

HUMAN PAPILLOMAVIRUS VACCINE KNOWLEDGE, BELIEFS, ATTITUDES, AND  
BARRIERS: AN EDUCATIONAL INTERVENTION FOR MALE COLLEGE STUDENTS TO  
INCREASE KNOWLEDGE, VACCINE INTENT, AND VACCINE UPTAKE

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**Title**

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## ABSTRACT

Human papillomavirus (HPV) is the most common sexually transmitted infection in the United States. When the virus does not spontaneously resolve, HPV infections can develop into papillomas or cancers (CDC, 2020d). While interventions promoting the HPV vaccine as a means to prevent cervical cancer have been successful, HPV-related cancer in men has been commonly overlooked. Current data shows low rates of HPV immunization for young adult males in North Dakota (NDIIS, 2020).

To address this low uptake, an intervention was designed to address the following clinical question: In college males ages 18 to 26, will the provision of education regarding HPV and the HPV vaccine increase the knowledge, vaccine intent, and initiation of the HPV vaccine series within two months at NDSU? The purpose of this educational intervention project is to (a) increase knowledge regarding HPV and the HPV vaccine and (b) promote increased HPV vaccination uptake among college males ages 18 to 26 at NDSU.

This intervention occurred in the online space, using VoiceThread as the educational module and Qualtrics for pre- and post-intervention surveys. Undergraduate students enrolled in a human biology course were invited to complete the surveys and module. The target sample analyzed in this project was college males ages 18 to 26. The surveys were designed to assess knowledge, beliefs, attitudes, and barriers to HPV and HPV vaccination.

Results of this study indicated that 100% of previously unvaccinated males intended to receive the HPV vaccine following the education. An increase in knowledge and awareness of HPV and the belief that the HPV vaccine is safe and effective was also observed. Two months following the intervention, one participant indicated he had obtained the vaccine while three participants indicated they plan to receive it in the future.

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## LIST OF ABBREVIATIONS

CIN2.....	Cervical intraepithelial neoplasia, subtype 2.
VaIN2.....	Vaginal intraepithelial neoplasia, subtype 2.
VaIN3.....	Vaginal intraepithelial neoplasia, subtype 3.
VIN2 .....	Vulvar intraepithelial neoplasia, subtype 2.
VIN3 .....	Vulvar intraepithelial neoplasia, subtype 3.

## **CHAPTER 1: INTRODUCTION**

### **Background**

Human papillomavirus (HPV) is currently the most common sexually transmitted infection in the United States (Centers for Disease Control and Prevention [CDC], 2020a). In fact, HPV is so common that nearly all sexually active American men and women will contract at least one strain of the virus at some point in their lives. Approximately 79 million Americans, most in their late teens and early 20s, currently have an HPV infection (CDC, 2019a). The CDC estimates that 14 million Americans will be infected each year (CDC, 2020a).

HPV is transmitted through skin-to-skin contact via sexual intercourse such as through having vaginal, anal, or oral sex with a person who carries the virus (CDC, 2020a). Infection typically occurs soon after first sexual activity (CDC, 2020d). HPV can also be spread from one body site to another through mechanisms such as front-to-back wiping in females (CDC, 2020d; Simpson et al., 2016). Rarely, HPV can be transmitted from mother to infant during vaginal delivery which can result in juvenile-onset recurrent respiratory papillomatosis (CDC, 2020d). Most people who are infected with HPV do not show any signs or symptoms for many years (CDC, 2019a). HPV can be spread even when an infected person is asymptomatic (CDC, 2019a).

Nine out of ten times, an HPV infection will clear spontaneously (CDC, 2020a). When the virus does not clear on its own, HPV infections can develop into anogenital papillomas or warts, recurrent respiratory papillomatosis, cervical precancers, and cervical, anal, vaginal, vulvar, penile, or oropharyngeal cancers (CDC, 2020d). HPV-related cancers often take years to decades to develop after a person contracts the virus (CDC, 2019a).

HPV is made up of a group of small, double-stranded DNA viruses which infect epithelial tissue (CDC, 2020d). Over 200 types of HPV have been identified. High-risk HPV

types (16, 18, 31, 33, 45, 52, 58, and others) act as carcinogens and contribute to cancers. Low-risk HPV types (6, 11, and others) develop into benign lesions or papillomas.

Prior to the availability of the HPV vaccine, approximately 350,000 patients sought care for genital papillomas each year (Morris, 2019). Benign anogenital papillomas, known as condyloma cuminatum, are most often caused by HPV types 6 and 11. Endocervical or anal papillomas caused by HPV types 16 and 18 are flat and are often difficult to see and diagnose. Visible anogenital papillomas are often soft, moist, pink or gray, and raised. Most of these papillomas are asymptomatic, but can sometimes present with itching, burning, or irritation. They may be found under the foreskin, on the coronal sulcus, within the urethral meatus, on the penile shaft, around the anus, or in the rectum in males. In females, genital papillomas are most commonly seen on the vulva, cervix, perineum, and vaginal wall. Genital papillomas may resolve without treatment, or they may require mechanical removal or topical treatments with antimitotic agents, caustics, or interferon inducers.

HPV-related cancers can affect the cervix, vagina, vulva, penis, anus, and back of the throat (CDC, 2020b). HPV is estimated to cause 35,900 new cases of cancer in American men and women each year (CDC, 2020c). Every year in America, there are 11,000 new cases of cervical cancer, 196,000 cervical precancers, 14,000 oropharyngeal cancers, 6,500 anal cancers, 3,500 vulvar and vaginal cancers, and 900 penile cancers (CDC, 2020c). HPV is responsible for approximately 91% of cervical cancers, 91% of anal cancers, 75% of vaginal cancers, 70% of oropharyngeal cancers, 69% of vulvar cancers, and 63% of penile cancers (CDC, 2020d). Currently, the only widely-used screening tool for an HPV-related cancer is the Papanicolaou (Pap) test which screens for cervical cancer (CDC, 2020b). However, the remaining five types of

HPV-related cancers do not have routine screening tests and may remain undetected until serious health problems arise (CDC, 2020b).

Methods to avoid HPV and prevent HPV-related cancers include vaccination, routine cervical cancer screening, and limiting sexual exposure. Safety techniques such as consistent condom or barrier use, abstinence, and monogamy may reduce the risk for HPV transmission (CDC, 2019a). The Pap test is recommended for females beginning at age 21 to detect precancerous changes in cervical cells (CDC, 2020d). Cervical cancer was once the leading cause of death from cancer in women in the United States (CDC, 2020b). Through Pap tests and treatments for cervical neoplasia, most cases of and deaths from cervical cancer are preventable today (CDC, 2020d). Finally, immunization is an effective method to prevent HPV-related cancers. The CDC estimates that routine HPV vaccination could prevent over 90% of cancers caused by HPV every year (CDC, 2020c).

### **HPV Vaccine Information**

Three HPV vaccines have been developed, including the quadrivalent vaccine (Gardasil), 9-valent vaccine (Gardasil 9), and bivalent vaccine (Cervarix) (Cox & Palefsky, 2020). The quadrivalent vaccine targets HPV types 6, 11, 16, and 18. The bivalent vaccine targets HPV types 16 and 18. Only the 9-valent vaccine (Gardasil 9) is available in the United States today, which targets HPV types 6, 11, 16, 18, 31, 33, 45, 52, and 58. While the quadrivalent and bivalent HPV vaccines are licensed, they are not currently distributed in the United States.

The 9-valent HPV vaccine utilized recombinant DNA technology to prevent infection from HPV types 6, 11, 16, 18, 31, 33, 45, 52, and 58 (CDC, 2020d). Recombinant vaccines, also known as subunit vaccines, utilize a specific antigen within the DNA of a virus to produce a response within the human immune system (National Institute of Allergy and Infectious Diseases

[NIAID], 2019). The antigen used in the 9-valent HPV vaccine is the L1 major capsid protein of HPV (CDC, 2020d). The L1 proteins have the capability to self-assemble into virus-like particles which are noninfectious and non-oncogenic because they do not contain the genetic material needed for HPV to replicate inside the cells (CDC, 2020d; NIAID, 2019). Once injected however, these virus-like particles will stimulate the body to produce its' own antibodies (National Cancer Institute, 2019). Therefore, once a person encounters these 9 viruses in the future, the body will know how to fight them off before they develop into a papilloma or a cancer.

In 2006, the quadrivalent HPV vaccine was approved for females ages 11 to 12 with catch-up recommendations for all females up to age 26 to prevent cervical cancer (Lee et al., 2018). In 2009, this recommendation was extended to include males. In 2009, the bivalent vaccine was licensed, and in 2014 the 9-valent vaccine was licensed (CDC, 2020d). Today, the 9-valent HPV vaccine is available for all males and females ages 9 to 45 with recommendation for completion at ages 11 to 12 or prior to an individual's sexual debut (CDC, 2019b).

The Advisory Committee on Immunization Practices (ACIP) does not routinely recommend catch-up vaccination for adults older than 26 years of age (Meites et al., 2019). Rather, they recommend that the decision to vaccinate be made on an individual basis. However, the ACIP recognizes that HPV vaccination for previously unvaccinated adults ages 27 to 45 years old may be beneficial, and the decision to vaccinate should be made on an individual basis based on likelihood of prior exposure and future risk of exposure to HPV. HPV vaccines are not currently licensed for use in persons older than 45 years of age.

For individuals younger than 15 years old, the HPV vaccine series may be given in two doses at least six months apart (Cox & Palefsky, 2020). For those who start the HPV vaccine

series at 15 years or older, three doses should be given at 0, 1 to 2 months, and at 6 months. Patients who are immunocompromised should receive the three-dose schedule regardless of age. It is recommended for children with a history of sexual abuse or assault to begin the HPV vaccine series as early as possible at age 9 (CDC, 2020d).

Case reports have shown that certain health care workers may be at an increased risk for HPV-related disease based on occupational exposure (Harrison & Huh, 2020). While data is limited, the American Society for Colposcopy and Cervical Pathology recommends for health care workers of any age who participate in the treatment of HPV-associated disease (such as those who perform surgical excision or ablation of HPV-associated lesions) to consider HPV vaccination.

The HPV vaccine can be given without any pre-vaccination assessments (CDC, 2020d). No special evaluation for serologic or HPV DNA testing or pregnancy testing is required (Cox & Palefsky, 2020). HPV vaccination is avoided during pregnancy due to limited information regarding safety; however, no increased risk for adverse outcomes have been indicated when inadvertently given during pregnancy (Cox & Palefsky, 2020). This vaccine is safe for breastfeeding females (CDC, 2020d). HPV vaccination is recommended regardless of prior known HPV infection, as it will protect against infection of HPV types which are not already acquired (CDC, 2020d). However, the potential benefit of the HPV vaccine is not as great as it is for those who are vaccinated prior to sexual debut (CDC, 2020d).

The 9-valent HPV vaccine should not be given to anyone with history of severe allergic reaction following a prior dose or those who are severely allergic to yeast (CDC, 2020d). It is recommended to defer vaccination in those with moderate to severe acute illness until symptoms have improved. However, the HPV vaccine is generally well-tolerated.

In a combined analysis report done by Moreira et al. (2016), the safety of the 9-valent HPV vaccine along with associated adverse events were analyzed. This report utilized 7 phase III studies with a total of 15,875 participants. The analysis showed the most common adverse effects following the 9-valent HPV vaccine to include mild to moderate injection site reactions such as pain, swelling, and erythema. The most common systemic effects related to the vaccine included headache and fever. Serious adverse effects occurred in less than 0.1% of recipients, with infection and infestation occurring most frequently (15 participants). No vaccine-related deaths were seen, nor were any anaphylactic reactions due to the vaccine reported. Overall, the 9-valent HPV vaccine was shown have a favorable safety profile.

HPV types 16 and 18 are shown to cause about 70% of cervical cancers (Arbyn et. al, 2018). Within large randomized controlled trials, the various HPV vaccines have been shown to reduce cervical intraepithelial neoplasia and adenocarcinoma in situ (Arbyn et al., 2018). Additionally, the 9-valent HPV vaccine has been shown to reduce the incidence of vaginal and vulvar intraepithelial neoplasia (Joura et al., 2015). Specifically, a randomized trial comparing the 9-valent vaccine to the quadrivalent vaccine, the 9-valent HPV vaccine was shown to prevent infection and disease related to HPV types 31, 33, 45, 52, and 58 (not targeted in the quadrivalent vaccine) in addition to generating an antibody response to HPV types 6, 11, 16, and 18 (Joura et al., 2015).

Data regarding the impact of 9-valent HPV vaccination on anal intraepithelial neoplasia (AIN) and anal cancers is limited. However, the majority of anal cancers in both males and females are related to HPV types 16 and 18, so a beneficial impact of HPV vaccination to prevent AIN and anal cancer is suggested (Cox & Palefsky, 2020). In a randomized, placebo-controlled, double-blind trial of over 4,000 HPV-naïve males ages 16 to 26, the quadrivalent



HPV vaccine (which also targets HPV types 16 and 18) was shown to be 90% effective at preventing external genital papillomas (Guiliano et al., 2011).

HPV is thought to cause 70% of oropharyngeal cancer in America (CDC, 2020e). While it has not yet been evaluated whether HPV vaccination truly prevents HPV-related oropharyngeal cancer, it is hypothesized to provide protection based on the knowledge that the vaccine protects against the types of HPV that can cause oropharyngeal cancers. In a cross-sectional study by Chaturvedi et al. (2018), the prevalence of oral infections with HPV types 16, 18, 6, and 11 was significantly reduced in HPV-vaccinated individuals.

