

HUMAN PAPILLOMAVIRUS VACCINE KNOWLEDGE, BELIEFS, ATTITUDES, AND
BARRIERS: A COLLEGE-BASED INTERVENTION FOR STUDENTS TO INCREASE
KNOWLEDGE, VACCINE INTENT, AND VACCINE UPTAKE

A Dissertation
Submitted to the Graduate Faculty
of the
North Dakota State University
of Agriculture and Applied Science

By

Sarah Ann Siebert

In Partial Fulfillment of the Requirements
for the Degree of
DOCTOR OF NURSING PRACTICE

Major Department:
Nursing

February 2018

Fargo, North Dakota

North Dakota State University
Graduate School

Title

Human Papillomavirus Vaccine Knowledge, Beliefs, Attitudes, and
Barriers: A College-Based Intervention for Students to Increase
Knowledge, Vaccine Intent, and Vaccine Uptake

By

Sarah Ann Siebert

The Supervisory Committee certifies that this *disquisition* complies with North Dakota
State University's regulations and meets the accepted standards for the degree of

DOCTOR OF NURSING PRACTICE

SUPERVISORY COMMITTEE:

Mykell Barnacle, DNP, FNP-BC

Chair

Molly Secor-Turner, Ph.D.

Kara Falk, MSN, FNP-C

Lisa Montplaisir, Ph.D.

Approved:

3/6/2018

Date

Carla Gross, Ph.D., MSN, RN

Department Chair

ABSTRACT

The purpose of this disquisition was to determine knowledge, beliefs, attitudes, and barriers of college-age students at North Dakota State University (NDSU) related to the human papillomavirus (HPV) and the vaccine used to prevent certain strains of the virus. HPV is the most common sexually transmitted infection in the United States, with the highest rates of infection occurring in the late teens to early twenties (CDC, 2015b). Therefore, there is a need to educate college age students about HPV and how to protect themselves from acquiring HPV. An intervention was designed to address the following clinical question: Will the provision of HPV education to college students, ages 18-26, increase HPV knowledge, vaccine intent, and the number of student HPV vaccinations within six months at NDSU?

Project intervention consisted of two components: reaching out to NDSU students at the annual Sex Positivity Expo and members of two NDSU organizations, the Women's Activist Organization, and Violence Prevention Educators. Students were first instructed to take a pre-test to establish baseline HPV knowledge, beliefs, attitudes, and barriers. Following the pre-test, students were instructed to watch a short educational video about HPV and the HPV vaccine. Students then completed a similar post-test to assess if there were increases in basic HPV education, and changes in beliefs, attitudes, barriers, or intent to vaccinate.

Results between pre-and post-survey data indicated an increase in both HPV knowledge and intent to vaccinate. An increase in vaccination rates was not noted, although of the 30 student participants, 70% had completed the HPV vaccine series prior to education. Questions addressing attitude indicated an increase in motivation to maintain a healthy lifestyle. Questions addressing belief indicated students believed they would be protected from the most cancer-causing strains of HPV. Fifty percent of students indicated they believed themselves at risk for

acquiring HPV. Questions addressing barriers indicated the following were not barriers: healthcare coverage, work and school, and their provider offering them the chance to begin the HPV vaccine series. The only barrier identified with a slight increase in mean of 0.08 indicated the cost of the vaccine series to be a concern.

ACKNOWLEDGEMENTS

I would like to begin by acknowledging my committee members: Dr. Secor-Turner, Dr. Montplaisir, Dr. Falk, and especially the Chair of my committee, Dr. Barnacle. Your guidance and support throughout these past years has been a crucial component to my success with this practice improvement project.

I would like to acknowledge the NDSU organizations who participated in this practice improvement project: Women's Activist Association (WAO) and Violence Protection Educators (VPE). WAO was also in charge of the annual Sex Positivity Expo, so I again thank them for allowing me to participate in that event. Thank you to all organization members and students who participated in the Sex Positivity Expo, as your participation in this project was essential for its success.

I would also like to acknowledge the Health and Wellness Promotion Coordinator Emily Hegg, and Clinical Manager Theresa Wickenheiser for working with me in the developmental phases of this project. Also, a huge thank you to Registered Nurses Leslie Lessard and Rachel Froiland for assisting me at the Sex Positivity Expo and at the WAO organization education session. Your presence was greatly appreciated!

Last but not least, I would like to acknowledge my family. My husband, Joseph, has been my biggest cheerleader throughout this whole journey, and I can't thank him enough for his love and support. My daughters, Genevieve and Hailey, have been such amazing blessings in my life and have provided me with immense motivation to complete this journey in order to give them a better life! Also, a huge thank you to my mother-in-law, Mary Jo, who has spent many hours watching my daughters so I could go to the coffee shop and work on this project.

