of his original framework the theory of reasoned action (TRA) to predict an individual's intention to perform behavior within specific circumstances (Ajzen, 1991; Wiemken et al., 2015). The use of the TPB can help researchers and practitioners develop interventions to target specific factors that influence riskier decisions (Britt & Englebert, 2018; Hirth et al., 2019; Sweeney et al., 2015). Ajzen's newly developed theory includes the following four primary constructs: behavioral intention, perceived behavioral control, attitudes, and subjective norms (Ajzen, 1991; Britt & Englebert, 2018). Behavioral intention refers to the motivational factors that influence behavior (Ajzen, 1991; Catalano et al., 2017). Perceived behavioral control is the perception of whether a behavior is achievable (Catalano et al., 2017; Hirth et al., 2019) and whether the results are worth the

effort put into the action (Ajzen, 1991; Sweeney et al., 2015). Attitude is the individual's emotional attachment to a behavior and stems from his or her beliefs (Ajzen, 1991; Britt & Englebert, 2018; Gerend & Shepherd, 2012; Catalano et al., 2017), which influences if an action will be taken (Ajzen, 1991; Gerend & Shepherd, 2012; Sweeney et al., 2015). Subjective norm refers to expectations set by the individuals' social environment that influence decisions based on a concern for approval from others (Ajzen, 199; Britt & Englebert, 2018; Wiemken et al., 2015).

Relationship of TPB and Current Study

The study relates to significant factors that have led to gender bias among ethnic minority adolescent men and HPV vaccine initiation rates. The TPB has previously been utilized for multiple types of study designs related to HPV and vaccination adherence due to its versatility and applicability to the topic. Additionally, some of the previous studies suggest that men and racial minorities need further studies to be done on them relating to the HPV vaccine. Therefore, the TPB was an appropriate framework for the study because the study was a continuation of previously conducted HPV-related research.

Nature of Study

The nature of the study was quantitative research because it used statistics to summarize data, describe patterns, and support possible relationships, and connections (McLeod, 2019). The appropriate research design was a cross-sectional, observational study. In this design, the subjects are selected based on the chosen inclusion and exclusion criteria, and the researcher does not alter the exposures or outcome but rather studies the association between the variables (Setia, 2016). Given that the purpose of the

study was to identify significant factors that have led to gender bias with regard to HPV prevention, focusing on Black adolescent male patients, using a cross-sectional observational study was a reasonable choice. The study used secondary data from the 2018 National Immunization Survey-Teen (NIS-Teen), which was conducted by the CDC (2018a). In terms of the chosen statistical analysis, all the research questions were analyzed using descriptive statistics and multiple logistic regression. Multiple logistic regression was the most appropriate statistical test because it can obtain the odds ratio, meaning the chance of an outcome based on individual characteristics (Sperandei, 2014). Additionally, since the dependent variable is dichotomous, there is a reduction in possible confounding effects (Sperandei, 2014). Essentially, it is easier to compare the influence of multiple independent variables together using logistic regression as compared to other types of regression. Once the multiple logistic regression was completed for all the research questions, the analysis for the inferential statistics occurred for the results. The results described as statistically significant for the study had a *p*-value of 0.05 or less, and the associated odds ratios were reviewed as well.

The Use of Weights

The CDC chose to use weights as an adjustment method because there is potential bias in the collected data despite the attempts to avoid it. The weights were developed in three steps. The CDC first separated the adolescents by whether there was adequate healthcare provider data and similar responses to the interview questions. Then, the weights were initially created based on adequate provider data and the specific associated sociodemographic variables such as race. Lastly, the weights were adjusted based on the

number of actual completed surveys to consider missing data or nonresponsive participants. Given this information, the CDC provided two variables RDDWT_C and PROVWT_C that are used to take the weighted data into account when conducting a statistical analysis. The variable that was used during the analysis was RDDWT_C because it relates directly to the household subjects, whereas PROVWT_C relates to healthcare providers. The specific sampling weight is a method to approximate the number of adolescents within the target population that is represented by the given subject in the sample (CDC, 2018a). Through the RDDWT_C as the designated weight, the weighted data were taken into account during the analysis.

Definitions

Table 1

Summary of Chosen Variables from 2018 NIS-Teen

Variable Name	Definition
RDDWT_C	Final Single-Frame Cell-Phone RDD-Phase Weight (Excludes Territories)
HPVI_NUM_TOT	Number of HH-Reported HPV Shots Received (Total)
HPVI_REAS_11	Main Reason Teen will not receive HPV shots in the next 12 months: Safety Concern/Side Effects
HPVI_REAS_25	Main Reason Teen will not receive HPV shots in the next 12 months: Increased Sexual Activity Concern
HPVI_REAS_12	Main Reason Teen will not receive HPV shots in the next 12 months: Effectiveness Concern
HPVI_REAS_13	Main Reason Teen will not receive HPV shots in the next 12 months: Child Fearful
HPVI_REAS_5	Main Reason Teen will not receive HPV shots in the Next 12 Months: Not Sexually Active
HPVI_REAS_19	Main Reason Teen will not receive HPV shots in the Next 12 Months: Family/Parental Decision
HPVI_REAS_21	Main Reason Teen will not receive HPV shots in the Next 12 Months: More Info/New Vaccine
HPVI_RECOM	Had or has doctor or other health care professional ever recommended that Teen receive HPV shots?
HPVI_REAS_3	Main Reason Teen will not receive HPV shots in the next 12 months: Lack of Knowledge
HPVI_REAS_2	Main Reason Teen will not receive HPV shots in the next 12 months: Not needed or unnecessary
HPVI_REAS_24	Main Reason Teen will not receive HPV shots in the next 12 months: Not a school requirement
AGE	Age of selected Teen in years based on Date of Birth
SEX	Gender of selected Teen
RACEETHK	Race/Ethnicity of selected Teen

Assumptions

The first assumption was that the instrument used to collect the data was valid and reliable. The reason this assumption was made is based on the NIS-Teen being utilized over several years (CDC, 2018a). There are also several recent HPV vaccination studies that have used the NIS-Teen (Burdette et al., 2017; Choi et al., 2016; Franco et al., 2019). Another assumption was that the data were collected by trained interviewers and all attempts to reduce any bias were completed by the original researchers (CDC, 2018a). The reason this assumption was due to the use of secondary data in the study.

Scope and Limitations

Scope

The first scope of the study is the use of the TPB as the theoretical framework. Thought the TPB is useful in the health sciences, the health belief model (HBM) may be a sufficient theoretical framework for HPV-related studies (Gerend & Shepherd, 2012). The reason the TPB was chosen is based on several current studies that also used this framework (Britt & Englebert, 2018; Hirth, Batuuka, et al., 2018; Hirth, Berenson, et al., 2019; Johnson & Ogletree, 2017; Stanley et al., 2018; Vincent et al., 2016), which supports its applicability to HPV-related studies. Though it does not mean the HBM could have not been utilized as a potential theoretical framework as well, the scope of the study also related to the TPB's specific constructs.

With regard to the target population, the study relates to Black males between the ages of 13 to 17, so the findings may not be applicable to other populations. Additionally, since the study is about HPV vaccines in males, the results do not necessarily have any

relation to females. Specific to the dataset, the NIS-Teen occurs each year, so the results relate to the sample utilized during that time. Lastly, the collected data relate to adolescents in the United States and related territories, so it cannot be generalized to other countries.

Limitations

The limitations of the study are based on the use of secondary data as the data collection method. When researchers use any archived data, the study is limited to the definitions, values, and variables in the specific data sets (Dunn et al., 2015). Additionally, the dataset was not created for the purpose of the study; I had no influence on the original research design and data collection procedure. There can also be potential threats to internal validity, which include both recall bias and transfer bias while the survey was being conducted by the interviewers (CDC, 2018a; Pannucci & Wilkins, 2010). Recall bias is when the situation changes the subjects' recollections of events, and transfer bias occurs when subjects are lost to follow-up and the investigators must consider whether the associated results would be significantly different than those retained in the study (Pannucci & Wilkins, 2010). The reason recall bias is a threat to internal validity is the subjects had to recall information related to vaccinations (CDC, 2018a). The reason transfer bias is a potential threat even if the parental guardians provided information on their adolescents' healthcare providers, the providers may never follow up with the interviewers.

There is also a potential threat to external validity because of the study design. A cross-sectional observational study involves participants selected based on specific

criteria (Setia, 2016), so the findings may not be generalizable to other populations. Further, given the study used weighted data during the statistical analyses to consider any potential bias, the significance of the associations between the independent and dependent variables may not be accurate for the target population.

Significance

The study can provide insight into the factors that have led to the significant differences between men and women in terms of HPV vaccination adherence. The results can also provide information to future researchers on factors that should be considered to increase current vaccination rates in the male population. The potential practical application is healthcare providers improving how vaccinations are being presented to their patients to increase adherence to this preventative measure.

The first social change implication is expanding knowledge on how social and cultural differences change an individual's perspective. For instance, individuals have felt that the HPV vaccine could provide protection for themselves and other individuals; however, other have believed it would lead to stigma from other people, felt skeptical about the vaccine, and/or lacked knowledge about the topic to make an informed decision (Hirth et al., 2018; Pitts et al.,2017). Research has also shown how circumstances made it impractical for minority individuals to get the vaccine (Polonijo et al., 2016). The current study's results can further explain how an individual's perspectives and circumstances can influence decisions related to healthcare. Specific to the target population, Black Americans still have one of the highest HPV-related complication rates (Fu et al., 2019; Pierre-Joseph et al., 2015; Staples et al., 2018). But this study provides knowledge on the

types of factors that influence the Black male adolescent population, which can be used to encourage healthier decisions. From a broader perspective, a potential way to use the study's information for social change would be to encourage individuals to be more receptive and understanding of other people's point of view.

The other potential social change implication is to develop awareness about gender-related bias regarding vaccinations. This type of bias refers to not providing the same healthcare opportunities to populations based on gender. The current HPV vaccines show signs of gender bias due to primarily being given to females as a preventive measure to reduce the chance of developing cervical cancer (Daley et al., 2017). Current research supports males are also impacted by HPV, yet this group is significantly less likely to be suggested to get this preventative measure (Daley et al., 2017). The study can provide social change in terms of providing awareness that our current vaccination programs inaccurately describe the true benefits of HPV vaccines.

Summary and Conclusions

In this chapter, both the current social problem and the gap in the literature was introduced as it relates to the current study. The purpose of the study was to identify significant factors that have led to gender bias with regards to HPV prevention, focusing on Black male patients ages 13 to 17. The study can provide insight into factors that have led to gender-related bias as it relates to parental guardians believing HPV vaccinations are unnecessary for male patients. The chapter also described the use of a quantitative, cross-sectional, observational design and provided information on the theoretical

framework, definitions of key terms and concepts related to the study, as well as the limitations, scope, and the significance of the study.