In the past 10 years, data has shown that the HPV vaccine has provided lasting protection against close to 100% of HPV-associated precancers and genital papillomas (CDC, 2016). It is highly immunogenic, producing an antibody response to each covered HPV type within one month of vaccination in more than 98% of recipients (CDC, 2020d). In fact, the 9-valent HPV vaccine was shown to be 97% effective for preventing CIN2, VIN2 or 3, VaIN2 or 3 associated with HPV types 31, 33, 45, 52, and 58 in those who were HPV-naïve (Cox & Palefsky, 2020). While further studies are needed to determine the precise duration of protection of the HPV vaccine, ongoing monitoring has shown vaccine effectiveness above 90% for at least 10 to 12 years after vaccination (CDC, 2020d).

### **Significance**

A Healthy People 2030 goal is to increase vaccination rates (2020). Within this Healthy People 2030 goal, a subgoal is to increase the proportion of adolescents aged 13 through 15 who receive recommended doses of the HPV vaccine to 80%. Further, the authors of Healthy People 2030 seek to increase the proportion of adults age 19 years and older who get recommended

vaccines. Current data indicates that neither North Dakota nor the nation are in alignment with these goals.

Despite ample evidence supporting the efficacy and safety of the HPV vaccine, uptake within the young adult population remains low. The CDC estimates that 48.5% of American females and 13.5% of American males ages 19 to 26 years old have received at least one dose of the HPV vaccine (CDC, 2016). The North Dakota Immunization Information System (NDIIS, 2020) indicates that only 8.46% of females and 6.15% of males ages 18 to 26 have up-to-date HPV immunization status in North Dakota (Appendix E).

Of importance to note is the disparity between vaccination rates between males and females within these statistics. A study done by Daley et al. (2016) suggested that this gender variability “illustrates the feminization process that situates HPV as a concern only for females” (p. 983). When the HPV vaccine first became available to the public in 2006, it was heavily marketed as a way to prevent cervical cancer. This marketing limited the discussion of HPV prevention to a female audience and contributed to the creation of a social construct identifying HPV as a woman’s health issue.

Initial discussions regarding the HPV vaccine suggested that female-only vaccination could protect males through herd immunity (Daley et al., 2016). This put into question the cost-effectiveness of adding male vaccination, creating a controversy surrounding the practical need for male HPV vaccination. However, the idea of female-only vaccination does not account for the low vaccination rates among females and ignores the possibility of HPV transmission between men who have sex with men. Furthermore, there was a delay in scientific evidence regarding HPV-related cancer in males. Together, the delay in research and question of practicality regarding male HPV vaccination resulted in a lag between female and male HPV

vaccine licensure. Unfortunately, this lag created a gap in vaccination rates between males and females that still exists today.

Paradoxically, young adult men are one of the highest-risk groups for contracting HPV as this is a time when sexual debut commonly occurs (Catalano et al., 2017). Additionally, there are no widely used screening tools for HPV-related cancer in males, contributing to advanced illness at time of diagnosis. While many interventions exist among the literature to promote the uptake of the HPV vaccine among children and females, young adult males have been commonly overlooked. Overall, college males represent an important catch-up population to target for HPV prevention. This project was tailored to the young adult male population and aimed to promote greater HPV knowledge and motivate participants to seek HPV vaccination among male North Dakota State University (NDSU) students. Male students ages 18 through 26 were the target audience for this intervention.

### **Problem Statement**

The clinical question formulated was: In college males ages 18 to 26, will the provision of education regarding HPV and the HPV vaccine increase the knowledge, vaccine intent, and initiation of the HPV vaccine series within two months at NDSU?

### **Purpose**

The purpose of this educational intervention project was to (a) increase knowledge and awareness regarding HPV and the HPV vaccine and (b) increase intent to initiate the HPV vaccine series among NDSU college males ages 18 to 26.

### **Objectives**

The project objectives were as follows, targeted towards college males ages 18 to 26 who attend NDSU:

1. Assess beliefs, attitudes, and barriers associated with HPV vaccination in this cohort.
2. Increase knowledge surrounding HPV and the HPV vaccine by 50% through an online educational module measured via pre- and post-intervention surveys.
3. Increase awareness of HPV and the HPV vaccine through an online educational module.
4. Motivate participants to seek HPV vaccination after education, measured through intent to vaccinate.

## **CHAPTER 2: LITERATURE REVIEW AND THEORETICAL FRAMEWORK**

### **Literature Review**

Guided by the problem statement, an extensive literature search was conducted between October 2019 and December 2020 to determine influential factors for the suboptimal HPV vaccination rates in young adult college males along with educational intervention methods that may best promote it's increased uptake. The databases searched included Cochrane Database of Systematic Reviews, the Cumulative Index to Nursing and Allied Health Literature (CINAHL), and PubMed. The searches were limited to years 2015 through 2020. Search criteria included peer-reviewed, full-text journal articles in the English language. A secondary search of reference lists was also conducted.

### **Influences on Vaccination**

In attempt to describe the gender disparity affecting HPV vaccine uptake in males, several studies have been done. Lee et al. (2018) analyzed data from the 2015 College Student Health Survey and discovered significant characteristics of college males aged 18 to 26 who were most likely to have received the HPV vaccinations. These characteristics include being younger in age, having at least one parent with a graduate degree, having initiated sex, and being enrolled in a private 4-year educational institution. In a similar study done by Fuller and Hinyard (2017), characteristics of men ages 18 to 26 who were most likely to receive HPV vaccination included having health insurance, having a primary doctor, and receiving an HIV test. These characteristics have vague connections to cause for vaccination, and research is limited to interpretation regarding why these factors should cause increased HPV vaccination coverage. Among the existing literature, commonalities between young adult males who have not received the HPV vaccine included a lack of knowledge and awareness regarding HPV and the HPV

vaccine along with apathetic or dismissive attitudes about the contagiousness and severity of HPV.

### ***Knowledge and Awareness***

A barrier to adequate HPV vaccination in males that is common today is a lack of knowledge and awareness regarding HPV and the HPV vaccination. In a study done by Johnson and Ogletree (2017), 55.8% of male college students had not heard of HPV and 60% had not heard about the HPV vaccine. Among a sample of 256 males ages 18 to 26 who attended college at a public southeastern university and had not previously been vaccinated for HPV, one-third of the subjects reported that they had never heard of HPV and half reported they had never heard of the HPV vaccine (Catalano et al., 2017).

Pitts, Stanley, and Kim (2017) studied a cohort of college males ages 18 to 39 and attempted to uncover their HPV health beliefs and barriers to HPV vaccination. The most significant barrier to HPV vaccination for this group was the perception that it was “too late” to get the vaccine given the participants’ older age and prior sexual activity. This further reflects lack of knowledge and awareness in this population.

### ***Attitudes***

Along with increased education on HPV-related facts, a focus on changing the attitude surrounding HPV and HPV vaccination is necessary to improve HPV vaccination in the college male population. Many subjects in the study by Pitts et al. (2017) had apathetic or dismissive attitudes about the contagiousness and severity of HPV. Several students described that they wouldn’t see a healthcare provider unless they were sick or symptomatic, and following through with the HPV vaccine was frequently described as an inconvenience. In a study of college men

by Catalano et al. (2017), attitude was found to be a statistically significant predictor of the men's intention to receive the HPV vaccine series in the upcoming year.

Indifferent attitudes and lack of knowledge is not the only barrier to increasing the HPV vaccine uptake in this population. A study done by Lanning et al. (2017) found that HPV knowledge did not independently contribute to vaccination rates among 200 first- and second-year college students. The most influential factor for a student being vaccinated was community or organizational factors such as physicians, mothers, and fathers. This is supported in Johnson's and Ogletree's study (2017) where they found subjective norms such as social pressure was the strongest predictor of behavioral intention to be vaccinated against HPV.

In a review done by Sisson and Wilkinson (2019), school nurse education and attitude toward HPV vaccination was integral to increasing HPV vaccine uptake. This review was inspired by the United Kingdom (UK) where HPV vaccine uptake is at 88% for all required doses among females. The authors discovered that school nurses in the UK have played an active role in the delivery and promotion of the HPV vaccine. This review supports that while motivating factors for vaccination is multifactorial, "health-care provider recommendations were instrumental to increasing uptake" (p. 46). School nurses were found to be an influential motivation in young peoples' decision regarding HPV vaccination. This further supports the proposed intervention involving a nurse-led, school-based educational activity to promote the HPV vaccine.

### **Recommendations for Educational Intervention**

The existing literature regarding HPV and HPV vaccination education is largely focused on parents of adolescent girls. Unfortunately, studies in which young adult males are the target of educational efforts are limited. The majority of studies found through this literature review did

not provide a conclusive answer to addressing the low HPV vaccination rates for this population. However, these articles do provide valuable insight as to how future interventions could be more effective for increasing HPV vaccine uptake in college males ages 19 to 26.

Recommendations in the literature to improve college males' HPV vaccination rates involved focusing educational efforts on anticipated regret, promoting awareness of HPV severity and prevalence, and utilizing interactive educational methods directed at changing health beliefs and attitudes.

### *Anticipated Regret*

Results of a study by Christy et al. (2015) showed that “anticipatory emotions may play a more central role in decision-making regarding HPV vaccination than cognitions related to vaccination” (p. 437). In a survey of unvaccinated undergraduate students, anticipated regret of not receiving the HPV vaccine and then later developing an HPV-associated cancer was significantly associated with HPV vaccine intentions in males. Interestingly, this association was not consistently found in the female population in this study.

Overall findings of this study suggest that focusing educational efforts on “heightening awareness of the severity of HPV-related disease may result in a greater anticipated regret associated with forgoing HPV vaccination” (Christy et al., 2015, p. 437). In this way, male intent for receiving the HPV vaccine could be increased. Further research is needed to determine if this strategy could increase actual HPV vaccine uptake.

Hirth et al. (2018) conducted interview to determine perceptions and barriers to HPV vaccination in college students. Similar to Christy et al. (2015), Hirth et al. (2018) found anticipation of regret to be a high motivator for HPV vaccination. Other significant motivators included having help making appointments and vaccine availability on campus. Further, Hirth et



al. (2018) found that students were frequently unaware of how serious and persistent HPV can be along with its associated cancers.

### ***Awareness of HPV Severity and Prevalence***

In a cross-sectional survey of college students in South Carolina, significant knowledge gaps surrounding basic HPV pathology were found to be prevalent despite high awareness of HPV (Kasymova et al., 2018). Over 90% of participants reported awareness of HPV and the HPV vaccine. Despite high awareness, there were prevalent patterns of knowledge gaps regarding HPV, particularly for males. Participants commonly did not know that there was a lack of male screening available for HPV, and that HPV may cause penile cancer. Only 15% of participants correctly indicated that almost all sexually active individuals will contract HPV at some point.

Overall, there was a lack of awareness of the severity of HPV for participants in this study (Kasymova et al., 2018). Additionally, most of students in this study perceived their own risk for acquiring HPV to be low. Conclusively, this study confirms the need to improve HPV knowledge for college-aged individuals with a focus on the severity and prevalence of the disease.

### ***Educational Methods and Attitude Change***

A study by Mehta et al. (2016) also found that a high perceived severity of HPV was a positive predictor of the HPV vaccine's acceptability. This study utilized a multi-modal educational intervention strategy in its attempt to increase HPV vaccination in college men between the ages of 18 and 25. They utilized PowerPoint presentation, role plays, brain storming sessions, and group discussion within a two-hour experimental education program. This experiment resulted in an improved vaccine acceptability and an increase in the participants

intent to vaccinate. Overall, results of this study suggest that interactive educational methods that promote self-efficacy, address barriers, and discuss HPV severity could increase the vaccine's uptake.

Along with self-efficacy, attitude surrounding an idea has also been shown in the literature to affect vaccine uptake. A study by Catalano et al. (2017) showed that attitude was a statistically significant predictor of behavioral intention to receive the HPV vaccine series in the next 12 months. This study suggests that interventions to improve the HPV vaccine series completion should emphasize the efficacy, safety, and necessity of the HPV vaccine.

### ***Electronic Interventions***

In a study by Richman et al. (2016), electronic messaging was used to remind patients of their upcoming vaccine appointments with the goal of increasing HPV vaccine completion. Following low initial recruitment numbers, this study provided the HPV vaccine at no cost to interested students. The study participants included 264 males and females between the ages of 18 and 26 who attended a university in a rural part of North Carolina.

Over seven months, educational messages and appointment reminders were sent to students in the intervention group. Participants in the control group were simply provided with a paper card with the next appointment date. Surprisingly, the intervention group's completion rate was not significantly higher than those in the control group. However, a secondary assessment observed was an increase in participants' knowledge of HPV and the HPV vaccine associated with the group who received the electronic messages.

McRee et al. (2018) also conducted a web-based intervention to provide education about the HPV vaccine. In this study, a national sample of 150 young gay or bisexual men ages 18 to 25 who had not received the HPV vaccine were recruited via Facebook to participate in an online

education module titled “Outsmart HPV.” This module included education about HPV, the HPV vaccine, additional resources, and a vaccination plan. It included infographics and visual formats. Data from participants who completed “Outsmart HPV” was compared with participants who simply viewed a vaccine information statement from the CDC.