DEDICATION

To: Joseph, Genevieve, and Hailey Siebert

TABLE OF CONTENTS

ABSTRACT	iii
ACKNOWLEDGEMENTS	v
DEDICATION	vi
LIST OF TABLES	x
LIST OF FIGURES	xi
CHAPTER 1. INTRODUCTION	1
Background	1
Natural History and Epidemiology	3
HPV Vaccine Information	6
Significance.....	10
Problem Statement	12
Project Description with Purpose and Objectives.....	12
CHAPTER 2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK.....	15
Literature Review.....	15
Effectiveness and Barriers of Vaccine Acceptance	15
School-Based Interventions	19
Cost-Analysis	24
National Survey Data.....	25
Health Promotion Model.....	26
CHAPTER 3. PROJECT DESIGN.....	30
Needs Assessment.....	30
Project Implementation.....	32
NDSU IRB Approval.....	35
Data Collection	35

CHAPTER 4. EVALUATION	37
CHAPTER 5. RESULTS	40
Sample Population	40
Quantitative Data Results	40
3-6 Month Reassessment Surveys	47
Qualitative Data Results	48
Program Evaluation	49
CHAPTER 6. DISCUSSION AND RECOMMENDATIONS	52
Student Health Data	53
Education Questions	54
Belief, Attitude, and Barrier Questions.....	55
Gender and Age Findings	57
Reassessment Surveys	59
Limitations	59
Recommendations	60
Implications for Future Practice.....	61
Implications for Future Research.....	63
Application to Other DNP Roles	64
REFERENCES	65
APPENDIX A. KEY STAKEHOLDERS AND RESOURCES.....	74
APPENDIX B. PERMISSION TO USE RESEARCH.....	76
APPENDIX C. IRB APPROVAL	78
APPENDIX D. STUDENT PRE-INTERVENTION SURVEY	79
APPENDIX E. STUDENT POST-INTERVENTION SURVEY	81
APPENDIX F. STUDENT 3 AND 6 MONTH REASSESSMENT SURVEYS	83

APPENDIX G. STUDENT HANDOUTS.....	84
APPENDIX H. VOICETHREAD PRESENTATION.....	86
APPENDIX I. HPV POSTER PRESENTATION.....	87
APPENDIX J. COLLECTIVE RESULTS.....	88
APPENDIX K. GENDER RESULTS.....	92
APPENDIX L. AGE RESULTS.....	96
APPENDIX M. 3 AND 6 MONTH REASSESSMENT SURVEYS.....	100
APPENDIX N. EXECUTIVE SUMMARY OF THE PROJECT.....	102

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. HPV Vaccines.....	7
2. Logic Model.....	39
3. Education Questions	44

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. State HPV Vaccination Policies (KFF, 2015).....	23
2. Health Promotion Model (Pender et al., 2011).....	29
3. 2015 Nationwide HPV Vaccine Information (CDC, 2015i).....	31
4. Group Participation.....	41
5. Cohort Analysis	41
6. Student Health Data	42
7. Belief, Barrier, Attitude Increase Questions	45
8. Belief, Barrier, Attitude Decrease Questions	46
9. Implications for Future Practice.....	46
10. Reassessment Survey Responses	48

CHAPTER 1. INTRODUCTION

Background

Human papillomavirus (HPV) is the most common sexually transmitted infection (STI) in the United States today with over 150 related viruses (CDC, 2015a). The prevalence of the virus is so great the Centers for Disease Control and Prevention (2015a) has predicted nearly all sexually active men or women will acquire HPV at some point throughout their lifetime. Today, one out of four people in the United States are infected with HPV and the CDC predicts nine out of ten people will acquire the HPV infection at some point throughout their lifetime (CDC, 2015d, 2015e). Approximately 79 million Americans are infected with the HPV virus and roughly 14 million more acquire the infection every year (CDC, 2015d). Certain strains of HPV are known to cause warts (papillomas), which is what HPV is named for, and there are over 40 strains of HPV known to infect both male and female genitals (CDC, 2015a).

HPV is transmitted by skin-to-skin contact in vaginal, anal, or oral sexual encounters from a person who is a carrier of the virus (CDC, 2015a). Spread of the virus is most common throughout the late teens and early 20s (CDC, 2015b). The virus can be passed even when the infected person does not present with any active signs or symptoms, with onset of symptoms developing sometimes years after a person is infected (CDC, 2015a). While a majority of people will be exposed to HPV at some point in their lifetime, individuals may not even be aware because the body is naturally able to fight certain strains of the virus.