Looking forward to the next chapter, the main purpose of Chapter 2 is to provide a detailed discussion of the previous published literature on the research topic. The literature review describes the literature search strategy, information on the theoretical framework, and important aspects of literature related to key concepts and variables. The results will also provide further evidence with regard to the need for the current study.

Chapter 2: Literature Review

The HPV vaccination rate for male patients has been significantly low in the United States. The purpose of this study was to identify factors that have led to bias regarding HPV prevention in Black adolescent males ages 13 to 17. In this chapter, both earlier and recent literature are described as they related to the scope of the study. The main sections cover the TPB, gender bias and racial minorities, lack of knowledge and fear, social networks, sexual behaviors, health communication, and the use of the chosen research design, secondary data, and chosen dataset. The chapter also describes the literature search strategy, literature related to the chosen variables, strengths, limitations, and future studies. The chapter ends with a summary and conclusion.

Literature Search Strategy

The reviewed literature was gathered with the databases Medline, CINAHL Plus, as well as a general Thoreau multi-database search. These databases were originally selected due to being associated with the Walden University Library. Medline and CINHAHL Plus are primarily health science-related databases, and a Thoreau multi-database search provided relevant information on broader topics. The chosen keywords and phrases to find possible relevant literature included the following: *gender differences and HPV***,** *men and HPV vaccine*, *African American and HPV vaccine*, *men and HPV vaccine and risk factors*, *racial minorities and HPV vaccine*, *HPV knowledge and men*, *gender and HPV vaccine*, *theoretical framework and HPV vaccine*, *social networks and HPV vaccine, health communication and HPV vaccine*, *Theory of Planned Behavior and HPV vaccine*, and *Theory of Planned Behavior and African Americans and HPV vaccine*.

To limit the results from each database, all journal articles had to be peer-reviewed and published no earlier than 5 years ago. The exception was seminal articles that could provide a historical perspective on the chosen theoretical framework, or dissertation topic. After 103 potential articles were initially selected, additional inclusion and exclusion criteria were utilized to further limit the results. Any studies were excluded if they occurred outside of the United States, were literature reviews, not entirely relevant to the topic, or were duplicates of other articles. Based on the inclusion and exclusion criteria, the results were 66 peer-reviewed journal articles. The publication dates of the included articles ranged from 1991-2020 with the majority of the articles published 2016 or later. The following sections provide an analysis and synthesis of the selected literature.

Theoretical Framework

The TPB

The TPB was developed by Icek Ajzen to predict an individual's intention to perform behavior within specific circumstances (Ajzen, 1991; Wiemken et al., 2015). Previous researchers had used the concept of aggregation, but it was criticized for only providing guidance on behavior in general situations (Ajzen, 1991). Ajzen's original framework, the TRA, is also not applicable in situations that were out of the person's complete control (Ajzen, 1991). In contrast, the TPB can help researchers and practitioners develop interventions to target specific factors that influence riskier decisions (Britt & Englebert, 2018; Hirth et al., 2019; Sweeney et al., 2015). The following sections will cover the four primary constructs of Ajzen's theory: behavioral

intention, perceived behavioral control, attitudes, and subjective norms (Ajzen, 1991; Britt & Englebert, 2018).

Behavioral Intention and Perceived Behavioral Control

The construct of behavioral intention refers to the motivational factors that influence a certain behavior in the specific scenario (Ajzen, 1991; Catalano et al., 2017), which can include willingness to complete the behavior (Sweeney et al., 2015), costs, and the difficulty of the behavior itself (Ajzen, 1991). In essence, behavioral intention is the individual's actual control over the decision to complete the action. The construct of perceived behavioral control is the perception of whether a behavior is achievable (Catalano et al., 2017; Hirth et al., 2019). To make this determination, the individual assesses whether the results are worth the effort they put into the action (Ajzen, 1991; Sweeney et al., 2015).

Attitude

The construct of attitude is the individual's emotional attachment to a particular behavior that stems from the person's beliefs or the association between a situation and his or her intentions (Ajzen, 1991; Catalano et al., 2017; Sweeney et al., 2015). Based on how an individual feels about a scenario, a belief is linked to a related behavior (Ajzen, 1991; Britt & Englebert, 2018; Gerend & Shepherd, 2012). The person then develops an attitude toward the behavior, which influences whether he or she will act (Ajzen, 1991; Gerend & Shepherd, 2012; Sweeney et al., 2015).

Subjective Norm

The construct of subjective norm, also known as normative beliefs, are the expectations set by the individuals' social environment (Britt & Englebert, 2018; Wiemken et al., 2015). In essence, the subjective norm is how society influences the person's decisions. Although an individual's personal thoughts also contribute to his or her behaviors, gaining approval or disapproval from others can still have an impact (Ajzen, 1991; Britt & Englebert, 2018).

Advantages and Disadvantages

As with any theoretical framework, the TPB has both advantages and disadvantages to using it in research. The main advantage is that it helps predict an individual's intention to perform behavior within specific circumstances (Ajzen, 1991; Wiemken et al., 2015). For example, the TPB can be utilized as part of assessing a person's willingness to engage in positive and negative health-related behaviors (Hirth et al., 2019). Another advantage is that it provides insight into how decisions are influenced by opinions and information (Hesse & Rauscher, 2016; Sweeney et al., 2015). A final advantage is that the TPB looks at behavior from multiple perspectives (Catalano et al. 2017), meaning researchers and practitioners can develop interventions to target specific risk factors (Britt & Englebert, 2018; Hirth et al., 2019; Sweeney et al., 2015).

Disadvantages of the TPB include that it assumes everyone will eventually make rational decisions when emotions can influence behavior (Hesse & Rauscher, 2016). Another disadvantage is that the TPB focuses on individual factors but not enough on factors at the organizational, community, or policy level (Hirth et al., 2019; Wiemken et

al., 2015). Finally, the construct of perceived behavioral control may not necessarily add any significant perspective when conducting research when compared to the other constructs (Briit & Englebert, 2018; Catalano et al., 2017; Wiemken et al., 2015).

Theoretical Framework in Early Related Studies

One of the earliest attempts to test the TPB in the health sciences was a study by Millstein (1996), who compared the use of the TRA against the use of the TPB regarding physicians' behaviors on communicating to adolescent patients about sexually transmitted diseases (STDs). The regression analyses based on the constructs of the TRA and TPB supported that the TPB provided an explanation for an additional 12% of the results; thus, it is applicable in the health sciences (Millstein, 1966). In terms of earlier studies related to using the TPB for HPV vaccinations, there were three studies found during the literature search. Gerend and Shepherd (2012) designed their study to understand if the HBM would be more applicable than the TPB in predicting HPV vaccine rates, with the results showing that the TPB is more appropriate for studies involving the HPV vaccine. Studies done by Askelson et al. (2010) and Hertweck et al. (2013) further supported the use of the TPB through research on the influences of parents on HPV vaccinations. Askelson et al. (2010) used the TPB to provide insight into the reasons behind parents' motivation to vaccinate their children for HPV, which provided a foundation for further research and interventions for increasing HPV vaccination rates. Hertweck et al. (2013) chose the TPB to provide context for the factors and mechanisms that predict parents' health decisions, supporting that TPB is viable choice for HPV and

future studies are needed to take into account diverse nationalities, parental influences, family types, and cultures.

Recent Studies Using Theoretical Framework

Until more current research was completed, STDs were primarily associated with females due to social vulnerabilities, and safe sexual practices among males reduces masculinity (Stanley et al., 2018; Vincent et al., 2016). Based on the constructs of the TPB, Vincent et al. (2016) did a cross-sectional study with a sample of Black and Hispanic couples to determine the types of thoughts that influenced sexual behaviors. The results supported that masculine beliefs, culture, as well as gender and race, impact sexual behaviors (Vincent et al., 2016). Johnson and Ogletree (2017) used the framework to assess the knowledge and intentions of male college students in getting vaccinated for HPV. Hirth et al. (2018) also showed that the TPB can be used in different types of HPV study designs by completing a qualitative study with students to examine barriers and the motivating factors with regard to the need for the HPV vaccine. Another recent study conducted by Britt and Englebert (2018) showed that the constructs of the TPB were statistically significant in relation to opinions on vaccinations. The study's results also suggested developing more communication methods is essential to increase vaccination uptake, especially for males and racial minorities (Britt & Englebert, 2018). The most recent study found utilized the TPB constructs to evaluate a potential HPV vaccination adherence program (Hirth et al., 2019).

Relationship of TPB and Current Study

The study relates to significant factors that have led to gender bias among ethnic minority adolescent men and HPV vaccine initiation rates. The TPB has previously been utilized for multiple types of study designs related to HPV and vaccination adherence due to its versatility and applicability to the topic. Some of the previous studies also described suggest that men and racial minorities need further studies to be done on them relating to the HPV vaccine. Therefore, the TPB was an appropriate framework for the study because the study was a continuation of previously conducted HPV-related research.

Literature Review Related to Variables

Gender Bias and Racial Minorities

There has been gender bias and disparities regarding racial minorities since the development of the HPV vaccine. The HPV vaccine was not suggested for males until 2011, 5 years after it was originally suggested for females (Boakye et al., 2017). As of 2015, there was only an estimated 49.8% of males who initiated the vaccine process, and about 28% who completed the recommended doses (Stanley et al., 2018). Similar results have been supported in a study of college students that showed only 28% of the sampled men started the process, and women were twice as likely to get the vaccine after controlling for age, race, and sexual orientation (Preston & Darrow, 2019). Further, research based on the NIS-Teen data has shown that 27.6% of the sampled males initiated the process, and females were three times as likely to complete the 3-dose vaccine series compared to males (Choi et al., 2016). The initial reason for this gender bias is that the vaccine was originally developed to help females prevent cervical cancer (Cole et al.,

2012). The pharmaceutical companies even started a campaign nationwide before the vaccine was approved by the Food and Drug Administration (Stanley et al., 2018). However, it was unknown until 2010 that HPV was also associated with other forms of cancer more common in males (Cole et al., 2012).

Racial minorities have had a similar issue to males in being significantly less likely to get the HPV vaccine (De & Budhwani, 2017; Niccolai et al., 2011; Osazuwa-Peters et al., 2017; Polonijo & Carpiano, 2013). Though studies have suggested that race may not have an impact due to having no statistically significant results (Choi et al., 2016; Lu et al., 2015; Thambusway et al., 2016), there are other studies that do support this argument. Fuller and Hinyard (2017) found that Caucasian males had a 56% immunization rate, yet the second highest racial group, Hispanics, had only a 18% immunization rate, which was mainly because healthcare providers provided information on the HPV vaccine. Further, Cooper et al. (2017) used secondary data from the 2014 Health information National Trends Survey and found that Black men were 34.8% and Hispanic men were 43.6% less likely to have heard about the HPV vaccine when compared to White men. Although Blacks have had one of the highest HPV-related complication rates at 50.2%, a study on parent feelings regarding the HPV vaccine showed that 40% would not vaccinate due to a lack of trust in health care providers to support racial minorities (Fu et al., 2019). Even when racial minorities seemed more willing to get vaccinated for HPV, their circumstances made it impractical to get the vaccine (Polonijo et al., 2016). Overall, both males and racial minorities continue to be overlooked in terms of opportunities to engage in HPV preventative measures.