Despite all participants being unvaccinated, this group did initially show moderately high knowledge about HPV and the HPV vaccine (McRee et al., 2018). This study did show that the online module had positive effects on several attitudes and beliefs surrounding HPV vaccination. This suggests that visual, interactive learning formats may lead to better recall and acceptability of material related to HPV in this population. The effect on actual vaccination rates were not studied, so it is not possible to infer the impact that the education had on intention to vaccinate or vaccination rates.

## **Summary**

Overall, this review of literature has shown that there is a need for further research to better understand the direct effect of education on college males’ HPV vaccine uptake. Most of the current literature suggests that reasons for low vaccination in this population is multi-factorial. Therefore, one could conclude that a successful intervention should also be multi-factorial. In congruence with the literature, educational efforts should be interactive and focus on the severity of HPV.

## **Theoretical Framework**

Nola Pender’s Health Promotion Model (HPM) was the guiding theoretical framework utilized in this project. Permission was granted to use this model as the theoretical framework for this project was granted on November 29<sup>th</sup>, 2020 (Appendix D) The purpose of the HPM is to “assist nurses in understanding the major determinants of health behaviors as a basis for

behavioral counseling to promote healthy lifestyles” (Pender, n.d., p. 2). This model first appeared in nursing literature in 1982 and was revised in 1996 (Pender, n.d.). The HPM’s theoretical roots are based on the Expectancy Value Theory in which actions are taken to achieve a valued outcome and the Social Cognitive Theory which states that a person must alter the way they think in order to create a behavior change (Pender, n.d.).

Key concepts which form the basis of the HPM include the person, environment, nursing collaboration, health, and illness (Pender, n.d.). The central focus of the HPM is on eight beliefs which are assessed by the nurse and used to assist a client in changing behaviors. These eight beliefs include:

1. Perceived benefits of action
2. Perceived barriers to action
3. Perceived self-efficacy
4. Activity-related affect
5. Interpersonal influences
6. Situational influences
7. Commitment to the plan of action
8. Competing demands and preferences of the patient

Furthermore, the HPM is based on 14 theoretical propositions which provide a basis for investigative work on health behaviors (Pender, n.d.):

1. Beliefs, affect, and adoption of a health-promoting behavior is influenced by previous behaviors as well as inherited and acquired personal characteristics.
2. People will engage in behaviors from which they believe they will benefit.

3. Perceived barriers can inhibit a person's commitment to behavior change and drive other behaviors.
4. Perceived self-efficacy increases the likelihood that a person will commit to and perform a behavior.
5. Perceived self-efficacy leads to a decreased perception of barriers to conducting a behavior.
6. A positive attitude towards a behavior leads to improved perception of self-efficacy.
7. Association between positive emotions and a behavior increases the probability of commitment to and action towards that behavior.
8. People are more likely to engage in health-promoting behaviors when a significant other engages in, is expectant of, and enables the behavior.
9. Interpersonal influence by family, peers, and health care providers can contribute to an individual's engagement in health-promoting behavior.
10. Situational influences can contribute to an individual's participation in health-promoting behavior.
11. The greater the commitment to a health-promoting plan of action, the more likely this will occur over time.
12. When competing demands require immediate attention, commitment to a health-promoting plan is less likely to result in the desired behavior.
13. When other actions are more attractive, commitment to a health-promoting plan is less likely to result in the desired behavior.

14. People are able to alter their own thoughts, affect, interpersonal influences, and situational influences to create an environment conducive to health-promoting behavior.

The HPM is clearly connected to the clinical project and was utilized in the selection of educational materials and questions within the pre- and post-intervention surveys. To facilitate a behavior change such as seeking HPV vaccination, the nurse must understand how people are motivated or inhibited from making behavior changes (Pender, n.d.). In order to increase the uptake of the HPV vaccine, the nurse must anticipate the 14 theoretical propositions individualized to this cohort. Addressing the 8 beliefs will allow the nurse to better promote the HPV vaccine.

In this project, the VoiceThread presentation and supplemental vaccination plan handout strategically targeted the motivators discussed in the HPM. Addressing the first belief from the HPM (Pender, n.d.), the educational materials in this intervention focused on the benefits of receiving the HPV vaccine, such as the prevention of cancer and genital warts. The handout addressed the seventh belief (Pender, n.d.) in which a commitment to the plan of action was promoted through the use of a simplified vaccination plan.

The HPM (Pender, n.d.) was also used to guide the questions from the pre- and post-survey questionnaires. In acknowledgement of the first theoretical proposition, questions 14, 15, 16, and 17 within the pre-intervention survey addressed how previous behaviors (beliefs surrounding all vaccines) may influence the adoption of a health-promoting behavior (obtaining the HPV vaccine). The pre-survey question 13 assessed for a participant's perceived self-efficacy for making safe choices about his sexual health which addresses Pender's third belief. The pre-survey question 12 was used to assess for a participant's perceived risk for getting HPV, which is

based on Pender's second theoretical proposition, "people will engage in behaviors from which they believe they will benefit" (Pender, n.d.).

In acknowledgement of the third theoretical proposition of the HPM (Pender, n.d.), perceived barriers can inhibit a person's behavior. The pre-intervention survey questions 21 and 22 assessed for the possible barrier of cost and lack of health insurance and its effect on whether or not a person would receive the HPV vaccine. The VoiceThread module and supplemental handout attempted to limit the audience's believed barriers to vaccination by acknowledging the safety of the vaccine, discussing who should and should not receive the vaccine, educating on how to actually receive the vaccine, and providing resources regarding the financial aspect of receiving the vaccine. Question 14 within the post-intervention survey allowed participants to explain any other reasons why they would not want the HPV vaccine.

As Pender states in her ninth theoretical proposition, "interpersonal influence by family, peers, and health care providers can contribute to an individual's engagement in health-promoting behavior" (Pender, n.d.). The pre-intervention questions 24, 25, and 26 are used to address this aspect of health-promoting influences. Questions 19 and 20 within the pre-intervention survey assesses for a participant's exposure to a healthcare provider and will be utilized to assess Pender's sixth health belief and tenth theoretical proposition regarding situational influences as a contributing factor to a health-promoting behavior. Further discussion regarding the project design will occur within chapter three.

## **CHAPTER 3: METHODS**

### **Overall Project Design**

The project used a cross-sectional survey design distributed electronically to participants immediately before and after the completion of an online educational module. This method helped to rapidly determine the effect of the educational intervention (Melnik & Fineout-Overholt, 2019). The online module included video, text, and speech to appeal to different learning styles along with additional resources. The project included a two-month reassessment survey to assess whether the intervention had an effect on vaccine initiation by applicable participants. The reassessment survey also assessed for the likelihood of receiving the vaccine in the future.

Pre- and post-educational surveys included questions regarding knowledge, awareness, beliefs, and attitudes surrounding HPV and the HPV vaccine. Questions also assessed for potential barriers to vaccination, current vaccination status, beliefs surrounding vaccination in general, and intent to receive the HPV vaccine. Potential contributing factors such as interpersonal influences and relationship with a healthcare provider were also assessed within the pre-survey.

Questions within the pre- and post-intervention survey were compared and address the project objectives as follows:

- Beliefs: Pre-survey questions 12 through 17 and post-survey question 8 through 10.
- Attitudes: Pre-survey question 18 and post-survey questions 11.
- Barriers: Pre-survey questions 21 and 22.
- Interpersonal influences: Pre-survey questions 19, 20, 24, 25, and 26.
- Knowledge: Pre-survey questions 4 through 9 and post-survey questions 1 through 6.



- Awareness: Pre-survey questions 10 and 11 and post-survey question seven.
- Intent to vaccinate: Pre-survey question 23 and post-survey question 12.

This project design builds upon Siebert's (2018) work entitled "Human Papillomavirus Vaccine Knowledge, Beliefs, Attitudes, and Barriers: A College-Based Intervention for Students to Increase Knowledge, Vaccine Intent, and Vaccine Uptake." Permission was granted to use a similar intervention design as well as similar questions from her pre- and post-surveys (Appendix C). Siebert's surveys were developed using a combination of research tools by Barry (2013) and Donadiki et al. (2014), in addition to the Health Promotion Model (Pender et al., 2011). Permission was granted from Barry to utilize and modify her research questions in this project (Appendix D). Permission was granted from Pender et al. to utilize her Health Promotion Model and any related questionnaires for this research project (Appendix D). Donadiki utilized the Health Promotion Model for her questionnaires (2014).

### **Implementation Plan**

The Iowa Model of Evidence-based Practice (2017) was applied to this project to facilitate the development and implementation of this educational intervention project. Permission to utilize this model was obtained and granted from the University of Iowa Hospitals and Clinics on July 30, 2021 (Appendix F). See Appendix H for the application of the Iowa Model to this project.

### **Setting/Recruitment**

The setting for this project was NDSU in Fargo, ND. The implementation site was primarily in the online space. Participants were recruited from Kimberly Booth's Human Biology (BIOL 126) course. Participation was promoted by offering participants a chance to win a \$50 Target gift card in which 2 participants were randomly selected; participants who

completed the module and surveys were also granted extra credit for their Human Biology course. NDSU Student Health was also invited to participate in this project, and they provided feedback for the supplemental handout (Appendix L) and have included the intervention VoiceThread on their website.

### **Sample**

The HPV vaccine is not required for admission to NDSU, so the data regarding the baseline uptake of this vaccine in this specific population is unknown. However, data from the NDIIS (2020) states that only 6.15% of males ages 18 to 26 have up-to-date HPV immunization status in North Dakota. While not all NDSU students may identify as residents of North Dakota, national data also indicates poor uptake of the HPV vaccine by young adult males (CDC, 2016). To target this population of interest, the project was designed with the following inclusion criteria:

1. A current NDSU student in the age range of 18-26 whose sex assignment at birth is male.
2. Able to read and understand English independently.

Participants who are female or who have already received the HPV vaccine series were not excluded from the study. These students were allowed to participate in the educational module to help determine the educational effect of the activity and to promote fairness for the extra credit incentive. However, the two-month reassessment survey was used to determine whether the intervention had an effect on previously unvaccinated male participants' intent to vaccinate. The goal was to reach at least 30 participants for this study.

## **Intervention**

The primary intervention for this project was an online educational module using VoiceThread technology developed to target the college male population with the goal of increasing the knowledge and awareness surrounding HPV and the HPV vaccine and to motivate participants to seek HPV vaccination. The module can be found at the link: <https://ndsu.voicethread.com/share/18108702/>. The module took 10 minutes to complete; its length was selected in order to promote increased participation and attention to the content. Supplemental resources for more in-depth information regarding HPV and the HPV vaccine were provided in the module. A simplified vaccination plan was provided to aid participants in obtaining the HPV vaccine (Appendix L). Qualtrics surveys were completed prior to and after viewing the module to assess if baseline knowledge, beliefs, attitudes, barriers, or overall student intent to receive the vaccine improved after receiving the education. Questions in these surveys can be viewed in Appendices I and J. Student e-mail addresses were collected in a separate final survey, and two months after closure of the project, a reassessment survey was sent to participants who indicate their sex at birth is male, their age range is 18-26, and they had not yet received or started the HPV vaccine series to assess for vaccine initiation (Appendix K).

## **Timeline**

The timeline for project implementation was as follows:

1. Fall 2020: Conduct review of literature.
2. Spring 2021: Evaluate theoretical framework and apply to project.
3. Summer 2021: Create VoiceThread module and Qualtrics surveys.
4. September 2021: Conduct proposal meeting.

5. October 2021: Submit request for project approval by NDSU's Institutional Review Board (IRB).
6. October 2021: Launch online module.
7. December 2021: Begin analysis of pre- and post-intervention surveys.
8. February 2022: Disperse two-month reassessment Qualtrics survey.
9. February 2022: Begin final analysis of project.
10. March 2022: Conduct final defense meeting.

### **Evaluation/Outcomes/Data Analysis**

Both quantitative and qualitative data were collected via the pre- and post-surveys through Qualtrics surveys. The pre-survey and post-survey both contained questions regarding beliefs, attitudes, and barriers regarding HPV and HPV vaccination; this was done to provide a better understanding of this cohort. Knowledge and awareness surrounding HPV and the HPV vaccine were analyzed and compared from the pre- and post-survey questions. Intent to vaccinate was also measured through questions in both surveys. Survey results were acquired anonymously through an anonymous response setting in Qualtrics. The two-month reassessment survey helped determine whether an actual increase in vaccination rates was obtained. A logic model was developed to demonstrate the relationships between the components of this project and is shown in Table 1.