Although most HPV infection remains asymptomatic, some strains do result in various clinical manifestations including genital warts, cervical cell abnormalities, anogenital squamous cell cancers, oropharyngeal cancers, and recurrent respiratory papillomatosis (CDC, 2013). The two most significant manifestations are considered to be visible genital warts and cervical

abnormalities detected by Papanicolaou (Pap) tests (CDC, 2013). Genital warts have four classifications: Condylomata acuminata, smooth papules, flat papules, and keratotic warts (CDC, 2013). Symptoms associated with genital warts in various locations include dyspareunia (painful intercourse), pruritus (itching), burning, hematuria (blood in the urine), discharge, obstruction of the birth canal (due to increased growth during pregnancy), anal bleeding, or impaired urinary stream (CDC, 2013). People who have weakened immune systems are less likely to fight off certain strains of HPV and subsequently, are at higher risk to develop sequelae associated with it (CDC, 2016a). Immune system responses have also been examined to conclude determinants of naturally acquired protection including multiple factors such as antibody levels, antibody response, and serological responses (Franceschi & Baussano, 2014).

The majority of cervical, vaginal, penile, anal, and oropharynx cancer occur due to HPV strains the body is not able to clear (CDC, 2015b). The CDC reports there are 38,793 new cancers diagnosed annually which are found in body parts where HPV is often found, with HPV being responsible for 30,700 of these cases (CDC, 2016b). Overwhelmingly, HPV is the causative factor in 79% of those cancers (CDC, 2016b). Cervical cancer is listed as the most common HPV-associated cancer for women, while oropharyngeal cancers (posterior throat, including the base of the tongue and tonsils) are the most common for males (CDC, 2016b). Eleven thousand women are annually diagnosed with cervical cancer, with an estimated 4,400 dying every year (CDC, 2015c). Annually in the U.S., about 400 males develop cancer of the penis, 1,500 develop HPV-related cancer of the anus, and 5,600 develop oropharynx cancer (although this can also be related to tobacco or alcohol use) (CDC, 2012a).

Natural History and Epidemiology

HPV is a double-stranded deoxyribonucleic acid (DNA) virus belonging to the Papillomaviridae family (CDC, 2015j; CDC, 2013). The virus infects the basal epithelium lining of the skin, stimulating cellular proliferation (CDC, 2015j; CDC, 2013). There is a difference between males and females for how the virus affects the genital tract, affecting mucous membranes in females and keratinized epithelia in males (Franceschi & Baussano, 2014). Each strain of the virus is genetically distinguished by the outer capsid protein L1 with the majority of strains targeting the cutaneous epithelium, causing skin warts (CDC, 2015j). Approximately 40 HPV types target mucosal epithelium which are epidemiologically associated with cervical cancer (CDC, 2015j). Low-risk, or nononcogenic HPV strains (such as HPV-6 and 11) are known to cause 90% of genital warts and also laryngeal papillomas, which are benign (CDC, 2015j). Low-risk HPV strains have also been known to cause respiratory tract warts in children (juvenile-onset recurrent respiratory papillomatosis, or RRP) (CDC, 2012b). High-risk strains (such as HPV-16 and 18) are known to cause a range of sequelae including both low and high-grade cervical changes and anogenital cancers (CDC, 2015j). HPV is linked to 90% of anal cancers, 71% of vulvar/vaginal/penile cancers, and 72% of oropharyngeal cancers (CDC, 2015j). HPV-related high-grade cervical cell changes are the predecessors to cancer, and have been linked to 99% of cervical cancers (CDC, 2015j). HPV type 16 is linked to about 50% of cervical cancer, while types 16 and 18 combined account for approximately 70% (CDC, 2015j). According to the American Cancer Society (ACS) in 2014, cervical cancer was previously the most common cause of death for women in the United States; however, the death rate has been reduced by more than 50% within the last 40 years with increased utilization of the Pap test in health care practice. While the majority of cervical cancer is found in women under the age of

50, and rarely found in women under 20, a small percentage (15%) is found in women over the age of 65 (ACS, 2014).

HPV is an extremely infectious virus, with the incubation process ranging anywhere from three weeks to several months for genital warts to appear, several months to years for adverse changes in cervical cells to occur, and decades for cervical cancers (CDC, 2013a). The median amount of time for detection of new cervical cancers to appear is eight months, but this number is variable (CDC, 2013a). The CDC estimates that 70% of new infections clear within the first year and 90% clear within two years (CDC, 2013a). The DNA clearance of HPV is likely due to gradual onset of a more effective immune response (CDC, 2013).