Lack of Knowledge and Fear

Similar to other types of vaccinations, the HPV vaccine adherence rates are significantly lower partially due to not understanding its benefits and fear of possible side effects. These concerns have occurred since the early stages of the vaccine and currently still have an influence on the public health issue. For instance: a key result from Fu et al., (2019) was about 40% of the Black participants would not be vaccinated due to fear of possible medical experimentation. Another study suggested that based on data from the 2010 NIS-Teen, all racial/ethnic minorities had about 55% less odds of having any knowledge of the HPV vaccine compared to Whites (Polonijo & Carpiano, 2013). Other studies have also supported that the main three reasons for not being vaccinated included lack of knowledge, cost, and fear of side effects (Katz et al., 2016; Kepka et al., 2018). Research has indicated that (Cooper et al., 2017). Even in a study where 84% of the participants had knowledge of the HPV vaccine, only 28% of the males initiated the vaccine series because most of the known information was inaccurate (Preston & Darrow, 2019).

Qualitative approach has also shown insight into individual perspectives on the HPV vaccine (Hirth et al., 2018; Pierre-Joseph et al., 2015; Pitts et al., 2017). Pierre-Joseph et al. (2015) suggested that parents may be more willing to get the vaccine if it was not recently developed and there was more information provided about its benefits for disease prevention. Pitts et al. (2017) and Hirth et al. (2018) found that there were students who felt the HPV vaccine could provide protection for themselves and other individuals. However, there were also several students that believed it would lead to

stigma from other people, people who felt skeptical about the vaccine, and/or lacked knowledge about the topic to make an informed decision.

The final aspect that has led to a lack of knowledge is the types of available sources. Both the studies done by Scherer et al., (2018) and Benavidez et al. (2020) supported the type of information and available educational materials will influence HPV-related knowledge. Using a stratified random sample based on Survey Sampling International, a sample of 18-26 -year-old individuals across the United States conducted an online survey to understand more about psychological aspects of HPV vaccine adherence (Scherer et al., 2018). The researchers used ANOVA to test how different traits compared to each other regarding vaccination status (Scherer et al., 2018). One of the key results was the ability to understand scientific and health information did have a positive association with the willingness to get the vaccinations (Scherer et al., 2018). These results suggest until material is given that enhances patient's abilities to understand HPV-related information, the vaccination rates may not increase. Benavidez et al. (2020) further supported the need for proper and available educational materials. This study's purpose was to examine how the type of source of medical information influenced knowledge of 18-26 -year-old American individuals of HPV-related topics (Benavidez et al., 2020). The study involved using secondary data from the 2013, 2014, and 2017 Health Information National Trends Survey where the independent variables were sources of medical information and dependent variable was HPV awareness (Benavidez et al., 2020). Using logistic regression analyses, the main results were 56.2% of medical information came from electronic media, 26.7% came from family members or social

groups and only 17.1% came from healthcare providers (Benavidez et al., 2020). Another main result was any individual who did not get the information from healthcare providers were about 4 times less likely to understand HPV-related information (Benavidez et al., 2020). Based on the results of these studies, there is evidence that still suggests a clear misunderstanding amongst multiple ethnic groups and individuals about the HPV vaccine, and other related topics.

Social Networks

The topic of HPV vaccinations is influenced by social networks because they can either encourage or deter individuals away from initiating the vaccine series. Within social networks, there are two main subsets of influencers, which are family members, and institutions, such as schools.

Family Members

It is common for patients, particularly patients from racial and ethnic minorities, to be influenced by family member's opinions in some manner (Fu et al., 2019). Part of the reason for this occurrence is lack of trust in healthcare providers and growing up in a culture that respects the opinions of the older generation individuals (Fu et al., 2019). Another common reason is the person's background can influence their perspective on gender norms, such as how each gender should contribute to a relationship (Stanley et al., 2018). Polonijo and Carpiano (2016) conducted a study that focused on social and race/ethnical influences on HPV vaccinations in adolescent males. A key result in their study was that ethnic minorities appear to be more willing to be vaccinated when it appears to help their community (Polonijo, & Carpiano, 2016). In other words, if the

participants believed the physical and social environment would also improve, they felt more obligated to get the HPV vaccine as a service to other people (Polonijo, & Carpiano, 2016). Britt and Englebert (2017) conducted a study to explore behavioral determinants with regards to the HPV vaccination in rural college students. A key result was students were negatively influenced by living in areas where it took too much time and effort to get multiple doses of the vaccine (Britt & Englebert, 2017). Common reasons given by the subjects were other demands came up as a priority for the participants, or there were not enough resources to get the vaccine (Britt & Englebert, 2017).

Institutions

The type of institutions individuals go to can also influence healthcare decisions, particularly schools for the target population. There are different parts of the United States that continue to debate on whether the HPV vaccine should be mandatory for students (Calo et al., 2016). The main issues are enough parents use exemptions to get around any mandates, and lack of enforcement with regards to vaccine-related policies from the government (Calo et al., 2016). For instance: the study done by Calo et al. (2016) used a nationwide survey, yet only about 20% of the sample believed in enforcing the HPV vaccine mandates primarily due to fear of possible complications. Another study done by Rosen et al. (2017) further supported the influence of schools using secondary data from National Association of School Nurses. The researchers assessed how school nurses felt about the HPV vaccine based on factors related to the constructs of the TPB. After the data was analyzed using multiple regression, there was about 90% that knew the

risk of HPV as it related to cancer, but about 60% did not feel it would be beneficial to provide the information to the students (Rosen et al., 2017). The main reason is about 67% of the sample stated they must get permission from the school before distributing information to students (Rosen et al., 2017). Therefore, unless schools begin to take their role in HPV prevention more seriously, students may not feel the vaccine is an effective preventative measure. Overall, there is support that different types of social networks can impact HPV vaccine rates, and more research is needed in this area.

Sexual Behaviors

There are currently still gender stereotypes in terms of how males need to act to be seen as masculine from a social perspective. Specific to sexual relationships, society has led males to believe females should use protective measures against STDs, but males do not necessarily follow the same procedures (Vincent et al., 2016; Stanley et al., 2018). For instance: research suggests that up to about 47% of male college students do not use a condom or other protective measures (Sledge, 2015). The study by Sledge (2015) used a cross-sectional study design to assess HPV knowledge amongst male Black students. Some of the key results included: about 48% of the participants did not believe in using protection during intercourse, 41% would engage in sexual activities consistently, and only 13.2% knew the HPV vaccine could be used for males (Sledge, 2015). A common reason for this perspective is males appear to have more choices on the types of sexual activities, so it is assumed this population already has protection (Pierre-Joseph et al., 2014). The study by Sanders-Thompson et al. (2016) had results that suggested both males and females who were more open about their sexual orientation and behaviors

increased the likelihood of HPV vaccination. However, the researchers used secondary data, and discussed the wording of the original survey could have led to bias in the results (Sanders-Thompson et al., 2016). There are also other studies that do support sexual behavior is a contributing factor to HPV. Key results from the qualitative study completed by Stanley et al. (2018) included men tend to be more sexually active than women, and usually are provided less education on safe practices. Thus, suggesting sexual behaviors can contribute to an increased risk for HPV in this population (Stanley et al., 2018). Studies completed by both Nyitray et al. (2018) and Chandler et al. (2018) further supports the impact of sexual behaviors. Both studies used a similar procedure in which the researchers did both a questionnaire and took biological samples from willing participants in order to determine if the type of sexual relationship had an influence on HPV infections (Chandler et al., 2018; Nyitray et al., 2018). Not only was the type of sexual relationship a contributing factor, but the results also suggested drug use, not using a condom, number of sexual partners, and history of other STDs would increase the likelihood of men getting HPV (Chandler et al., 2018; Nyitray et al., 2018). The final study found conducted by Cooper et al. (2018) further supports sexual behaviors have an impact. Using secondary data from a previous cross-sectional study done at a university focusing on ethnic minorities, the researchers wanted to understand factors that influenced ethnic minority males regarding HPV vaccine series initiation (Cooper et al., 2018). Focusing specifically on knowledge about the topic and sexual behaviors, a key result was males who reported having sexual relationships were less likely to get the HPV vaccine, primarily to not believing it is not an important health concern (Cooper et al.,

2018). The researchers suggested more research was needed to provide information on HPV, otherwise it will continue to impact racial/ethnic minorities (Cooper et al., 2018). These studies described do provide evidence that sexual behaviors do require more study as they relate to HPV and vaccine rates.

Lack of Communication from Healthcare Providers

The opinion of healthcare providers can influence different types of health-related choices such as vaccination adherence. The study completed by Johnson et al. (2017) did not support recommendations from healthcare providers have an impact on HPV vaccinations, but it did support more research is needed in this area. However, there is a decent amount of research supporting the described argument. Both Clarke et al. (2015) and Lai et al. (2016) discussed how patients will be more likely to use HPV vaccines if healthcare providers recommend this preventative measure. Both Cooper et al. (2017) and Franco et al. (2019) supported that men who received information from healthcare providers would also have a higher likelihood of implementing the HPV vaccine process. The current concern is healthcare providers will typically not discuss HPV-related topics (Catalano et al., 2017). A key result from Burdette et al. (2017) was only 22% of males in the sample were recommended by healthcare professionals to get the HPV vaccine. Also, Polonijo and Carpiano (2013), Burdette et al. (2017) and Cooper et al. (2017) all supported racial minorities receive less recommendations from healthcare providers as compared to Whites. The qualitative studies completed by Ogunbajo et al. (2016) and Amuneke-Nze et al. (2018) further supports concerns about the current approaches being used by healthcare providers to discuss HPV-related topics. The key themes included: if a

pediatrician discussed the vaccine, the participants would be more supportive, and there is limited knowledge of HPV because it is a STD, so no one talks about the topic (Ogunbajo et al., 2016; Amuneke-Nze et al., 2018).