**Table 1***Logic Model*

<b>Inputs</b>	<b>Activities</b>	<b>Outputs</b>	<b>Outcomes</b>	<b>Impact</b>
Graduate Committee Members	Development of “HPV 101” VoiceThread Module and corresponding surveys and supplemental handout	Collect completed pre-surveys	Understanding regarding beliefs, attitudes, and barriers associated with HPV vaccination.	Improved knowledge surrounding HPV and the HPV vaccine.
DNP Student		Collect completed post-surveys		
Clinical Practice Guidelines		Collect completed reassessment surveys	Increased knowledge surrounding HPV and the HPV vaccine by 50%.	Improved awareness of HPV and the HPV vaccine.
Educational Module	Completion of Qualtrics pre-survey	Compare completed pre- and post-surveys to evaluate for objectives met		Improved vaccination intent by this cohort.
NDSU email system/Software (Qualtrics)	Viewing of VoiceThread Module “HPV 101”	Evaluate completed reassessment survey to determine effect on actual vaccine uptake	Increased awareness of HPV and the HPV vaccine.	Improved HPV vaccine uptake by this cohort.
Kimberly Booth’s course <i>Human Biology</i>	Viewing of supplemental HPV Vaccination Plan handout		Participants motivated to seek HPV vaccination.	Improved HPV vaccine uptake by the future children of this cohort.
Participants: Male college students at NDSU ages 18-26.	Completion of Qualtrics post-survey	# of people reached		Long-term: reduce the burden of HPV-related cancer in males.
	Completion of Qualtrics two-month reassessment survey			
	Sharing the VoiceThread with Student Health to further disseminate the education			

## **CHAPTER 4: RESULTS**

### **Survey Response**

The educational VoiceThread module was disseminated to students enrolled in Human Biology, BIOL 126, during the fall semester of 2021 taught by Kimberly Booth. Booth indicated that 227 students were enrolled in this course. The module and surveys were extended to all sexes and genders to promote fairness, as extra-credit for the course was granted upon completion. Responses were collected from October 22, 2021 until December 6, 2021.

A total of 42 students completed the pre-survey. Of those 42, 12 (29%) indicated their sex at birth was male and 30 (71%) indicated their sex at birth was female. Of the 12 males, 10 indicated their age was between 18 and 20 years old, one indicated they were between 21 and 26 years old, and one indicated “other.” There were 29 participants (9 male and 20 female) who completed the post-survey indicating they watched the VoiceThread module in its entirety, allowing them to be granted extra credit for their course and chance to win a gift card.

The population of interest for this study was college males ages 18-26. Therefore, responses for persons who indicated their sex at birth was not male and whose age range fell out of 18-26 were excluded. Eleven participants meeting inclusion criteria completed the pre-survey and nine completed the post-survey, indicating that two of the eleven participants did not complete the intervention. In question two from the final survey, there were seven students who indicated their sex at birth was male, their age is 18-26, and they have not yet received or started the HPV vaccine series; these students were sent reassessment surveys via the email address they provided. Due to the small sample size of this intervention project, confidence intervals and p-values were not included in the analysis due to lack of statistical significance.

## **Objective One**

Objective one aimed to assess beliefs, attitudes, and barriers associated with HPV vaccination for this cohort. Pre-survey questions 12-17 and post-survey questions 8-10 were designed to evaluate beliefs and attitudes surrounding HPV, sexual health, and vaccines in general; results from these questions are shown in Table 2. Pre-survey question 18 and post-survey question 11, “HPV is contagious and could be life-threatening” intend to measure whether the module created a change in attitude surrounding HPV; these results are also shown in Table 2.

Barriers to vaccination were assessed through pre-survey questions 21 and 22. In question 21, 11 (100%) of respondents indicated that they currently have health insurance coverage. Participants were also asked if cost would influence the decision whether or not to receive a vaccine recommended by a healthcare provider; 7 participants (63.64%) responded saying agree, 3 (27.27%) said disagree, and 1 (9.09%) said unsure.

Interpersonal influences on vaccination are tied to objective one. These influences were measured through questions 19, 20, 24, 25, and 26 from the pre-survey. Results are shown on the graph below.

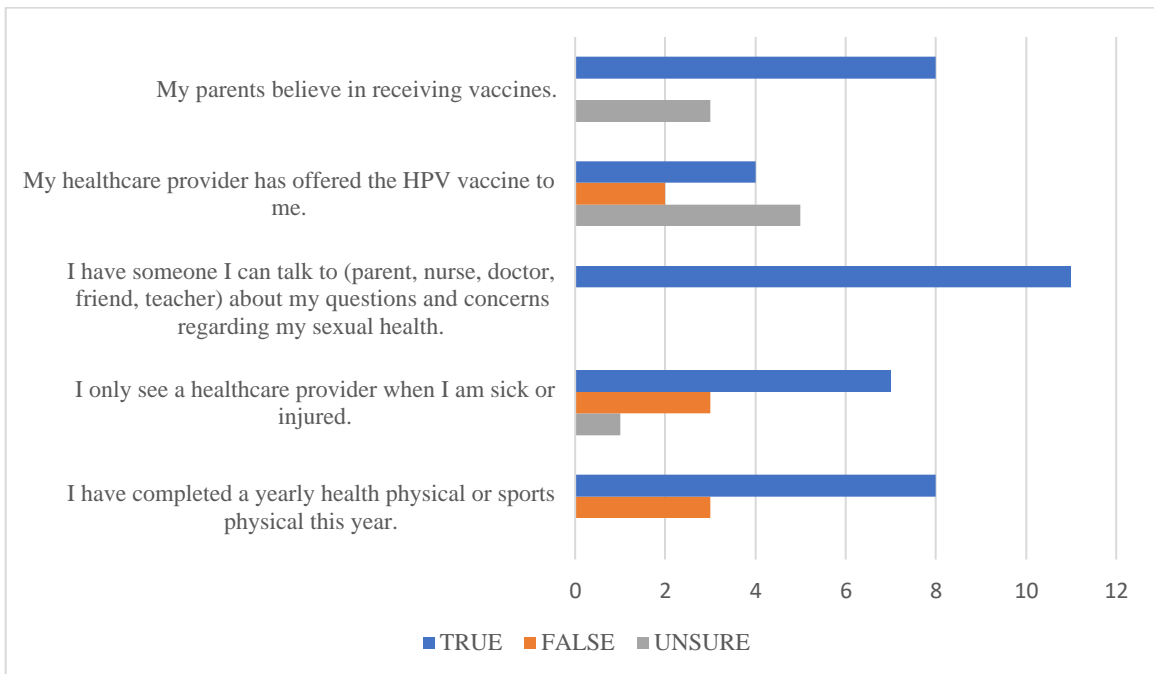
**Table 2**

*Beliefs and Attitudes*

	Pre-survey (n=11)			Post-survey (n=9)		
	Agree	Disagree	Unsure	Agree	Disagree	Unsure
I believe that I could be at risk (now or in the future) of getting HPV.	n=6 54.55%	n=2 18.18%	n=3 27.27%	n=7 77.78%	n=1 11.11%	n=1 11.11%
I have the knowledge and skills to make safe choices about my sexual health.	n=10 90.91%	n=1 9.09%	n=0 0.00%			
I believe that vaccines are effective and prevent diseases.	n=8 72.73%	n=0 0.00%	n=3 27.27%			
I believe that it is better to be vaccinated rather than to get the disease.	n=11 100.00%	n=0 0.00%	n=0 0.00%			
I believe that the HPV vaccine is safe.	n=4 36.36%	n=0 0.00%	n=7 63.64%	n=9 100.00%	n=0 0.00%	n=0 0.00%
I believe that if I receive the HPV vaccine, I will be protected from cancers related to HPV.	n=6 54.55%	n=0 0.00%	n=5 45.45%	n=9 100.00%	n=0 0.00%	n=0 0.00%
HPV is contagious and could be life-threatening.	n=9 81.82%	n=0 0.00%	n=2 18.18%	n=9 100.00%	n=0 0.00%	n=0 0.00%

**Figure 1**

*Interpersonal Influences*





## Objective Two

Objective two aimed to increase knowledge surrounding HPV and the HPV vaccine by 50%. Questions 4-9 of the pre-survey and 1-6 of the post-survey address basic knowledge of HPV and the HPV vaccine. Results are in Table 3. The correct answers have been highlighted within the table; analysis for this objective occurs as a percentage of participant answers.

**Table 3**

### *Knowledge*

	Pre-survey (n=11)			Post-survey (n=9)				
	True	False	Unsure	True	False	Unsure		
Human papillomavirus (HPV) is the most common sexually transmitted infection in the United States.	n=7 63.64%	n=0 0.00%	n=4 36.36%	n=9 100.00%	n=0 0.00%	n=0 0.00%		
Nearly 100% of sexually active people will become infected with HPV at some point in their lifetime.	n=7 63.64%	n=4 36.36%	n=0 0.00%	n=8 88.89%	n=1 11.11%	n=0 0.00%		
If I am infected with HPV, I could get genital warts and/or cancer.	n=7 63.64%	n=0 0.00%	n=4 36.36%	n=9 100.00%	n=0 0.00%	n=0 0.00%		
The highest rates of new genital HPV infections happen in early adulthood.	n=11 100.00%	n=0 0.00%	n=0 0.00%	n=9 100.00%	n=0 0.00%	n=0 0.00%		
	1	2	3	4	1	2	3	4
How is HPV transmitted/passed on? (Select all that apply)	n=5 25.00%	n=4 20.00%	n=1 5.00%	n=10 50.00%	n=7 41.18%	n=1 5.88%	n=0 0.00%	n=9 52.94%
1. Skin-to-skin contact								
2. Contact with infected blood								
3. An infected person coughs or sneezes on another person								
4. Vaginal, oral, or anal sex								
	1	2	3	1	2	3		
Who can receive the HPV vaccine?	n=0 0.00%	n=0 0.00%	n=11 100.00%	n=0 0.00%	n=1 11.11%	n=8 88.89%		
1. Males								
2. Females								
3. All sexes								

### **Objective Three**

Objective three aimed to increase awareness of HPV and the HPV vaccine. Pre-survey questions 10 and 11 and post-survey question 7 were created to measure this objective. Baseline information regarding awareness was obtained in the pre-survey. In pre-survey question 10, 8 participants (72.73%) indicated that they had heard of HPV while 3 participants (27.27%) indicated that they had not. In pre-survey question 11, 5 participants (45.45%) indicated that they had heard of the HPV vaccine, 5 participants (45.45%) indicated that they had not heard of it, and 1 participant (9.09%) indicated that he was unsure. All respondents (9) indicated true to the post-survey question, “I know enough information about HPV and/or the HPV vaccine to decide whether or not I would like the vaccine.”

### **Objective Four**

Objective four aims to motivate participants to seek HPV vaccination after education, measured through intent to vaccinate. This was measured via pre-survey question 23 and post-survey question 12. Question 23 of the pre-survey aimed to discover how many participants had, hadn't, or were unsure whether they had received the HPV vaccine; 2 (18.18%) responded true, 4 (36.36%) responded false, and 5 (45.45%) were unsure. In post-survey question 12, all (6) respondents who have not yet received the HPV vaccine indicated that they intend to receive the HPV vaccine in the future; 3 participants responded to this question that they had already received the HPV vaccine.

### **Participant Feedback**

The open-ended question number 14 of the post-survey allowed students to type a response about why they do or do not want or believe in the HPV vaccine. The following responses were obtained from participants whose sex at birth was male:

- “I believe that a vaccine is proven to be safe, so I am comfortable with receiving this. The video was also very explanatory about the vaccine and the reducing of HPV it can cause.”
- “i [*sic*] believe in the vaccine because there is data behind it to show how effective it is”
- “I will take the HPV vaccine to keep myself safe after learning about it.”
- “I do not want to contract HPV because I learned it can be very dangerous.”

The following responses were obtained from participants whose sex at birth was female:

- “I believe [*sic*] in it, its important to stay protected and have safe sex”
- “I learned more about the vaccine then I originally knew before I got the vaccines”
- “I believe in vaccines period.”
- “One of my friends got dick [*sic*] from the vaccine and now has seizures every day.”
- “I am still unsure because vaccines can have long term effects on people. This disease can also go unnoticed or terminate itself. I also believe in religious exemptions for vaccines.”
- “I already received it when I was younger, at its most basic form its technically a vaccine against cancer- why wouldn't you want it?”
- “I think the information that Shannon shared was very informative and well written. It was short and brief but got the point across.”
- “I believe that it is a beneficial part of trying do [*sic*] develop that herd immunity. There is no harm in receiving it, but there could be harm in not receiving it.”

Post-survey question 13 asks, “How informative did you find the information within the module that you viewed?” This question was graded on a Likert scale. From the male cohort, 2

(22.22%) participants indicated “informative,” and 7 (77.78%) participants indicated “very informative.” From the female cohort, 5 participants indicated “informative” and 16 participants indicated “very informative.” No students from either cohort indicated “not at all” or “slightly” informative.

### **Two-Month Reassessment Survey**

In February 2022, a reassessment survey was sent out to the seven students who indicated their sex at birth was male, their age is 18-26, and they have not yet received or started the HPV vaccine series from question two of the post-survey. These surveys were distributed individually to the email addresses provided in the post-survey. Three reminder emails were sent between February 1, 2022 and February 9, 2022. Six participants completed this reassessment survey.

The first question from the reassessment survey asks, “Did the human papillomavirus (HPV) education provided make you more likely to receive the HPV vaccine?” To this question, three participants answered “yes,” and three participants answered “no.” Question two asks “Have you been vaccinated with at least one dose of the HPV vaccine series since receiving the education?” One participant answered “yes” and five participants answered “no.” The final question from the reassessment survey asks “If you have not received the HPV vaccine yet, do you plan to receive it in the future?” Three participants answered “yes,” one participant answered “no,” one participant answered “unsure,” and one participant indicated “I have received it or started the series.”

## **CHAPTER 5: DISCUSSION AND RECOMMENDATIONS**

### **Summary**

Overall, this educational module had positive feedback from participants, and the objectives proved to be either met or partially met. All respondents indicated that the information within the module was either informative or very informative. The open-ended responses provided by male participants showed favorability in receiving the HPV vaccine in the future. In fact, all previously unvaccinated male respondents indicated that they intend to receive the HPV vaccine in the future after viewing the module. Two months after the project was completed, one respondent indicated he had been vaccinated with at least one dose of the HPV vaccine since receiving the education. The results of this project will be analyzed, and the objectives will be discussed further in this chapter.