Persistent HPV infection which is not cleared from the body ultimately results in cervical intraepithelial neoplasia (CIN), ranging from CIN1 (low-grade) to CIN2 or CIN3 (higher-grade) (CDC, 2015j). CIN1 has a good chance of spontaneously resolving within the first few years of infection, but if it does not clear from the body will result in higher-grade CIN2 or 3 which can be precursors to cancer if they remain undetected and untreated (CDC, 2015j). Important to note, some high-grade CIN naturally regresses on their own (CDC, 2015j).

Risk factors related to infection with HPV are predominantly related to sexual history including young age, number of pregnancies, genetic factors, smoking, oral contraceptive use, poor nutrition, and lack of male partner circumcision (CDC, 2015j; CDC, 2013). Certain types of sexual behavior also put a person at greater risk, including an increasing numbers of sex partners throughout one's lifetime, first sexual intercourse occurring at a young age, as well as high risk behaviors individuals may engage in during sexual activity (CDC, 2013). Engaging in sexual activity with partners who have had multiple other sexual partners has been shown to increase risk (CDC, 2013). Immunosuppression increases the risk of HPV detection, such as persons with

HIV, those on dialysis, and those who have had a kidney transplant (CDC, 2013). The biggest risk factor for precancerous and cancerous cervical cell changes is persistent infection with oncogenic HPV-types (CDC, 2013). Risk factors for persistent infection include advanced age, certain HPV types, and immune suppression (CDC, 2013). Ways to avoid acquiring health problems associated with HPV include cervical cancer screenings and getting vaccinated (CDC, 2016a).

Methods of HPV prevention include using condoms and being in a mutually monogamous relationship (CDC,2016a). Abstaining from sexual activity is the most certain way of preventing any HPV infection (CDC, 2015j). Although condoms are an efficient prevention method, effectively lowering the chances of contracting HPV, the virus is also able to infect areas not covered by a condom through skin to skin contact or nonpenetrative sexual activity (CDC, 2016a; CDC, 2015j). Therefore, a condom cannot be considered to fully protect against acquiring the virus. According to the CDC (2015j), studies indicate that infection happens soon after sexual activity begins; one study involving college women determined a 40% rate of infection 24 months after the first sexual encounter (CDC, 2015j). Another mode of transmission includes a nonsexual route from a woman to an infant during passage through the birth canal (CDC, 2015j).

Laboratory diagnosis of HPV is completed through use of clinical samples, with HPV detection assays having a great amount of variability in sensitivity and type specificity (CDC, 2015j). Recognition of the virus depends on the method of clinical sample collection as well as anatomy of the sample region (CDC, 2015j). Multiple HPV tests approved by the FDA have successfully identified high-risk HPV strains (HPV-16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 66, 68) (CDC, 2015j). Pap tests and liquid-based cytology are used today for HPV screening

(CDC, 2015j). Cervical cancer screening should be done every three years beginning at the age of 21 through the age of 65 or every five years with HPV testing (for ages 30-65) according to organizations such as U.S. Preventive Services Task Force (USPSTF), American Cancer Society (ASC), American Society for Colposcopy and Cervical Pathology (ASCCP), and the American Society for Clinical Pathology (ASCP) since 2012 (CDC, 2015j).

HPV Vaccine Information

Immunizations are of great importance to preventative care measures in health care today. Through following routine immunization schedules, parents can protect their children and the community from dangerous disease processes which used to be prevalent, and some that still are (such as HPV), throughout populations. Immunizations are also utilized to prevent certain types of cancers throughout one's lifetime. HPV has been linked to the two most common types of cervical cancer, squamous cell carcinoma and adenocarcinoma (CDC, 2015j).

Three vaccines have been approved and recommended by the Advisory Committee on Immunization Practices (ACIP) and the U.S. Food and Drug Administration (FDA) for the prevention of HPV: Gardasil 9, Gardasil, and Cervarix (USFDA, 2015; CDC, 2015f). Cervarix is no longer available in the United States today due to the low market demand (Mulcahy, 2016). All three types of vaccinations have been shown to prevent cervical cancer in women (HPV, 2012). Gardasil 9, the newest available vaccine, was licensed for distribution in 2014 and protects against 9 strains (9-valent or 9vHPV) of the HPV virus compared to quadrivalent Gardasil (protecting against 4 strains, or 4vHPV), and previously used bivalent Cervarix (protecting against 2 strains, or 2vHPV) (CDC, 2015g). The 2vHPV vaccine targeted HPV types 16 and 18; 4vHPV targets the HPV types 6,11, 16, and 18; 9vHPV targets the same HPV types as the 4vHPV, in addition to 31,33,45,52, and 58 (Markowitz et al, 2016). While there are over

150 types of HPV with over 40 cancer-causing HPV types, seven are considered to be “high risk” (16, 18, 31, 33, 45, 52, and 58) (NIH, 2015). Repeated exposure to the high-risk types can lead to cellular changes with the probability of progression to cervical, anal, penile, vaginal, vulvar, or oropharyngeal cancer (NIH, 2015).