Contributing Factors

Part of the reason for healthcare providers will not discuss the vaccine is their personal knowledge of HPV-related topics (Finney-Rutten et al., 2017). The study by Finney-Rutten et al. (2017) focused on how much clinicians' knowledge influenced HPV vaccine recommendations. The results were only about 80% of the participants understood HPV-related topics and 40% of the participants did not believe in discussing these concepts due to believing parents will not be receptive to their recommendations (Finney-Rutten et al., 2017). The results suggested by Scherr et al. (2016) were similar to Finney-Rutten et al. (2017) because the participants who did not know about HPV would not recommend any educational material to patients or parental guardians (Scherr et al., 2016). The other main reason the HPV vaccine is not discussed by healthcare providers is limited communication methods. Nan et al. (2018) conducted research on framing messages regarding HPV vaccinations mandates using a sample of Black parents (Nan et al., 2018). A key result was if the parents felt they could trust information from healthcare facilities and government agencies, they would be more willing to support the mandates (Nan et al., 2018). Both Clark et al. (2016) and Lai et al. (2016) focused on how the participants gained information on HPV. Both studies suggested the participants who supported the HPV vaccine felt healthcare professionals had spent enough time and described the material in a manner that made it understandable to them (Clark et al.,

2016; Lai et al., 2016). The results also suggested healthcare providers still need to improve their relationships with patients, as well as learning different ways to communicate with them (Clark et al., 2016; Lai et al., 2016). The studies described above provide evidence that health communication does appear to continue to impact vaccination rates in the United States, so more research is needed in this area.

Use of Research Design, Secondary Data, and Chosen Dataset

After the literature for the chosen variables and public health issue was reviewed, there were multiple examples of previous studies that used the chosen research design, secondary data, and chosen dataset for the data collection method. The study conducted by Clark et al. (2016) used a cross-sectional study design and referenced material from the (NIS-Teen). The studies conducted by Catalano et al. (2017), Fu et al., (2019) as well as Preston and Darrow (2019) collected primary data but still used a cross-sectional study design. The studies conducted by Hertweck et al. (2012), as well as Johnson and Ogletree (2017), also collected primary data but still used a cross-sectional study design. These articles support a quantitative cross-sectional study design can be utilized for HPV research. The studies completed by Cole et al. (2012), Clarke et al. (2016), Osazuwa-Peters et al. (2016), Polonijo et al., (2016), as well as Boakye et al. (2017) used secondary data as their data collection method. The studies completed by Cooper et al., (2017), Fuller and Hinyard (2017), and Cooper et al., (2018) also used secondary data as their data collection method. These examples of previous research support the use of secondary data can be utilized for HPV research. Lastly, the studies conducted by Niccolai et al. (2011), Polonijo and Carpiano (2013), Lu et al. (2015), and Choi et al.

(2016) used a version of the NIS-Teen as their specific data source for secondary analysis. Also, the more recent studies conducted by Burdette et al., (2017), De and Budhwani (2017), Johnson et al. (2017), and Franco et al. (2019) also used a version of the NIS-Teen as their specific data source for secondary analysis. All of these studies demonstrate that the NIS-Teen has been utilized for many years to conduct HPV-related research, so it is a viable secondary data source. In summary, the studies described above provide support that using a cross-sectional study design involving secondary data from the NIS-Teen is a viable choice for the current study on HPV vaccinations.

Summary and Conclusions

The described results of the literature review provided support that both males and minorities have not been given the same opportunities to receive the HPV vaccine as a potential preventative measure. As of 2015, there was only an estimated 49.8% of males who have initiated the vaccine process, and about 28% who completed the recommended doses (Stanley et al., 2018). Also, minorities are significantly less likely to have knowledge of the HPV vaccine when compared to Whites (Osazuwa-Peters et al., 2017). The literature review suggested multiple factors that can contribute to these discrepancies such as gender bias, race/ethnicity, lack of knowledge, fear, social environments, sexual behaviors, and lack of support from healthcare providers. The literature review also provided support for the purpose of the current study. The current study is needed to understand how much of an influence these factors have on HPV vaccine initiation. The results can also provide a foundation for future research on increasing HPV vaccination rates in both male and minority populations. Looking forward into the next section, the

main purpose of Chapter 3 is to provide a detailed explanation of the chosen research methodology and design for the study. Chapter 3 provided insight into how the chosen research questions, variables, and data source can further address the current public health issue of bias of parental guardians with regards to HPV prevention in male patients.

Chapter 3: Research Method

Because the HPV vaccine has not been a gender-neutral vaccine, willingness to vaccinate male patients for HPV is low in the United States. The purpose of the study was to identify significant factors that have led to bias with regards to HPV prevention in male patients, with a focus on Black adolescents ages 13 to 17. The chapter describes both the research design and methodology as well as the chosen data analysis plan to address the selected research questions. The chapter concludes by explaining the ethical procedures relevant to collecting and storing the data and relevant threats to the validity of the study.

Research Design and Rationale

Research Design Choice and Rationale

Because the purpose of the study was to identify significant factors that have led to bias with regard to HPV prevention in Black male patients, a quantitative cross-sectional observational study design was utilized. A quantitative research approach was chosen based on the nature of the methodology. Quantitative research uses statistical analyses to summarize data, describe patterns, and support possible relationships and connections (McLeod, 2019). On the contrary, qualitative research focuses more on the interpretation of phenomena in terms of the meanings people bring to them (McLeod, 2019). Given the study's focus on possible relationships and connections, using quantitative research was more appropriate for the study. In terms of research design, a cross-sectional, observational studies involve studying the association between variables rather than altering outcomes (Setia, 2016). Previous research supports the use cross-

sectional designs with HPV-related studies (Catalano et al., 2017; Clark et al., 2016; Fu et al., 2019; Hertweck et al., 2012; Ogletree, 2017; Preston & Darrow, 2019). The chosen variables related to the design are shown in Table 2.

Table 2

2018 NIS-Teen Variables and Definitions

Location in survey and classification	Variable name	Definition
Section 1: Variables used for weight	RDDWT_C	Final Single-Frame Cell-Phone RDD-Phase Weight (Excludes Territories)
Section 2: Dependent variable	HPVI_NUM_TOT	Number of HH-Reported HPV Shots Received (Total)
Section 2: Independent variables	HPVI_REAS_11	Main Reason Teen will not receive HPV shots in the next 12 months: Safety Concern/Side Effects
	HPVI_REAS_25	Main Reason Teen will not receive HPV shots in the next 12 months: Increased Sexual Activity Concern
	HPVI_REAS_12	Main Reason Teen will not receive HPV shots in the next 12 months: Effectiveness Concern
	HPVI_REAS_13	Main Reason Teen will not receive HPV shots in the next 12 months: Child Fearful
	HPVI_REAS_5	Main Reason Teen will not receive HPV shots in the Next 12 Months: Not Sexually Active
	HPVI_REAS_19	Main Reason Teen will not receive HPV shots in the Next 12 Months: Family/Parental Decision
	HPVI_REAS_21	Main Reason Teen will not receive HPV shots in the Next 12 Months: More Info/New Vaccine
	HPVI_REAS_3	Main Reason Teen will not receive HPV shots in the next 12 months: Lack of Knowledge
	HPVI_REAS_2	Main Reason Teen will not receive HPV shots in the next 12 months: Not needed or unnecessary
	HPVI_REAS_24	Main Reason Teen will not receive HPV shots in the next 12 months: Not a school requirement
Section 3: Covariates	AGE	Age of selected Teen in years based on Date of Birth
	SEX	Gender of selected Teen
	RACEETHK	Race/Ethnicity of selected Teen

Methodology

Target Population

The target population comprised of Black adolescent males 13 to 17 years of age in the United States. It is estimated that 25% percent of all children in the United States are first- or second-generation immigrants, and about 15-16% of the population are Black (Youth Center for Community Action, 2020). Despite this information, all racial/ethnic minorities are significantly less likely to have knowledge of and initiate the recommended 3-dose HPV vaccine schedule (Cooper et al., 2017; Fuller & Hinyard, 2017; Osazuwa-Peters et al., 2017). The study population was chosen specifically because compared to other racial groups, Black Americans still have one of the highest HPV-related complication rates (Fu et al., 2019; Pierre-Joseph et al., 2015; Staples et al., 2018). Some of the reasons that have led to the increase included: lack of trust in healthcare providers, fear related to side effects and taking away an individual's right to refuse a medical treatment, as well as not understanding enough about the vaccine (Ashing et al., 2017; Cooper et al., 2017; Katz et al., 2016; Pierre-Joseph et al., 2015).

Sample and Sampling Procedures

The study involved getting the sample of Black adolescents age 13-17 using preexisting data sources. The source of data was the 2018 NIS-Teen provided by the CDC. The 2018 version of the NIS-Teen is one of the most current versions available for public use, thus an appropriate choice for the study. The NIS-Teen, which is conducted as an add-on to the NIS-Child, is a group of phone surveys completed annually to monitor

the current vaccination coverage among teens at the national, state, and selected local levels. The design and implementation of the NIS-Teen cell-phone sample involve three procedures. The researchers first used independent, quarterly samples of telephone numbers provided by Marketing Systems Group. The target sample size of completed telephone interviews in each estimation area is designed to achieve an approximately equal coefficient of variation of 6.5%. The researchers deemed a telephone number as a part of the sample if the respondent during the NIS-Child provided any indication of having an associated healthcare provider. The samples were then divided into random subsamples called replicates to spread the interviews for each sampling area evenly across a 3-month period. Third, an automated procedure eliminated numbers that were previously put onto a do-not-call list from the sample. Overall, the total initial sample size consisted of 15,245,878 telephone numbers, of which only 53,974 were deemed eligible for the NIS-Teen interview because they belonged to an adult living in a household with at least one age-eligible adolescent. Among the identified eligible households, 38,834 (71.9%) completed the household interview, and 18,700 were included in the final sample because all other respondents did not give consent to contact the teen's provider or providers, the provider or providers did not respond, or the provider or providers responded but did not report any vaccinations for the subject (CDC, 2018a).

Power Analysis Calculation

I used G*power 3.1 (Faul et al., 2013) to calculate the sampled size needed to detect the likelihood of a statistically significant relationship between significant factors and the likelihood of a Black adolescent male initiating the HPV vaccine process. The

chosen power analysis involved setting the statistical test to logistic regression, an alpha level of 0.05, an effect size of 0.80, and an odds ratio of 1.47. The reason the alpha level of 0.05 was chosen is because there were several previous HPV studies have also used this alpha level (Britt & Englebert, 2018; Catalano et al., 2017; Fu et al., 2017; Hesse & Rauscher, 2016; Wiemken et al., 2015). The reason an effect size of 0.80 was chosen is because an under-sized study sample may not produce enough results, but too large of a sample could result in statistically detectable results with no scientific relevance (Kang et al., 2008; Statistic Solutions, 2020). The odds ratio was determined by averaging the odds ratios of Black adolescents in recent HPV vaccination studies (Burdette et al., 2017; Choi et al., 2016; Franco et al., 2019). The odds ratios that came about from the studies ranged from 1.29-1.77, and 1.47 is within the middle of that range. Lastly, the distribution was changed to a binomial distribution because the dependent variable used for the study is dichotomous (CDC, 2018a). Based on this information, the minimum sample size necessary for the study is (N = 1,194).