### **Discussion**

#### **Objective One**

Objective one intended to assess the beliefs, attitudes, and barriers associated with HPV vaccination in this cohort. These elements have been assessed through evaluation of the pre- and post-intervention survey results. Caution is exercised in drawing inferences from this study due to the small sample size and participant drop-out prior to completion of the post-survey. Through the pursuit of this objective, this study provides data in relation to contributing factors regarding HPV vaccination in this sample.

#### ***Beliefs***

In the pre-intervention survey, 72.73% of participants believed that vaccines are effective and prevent diseases, while 100% believed it would be better to be vaccinated than to get the disease. Pender's first theoretical proposition (n.d.) states "previous behaviors may influence the

adoption of a health-promoting behavior.” Consistent with this proposition, the generally positive response towards vaccines in this group may contribute to the overall positive response and acceptance of the education provided in the module.

This intervention appeared to increase the belief that the HPV vaccine is effective. Prior to viewing the module, 54.55% of respondents answered “agree” to the question “I believe that if I receive the HPV vaccine, I will be protected from cancers related to HPV.” In the post-intervention survey, 100% of respondents agreed to this question. This relates to Pender’s second theoretical proposition (n.d.) which states that “people will engage in behaviors from which they believe they will benefit,” and may positively influence participants’ likelihood to obtaining the HPV vaccine in the future.

This intervention also appeared to increase the belief that the HPV vaccine is safe. In the pre-intervention survey, 36.36% of participants indicated “agree” to the question “I believe the HPV vaccine is safe.” In the post-intervention survey, 100% of participants agreed to this corresponding question.

### *Attitudes*

In Pender’s sixth theoretical proposition (n.d.), “a positive attitude towards a behavior leads to improved perception of self-efficacy.” In Pender’s fourth and fifth theoretical proposition (n.d.), “perceived self-efficacy increases the likelihood that a person will commit to and perform a behavior and leads to a decreased perception of barriers to conducting a behavior.” Overall, the participants of this study were shown to have a positive perception of self-efficacy as evidenced by the 90.91% positive response to the question “I have the knowledge and skills to make safe choices about my sexual health.” This baseline data from the pre-survey suggests that

participants may have an increased likelihood for the behavior change of obtaining HPV vaccination.

This intervention impacted participants' attitude regarding HPV contagiousness and severity. In the pre-intervention survey, 81.82% of participants indicated "agree" to the question "HPV is contagious and could be life-threatening," while 18.18% indicated they were "unsure." In the post-intervention survey, 100% of participants agreed to this question. This relates to the literature suggesting that attitude about the contagiousness and severity of HPV may impact vaccination rates (Catalano et al., 2017; Pitts et al., 2017).

The educational module also appeared to increase participants' perception of risk for getting HPV. In the pre-intervention survey, 54.55% of participants indicated "agree" to the question "I believe that I could be at risk (now or in the future) of getting HPV." In the post-intervention survey, this rate increased to 77.78%, with one participant answering "disagree" and one answering "unsure." The question did not provide the opportunity for participants to explain rationale for their answers.

### ***Barriers***

Pender's third theoretical proposition (n.d.) states that "perceived barriers can inhibit a person's commitment to behavior change and drive other behaviors." Barriers were assessed within the pre-survey questions regarding health insurance and vaccine cost. All participants indicated that they had health insurance. When asked whether cost would influence the decision to receive a vaccine recommended by a healthcare provider, 63.64% of participants responded saying agree. A facilitating factor to aiding participants to overcome perceived barriers was the email attachment of a supplemental handout (Appendix L) in which cost was addressed.

### *Interpersonal Influences*

Pender's ninth theoretical proposition (n.d.) states that "interpersonal influences by family, peers, and healthcare providers can contribute to an individual's engagement in health-promoting behavior." This is applicable to the literature previously discussed in this paper showing that community or organizational factors such as physicians, mothers, and fathers, subjective norms such as social pressure, and healthcare provider recommendation can be influential factors for a student being vaccinated against HPV (Lanning et al., 2017; Johnson & Ogletree, 2017; Sisson & Wilkinson, 2019). In a recent observational study of college students conducted by Stout et al. (2020), results indicated that perceiving greater support from one's friends, parents, and provider for HPV vaccination was related to greater self-efficacy for vaccination and related to increased vaccination intent.

The participants in this dissertation project were assessed within the pre-intervention survey to find if there would be any correlation between interpersonal influences and existing beliefs and attitudes of the participants. To the question "I have someone I can talk to (parent, nurse, doctor, friend, teacher) about my questions and concerns regarding my sexual health," 100% of respondents answered "true." While not directly related to HPV vaccination, this could be considered a positive influence on subjects' high-rate self-efficacy (90.91%) and may contribute to greater vaccine uptake.

To the question "my parents believe in receiving vaccines," 72.72% of participants answered "true" and the remaining 27.27% answered "unsure." No participants answered "false" to this question, which may contribute to the successful impact of the education as there were no known parental influences against HPV vaccination. While nonspecific to HPV vaccination, this question was interesting to assess; the HPV vaccine is typically given during childhood, where



consent is generally obtained from the parent rather than the child, and this dissertation project attempts to target the “catch-up” population of young adults with possible new-found independence for decision-making in regard to their healthcare.

When asked the question “my healthcare provider has offered the HPV vaccine to me,” 36.36% of participants answered “true,” 18.18% answered “false,” and 45.45% answered “unsure.” The results of this question were surprising, as it is typically standard of care to offer all available vaccines to all patients. It may suggest that either the HPV vaccine was offered and given during childhood (when the patient did not fully understand what vaccines he was receiving, or discussion was held with the parent rather than the child), or this may be an area of missed opportunity within the healthcare system. Out of these 11 participants completing the pre-survey, 72.72% indicated they have completed a yearly health physical or sports physical this year, showing that a greater number of participants had met with a healthcare provider than indicated they were offered the HPV vaccine.

Interestingly, 63.63% of participants stated they “only see a healthcare provider” when sick or injured; this is incongruous with the stated 72.72% who state they completed a physical this year which is typically done when a patient is well. The results of this question could indicate that either respondents did not understand the question or complete it accurately, or they do not understand that yearly health physicals are not conducted the same as a visit with a healthcare provider that occurs when a patient has a presenting problem or acute illness. The results of this group of questions shows opportunity for improved HPV vaccine uptake through offering the vaccine during acute visits, as there is a population of young adult males who do not complete routine annual visits when vaccines are typically updated in the primary care setting.

## Objective Two

Objective two intended to increase knowledge surrounding HPV and the HPV vaccine by 50%. This objective was partially met. An overall increase in correct answers was seen between the pre- and post-intervention surveys (Table 3). This comparison did not meet the goal of a 50% increase; however, baseline knowledge was greater than anticipated. Further, the drop-out rate of participants between the pre- and post-intervention surveys may have skewed results.

To the questions “HPV is the most common sexually transmitted infection in the United States,” and “If I am infected with HPV, I could get genital warts and/or cancer,” there was a 36.36% increased correct response rate with 100% of respondents answering correctly in the post-survey. These questions aimed to increase student knowledge that HPV is common and harmful.

To the question “nearly 100% of sexually active people will become infected with HPV at some point in their lifetime,” there was a 25.25% increase in the correct response following the educational module. In the post-survey, only 1 participant answered incorrectly while 4 participants answered incorrectly in the pre-survey. One could consider the differing wording between the module and the surveys as a reason for the incorrect response in the post-survey, as in the module this topic is worded, “nearly 100% of sexually active men and women will contract at least one strain of the virus at some point in their lives.”

To the question “the highest rates of new genital HPV infections happen in early adulthood,” all respondents answered correctly “true” to both the pre- and post-surveys. This lack of increased correct response rate is not necessarily an adverse finding, as baseline knowledge appeared to be high.

Question eight on the pre-survey (corresponding to question five on the post-survey), was in “select all that apply” format and assessed knowledge on how HPV is transmitted. There were two correct answers. In the pre-survey, there was a 25% and 50% correct response rate; in the post-survey these rates increased to 41.18% and 52.94%. While knowledge did appear to increase, this did not meet to goal of increasing by 50%. Possible rationale for this is that the “select all that apply” format may have been confusing or missed by respondents or that students may not have paid attention to the educational module slide for which this question was addressed.

Unfortunately, there was an observed decrease in knowledge of which sex can/should receive the HPV vaccine. In the pre-survey, 100% of respondents answered correctly “all sexes,” while 88.89% answered correctly in the post-survey. The pre-survey worded the question as who “can” receive it, while the post-survey worded it as who “should” receive it. While this discrepancy was not intentional nor would it impact the correct answer, it may account for the decline in correct response rate.

### **Objective Three**

Objective three intended to increase awareness of HPV and the HPV vaccine through dissemination of this online module to college students. Baseline data from the pre-intervention survey showed that 72.73% of participants had heard of HPV while only 45.45% indicated they had heard of the HPV vaccine. This objective was met as evidenced by results from the post-survey where 100% of participants indicated “true” to the question “I know enough information about HPV and/or the HPV vaccine to decide whether or not I would like the vaccine.”

In recent literature, a study conducted by Niu et al. (2020), showed that persons who “used the Internet to engage in various types of social media for health purposes” (p. 3) were

positively associated with HPV vaccine perceived effectiveness. This further supports the literature which suggests that web-based or electronic interventions may positively affect knowledge, attitudes, and beliefs surrounding HPV vaccination (McRee et al., 2018; Richman et al., 2016). This dissertation project supports these findings and suggests that an online format of education may also effectively increase awareness of HPV and the HPV vaccine.

#### **Objective Four**

Objective four intended to motivate participants to seek HPV vaccination after education. This objective was met, as shown by 100% of respondents who have not already received the HPV vaccine indicating in the post-survey that they intend to receive the HPV vaccine in the future. However, 50% (n=3) of respondents to the post-survey indicated that the HPV education made them more likely to receive the HPV vaccine while 50% (n=3) said they were unsure.

Actual vaccine initiation two months following the intervention was one out of six respondents who indicated that he had been vaccinated with at least one dose of the HPV vaccine since receiving the education and three respondents who indicated they plan to receive it in the future. One respondent indicated “no,” he does not plan to receive the HPV vaccine in the future, however there was no rationale provided for his response.

#### **Limitations**

There were a few limitations to this project. Not all respondents from the pre-survey completed the post-survey. Data analysis could have been strengthened if the pre- and post-surveys corresponded in a way that incomplete responses could have been discarded from the analysis. Furthermore, this intervention took place online which did not allow students to ask questions during the module or during the surveys. Asking questions may have allowed students

to clarify the wording of the questions of the surveys. Increased recruitment of male participants would have also been beneficial to increase sample size for this project.

Another limitation to this project is that not all participants meeting inclusion criteria for the reassessment survey ultimately completed the survey. Additionally, actual vaccination status from the reassessment survey is a self-report. While there is no motivation to lie in this survey, there could have been a possible Hawthorne effect related to participants wanting to please the researcher.

### **Recommendations**

Due to the positive outcome of increased intent to vaccinate found in this project, it would be beneficial to continue this type of education within NDSU to various other student organizations or courses. This project is in harmony with NDSU's strategic plan for 2021-2026 through their mission to "provide transformational education, create knowledge through innovative research, and share knowledge through community engagement" (NDSU, 2021, p. 3). This project also aligns with NDSU's core values of collegiality, community, excellence, impact, innovation, responsiveness, and transformation. The program provides opportunity to grow in academia, foster achievement outside the classroom, and broadens understanding of the world and responsibility as a citizen. The program is supported by evidence-based research and focuses on health promotion and primary prevention.

Researchers recommended to continue future phases of this research project include graduate student nurses, medical students, educators within various healthcare-related fields, registered nurses, advanced practice nurses, physicians, and physician associates. Healthcare professionals have great credibility for providing education about HPV and HPV vaccination. This type of educational intervention would be beneficial to continue within the university or

college setting or within online domain heavily trafficked by young adults such as various social media platforms.

### **Implications for Future Research**

Future studies that focus on education regarding HPV and the HPV vaccine could benefit from the methods and findings of this research project. When conducting a similar intervention in the future, recommendations for improvement would be to focus primarily on increasing the sample size receiving the education. Contact was made with sororities and fraternities at NDSU as well as the NDSU Wellness Center for this project, however no parties responded with interest in hosting an educational intervention. In the future, these could be potential target intervention sites to increase sample size.

This project was completed during the COVID-19 pandemic, at a time when vaccine hesitancy is a highly emphasized topic within the media. Attitude regarding vaccines in general was assessed in this project; results showed that most participants had a positive attitude toward vaccines. However, these participants were enrolled in a human biology course; one could consider this cohort to have more of an interest in science which may contribute to less hesitancy toward vaccines. A recommendation for future research is to extend this education to various courses to assess for variability in attitudes and acceptance of the information.

Results of this project support the need for additional research on methods for improving HPV vaccine uptake in this population. Given the pre-survey results showing that only 45% of participants had heard of the HPV vaccine, future research projects should focus on marketing of the HPV vaccine to increase awareness. While intent to vaccinate was high from the post-survey, only one participant from the reassessment survey indicated he had obtained or started the HPV vaccine series. Possible ideas for improving actual vaccine uptake include hosting this

informational intervention at an in-person setting where the HPV vaccine is available, such as at a student health clinic.