Table 1

HPV Vaccines

	Bivalent/2vHPV (Cervarix)	Quadrivalent/4vHPV (Gardasil)	9-valent/9vHPV (Gardasil 9)
Manufacturer	GlaxoSmithKline	Merck	Merck
Year Licensed	October 2009 – females	June 2006 – females; October 2009 - males	December 2014 – males and females
HPV types in vaccine	16 and 18	6, 11, 16, and 18	6, 11, 16, 18, 31, 33, 45, 52, and 58
Adjuvant in vaccine	AD04: 500 µg aluminum hydroxide 50 µg 3-0-desacyl-4'-monophosphoryl lipid A	AAHS: 225 µg amorphous aluminum hydroxyphosphate sulfate	AAHS: 500 µg amorphous aluminum hydroxyphosphate sulfate
Recommended for...	Females ages 11-12 Females ages 13-26 who have not been previously vaccinated (No longer available in the US)	Females and males ages 11-12 Females ages 13-26 and males ages 13-21 who have not been previously vaccinated Unvaccinated males ages 22-26 who have sex with men or who are immunocompromised	Females and males ages 11-12 Females ages 13-26 and males ages 13-21 who have not been previously vaccinated. Unvaccinated males ages 22-26 who have sex with men or who are immunocompromised
Contraindicated for...	People with hypersensitivity to latex	People with hypersensitivity to yeast	People with hypersensitivity to yeast

(CDC, 2015c)

The CDC has recently changed the recommendations for HPV vaccines to be administered as a two-dose series at least six to 12 months apart starting at the ages of 11 and 12, although can be started as early as age 9 (CDC, 2016d). For those ages 15-26 years old, the series continues to be administered as a three-dose series (0, 1-2 months, 6 months) (CDC, 2016c; CDC, 2016d). If a person waits longer than recommended between shots (months or years), the vaccine series can still be completed without having to be restarted (CDC, 2015k). Booster doses are not recommended at this time by the Advisory Committee on Immunization Practices (ACIP) for the HPV vaccine series (CDC, 2015k). The 2vHPV vaccine was used for

females only, while the 4vHPV and 9vHPV vaccines are still available to be used for both males and females. A catch up vaccination is also available for adolescents ages 13-18 years old (CDC, 2016c). The 9vHPV vaccine has been approved for use up to the age of 26 (CDC, 2015e). The HPV vaccine is not recommended over the age of 26 due to the lack of protection from HPV-related diseases after this age (CDC, 2017a). The best way to prevent a woman over age 26 from developing cervical cancer is to perform recommended screening tests (CDC, 2017). One of the goals of treatment is to vaccinate pre-teens and adolescents before any sexual activity begins. Early vaccination has been shown to be beneficial because the immune response is two to three times greater in pre-teens (ages 9-11) when compared to teenagers and young adults (15-25) (NY, 2012). The way to achieve the greatest benefit from the vaccine is to receive all three doses in the vaccination series if over the age of 15, and both doses six months apart if age 14 or under (CDC, 2017). The highest immune responses observed after completion of a three-dose vaccination series show elevated antibody titers preserved for 8.4 years with 2vHPV and 8 years with 4vHPV (Mishra, Pimple, Shastri, 2015). According to the CDC, clinical trials and current research has shown protection from HPV with the vaccine lasts anywhere from 8-10 years with no evidence of the vaccine losing efficacy with time (CDC, 2015k). There is no data related to protection over the amount of 10 years because the vaccines were only released 10 years ago in 2006.

Long-term antibodies have been credited to plasma cells found in bone marrow which constantly produce IgG antibodies (Mishra et al, 2015). There is evidence of vaccine efficacy either with one dose, or with two doses given 6 months apart (Mishra et al, 2015). Certain countries have recently begun to implement vaccination programs using a two-dose series instead of a three-dose series, which is why the CDC recently changed the recommendations for

younger United States (U.S.) adolescents to receive the HPV series in two doses. Australia's HPV vaccination catch-up program has determined there is still protection from the specific strains of HPV with less than three doses, and England anticipates high coverage from the virus with a two-dose schedule (Mishra et al, 2015). Overall, one dose of the vaccine alone has been predicted to likely be inadequate to stimulate measurable cross-protection, whereas a greater amount of cross protection is available following completion of all three doses (Mishra et al, 2015).