Access to the Data Set

The 2018 NIS-Teen data sets are publicly available and can be downloaded from the CDC website. In addition to accessing the data set, researchers can download all documents associated with the data set, including data documentation, a codebook, a data user's guide, a copy of the Household Interview Questionnaire that was used to collect the data, and the providers' immunization history questionnaire. Additionally, because the CDC allows their datasets to be used by the public for research purposes, the data have already been assessed to ensure identity of subjects cannot be found by others.

Despite the NIS-Teen being publicly available, there are also policies expected to be followed. The National Center for Immunization and Respiratory Disease (NCIRD) and the CDC expect the users to only use the data files for analysis and statistical reporting, and researchers are prohibited from linking these data files with other NCIRD or non-NCIRD data files. If identifying information is inadvertently found, users are prohibited from using such information and are asked to contact the NCIRD. Lastly, the CDC only provides information in a format compatible with either SAS or R (CDC, 2018b); thus, R version 4.0.0 was utilized initially and converted to a file compatible with SPSS version 27 for analysis.

Instrumentation and Operationalization of Constructs

Instrument

The NIS-Teen is one of several different surveys used by the CDC and NCIRD to monitor health among adolescents 13 to 17 years of age and focuses on vaccine coverage. In 1992, the CDC began using the NIS to track vaccination coverage in the United States due to mandates created by the Childhood Immunization Initiative (CDC, 2018a). There are several vaccines covered in the survey, such as tetanus, diphtheria, and acellular pertussis vaccine, measles, mumps, and rubella vaccine, season influenza vaccine, and the HPV vaccine. The survey is administered annually through telephone interviews to the parents of eligible adolescents in all 50 states, the District of Columbia, and some U.S. territories. The NIS occurs in two parts: Part 1 involves data collection from eligible participating households, and Part 2 collects vaccination information from health care providers. The household part of the survey is divided into five sections. Section A

involves explaining the survey to the participants and some basic information about vaccine history, Section B is about information on current vaccines, Sections C and D focus on demographical information and information on healthcare providers, and Section E involves collecting information related to health insurance. Part 2, the health care provider part of the survey, is used to verify vaccination information provided by parental guardian during the telephone interviews. The second portion of the NIS is necessary to reduce possible bias and/or misinformation provided by the household participants (CDC, 2018a).

Operationalization

After the chosen independent variables in the NIS-Teen codebook were reviewed, all the independent variables were coded as 1 for *yes* or 2 for *no*, which meant the participant agreed or disagreed with the specific statement. For example, HPVI_REAS_2 stated that the participant's main reason for not getting the teen the HPV vaccination is he or she thinks is not necessary and the participant either stated yes or no to agreeing with the statement (CDC, 2018a). Therefore, all the independent variables are nominal, dichotomous variables because they are categorical in nature and only have two responses for the survey.

The chosen dependent variable for the study was HPV vaccine initiation, and the covariates for this study were age, gender, and race. After the chosen dependent variable and covariates in the 2018 NIS-Teen codebook were reviewed, the dependent variable HPVI_NUM_TOT is the total number of HPV shots provided by the household from 0 to 9, thus it is currently a continuous variable (CDC, 2018a). To ensure the dependent

variable refers to initiation, the values 1-2 were recoded as 2, and 0 was recoded as 1. All other values did not need to be included because the vaccine process would be completed after the recommended 3-dose HPV vaccine schedule (Cooper et al., 2017; Fuller & Hinyard, 2017; Osazuwa-Peters et al., 2017).

In terms of the covariates, the covariate age is a continuous variable because the actual teen's age is written as the response. The covariate gender is a dichotomous nominal variable due to it being a description and only two possible responses. Lastly, the covariate race/ethnicity is a nominal categorical variable because each coded response represents the participant's described race or ethnicity (CDC, 2018a). It was unnecessary to include any other covariates because none of the other variables in the NIS-Teen were relevant to the study.

Research Questions and Hypotheses

Research Question 1: What is the association between the influence of family members and vaccination requirements to go to school and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age?

$H_0$1: There is no association between the influence of family members and vaccination requirements to go to school and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age.

H_a1: There is an association between association between the influence of family members and vaccination requirements to go to school and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age.

Research Question 2: What is the association between sexual activity and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age?

$H_0$2: There is no association between sexual activity and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age.

H_a2: There is an association between sexual activity and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age.

Research Question 3: What is the association between feeling fear, being a newer vaccine, lack of knowledge on the vaccine, as well as the recommendation provided by a healthcare provider and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age.

$H_0$3: There is no association between feeling fear, being a newer vaccine, lack of knowledge on the vaccine, as well as the recommendation provided by a healthcare provider and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age.

H_a3: There is an association between feeling fear, being a newer vaccine, lack of knowledge on the vaccine, as well as the recommendation provided by a healthcare provider and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age.

Research Question 4: What is the association between the adolescent's beliefs about the vaccine's necessity, safeness, and effectiveness and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age?

$H_0$4: There is no association between the adolescent's beliefs about the vaccine's necessity, safeness, and effectiveness and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age.

H_a4: There is an association between the adolescent's beliefs about the vaccine's necessity, safeness, and effectiveness and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age.

Statistical Analysis Plan

The data itself was analyzed using SPSS version 27**.** In cases of nonresponses, the developers of the 2018 NIS-Teen data set imputed values to account for the missing data (CDC, 2018a). However, when it was possible missing data were excluded from all statistical analyses. The chosen statistical analysis plan involved both descriptive statistics and inferential statistical analysis. The first step was any variables not included in the study were removed, and all participants that are not Black males 13-17 years old were removed as well. The descriptive statistics was completed by using a frequency table to see how many subjects are in each age group from 13 to 17 years old. For the inferential statistics, as previously described, the chosen dependent variable for the study was HPV vaccine initiation, and the co-variates for this study were include age, gender, and race (CDC, 2018a). After the chosen dependent variable and covariates in the 2018 NIS-Teen codebook were reviewed, the dependent variable HPVI_NUM_TOT is the total number of HPV shots provided by the household from 0 to 9, thus it is currently a continuous variable (CDC, 2018a). In order to ensure the dependent variable refers to initiation, the values 1-2 will be recoded as 2 and 0 will be recoded as 1. All other values

would not need to be included because the vaccine process would be completed after the recommended 3-dose HPV vaccine schedule (Osazuwa-Peters et al., 2017; Fuller & Hinyard, 2017; Cooper et al., 2017). After the dependent variable has been recoded, all the research questions were analyzed using multiple logistic regression. The first reason multiple logistic regression was an appropriate statistical test is it can obtain the odds ratio, meaning the chance of an outcome based on individual characteristics (Sperandei, 2014). Also, since the dependent variable is dichotomous, there is a reduction in possible confounding effects (Sperandei, 2014). Essentially, it is easier to compare the influence of multiple independent variables together using logistic regression as compared to other types of regression. Once the multiple logistic regression was completed for all the research questions, the analysis for the inferential statistics occurred for the results. The results described as statistically significant for the study had a *p*-value of 0.05 or less, and the associated odds ratios were reviewed as well.

Statistical Assumptions: Multiple Logistic Regression

As with all statistical tests, there are assumptions made about the data when conducting a multiple logistic regression. There are six main assumptions related to multiple logistics regression (Laerd Statistics, 2018). The first two are the dependent variable should be nominal, primarily dichotomous, and have one or more independent variables that are continuous, ordinal, dichotomous or nominal variables (Laerd Statistics, 2018). The next two are no signs of multicollinearity amongst the independent variables, and independence of observations and the dependent variable should have mutually exclusive and exhaustive categories (Laerd Statistics, 2018). The final two assumptions

are a linear relationship between any continuous independent variables and the logit transformation of the dependent variable and no potential outliers in the data (Laerd Statistics, 2018). As long as these assumptions were reviewed before the analysis was ran, the use of multiple logistic regression is appropriate for the study.

Rationale for Inclusion of Covariates

The three covariates taken into consideration in this study included gender, age, and race. The main reason all these covariates were considered is because they helped establish the parameters of the study. With regards to gender, as described in Chapter 2, there is gender bias with regards to the HPV vaccine primarily due to it was originally developed to help females prevent cervical cancer (Cole et al., 2012). For example: A 2016 study by Choi et al. (2016), used the 2012 NIS-Teen to understand more about the reasons for vaccine differences amongst males and females. Two of the key results were 55.6% of the sampled females as compared to 27.6% of the sampled males initiated the process, and females were three times as likely to complete the 3-dose vaccine series as compared to males (Choi et al., 2016). With regards to age, the NIS-Teen is one of several different surveys used by the CDC and NCIRD to monitor health among adolescents 13 to 17 years of age and focuses primarily on vaccine coverage (CDC, 2018a). Thus, it is essential to take age into account because it defines part of the target population. Lastly, similar to gender, there is evidence supporting compared to Whites, other racial groups are significantly less likely to get the HPV vaccine (De & Budhwani, 2017; Niccolai et al., 2011; Polonijo & Carpiano, 2013). Thus, given this information, race could influence the number of participates in the original survey and the current

study. Given the parameters of the study it is unnecessary to take any other control variables into account.

The Use of Weights

The CDC chose to use weights as an adjustment method because there is potential bias in the collected data despite the attempts to avoid it. The weights were developed in three steps. The CDC first separated the adolescents by whether there was adequate healthcare provider data and similar responses to the interview questions. Then, the weights were initially created based on adequate provider data and the specific associated sociodemographic variables such as race. Lastly, the weights were adjusted based on the number of actual completed surveys to consider missing data or nonresponsive participants. Given this information, the CDC provided two variables RDDWT_C and PROVWT_C that are used to take the weighted data into account when conducting a statistical analysis. The variable that was used during the analysis was RDDWT_C because it relates directly to the household subjects, whereas PROVWT_C relates to healthcare providers. The specific sampling weight is a method to approximate the number of adolescents within the target population that is represented by the given subject in the sample (CDC, 2018a). Through the RDDWT_C as the designated weight, the weighted data were taken into account during the analysis.

Threats to Validity and Ethical Procedures

External Validity

The concept of external validity refers to the extent to which the results of a study are generalizable, and can be utilized in other contexts (Andrade, 2018; Huebschmann, et

al., 2019). In other words, the ability to apply the same results to subjects with characteristics that are different from those in the study (Andrade, 2018; Huebschmann, et al., 2019). There is a potential threat to external validity because of the study design and the original survey. A cross-sectional observational study involves the subjects are selected based on the chosen inclusion and exclusion criteria (Setia, 2016). Also, the researcher does not alter the exposures or outcome, rather just studies the association between the variables (Setia, 2016). Additionally, the NIS-Teen is a cross-sectional survey that occurs each year (CDC, 2018a). Given the specific circumstances associated with both the current study and the secondary data source, the threat to external validity is there is no guarantee the same results will occur in the future. Thus, the study's results may not be generalizable, and cannot be utilized in other contexts (Andrade, 2018; Huebschmann et al., 2019).