### **Implications for Future Practice**

After conducting a literature review regarding this topic and analyzing the results of this project, many implications for future practice as a healthcare provider have been noted. This project aligns with data from the CDC (2016) and NDIIS (2020) indicating that uptake of the HPV vaccine by young adult males is low with only 18.18% of male pre-survey participants indicating they have received the HPV vaccine. Within the clinical setting, this provides opportunity to assess for HPV vaccination status in our male patients and to offer them the vaccine. While HPV-related cervical cancer is routinely screened for in women, no screening recommendations exist for HPV-related cancers in males. This underscores the importance of primary prevention of HPV-related cancers through vaccination of males.

While some providers may reserve vaccination recommendations for routine wellness visits, data shows that the young adult male population may not see a healthcare provider unless they are sick or injured (Figure 1; Pitts et al., 2017). A recommendation for practice as a healthcare provider would be to offer the HPV vaccine during a visit where the patient is generally well or mildly ill. If the patient is moderately or severely ill at the visit, the provider should recommend HPV vaccination at a future time; a possible technique for improving HPV vaccination uptake in this instance would be to schedule the patient for a future nurse visit where the vaccine can be administered.

Within the clinic setting, healthcare providers should model their patient education techniques after the design of this intervention project: discussing the severity and prevalence of HPV and the safety and efficacy of the 9-valent HPV vaccine. For patients who are still

skeptical, focusing discussion on anticipated regret (Christy et al., 2015; Hirth et al., 2018) may also be helpful; for example, a provider could say, “I wouldn’t want you to miss this opportunity to be vaccinated and then later go on to develop a cancer from HPV.”

Results of this study also showed that education within a school-based setting may positively impact vaccination rates. While children were not the target of this project, the HPV vaccine is recommended beginning at age 9 for high-risk groups with completion routinely recommended at age 11 through 12 and prior to age 15. One could consider that education regarding HPV and the availability of the HPV vaccine through a middle school or high school class would be helpful in improving HPV vaccination rates overall.

This study did not aim to determine whether vaccine mandates could improve vaccination rates. However, this could be an area for future discussion and investigation. The HPV vaccine is currently not mandatory for admission to the North Dakota University System. Making this vaccine mandatory could perhaps increase external motivation for students to complete this vaccine prior to entering college. Such a mandate may be met with resistance from the conservative state of North Dakota. However, considering the HPV vaccine’s poor uptake despite its excellent safety and efficacy profile, a case could be made for mandating this vaccine for admission to a school system.

### **Dissemination**

The VoiceThread module was disseminated through NDSU Student Health via their webpage *Immunizations*. It can be found at the following webpage link:

[https://www.ndsu.edu/studenthealthservice/patient\\_resources/immunizations\\_1/](https://www.ndsu.edu/studenthealthservice/patient_resources/immunizations_1/)

This project was disseminated at the North Dakota Nurse Practitioner Association Thirteenth Annual Pharmacology Conference through a poster presentation in September 2021 (Appendix



N). Plans to further disseminate this research include presenting a poster at NDSU this spring (Appendix O), completing a three-minute video to be posted on NDSU's website, and submission to NDSU's dissertation repository. In the future, I would also consider submitting a manuscript to a peer-reviewed sexual health or health promotion journal.

### **Conclusion**

This project can be applied to other roles of the doctoral-prepared nurse practitioner including leadership, advocacy, translating evidence into practice, and interprofessional collaboration. Advanced leadership skills were developed during the years spent researching and designing this intervention. Communication with key stakeholders and study participants was an important aspect in the success of this project. Translating the evidence behind HPV vaccination into this practice improvement project required a complex understanding of the science along with the way that people are motivated to seek a behavior change. This project has allowed for advocacy of the college male population by focusing on their unique nuances of attitudes, beliefs, and barriers towards HPV vaccination. Interprofessional collaboration was demonstrated through collaboration with the committee chair and members, Human Biology instructor, and NDSU Student Health.

Overall, this project is significant in its contribution to a body of knowledge regarding HPV vaccination among young adult males. It applies techniques identified in the literature for increasing knowledge regarding HPV and the HPV vaccine and promoting the HPV vaccine, such as focusing educational efforts on the severity of HPV and anticipated regret from not having received the HPV vaccine. Additionally, it provides discussion of common attitudes, beliefs, and barriers for HPV vaccination among college males. The outcomes of this project reinforce the importance of a continuous pursuit behind the "why" of low HPV vaccination rates

among this specific cohort. In finding the “why,” we can learn how to increase the uptake of this life-saving vaccine.

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## APPENDIX A: IRB APPROVAL



10/19/2021

Dr. Mykell M Barnacle  
Nursing

Re: IRB Determination of Exempt Human Subjects Research:  
Protocol #IRB0003915, "HUMAN PAPILLOMAVIRUS VACCINE KNOWLEDGE, BELIEFS, ATTITUDES, AND BARRIERS:  
AN EDUCATIONAL INTERVENTION FOR MALE COLLEGE STUDENTS TO INCREASE KNOWLEDGE, VACCINE  
INTENT, AND VACCINE UPTAKE"

NDSU Co-investigator(s) and research team:

- Mykell M Barnacle
- Shannon Thompson

Approval Date: 10/19/2021

Expiration Date: 10/18/2024

Study site(s): Kimberly Booth will be offering extra-credit to students in her biology course.

Funding Agency:

The above referenced human subjects research project has been determined exempt (category 1) in accordance with federal regulations (Code of Federal Regulations, Title 45, Part 46, *Protection of Human Subjects*).

Please also note the following:

- The study must be conducted as described in the approved protocol.
- Changes to this protocol must be approved prior to initiating, unless the changes are necessary to eliminate an immediate hazard to subjects.
- Promptly report adverse events, unanticipated problems involving risks to subjects or others, or protocol deviations related to this project.

Thank you for your cooperation with NDSU IRB procedures. Best wishes for a successful study.

*NDSU has an approved FederalWide Assurance with the Department of Health and Human Services: FWA00002439.*

## APPENDIX B: EXECUTIVE SUMMARY

### EXECUTIVE SUMMARY

#### HUMAN PAPILLOMAVIRUS VACCINE KNOWLEDGE, BELIEFS, ATTITUDES, AND BARRIERS: AN EDUCATIONAL INTERVENTION FOR MALE COLLEGE STUDENTS TO INCREASE KNOWLEDGE, VACCINE INTENT, AND VACCINE UPTAKE

##### INTRODUCTION

Human papillomavirus (HPV) is the most common sexually transmitted infection in the United States. When the virus does not clear on its own, HPV infections can develop into papillomas or cancers (CDC, 2020d). While interventions promoting the HPV vaccine as a means to prevent cervical cancer have been successful, HPV-related cancer in men has been commonly overlooked. Current data shows low rates of HPV immunization for young adult males in North Dakota (NDIIS, 2020).

##### Purpose

The purpose of this educational intervention project is to

- (a) increase knowledge and awareness regarding HPV and the HPV vaccine and
- (b) increase intent to initiate the HPV vaccine series among NDSU college males ages 18 to 26.

##### PROJECT DESIGN

An educational module was developed using VoiceThread. The module included video, text, and speech. A supplemental handout was provided to help combat possible barriers to vaccination. Pre-intervention, post-intervention, and follow-up surveys were developed using Qualtrics. The module and surveys were distributed to students enrolled in a Human Biology course at NDSU.

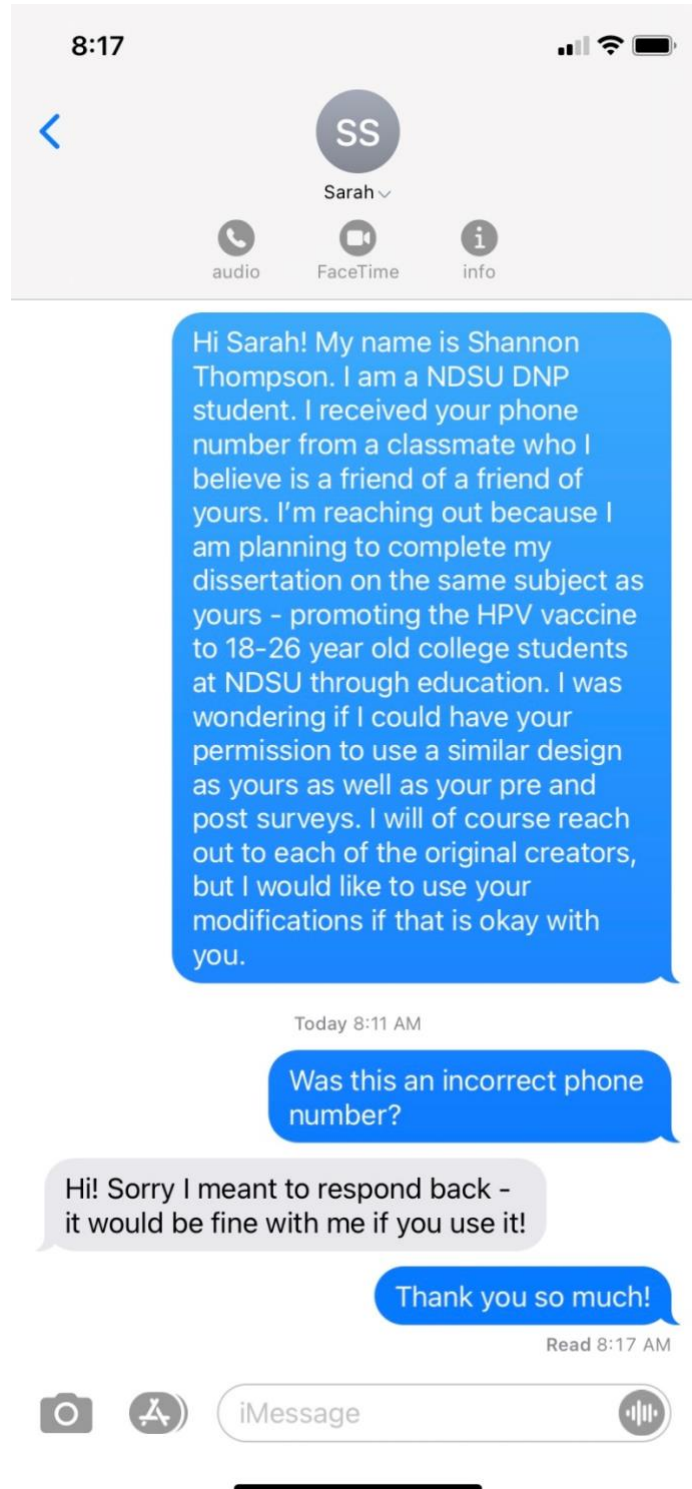
##### RESULTS AND CONCLUSION

- Knowledge and awareness surrounding HPV and the HPV vaccine increased.
- 100% of male participants indicated in the post-survey that they intend to receive the HPV vaccine in the future if they have not already received it.
- Two months following the project, one participant indicated that he had actually obtained or started the HPV vaccine series since receiving the education.

##### RECOMMENDATIONS

- Continue this type of education within NDSU and/or other school-based organizations.
- Extend this intervention to other types of classes to increase sample size.
- Apply educational techniques discussed in this project to patients seen in a clinical healthcare setting where the HPV vaccine is readily available and able to be administered.

**APPENDIX C: PERMISSION TO MODEL STUDY AFTER SARAH SIEBERT**



## APPENDIX D: PERMSSION TO USE RESEARCH TOOLS

**Re: Permission to use the Health Promotion Model**

Nola Pender <npender@umich.edu>

Sun 11/29/2020 5:09 PM

**To:** Thompson, Shannon <shannon.thompson.3@ndsu.edu>

■ 1 attachments (15 KB)

HEALTH PROMOTION MODEL WEBSITES.docx;

Dear Shannon:

You have my permission to use the Health Promotion Model (HPM) as your framework and to use any related questionnaires. Please see the attachment for the resources we have available related to the HPM.

Wishing you good health,

Nola Pender

On Sat, Nov 28, 2020 at 9:01 PM Thompson, Shannon <[shannon.thompson.3@ndsu.edu](mailto:shannon.thompson.3@ndsu.edu)> wrote:

Hello Nola Pender,

I am a Doctorate of Nursing Practice student at North Dakota State University. I am conducting a practice improvement project with the aim of increasing the uptake of the human papillomavirus vaccine among college males.

May I have your permission to use your Health Promotion model at the theoretical framework for my research?

Thank you,  
Shannon Thompson, BSN, RN, OCN



Denise Corrigan <denisebarry@mac.com>

Sun 8/8/2021 9:53 AM

To: Thompson, Shannon



Hi Shannon,

Yes you have my permission. Good luck to you and your dissertation!!

Take care

Denise

Sent from my iPhone

On Aug 3, 2021, at 12:19 PM, Thompson, Shannon <shannon.thompson.3@ndsu.edu> wrote:

Ms. Corrigan,

I am currently a student at North Dakota State University enrolled in a Doctor of Nursing Practice program. I am completing a dissertation project titled "Human papillomavirus vaccine knowledge, beliefs, attitudes, and barriers: An educational intervention for male college students to increase knowledge, vaccine intent, and vaccine uptake."

I am emailing to ask permission to use your pretest and posttest tools with my own modifications from your capstone project "Increasing knowledge about HPV and the vaccine amongst adolescents and adults through a school-based setting."