Although the vaccines are both safe and effective, there are some common side effects. These include pain, redness, or swelling in the arm where the vaccine was administered, fever, headache, fatigue, nausea, and muscle or joint pain (CDC, 2015e). There is also a risk of fainting with any medical procedure or severe (anaphylactic) allergic reactions (CDC, 2015e). The CDC (2015e) reports that the most recent 9vHPV vaccine was evaluated in seven studies to determine safety. Higher rates of redness and swelling were reported than the previous 4vHPV vaccine, with these side effects increasing after administration of subsequent doses of the 9vHPV vaccine series (CDC, 2015e). The CDC released a report in 2014 related to side-effects of the 4vHPV vaccine, citing 92% of the side effects were classified as non-serious (CDC, 2015e). Because fainting has been known to happen after vaccine administration, the CDC recommends to have the patient remain seated and kept under observation for 15 minutes after vaccination (CDC, 2015e).

The vaccine is contraindicated for anyone who is severely allergic (e.g. anaphylaxis) to any component of the vaccine, severely allergic to yeast, or someone with a moderate to severe acute illness (CDC, 2015j; Gardasil, 2015). Severe latex allergy is a contraindication for the bivalent HPV vaccine (Cervarix) because the prefilled syringe cap contains latex (CDC, 2015j).

Although there is no proof of adverse pregnancy outcomes, the vaccines are not recommended for use during pregnancy, or should be delayed until after pregnancy if the series has already been started (CDC, 2015j).

After a literature review was completed to determine types of lacking inoculation across the nation, a need was found for the continued promotion of HPV vaccination education for males and females in the age groups of 9-12 and 13-17 (CDC, 2015e). The most recent national average statistical data from the CDC has shown slight increases in the number of adolescents ages 13-17 vaccinated with either the bivalent or quadrivalent HPV vaccine from year to year (CDC, 2015e). Girls with at least one dose of the HPV vaccine had a 3.3% increase from 2013 to 2014 (56.7% in 2013, 60.0% in 2014), while boys with at least one dose had an 8.1% increase (33.6% in 2013, 41.7% in 2014) (CDC, 2015e).

Several studies have cited a decrease in HPV-related cancer within six years of original 4vHPV vaccine introduction with results that closely mimic this research (Markowitz et al., 2016). Markowitz et al. noted in their study that six years after 4vHPV introduction, HPV-related cancer prevalence fell from 11.5% to 4.3% with a 34% decrease in prevalence in 14 to 19 year-olds. There was no statistically significant change in prevalence in cross coverage with other uncovered strains (Markowitz et al., 2016). The next section discusses formulation of the problem statement which addresses patient population, intervention, comparison intervention, outcome, and time frame (PICOT) (Melnyck & Fineout-Overholt, 2015).

Significance

HPV is currently the most common STI in the U.S. (CDC, 2015j). With the high prevalence of the virus, the CDC predicts nearly all sexually active men and women will acquire at least one of over 150 HPV types at one point in their lifetimes (CDC, 2015c). Although HPV

vaccine coverage has greatly increased in the U.S., rates remain low in comparison to other recommended vaccines (Holman et al, 2014).

According to Healthy People 2020, the national target percentage for HPV vaccination in both males and female adolescents ages 13-15 years old is 80% (HP2020, 2014). Nationally, only a few states have reached a level of 70% or greater (CDC, 2015i). The state of North Dakota (ND), which is where the intervention project takes place, is currently in the 70% or greater range for females and 60% or greater range for males (CDC, 2015i). The Advisory Committee on Immunization Practices (ACIP) currently recommends three vaccines (Cervarix, Gardasil, Gardasil9) for routine vaccination after researching the efficacy, immunogenicity, and safety (CDC, 2015f; CDC, 2014a). Each of the three vaccines provide immunity for males and females (except Cervarix, which is only for females) against specific high-risk HPV types proven to be cancer-related (cervical, anogenital, oropharyngeal) as well as protecting against low-risk types causing genital warts (CDC, 2014a). The prevalence of HPV has decreased greatly since the first two vaccines (Cervarix and Gardasil) were created in 2006, decreasing from 11.5% to 5.1% in females ages 14 to 19 when comparing numbers from 2003-2006 and 2007-2010 (KFF, 2015). Administration of HPV vaccinations is a strategy that will save thousands of lives (KFF, 2015). Through continually educating the public and promoting the use of the HPV vaccines, it one can assume that HPV vaccination rates will increase and more people will be prevented from acquiring preventable HPV-related cancers.