Internal Validity

Internal validity examines whether the way a study was designed and conducted can lead to results that represent accurate information with regards to the chosen target population (Andrade, 2018; Kaya, 2015). The actual study design and associated procedures occur under the direction of the CDC (CDC, 2018a). Also, the associated questionnaires have been standardized, and are administered by highly trained screeners and interviewers, so threats of this nature were minimized (CDC, 2018a). The actual potential threats to internal validity are both recall bias and transfer bias while the survey was being conducted by the interviewers (CDC, 2018a; Pannucci & Wilkins, 2010). Recall bias is when the situation changes the subjects' recollections of events, and

transfer bias occurs when subjects are lost to follow-up and the investigators must consider whether the associated results would be significantly different than those retained in the study (Pannucci & Wilkins, 2010). The reason recall bias is a threat to internal validity is the subjects had to recall information related to vaccinations (CDC, 2018a). To reduce its impact, healthcare providers were contacted to attempt to verify the given information from parents (CDC, 2018a). The reason transfer bias is a potential threat even if the parental guardians provided information on their adolescents' healthcare providers, the providers may never follow up with the interviewers. To reduce the potential impact, several reminders were sent to the healthcare providers if they did not respond in two weeks, and the collected data was edited and cleaned as well (CDC, 2018a).

Construct Validity

The concept of construct validity is the ability for an instrument to measure the actual construct it is intended to measure (Strauss & Smith, 2009). In other words, an instrument cannot be defined as valid and used properly in a study if it cannot evaluate the specific topic. However, there are no concerns about any construct validity because the NIS-Teen has been utilized over several years (CDC, 2018a). Also, as previously discussed, there are several recent HPV vaccination studies that use the NIS-Teen (Choi et al., 2016, Burdette et al., 2017; Franco et al., 2019), which further supports it can be an effective data source for both vaccinations and the current study. Therefore, the evidence suggests the NIS-Teen does satisfy the concept of construct validity.

Ethical Considerations

For this study, there are no concerns about gaining access to the data, since it is already possible for public use, and the CDC already gives permission to use it. Also, the researchers already removed data related to personal and related information to possibly identify subjects, so there are no concerns about this potential ethical concern (CDC, 2018a). On a personal level, I stored the data in a secure location, and did not disseminate the information to anyone. Also, I made sure to gain the Walden University's Institutional Review Board (IRB). The ethics review was conducted by the IRB, and the approval for the study occurred on December 30, 2020 approval before using or accessing the data. The associated approval number was 12-30-20-0954427. Since these procedures were followed, the data from the 2018 NIS-Teen was kept confidential and only utilized for research purposes.

Summary and Conclusions

As described in the chapter, a quantitative cross-sectional observational study design was utilized as the appropriate study design. The study used secondary data from 2018 NIS-Teen and focused on the data pertaining to Black adolescent males ages 13-17. The power analysis using the program G*Power 3.1., the chosen instrument, and operationalization of the chosen variables were also described in the chapter. The chosen data analysis plan was discussed, which involves both descriptive statistics and the use of logistic regression as the main inferential statistical test. The chapter concluded with a discussion of the factors that could have threatened the validity of the study and the ethical procedures that were followed throughout the study. Looking forward into the

next section, the main purpose of Chapter 4 was to provide a detailed summary of the results. Chapter 4 also provided further insight into the possible relationships between the independent variables and dependent variable in the chosen research questions.

Chapter 4: Results

Racial/ethnic minorities are significantly less likely to have knowledge of and initiate the recommended 3-dose HPV vaccine schedule (Cooper et al., 2017; Fuller & Hinyard, 2017; Osazuwa-Peters et al., 2017). The purpose of the study was to identify significant factors that have led to bias with regard to HPV prevention in male patients, with a focus on Black male adolescents ages 13 to 17. The study involved secondary data from the 2018 NIS-Teen, which was conducted by the CDC (2018a). The research questions addressed the association between family members and vaccination requirements for school, sexual activity, fear of a new vaccine, lack of knowledge, and health care recommendations, and beliefs in the vaccine and the likelihood of receiving the HPV vaccine among Black males. All the research questions were analyzed using descriptive statistics and multiple logistic regression through SPSS version 27. The results were described as statistically significant for the study if there was a *p*-value of 0.05 or less, and the associated odds ratios were reviewed as well.

Data Collection

Institutional Review Board

To ensure that the current research study complies with Walden University's ethical standards as well as U.S. federal regulations, the study had to be approved by the associated IRB (Walden University Center for Research Quality, 2020). The ethics review was conducted by the IRB, and the approval for the study occurred on December 30, 2020. The approval for the study occurred before the participant recruitment, data

collection, or dataset access (Walden University Center for Research Quality, 2020). Therefore, the study was reasonable from an ethical perspective.

Recruitment, Response Rates, and Discrepancies

As discussed in Chapter 3, the survey is administered annually through telephone interviews to the parents of eligible adolescents in all 50 states, the District of Columbia, and some U.S. territories. Specific to the 2018 NIS-Teen, all household interviews occurred from January 2018 to January 2019, and the associated healthcare provider data collection occurred from February 2018 through April 2019. To determine the overall response rate, the researchers first determined the percentage of adolescents with adequate provider data within each geographic area. The range of percentages were from 39.4% to 58.7%. Then, the researchers excluded any responses that came from United States related territories. The final response rate ended up as 48.3% for the entire sample. The response rate was considered adequate for the study given the CDC defined the target coefficient of variation to be 6.5% for each designated geographic area, and a true coverage parameter of 50%.

In terms of discrepancies, there were several occasions where either there were nonresponses from participants, missing data, or the data were inaccurate. All these discrepancies can lead to potential bias in the results. Therefore, the CDC chose to use weights as an adjustment method. The CDC first separated the adolescents by whether there was adequate healthcare provider data and similar responses to the interview questions. Then, the weights were initially created based on adequate provider data, and the specific associated sociodemographic variables such as race. Lastly, the weights were

adjusted based on the number of actual completed surveys. Given this information, the CDC provided two variables RDDWT_C and PROVWT_C that were used to take the weighted data into account when conducting the statistical analysis. The variable used during the study was RDDWT_C because it relates directly to the household subjects, wheras PROVWT_C relates to healthcare providers (CDC, 2018a).

Results

Descriptive Statistics

Based on the power analysis, the minimum sample size necessary for the study is (N = 1,194). However, the power analysis was completed for a non-weighted sample. To demonstrate the sample size was still accurate, a non-weighted descriptive statistical analysis was completed first (see Table 3). The non-weighted sample size is (N = 1870) Black male adolescents ages 13-17. It was determined after deleting all other ethnic groups and then getting rid of all Black females since the study is specific to males. A frequency table showed there were initially 1,900 potential individuals, but 30 were missing data. Therefore, the final non-weighted sample size is (N = 1,870) Black male adolescents ages 13-17. Given the non-weighted sample size is met, the rest of the results were completed using the weighted data based on variable RDDWT_C. The overall weighted data shows the non-weighted data represented (N = 395,067) Black male adolescents ages 13-17 (Table 4).

Table 3

2018 NIS-Teen Unweighted Descriptive Statistics for Black Males 13-17

Age	Frequency	Percent
13	367	19.3
14	391	20.6
15	348	18.3
16	351	18.5
17	413	21.7
Missing	30	1.6
Total	1,900	100.0

Table 4

2018 NIS-Teen Weighted Descriptive Statistics for Black Males 13-17

Age	Frequency	Percent
13	76,968	19.5
14	97,093	24.6
15	61,073	15.5
16	87,197	22.1
17	72,739	18.4
Total	395,067	100.0

Statistical Test: Multiple Logistic Regression

All the research questions were analyzed using multiple logistic regression through SPSS version 27. Multiple logistic regression can obtain the odds ratio, meaning the chance of an outcome based on individual characteristics (Sperandei, 2014). Additionally, since the dependent variable is dichotomous, there was a reduction in possible confounding effects (Sperandei, 2014). Essentially, it was easier to compare the influence of multiple independent variables together using logistic regression as compared to other types of regression. Once the multiple logistic regression was completed for all the research questions, the analysis for the inferential statistics

occurred. The results described as statistically significant had a *p*-value of 0.05 or less, and the associated odds ratios were reviewed as well.

Statistical Assumptions: Multiple Logistic Regression

As with all statistical tests, there are assumptions made about the data when conducting a multiple logistic regression. There are six main assumptions related to multiple logistics regression. The first two are that the dependent variable should be nominal, primarily dichotomous, and have one or more independent variables that are continuous, ordinal, dichotomous or nominal variables. The next two are no signs of multicollinearity among the independent variables, and independence of observations, and the dependent variable should have mutually exclusive and exhaustive categories. The final two assumptions are a linear relationship between any continuous independent variables and the logit transformation of the dependent variable and no potential outliers in the data (Laerd Statistics, 2018). As long as these assumptions are reviewed before the analysis is run, the use of multiple logistic regression is appropriate for the study.

Research Question 1

Research Question 1: What is the association between the influence of family members and vaccination requirements to go to school and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age?

$H_0$1: There is no association between the influence of family members and vaccination requirements to go to school and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age.

H_a1: There is an association between association between the influence of family members and vaccination requirements to go to school and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age.

After the multiple logistic regression was ran in SPSS version 27, all the independent variables had a *p*-value of .000 (Table 5). Given the *p*-value for the study must be 0.05 or less to be statistically significant, both the factors (influence of family members and vaccination requirements to go to school were statistically significant. Therefore, the null hypothesis ($H_{0)}$ can be rejected for research question 1, and there is support in favor of the alternative hypothesis ($H_{a)}$.

The associated odds ratio for family and parental decision (OR=4.723 95% CI [4.430, 5.034]) suggests Black males ages 13-17 are 4.723 times more likely to consider the influence of family members regarding initiating the HPV vaccine (Table 5). The associated odds ratio for not being a school requirement (OR=1.171 95% CI [1.120, 1.225]) suggests Black males ages 13-17 are 1.171 times more likely take to into account the influence of vaccination requirements for school regarding initiating the HPV vaccine (Table 5).

Table 5

Results of Logistic Regression Completed on Research Question 1

							95% CI	
Variable	B	SE	Wald	df	Sig.	. OR	Lower	Upper
Family/parental decision	1.552	.033	2271.382	1	.000	4.723	4.430	5.034
Not a school requirement	.158	.023	47.540	1	.000	1.171	1.120	1.225
Constant	-1.079	.004	84128.415	1	.000	.340		

Research Question 2

Research Question 2: What is the association between sexual activity and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age?

$H_0$2: There is no association between sexual activity and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age.

H_a2: There is an association between sexual activity and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age.