# APPENDIX E: NDIIS DATA REQUEST

11/28/2020

Mail - Thompson, Shannon - Outlook

## Data Request- NDIIS

Goebel, Rachel <[rgoebel@nd.gov](mailto:rgoebel@nd.gov)>

Fri 10/2/2020 6:02 PM

To: Thompson, Shannon <[shannon.thompson.3@ndsu.edu](mailto:shannon.thompson.3@ndsu.edu)>

Cc: Woinarowicz, Mary A. <[mary.woinarowicz@nd.gov](mailto:mary.woinarowicz@nd.gov)>

■ 1 attachments (10 KB)

S.THOMPSON\_DATA\_REQUEST.xlsx;

Hello Shannon,

Attached please find the information requested through your data request. These figures represent the number of records indicating up-to-date HPV immunization status for males and females, ages 18-26, through the third quarter of 2020.

Sincerely,

**Rachel Goebel, LBSW MPH**

*NDIIS Coordinator*

Phone 701.214.7322 • [rgoebel@nd.gov](mailto:rgoebel@nd.gov) • [www.ndhealth.gov/immunize/](http://www.ndhealth.gov/immunize/)



SEX	HPV_UTD	DENOMINATOR	PERCENTAGE_UTD
MALE	13987	227361	6.15%
FEMALE	22269	263173	8.46%

## APPENDIX F: PERMISSION FOR IOWA MODEL

Permission to Use The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care

[Kimberly Jordan - University of Iowa Hospitals and Clinics <survey-bounce@survey.uiowa.edu>](#)

Fri 7/30/2021 9:10 AM

To: Thompson, Shannon <shannon.thompson.3@ndsu.edu>

You have permission, as requested today, to review and/or reproduce *The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care*. Click the link below to open.

[The Iowa Model Revised \(2015\)](#)

Copyright is retained by University of Iowa Hospitals and Clinics. **Permission is not granted for placing on the internet.**

**Reference:** Iowa Model Collaborative. (2017). Iowa model of evidence-based practice: Revisions and validation. *Worldviews on Evidence-Based Nursing*, 14(3), 175-182. doi:10.1111/wvn.12223

In written material, please add the following statement:

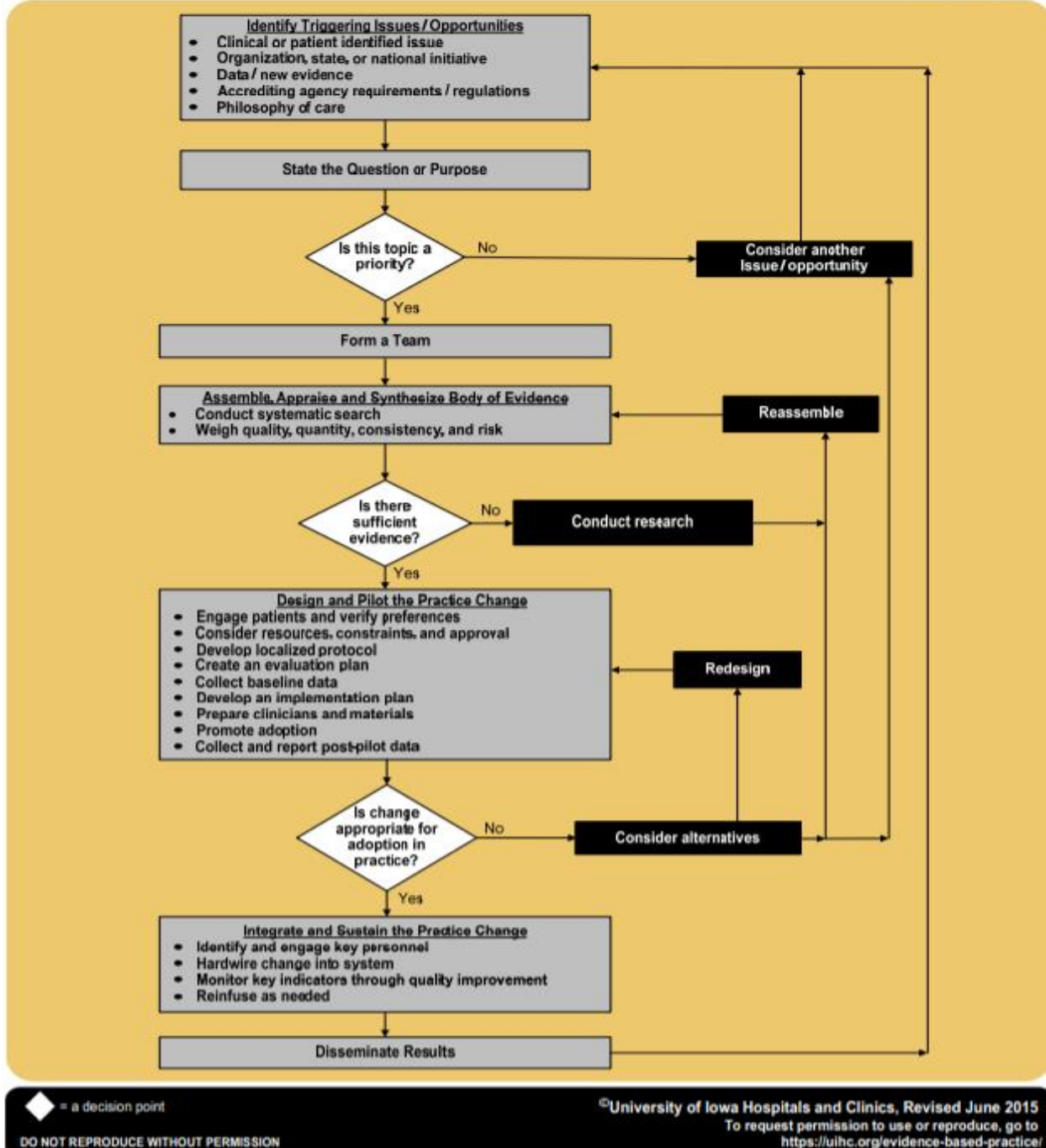
*Used/reprinted with permission from the University of Iowa Hospitals and Clinics, copyright 2015. For permission to use or reproduce, please contact the University of Iowa Hospitals and Clinics at 319-384-9098.*

Please contact [UHCNursingResearchandEBP@uiowa.edu](mailto:UHCNursingResearchandEBP@uiowa.edu) or 319-384-9098 with questions.



## APPENDIX G: IOWA MODEL

# The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care



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## APPENDIX H: APPLICATION OF IOWA MODEL TO PROJECT

**Identify Triggering Issues/Opportunities**

HPV is the most common sexually transmitted infection in the U.S. (CDC, 2020a). HPV infections can develop into cancer years to decades after contraction (CDC, 2019a). There are currently no screening tools for HPV infection in males, contributing to advanced illness at the time of diagnosis (Catalano et al., 2017). The HPV vaccine has been shown to provide lasting protection against HPV-related cancers (CDC, 2016). Unfortunately, uptake remains low both nationally and locally. The NDIIS (2020) only indicates up-to-date HPV immunization for 6.15% of males ages 18 to 26. Young adult men are one of the highest-risk groups for contracting HPV.

**State the Question or Purpose**

Problem Statement: In college males ages 18 to 26, will the provision of education regarding HPV and the HPV vaccine increase the knowledge, vaccine intent, and uptake of the HPV vaccine within three months at NDSU?

Purpose: (a) to increase knowledge regarding HPV and the HPV vaccine and (b) to promote increased HPV vaccination uptake among NDSU college males ages 18 to 26.

**Is this topic a priority? → YES**

**Form a Team**

Name	Role
Mykell Barnacle	Chair
Kelly Buettner-Schmidt	Committee Member
Allison Peltier	Committee Member
Lisa Montplaisir	Committee Member
Elisha Anderson	Graduate Appointee

**Assemble, Appraise, and Synthesize Body of Evidence**

An extensive literature search was conducted between October 2019 and December 2020 to determine influential factors for the suboptimal HPV vaccination rates in this cohort along with educational intervention methods that may best promote its' increased uptake. Most of the current literature suggests that reasons for low vaccination in college males is multi-factorial. In congruence with the literature, educational efforts should be interactive and focus on the severity of HPV.

**Is there is sufficient evidence? → YES**

**Design and Pilot the Practice Change**

An online module targeted towards young adult college males was developed. The online module can be found at <https://ndsuvocethread.com/share/18108702/>. The module includes text, speech, and video to appeal to different learning styles. This module emphasizes the commonality and severity of HPV and the safety and efficacy of the HPV vaccine. Pre- and post-intervention surveys were developed to evaluate the effect of the module. The VoiceThread and surveys were disseminated along with a simplified plan for obtaining HPV vaccination to NDSU students enrolled in a human biology course.

**Is change appropriate for adaptation in practice? → YES**

**Integrate and Sustain the Practice Change**

Overall, this project further contributes to a body of knowledge calling for intervention to increase vaccine uptake. Through continuing education and dissemination of the results of this project, uptake of the HPV vaccine by this cohort can hopefully continue to increase over time.

**Dissemination**

The results of this study are to be disseminated via the NDSU library website. This project has also been disseminated via poster presentations through NDSU. Dissemination of the educational content is also occurring through NDSU Student Health on their *Immunizations* webpage:  
[https://www.ndsu.edu/studenthealthservice/patient\\_resources/immunizations\\_1/](https://www.ndsu.edu/studenthealthservice/patient_resources/immunizations_1/)

**APPENDIX I: STUDENT PRE-INTERVENTION SURVEYS**

1. I give my permission to participate in this study and attest I am at least 18 years old.	Yes	No	
2. Sex:	Male	Other	
3. I am in the age group of:	18-20	21-26	
4. Human papillomavirus (HPV) is the most common sexually transmitted infection in the United States.	True	False	Unsure
5. Nearly 100% of sexually active people will become infected with HPV at some point in their lifetime.	True	False	Unsure
6. If I am infected with HPV, I could get genital warts and/or cancer.	True	False	Unsure
7. The highest rates of new genital HPV infections happen in early adulthood.	True	False	Unsure
8. How is HPV transmitted/passed on? (Select all that apply)			
A. Skin-to-skin contact			
B. Contact with infected blood			
C. An infected person coughs or sneezes on another person			
D. Vaginal, oral, or anal sex			
9. Who can receive the HPV vaccine?	Males	Females	All sexes
10. I have heard of HPV.	True	False	Unsure
11. I have heard of the HPV vaccine.	True	False	Unsure
12. I believe I could be at risk (now or in the future) of getting HPV.	Agree	Disagree	Unsure
13. I have the knowledge and skills to make safe choices about my sexual health.	Agree	Disagree	Unsure
14. I believe that vaccines are effective and prevent diseases.	Agree	Disagree	Unsure
15. I believe that it is better to be vaccinated rather than to get the disease.	Agree	Disagree	Unsure
16. I believe that the HPV vaccine is safe.	Agree	Disagree	Unsure
17. I believe that if I receive the HPV vaccine, I will be protected from cancers related to HPV.	Agree	Disagree	Unsure
18. HPV is contagious and could be life-threatening.	True	False	Unsure
19. I have completed a yearly health physical or sports physical this year.	True	False	Unsure
20. I only see a healthcare provider when I am sick or injured.	True	False	Unsure
21. I currently have health insurance coverage.	True	False	Unsure
22. Cost would influence my decision whether or not to receive a vaccine recommended by my healthcare provider.	True	False	Unsure
23. I have received at least one of the HPV vaccine series of shots.	True	False	Unsure

24. I have someone I can talk to (parent, nurse, doctor, friend, teacher) about my questions and concerns regarding my sexual health.	True	False	Unsure
25. My healthcare provider has offered the HPV vaccine to me.	True	False	Unsure
26. My parents believe in receiving vaccines.	True	False	Unsure

(Adapted from Barry, 2013; Donadiki et al., 2014; Pender et al., 2011; Siebert, 2018)

**APPENDIX J: STUDENT POST-INTERVENTION SURVEYS**

<b>Questions</b>	<b>True</b>	<b>False</b>	<b>Unsure</b>	
1. Human papillomavirus (HPV) is the most common sexually transmitted infection in the United States.	True	False	Unsure	
2. Nearly 100% of sexually active people will become infected with HPV at some point in their lifetime.	True	False	Unsure	
3. If I am infected with HPV, I could get genital warts and/or cancer.	True	False	Unsure	
4. The highest rates of new genital HPV infections happen in early adulthood.	True	False	Unsure	
5. How is HPV transmitted/passed? (Select all that apply)				
A. Skin-to-skin contact				
B. Contact with infected blood				
C. An infected person coughs or sneezes on another person				
D. Vaginal, oral, or anal sex				
6. Who should receive the HPV vaccine?	Males	Females	All sexes	
7. I know enough information about HPV and/or the HPV vaccine to decide whether or not I would like the vaccine.	True	False	Unsure	
8. I believe I could be at risk (now or in the future) of getting HPV.	Agree	Disagree	Unsure	
9. I believe that the HPV vaccine is safe.	Agree	Disagree	Unsure	
10. I believe that if I receive the HPV vaccine, I will be protected from cancers related to HPV.	Agree	Disagree	Unsure	
11. HPV is contagious and could be life-threatening.	True	False	Unsure	
12. I intend to receive the HPV vaccine in the future if I have not already had it.	True	False	Unsure	I have already received the HPV vaccine.
13. How informative did you find the information within the module that you viewed?	1 Not at all informative 2 Slightly informative 3 Informative 4 Very informative			
14. If you choose, please provide an explanation of why you do or do not want or believe in the HPV vaccine.				