The project is significant because the education provides for the continued promotion of HPV vaccinations to allow for greater HPV knowledge among North Dakota State University (NDSU) students in Fargo, ND. Students ages 18-26 were targeted for education and vaccine promotion within NDSU. HPV vaccination of young adults between the ages of 16-25 has been

proven highly beneficial for several reasons: they are at a higher risk of contracting HPV due to the fact that young adult bodies are more biologically susceptible; the lack of STI testing in this age group; the hesitancy to talk about sexual activity with their primary care providers; limitations in insurance or transportation; and the tendency of having multiple sexual partners (Krawczyk et al., 2011; CDC, 2017b). The problem statement has been formulated to address increasing vaccination uptake through the use of education in the university setting.

Problem Statement

Clinical Question: Will the provision of HPV education to college students, ages 18-26, increase HPV knowledge, vaccine intent, and the number of student HPV vaccinations within six months at NDSU? The chosen college setting provides direct access to educate the target population, students ages 18-26, who have either already received, or have the potential to receive or complete the HPV vaccination series.

Project Description with Purpose and Objectives

North Dakota State University (NDSU) in Fargo, ND is where the education intervention was completed. The university's mission statement is to address the "needs and aspirations of people in a changing world by building on our land-grant foundation" (NDSU, 2009). The core values of NDSU include the following values and principles: land-grant, people, scholarship, teaching and learning, ethics, culture, and accountability (NDSU, 2009). Both the mission statement and the core values correlate well to the strategic plan and goals of the practice improvement project. The educational sessions met student needs by giving them empowering knowledge to make safer sexual choices.

The most pertinent core values of NDSU to the clinical intervention include people, accountability, and teaching and learning. Improving intellectual and personal development, as

well as safety and welfare of students through increasing knowledge about HPV is one of the clinical objectives of the clinical intervention. The desired impact of increasing knowledge to reflect safer sexual choices and prevent acquiring the most harmful, cancer-causing HPV types positively influenced student's lives. It was also anticipated that increasing student accountability would allow for improved quality of life through providing the tools and knowledge needed to protect themselves and others from the harmful sequelae of HPV. A comfortable teaching and learning environment outside of the traditional classroom setting was required for the promotion of quality education to NDSU students. Meetings with two organizations (Women's Activist Organization and Violence Prevention Educators) provided the opportunity and setting for the educational sessions to take place. Attendance at the annual spring Sex Positivity Expo also provided the opportunity to interact with NDSU students about HPV and HPV vaccine information, as well as invite them to take place in the clinical study.

Project objectives were established to describe what was anticipated to be achieved by the HPV educational program at its conclusion. The objectives identify the target population as NDSU students, as well as evaluation of student beliefs, attitudes, and barriers associated with the vaccine.

- Objective One – *Determine whether an educational video intervention can successfully improve HPV knowledge among NDSU students.*
- Objective Two – *Determine whether an educational video intervention can successfully improve HPV vaccination intent and vaccine uptake among NDSU students.*
- Objective Three – *Assess NDSU student beliefs, attitudes, and barriers associated with the HPV vaccine.*

- *Objective Four - Provide HPV education to NDSU student participants at the annual 2017 spring Sex Positivity Expo.*

CHAPTER 2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Literature Review

An extensive systemic literature review and synthesis was performed to determine current effectiveness and barriers to HPV vaccine acceptance, school-based interventions, and vaccine cost-analysis. National survey data was also analyzed to determine trends in HPV prevalence from when the vaccines were first released in 2006. The broad amount of literature found and number of significant findings on the topic reinforces the need to continue HPV education and vaccination promotion in order to reduce morbidity and mortality rates associated with HPV (Zimet, 2005).

Effectiveness and Barriers of Vaccine Acceptance. When considering effectiveness and barriers to vaccine acceptance, there are three main categories: parental concerns, clinician beliefs/practice styles, and adolescents' abilities to utilize patterns of health care (Fiks et al., 2013). Parents are not only reluctant to vaccinate their adolescent children against STIs, but also have concerns about vaccine safety and efficacy (Fiks et al., 2013). Some clinicians have been noted to postpone recommendations due to anticipation of parental objections, doubts about safety/efficacy, and knowledge deficits about risk factors, ultimately resulting in missed vaccination opportunities (Fiks et al, 2013). A barrier to adolescents include less frequent attendance at well-check visits, ultimately presenting more limitation to provide vaccine education and promotion (Fiks et al, 2013).