After the multiple logistic regression was ran in SPSS version 27, the independent variables Not sexually active had a *p*-value of 0.943 and Increased sexual activity concern had a *p*-value of 0.974 (Table 6). Given the *p*-value for the study must be 0.05 or less to be considered statistically significant, neither of the factors (not sexually active and increased sexual activity concern) were statistically significant. Therefore, the null hypothesis ($H_{0)}$ cannot be rejected for research question 2. The results suggest Black males ages 13-17 are less likely to be influenced by sexual activity with regards to initiating the HPV vaccine (Table 6).

Table 6

Results of Logistic Regression Completed on Research Question 2

							95% CI	
Variable	B	SE	Wald	df	Sig.	. OR	Lower	Upper
Not sexually active	20.234	282.417	.005	1	.943	6131332133.8	.000	1.519E+249
Increased sexual activity concern	20.234	610.437	.001	1	.974	6133323966.7	.000	
Constant	-81.906	1345.202	.004	1	.951	.00		

Research Question 3

Research Question 3: What is the association between feeling fear, being a newer vaccine, lack of knowledge on the vaccine, as well as the recommendation provided by a healthcare provider and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age.

$H_0$3: There is no association between feeling fear, being a newer vaccine, lack of knowledge on the vaccine, as well as the recommendation provided by a healthcare provider and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age.

H_a3: There is an association between feeling fear, being a newer vaccine, lack of knowledge on the vaccine, as well as the recommendation provided by a healthcare provider and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age.

After the multiple logistic regression was ran in SPSS version 27, all the variables had a *p*-value of .000 (Table 7). Given the p-value for the study must be 0.05 or less to be

statistically significant, all the factors were statistically significant. Therefore, the null hypothesis ($H_{0)}$ can be rejected for research question 3, and there is support in favor of the alternative hypothesis ($H_{a)}$.

The associated odds ratio for more info and being a newer vaccine, (OR=1.974 95% CI [1.862, 2.092]) suggests Black males ages 13-17 are 1.974 times more likely to consider the influence of being a newer vaccine regarding initiating the HPV vaccine (Table 7). The associated odds ratio for healthcare provider recommendation (OR=1.134 95% CI [1.118, 1.151]) suggests Black males ages 13-17 are 1.134 times more likely to consider their healthcare provider's recommendation regarding initiating the HPV vaccine (Table 7). The associated odds ratio for child is fearful (OR=5.273 95% CI [4.485, 6.201]) suggests Black males ages 13-17 more 5.273 times more likely to consider fear regarding initiating the HPV vaccine (Table 7). The associated odds ratio for lack of knowledge (OR=0.590 95% CI [.576, .604]) suggests Black males ages 13-17 are less likely to initiate the HPV vaccine if they do not have enough knowledge on the subject (Table 7).

Table 7

Results of Logistic Regression Completed on Research Question 3

							95% CI	
Variable	B	SE	Wald	df	Sig.	. OR	Lower	Upper
More info/new vaccine	.680	.030	521.194	1	.000	1.974	1.862	2.092
Healthcare provider recommendation	.126	.007	294.139	1	.000	1.134	1.118	1.151
Child is fearful	1.663	.083	404.656	1	.000	5.273	4.485	6.201
Lack of knowledge	-.528	.012	1916.375	1	.000	.599	.576	.604
Constant	-4.860	.178	744.157	1	.000	.008		

Research Question 4

Research Question 4: What is the association between the adolescent's beliefs about the vaccine's necessity, safeness, and effectiveness and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age?

$H_0$4: There is no association between the adolescent's beliefs about the vaccine's necessity, safeness, and effectiveness and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age.

H_a4: There is an association between the adolescent's beliefs about the vaccine's necessity, safeness, and effectiveness and the likelihood of a Black adolescent male initiating the HPV vaccine process while controlling for age.

After the multiple logistic regression was ran in SPSS version 27, most of the variables had a *p*-value of .000 (Table 8). Given the *p*-value for the study be 0.05 or less to be considered statistically significant, most the factors were statistically significant. While the independent variable vaccine is unnecessary is not statistically significant

(p=.701), the other variables being considered all had a p-value of .000 (Table 8). Therefore, the null hypothesis ($H_{0)}$ can be rejected for research question 4, and there is support in favor of the alternative hypothesis ($H_{a)}$.

The associated odds ratio for safety and side effect concerns (OR=1.310 95% CI [1.281, 1.339]) suggests Black males ages 13-17 are 1.310 times more likely to consider the influence of possible safety concerns and side effects regarding initiating the HPV vaccine (Table 8). The associated odds ratio for effectiveness concern (OR=.004 95% CI [.003, .008]) suggests Black males ages 13-17 are less likely to initiate the HPV vaccine if they have concerns about its effectiveness (Table 9). Lastly, the results suggest Black males ages 13-17 are less likely to be influenced by believing the vaccine is unnecessary with regards to initiating the HPV vaccine (Table 8).

Table 8

Results of Logistic Regression Completed on Research Question 4

							95% CI	
Variable	B	SE	Wald	df	Sig.	OR	Lower	Upper
Safety and Side Effects Concern	.270	.011	568.840	1	.000	1.310	1.281	1.339
Effectiveness Concern	-5.404	.292	.341.667	1	.000	.004	.003	.008
Vaccine is unnecessary	.004	.009	.148	1	.701	1.004	.985	1.022
Constant	9.369	.586	255.922	1	.000	11720.461		

Summary and Conclusions

In this chapter, the results of the data analysis occurred to answer the four associated research questions based on weighted data from the 2018 NIS-Teen. A frequency table was ran and showed there were initially 1900 potential individuals, but

30 were missing data. Therefore, the final non-weighted sample size is (N = 1,870) Black male adolescents ages 13-17. Given the non-weighted sample size is met, the rest of the results were completed using the weighted data based on variable RDDWT_C. The overall weighted data shows the non-weighted data represented (N = 395,067) Black male adolescents ages 13-17. After the multiple logistic regression was ran using SPSS version 27 on the weighted data for the four associated research questions, all the results gave support to the alternative hypothesis, except for research question 2. Also, nearly all the independent variables were statistically significant, other than (Not sexually active and Increased sexual activity concern) (Table 6) and (Vaccine is unnecessary) (Table 8). The final section Chapter 5 was the interpretation of the findings of this study based on published research regarding factors associated with initiation of HPV vaccinations in minority populations, focusing on Black males. In Chapter 5, the limitations of the study, recommendations for future studies, and the implications for positive social change were discussed as well.

Chapter 5: Discussion, Recommendations, and Conclusion

Parental guardians' willingness to vaccinate male patients for HPV has significantly been reduced in the United States. The purpose of this quantitative study was to identify significant factors that have led to bias with regard to HPV prevention in Black male adolescents. After running multiple logistic regression on the weighted data for the four associated research questions, all the results gave support to the alternative hypothesis, except for Research Question 2. Also, nearly all the independent variables were statistically significant, other than (Not sexually active and Increased sexual activity concern) (Table 6) and (Vaccine is unnecessary) (Table 8).

Interpretation of the Findings

Summary of the Current Study's Findings

Research Questions 1, 3, and 4 were supported, but the results from Research Question 2 showed that the null hypothesis had to be accepted for the study. Specific to Research Question 1, the results suggested that Black males ages 13-17 are more likely to consider the influence of family members and the influence of vaccination requirements for school with regard to initiating the HPV vaccine. Specific to Research Question 2, the results suggested that Black males ages 13-17 are less likely to be influenced by sexual activity with regards to initiating the HPV vaccine. Specific to Research Question 3, the results suggested that Black males ages 13-17 are more likely to consider the influence of being a newer vaccine, their healthcare provider's recommendations, and fear about initiating the HPV vaccine. The results also suggested that Black males ages 13-17 are less likely to initiate the HPV vaccine if they do not have enough knowledge on the

subject. Specific to Research Question 4, the results suggested that Black males ages 13-17 are more likely to consider the influence of possible safety concerns and side effects with regard to initiating the HPV vaccine. The results also suggested that Black males ages 13-17 are less likely to initiate the HPV vaccine if they have concerns about its effectiveness Lastly, the results suggested that Black males ages 13-17 are less likely to be influenced by believing the vaccine is unnecessary with regard to initiating the HPV vaccine.

Findings as Compared to Literature Related to the Current Study's Chosen Variables

Research Question 1

The current study's results suggested that Black males ages 13-17 are more likely to get the HPV vaccine due to the influence of family members and vaccination requirements for school. The results confirm results in previous studies. According to Fu et al. (2019), it is common for patients, particularly patients from racial and ethnic minorities, to be influenced by family members' opinions based on living in a culture that respects the opinions of the older generation individuals. Polonijo and Carpiano (2016) and Britt and Englebert (2017) further support this argument, suggesting that ethnic minorities appear to be more willing to be vaccinated when it appears to help their family and community. Specific to schools, Rosen et al. (2017) assessed how school nurses felt about the HPV vaccine based on factors related to the constructs of the TPB. After the data were analyzed using multiple regression, about 90% knew the risk of HPV as it related to cancer, but about 60% did not feel it would be beneficial to provide the

information to the students. The main reason is about 67% of the sample stated they have to get permission from the school before distributing information to students. Given the current study, along with several other studies, Black males ages 13-17 can be influenced by both physical and social environments, these factors may need to be taken into account to increase the initiation of the HPV vaccine.

Research Question 2

The current study's results suggested that Black males ages 13-17 are less likely to get the HPV vaccine based on sexual activity. These results can extend knowledge on this topic because it contradicts some of the findings from other studies. However, the previous studies focused on adult Black males rather than adolescents. For instance, Stanley et al. (2018) indicated that men tend to be more sexually active than women and usually are provided less education on safe practices, suggesting that sexual behaviors can contribute to an increased risk for HPV in this population. Nyitray et al. (2018) and Chandler et al. (2018) further suggested that type of sexual relationship is a contributing factor to HPV infection as well as drug use, not using a condom, number of sexual partners, and history of other STDs.

Though previous studies focused on adult males do not relate to the current study's results, the results from studies that focused on Black male college students may suggest that the current study's results are accurate. For example, Sledge (2015) used a cross-sectional study design to assess HPV knowledge among male Black college students and found that 48% of the participants did not believe in using protection during intercourse, 41% would engage in sexual activities consistently, and only 13.2% knew

the HPV vaccine could be used for males. Cooper et al. (2018) also found that males who reported having sexual relationships were less likely to get the HPV vaccine, primarily to not believing it is not an important health concern. These studies do support the results of the current study because both studies suggested that sexual behaviors may not be as much of an influence on initiating the HPV vaccine. After comparing the current study results with previous research, the age of the study population may change the results with regard the influence of sexual behavior on HPV vaccine initiation rates.