(Barry, 2013; Donadiki et al., 2014; Pender et al., 2011; Siebert, 2018)

**APPENDIX K: STUDENT TWO-MONTH REASSESSMENT SURVEY**

<b>Questions</b>	<b>Yes</b>	<b>No</b>	<b>Unsure/NA</b>
1. Did the human papillomavirus (HPV) education provided make you more likely to receive the HPV vaccine?			
2. Have you been vaccinated with at least one dose of the HPV vaccine series since receiving the education?			
3. If not currently vaccinated for HPV, do you plan on receiving it in the future?			

(Siebert, 2018)

## APPENDIX L: HPV VACCINATION PLAN

### HPV Vaccination Plan

#### Have I already gotten it?

- Create an account with MyIR Mobile to access your immunization records:  
<https://app.myirmobile.com/auth/register>
- OR follow these steps: <https://www.cdc.gov/vaccines/adults/vaccination-records.html>

#### Where can I get it?

Most health clinics. Also offered at NDSU Student Health at 1707 Centennial Blvd, Fargo, ND.

#### How much does it cost?

If you have insurance → Call the number on your insurance card to ask if it is covered.

If you do not have insurance → Visit <https://www.merckhelps.com/gardasil%209>

If you are 18 years old, you can receive the HPV vaccine for free through the VFC program.

If you are 19-26 years old, you may be eligible to receive it through the 317 program.

#### How do I make an appointment?

For NDSU Student Health: call (701) 231-7331 OR use the online health portal at:

[https://www.ndsu.edu/studenthealthservice/scheduling\\_an\\_appointment](https://www.ndsu.edu/studenthealthservice/scheduling_an_appointment)

Select “Appts” and search for Reason: “Immunization – HPV-9”

#### Completion Plan (check off or add date to the right column to help you keep track)

First dose	
Second dose (1-2 months later)	
Third dose (6 months from first dose)	



## APPENDIX M: COVER LETTER

NDSU North Dakota State University  
School of Nursing-Dept. 2670  
PO Box 6050  
Fargo, ND 58108-6050  
701.231.5692

Title of Project: Human Papillomavirus Vaccine Knowledge, Beliefs, Attitudes, and Barriers: An Educational Intervention for Male College Students to Increase Knowledge, Vaccine Intent, and Vaccine Uptake

Dear Colleague,

My name is Shannon Thompson. I am currently a Doctor of Nursing Practice student at North Dakota State University (NDSU). I am asking for your help with a project. The purpose of this project is to a) increase knowledge regarding HPV and the HPV vaccine and (b) promote increased HPV vaccination uptake among college males ages 18 to 26.

As part of this project, I will ask you to complete pre- and post-surveys to evaluate your knowledge, attitudes, and beliefs before and after viewing an online educational module regarding HPV and the HPV vaccine. Participants will include NDSU college students enrolled in a Human Biology course. Completion of the surveys and module will be incentivized with extra credit for the course and a chance to win one of two \$50 Target gift cards. The population of interest for this study is males ages 18-26, however all sexes and age groups may complete the module.

All survey responses will be kept confidential. The survey is anonymous and contains no personal identifying items. You will be asked to elicit your email address to obtain extra credit for your Biology course, to be entered for a chance to win a Target gift card, and to be contacted within two months for a follow-up survey. Your email address will not be analyzed in association with your answers for this study. Your participation is voluntary. If you do not wish to participate, you may decline or withdraw from participation at any time without penalty. The questionnaires and completion of the module should take less than 20 minutes to complete. Completion of the survey will constitute your consent to participate in the survey. All procedures for the study have been determined exempt by the Institutional Review Board at North Dakota State University.

Thank you in advance for your participation in this dissertation project. I believe that this information will be vital in improving our HPV vaccination rates and thus reducing the burden of HPV-related cancers within our community.

If you have any questions or comments, please feel free to contact me at shannon.thompson.3@ndsu.edu. You may also contact my advisor, Dr. Mykell Barnacle by email at mykell.barnacle@ndsu.edu or by phone at 701.231.7730. You have rights as a research participant. If you have questions about the rights of human participants in research, or to report a problem, contact the North Dakota State University IRB Office by e-mail at NDSU.IRB@ndsu.edu.

# APPENDIX N: PHARMACOLOGY CONFERENCE POSTER PRESENTATION



## Human Papillomavirus Vaccine:

### An Educational Intervention to Increase Uptake in Male College Students

Shannon Thompson, BSN, RN, OCN, DNP Student

Mykell Barnacle, DNP, FNP-BC<sup>1</sup>, Kelly Buettner-Schmidt, PhD, RN, FAAN<sup>1</sup>, Allison Peltier, DNP, FNP-C<sup>1</sup>, Lisa Montplaisir, PhD<sup>2</sup>, Elisha Anderson, DNP, FNP-C<sup>3</sup>  
 North Dakota State University School of Nursing<sup>1</sup>, North Dakota State University Departments of Biological Sciences and School of Education<sup>2</sup>, Essentia Health<sup>3</sup>


### INTRODUCTION

**Background**

- HPV is the **most common** sexually transmitted infection in the United States.
- When HPV does not clear on its own, HPV infections can develop into **papillomas, precancers, and cancer**.
- HPV is spread even when an infected person is asymptomatic.
- In the past 10 years, data has shown that the HPV vaccine (Gardasil 9) has provided **lasting protection against close to 100%** of HPV-associated precancers and genital papillomas.

**Significance**

- The North Dakota Immunization Information System only indicates up-to-date HPV immunization status for **6.15%** of males ages 18 to 26 (2020).
- Young adult men are one of the **highest-risk groups** for contracting HPV.
- There are **no screening tools** for detecting HPV-related cancer in males, which contributes to advanced illness at the time of diagnosis.



**PROBLEM STATEMENT**

- In college males ages 18 to 26, will the provision of education regarding HPV and the HPV vaccine increase the knowledge, vaccine intent, and uptake of the HPV vaccine within three months at NDSU?

### PURPOSE

- To **increase knowledge** regarding HPV and the HPV vaccine
- To **promote increased HPV vaccination uptake** among college males ages 18 to 26

### PROJECT OBJECTIVES

The project objectives are as follows, targeted towards college males ages 18 to 26 who attend NDSU:

1. **Assess beliefs, attitudes, and barriers** associated with HPV vaccination.
2. **Increase knowledge surrounding HPV and the HPV vaccine** by 50% through an online educational module measured via pre- and post-intervention surveys.
3. **Increase awareness of HPV severity and prevalence** by 50% through an online educational module measured via pre- and post-intervention surveys.
4. **Motivate participants to seek HPV vaccination** after education, measured through intent to vaccinate.

### THEORETICAL FRAMEWORK

**Nola Pender's Health Promotion Model**

- **Purpose:** To assist nurses in understanding the major determinant of health behaviors as a basis for behavioral counseling to promote healthy lifestyles
- Pender provides **theoretical propositions** which explain the factors which go into behavior change.
- **Educational techniques** were adopted from this model to produce the educational module.
  - Target motivators for receiving the HPV vaccine such as prevention of cancer and genital warts
  - Limit audience's believed barriers to vaccination through a simplified vaccination plan

### LITERATURE REVIEW

- Much of the existing literature focused on improving HPV vaccination rates is targeted towards adolescent females.
- The literature does however show common beliefs and attitudes between young adult males who have not received the HPV vaccine:
  - Lack of knowledge and awareness regarding HPV and the HPV vaccine
  - Apathetic or dismissive attitudes about the contagiousness and severity of HPV
- Recommendation in the literature to improve college males' HPV vaccination rates:
  - Anticipated regret
  - Promote awareness of severity and prevalence
  - Focus on beliefs and attitudes

### TIMELINE

- **September 2021:**
  - Proposal meeting.
  - Submit request for project approval by NDSU's Institutional Review Board (IRB).
- **October 2021:**
  - Launch online module.
- **January 2022:**
  - Email three-month reassessment Qualtrics survey to students.
- **February 2022:**
  - Start final analysis of collected data.

### PROJECT DESIGN

- **Cross-sectional survey:** Electronic tests will be distributed via Qualtrics to participants immediately before and after viewing an online educational module.
- The **educational intervention** will be formatted as a **module**, including video, text, and links to outside resources.
- **Pre- and post-educational surveys** will include questions graded on a Likert scale.
- **Setting/sample:** The intervention will be distributed via email to males ages 18-26 who attend NDSU and will be promoted via NDSU platforms to be determined.

### EVALUATION and ANALYSIS

- **Pre- and post-survey:** used to analyze and compare knowledge and awareness surrounding HPV and the HPV vaccine.
- **Pre-survey:** used independently to determine baseline beliefs, attitudes, and barriers to HPV vaccination and HPV within the cohort.
- **3-month follow-up survey:** used to determine whether an actual increase in vaccination rates was obtained

\*References available upon request

# APPENDIX O: NDSU POSTER PRESENTATION

NDSU

NURSING

## Human Papillomavirus Vaccine: An Educational Intervention to Increase Uptake in Male College Students

Shannon Thompson, BSN, RN, OCN, DNP-Student

Mykell Barnacle, DNP, FNP-BC<sup>1</sup>, Kelly Buettner-Schmidt, PhD, RN, FAAN<sup>1</sup>, Allison Peltier, DNP, FNP-C<sup>1</sup>, Lisa Montplaisir, PhD<sup>2</sup>, Elisha Anderson, DNP, FNP-C<sup>3</sup>  
North Dakota State University School of Nursing<sup>1</sup>, North Dakota State University Departments of Biological Sciences and School of Education<sup>2</sup>, Essentia Health<sup>3</sup>


### INTRODUCTION

**Background**

- HPV is the **most common** sexually transmitted infection in the United States.
- When HPV does not clear on its own, HPV infections can develop into **papillomas, precancers, and cancer**.
- HPV is spread even when an infected person is asymptomatic.
- In the past 10 years, data has shown that the HPV vaccine (Gardasil 9) has provided **lasting protection against close to 100%** of HPV-associated precancers and genital papillomas.

**Significance**

- The North Dakota Immunization Information System only indicates up-to-date HPV immunization status for **6.15%** of males ages 18 to 26 (2020).
- Young adult men are one of the **highest-risk groups** for contracting HPV.
- There are no screening tools for detecting HPV-related cancer in males, which contributes to advanced illness at the time of diagnosis.



**PROBLEM STATEMENT**

In college males ages 18 to 26, will the provision of education regarding HPV and the HPV vaccine increase the knowledge, vaccine intent, and initiation of the HPV vaccine series within three months at NDSU?

### PURPOSE

- **Increase knowledge and awareness** regarding HPV and the HPV vaccine
- **Increase intent to initiate the HPV vaccine series** (among NDSU college males ages 18 to 26)

### PROJECT OBJECTIVES

The project objectives are as follows, targeted towards college males ages 18 to 26 who attend NDSU:

1. **Assess beliefs, attitudes, and barriers** associated with HPV vaccination in this cohort.
2. **Increase knowledge** surrounding HPV and the HPV vaccine by 50% through an online educational module measured via pre- and post-intervention surveys.
3. **Increase awareness** of HPV and the HPV vaccine through an online educational module.
4. **Motivate** participants to seek HPV vaccination after education, measured through **intent to vaccinate**.

### THEORETICAL FRAMEWORK

**Nola Pender's Health Promotion Model**

- **Purpose:** To assist nurses in understanding the major determinant of health behaviors as a basis for behavioral counseling to promote healthy lifestyles
- Pender provides **theoretical propositions** which explain the factors which go into behavior change.
- **Educational techniques** were adopted from this model to produce the educational module and surveys

### LITERATURE REVIEW

- Much of the existing literature focused on improving HPV vaccination rates is targeted towards adolescent females.
- The literature does however show common beliefs and attitudes between young adult males who have not received the HPV vaccine:
  - Lack of **knowledge and awareness** regarding HPV and the HPV vaccine
  - Apathetic or dismissive attitudes about the contagiousness and severity of HPV
- Recommendation in the literature to improve college males' HPV vaccination rates:
  - Anticipated regret
  - Promote awareness of **severity and prevalence**
  - Focus on **beliefs and attitudes**

\*References available upon request

### TIMELINE

1. **Fall 2020:** Conduct review of literature.
2. **Spring 2021:** Evaluate theoretical framework and apply to project.
3. **Summer 2021:** Create VoiceThread module and Qualtrics surveys.
4. **September 2021:** Conduct proposal meeting.
5. **October 2021:** Submit request for project approval by NDSU's Institutional Review Board (IRB).
6. **October 2021:** Launch online module.
7. **December 2021:** Begin analysis of pre- and post-intervention surveys.
8. **February 2022:** Disperse two-month reassessment Qualtrics survey.
9. **February 2022:** Begin final analysis of project.

### PROJECT DESIGN

- **Pre- and post-surveys:** Electronic tests were distributed using Qualtrics to participants immediately before and after viewing an online educational module.
- **The educational module** was formatted using VoiceThread, including video, text, and links to outside resources.
- Two months after closure of the intervention, a reassessment survey was distributed to previously unvaccinated males to assess for **actual uptake**.

### RESULTS and CONCLUSIONS

- **Knowledge and awareness** surrounding HPV and the HPV vaccine **increased**.
- **100%** of male participants indicated in the post-survey that they **intend** to receive the HPV vaccine in the future if they have not already received it.
- Two months following the project, **one participant indicated that he had actually obtained or started the HPV vaccine series** since receiving the education.