Research Question 3

The current study's results suggest that Black males ages 13-17 are more likely to be influenced to get the HPV vaccine based on it being a newer vaccine, their healthcare provider's recommendations, and fear. The results also suggested that they are less likely to initiate the HPV vaccine if they do not have enough knowledge on the subject. The current results further support the results of other previous studies. Polonijo and Carpiano (2013) used data from the 2010 NIS-Teen and showed that all racial/ethnic minorities had about 55% less odds of having any knowledge of the HPV vaccine, and about 22% less odds of initiating the vaccine process when compared to Whites. Katz et al. (2016) and Kepka et al. (2018) both found that common barriers related to the HPV vaccine were lack of education about the vaccine, fear, and possible side effects. Additionally, even with knowledge of the HPV vaccine, fewer initiated the vaccine because most of the known information was inaccurate (Preston & Darrow, 2019). Further, willingness to get the vaccine may be influenced by it being recently developed and not having information about its benefits for disease prevention (Pierre-Joseph et al., 2015).

Previous research has also discussed how patients will be more likely to use HPV vaccines if healthcare providers recommend this preventative measure (Clark et al., 2015; Lai et al., 2016). Both Cooper et al. (2017) and Franco et al. (2019) supported that men who received information from healthcare providers would also have a higher likelihood of implementing the HPV vaccine process. The current concern is that healthcare providers will typically not discuss HPV-related topics (Catalano et al., 2017). Because HPV is a STD, no one talks about the topic (Amuneke-Nze et al., 2018; Ogunbajo et al., 2016). Burdette et al. (2017) found that only 22% of males in the sample were recommended by healthcare professionals to get the HPV vaccine. Polonijo and Carpiano (2013), Burdette et al. (2017), and Cooper et al. (2017) also all found that racial minorities receive less recommendations from healthcare providers as compared to Whites. Given the current study, along with several other studies, Black males ages 13-17 can be influenced by their emotional attachment toward the vaccine, healthcare provider recommendations, and a lack of knowledge. Therefore, these factors may need to be taken into account to increase the initiation of the HPV vaccine.

Research Question 4

The current study's results suggested Black males ages 13-17 are more likely to consider the influence of possible safety concerns and side effects with regard to initiating the HPV vaccine. The results also suggested Black males ages 13-17 are less likely to initiate the HPV vaccine if they have concerns about its effectiveness. Lastly, the results suggested Black males ages 13-17 are less likely to be influenced by believing the vaccine is unnecessary with regards to initiating the HPV vaccine. The current study's

results help to confirm the results of most of the previous studies. Katz et al., (2016) used interviews to understand ethnic minorities groups' perspectives on barriers related to the HPV vaccine (Katz et al., 2016). Some of the common barrier described were lack of education about the vaccine, fear, and possible side effects. Kepka et al. (2018) got similar results as Katz et al. (2016) after they used a community-based participatory research design to understand more about different ethnic minorities' perceptions of the HPV vaccine in Utah. The results supported the main three reasons for not being vaccinated included lack of knowledge, cost, and fear of side effects (Kepka et al., 2018). The results of the studies done by Pitts et al. (2017) and Hirth et al. (2018) led to mixed results because there were students who felt the HPV vaccine could provide protection for themselves and other individuals. However, there were also several students that believed it would lead to stigma from other people, people who felt skeptical about the vaccine, and/or lacked knowledge about the topic to make an informed decision. The study conducted by Benavidez et al (2020) was conducted to examine how the type of source of medical information influenced knowledge of 18-26 -year-old American individuals of HPV-related topics (Benavidez et al., 2020). One the main results was any individual who did not get information from healthcare providers were about 4 times less likely to understand any material related to HPV (Benavidez et al., 2020). Based on these results and the current study's results, there is still miscommunication about the effectiveness, and safety concerns of the HPV vaccine. While the study conducted by Cooper et al. (2018) did not support the current study's results because their subjects suggested they would not get the HPV vaccine primarily due to not believing it is

important, the researchers also suggested more research was needed to provide information on HPV. Overall, the current study, as well as previous research, suggests Black males ages 13-17 can be influenced by their concerns about the vaccine, and more research may be needed about how perception of the necessity of the vaccine influences HPV vaccination initiation rates.

Findings Regarding the Theoretical Framework

Based on the current study's findings and the constructs of the TPB, the TPB does appear to have been an appropriate choice for HPV-related research. An advantage of utilizing the TPB is it looks at behavior from multiple perspectives (Catalano et al. 2017), thus researchers and practitioners can develop interventions to target specific risk factors (Britt & Englebert, 2018; Hirth et al., 2019; Sweeney et al., 2015). The current study looked at how several different factors can influence HPV vaccine initiation rates in ethnic minorities, specifically focusing on Black males ages 13-17. The study took into account the construct of subjective norm in research questions 1 and 2. The study took into account the construct of behavioral intention throughout all of the research questions, and the construct of attitude in research questions 3 and 4. The only construct that was difficult to discuss in this study was perceived behavioral control. However, as discussed in other research, a disadvantage of the TPB is the construct of perceived behavioral control may not necessarily add any significant perspective when conducting research when compared to the other constructs (Britt & Englebert, 2018; Catalano et al., 2017; Wiemken et al., 2015). The other main disadvantages of using the TPB are it assumes everyone will eventually make rational decisions (Hesse & Rauscher, 2016) and is the

TPB focuses primarily on factors at the individual level (Hirth et al., 2019; Wiemken et al., 2015). Given there are still emotional factors that can impact an individual's decision, it is not reasonable to expect all individuals will behave rationally even though getting the HPV vaccine may be an appropriate preventive measure. Also, while the current study does provide information on how Black males ages 13-17 may be influenced individually with regards to initiating the HPV vaccine, the results cannot be generalized to the entire Black community, or any other ethnic group.

Limitations of the Study

The limitations of the study are based on the use of secondary data as the data collection method. The limitations of the study are based on the use of secondary data as the data collection method. When researchers use any archived data, the study is limited to the definitions, values, and variables in the specific data sets since it was not designed for the current research (Dunn et al., 2015). There can also be potential threats to internal validity which include both recall bias and transfer bias while the survey was being conducted by the interviewers (CDC, 2018a; Pannucci & Wilkins, 2010). Recall bias is when the situation changes the subjects' recollections of events, and transfer bias occurs when subjects are lost to follow-up and the investigators must consider whether the associated results would be significantly different than those retained in the study (Pannucci & Wilkins, 2010). The reason recall bias is a threat to internal validity is the subjects had to recall information related to vaccinations (CDC, 2018a). The reason transfer bias is a potential threat even if the parental guardians provided information on their adolescents' healthcare providers, the providers may never follow up with the

interviewers. There is also a potential threat to external validity because of the study design. A cross-sectional observational study involves participants selected based on specific criteria (Setia, 2016), so the findings may not be generalizable to other populations. Lastly, given the study used weighted data during the statistical analyses to consider any potential bias, the significance of the associations between the independent and dependent variables may not be accurate for the target population.

Recommendations for Future Studies

After the results of previous studies and the current study were reviewed, two recommendations for future research stem from this information. Based on research question two, research on how the age of the study population may change the results with regards the influence of sexual behavior on HPV vaccine initiation rates. There were some discrepancies between the current study, and previous research. Based on research question four, more research may be needed about how perception of the necessity of the vaccine influences HPV vaccination initiation rates. There were some discrepancies between the current study, and previous research. Another recommendation for future research is using the same types of influences with other ethnic groups. This research may provide information on factors that significantly impact HPV vaccine initiation rates within several different ethnic minorities.

Implications

The study can provide insight into the factors that have led to the significant differences between men and women in terms of in terms of HPV vaccination adherence. The results can also provide information to future researchers on factors that should be

considered to increase current vaccination rates in the male population. The potential practical application is healthcare providers could improve how vaccinations are being presented to their patients to increase adherence to this preventative measure.

The first social change implication would be to help expand knowledge on how social and cultural differences change an individual's perspective. For instance: The results of the studies done by Pitts et al. (2017) and Hirth et al. (2018) led to mixed results because there were students who felt the HPV vaccine could provide protection for themselves and other individuals. However, there were also several students that believed it would lead to stigma from other people, people who felt skeptical about the vaccine, and/or lacked knowledge about the topic to make an informed decision (Hirth et al.,2018;Pitts et al.,2017). Similarly, the results of Polonijo et al., (2016) showed statistical significance in terms of racial minorities seemed to be more willing to vaccinated than Whites for HPV, but their circumstances made it impractical to get the vaccine. The current study's results further suggested how an individual's perspectives and circumstances can potentially influence decisions related to healthcare. Specific to the target population, Blacks still have one of the highest HPV-related complication rates (Fu et al., 2019; Pierre-Joseph et al., 2015; Staples et al., 2018). The study's results would help provide knowledge on the types of factors that influence the Black male adolescent population and potentially use them to encourage healthier decisions. From a broader perspective, a potential way to use the study's information for social change would be to encourage individuals to be more receptive and understanding of other people's point-of - view.

The other potential social change implication is to develop awareness about gender-related bias regarding vaccinations. This type of bias refers to not providing the same healthcare opportunities to populations based on gender. The current HPV vaccines show signs of gender bias due to primarily being given to females as a preventive measure to reduce the chance of developing cervical cancer (Daley et al., 2017). Current research supports males are also impacted by HPV, yet this group is significantly less likely to be suggested to get this preventative measure (Daley et al., 2017). The study can provide social change in terms of providing awareness that our current vaccination programs inaccurately describe the true benefits of HPV vaccines.

Conclusion

HPV will affect about 14 million people and leads to an estimated 19,400 women and 12,100 men getting cancer each year (CDC, 2019a). Vaccines have been developed to reduce the prevalence of HPV-related complications up to 86% (CDC, 2019b), yet the disease continues to be a current public health concern. The researchers of previous related studies suggested a topic that needed to be further researched is the HPV vaccine is not advertised as a gender-neutral vaccine. As of 2014, 60.0% of girls began the 3-dose HPV vaccine series as compared to 41.7% of boys in the United States (North & Niccolai, 2016). As of 2015, there was only an estimated 49.8% of males who have initiated the HPV vaccine process, and about 28% who completed the recommended doses (Stanley et al., 2018). The reason for this significant difference in vaccine initiation is related to evidence that supports gender bias has occurred since the development of the HPV vaccine. Racial minorities have had a similar issue in that there is evidence

supporting compared to Whites, other racial groups are significantly less likely to get the HPV vaccine (De & Budhwani, 2017; Niccolai et al., 2011; Polonijo & Carpiano, 2013). The study provided insight into factors that have led to this form of bias associated with the HPV vaccine due to specifically focusing on Black adolescent males ages 13-17. Many of these factors related to not being given the same information about the vaccine, not being given recommendations from healthcare providers, and not considering potential cultural differences with regards to healthcare. Overall, this study can provide important information to assist healthcare practitioners determine more appropriate methods to advertise the benefits of the HPV vaccine to underrepresented populations.

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