In a study by Fiks and associates (2013), a randomized control trial was performed to examine intervention techniques determining which would be the most effective to initiate the HPV vaccine series through providing decision support to families, clinicians, or both. The results indicated that a clinician-focused intervention was effective for initiating the series, while

the family-focus promoted completion of the series (Fiks et al., 2013). The results indicate the importance of proper provider education to increase initiation rates with the HPV series, reduce missed vaccination opportunities, and highlights the need for stricter adherence to providing further vaccine education support to families in order to promote series completion (Fiks et al., 2013).

A study completed by Davis et al., (2004) analyzed HPV vaccine parental acceptance of male and female adolescents ages 10 to 15. Five hundred and seventy-five parents/guardians were asked to complete a 30-question survey in relation to HPV knowledge and vaccine acceptance. After the survey, they were asked to read an educational fact sheet and then complete another 26-question post survey, reassessing their HPV knowledge. Parents who were opposed to the vaccine typically believed it would promote their children to engage in sexual intercourse earlier when compared to those parents who were supportive or undecided about the vaccine (Davis et al., 2004). Twenty-four percent of parents believed it would cause earlier sexual intercourse, 9% were supportive, and 6% were undecided (Davis et al., 2004). Of the participants who were initially opposed or not sure about allowing their adolescent to get the vaccine, 37% and 65% respectively, supported vaccination post educational intervention (Davis et al., 2004). Therefore, the educational intervention was able to greatly improve parental acceptance of the HPV vaccine (Davis et al., 2004).

In a systematic review of 55 articles, Holman and associates (2014) also reviewed HPV vaccination barriers. Clinician barriers that were identified included financial concerns, parental attitudes, knowledge gaps, insufficient insurance coverage/reimbursement, preference for vaccinating older adolescents, and preference for vaccinating girls when compared with boys (Holman et al, 2014). Parental barriers included not receiving a clinician's recommendation for

the vaccine, lack of information, belief that a child is too young, concerns about vaccine adverse effects/safety and newness, cost, and access to a clinic that offers the vaccine (Holman et al, 2014). Underserved population barriers included vaccine knowledge deficit, lack of insurance, not receiving a clinician's recommendation, distrust of health care systems, cultural factors, and immigration status (Holman et al, 2014). Specific barriers to males included the assumption of no benefit or need to get the HPV vaccination, lack of awareness, not receiving a clinician's recommendation, and cost (Holman et al, 2014). Barriers to completing the three-dose vaccination series overall included lack of insurance and medical home, lack of clinician recommendation, reduced contact with the medical system, and unawareness or forgetfulness (Holman et al, 2014).

A study by Walhart (2012) specifically focused on parental barriers identifying three central themes to the decision-making process of HPV vaccine administration: parental attitudes, beliefs, and barriers. Parental attitudes were brought up which correspond with previous research discussed such as knowledge deficit, physician role in vaccine promotion, perceived risk, and misunderstanding about the importance of vaccinating both males and females (as opposed to just females) (Walhart, 2012). Beliefs included religious, ethnic factors, and normative beliefs (Walhart, 2012). Barriers that were identified included the young age of administration, opposition to vaccines in general and three-dose requirement for HPV vaccine, in addition to similar concerns found in other studies (Walhart, 2012).

An interesting finding by Zimet (2005) identified personal acceptability as a barrier to vaccination due to the stigma of STIs and acceptance of the vaccine acting as "an admission of risky sexual behavior" (Zimet, 2005, S18). Other empirical research has determined a high level of interest in target populations of adolescents and young women, with knowledge of the

prevention of cervical cancer as a compelling vaccine feature (Zimet, 2005). Despite this viewpoint, more recent studies have shown that HPV vaccination does not have any impact on increasing the amount of sexual activity (Zimet et al., 2013, Smith et al., 2015; Jena et al., 2015; Mayhew et al., 2014). A quasi-experimental study in Canada reviewed health databases of 128,712 8th and 9th grade girls estimating risk difference and relative risk regarding HPV vaccination (Smith et al., 2015). The authors found strong evidence that any concerns of promiscuity increasing post HPV vaccination is unwarranted (Smith et al., 2015).

In 2013, Zimet and colleagues looked further into this topic through a review of behavioral science research exploring beliefs and behaviors linked with myths and misinformation affecting HPV vaccine uptake, or increased rates of HPV vaccination. Parental fear of their children's disregard for sexual safety following receipt of the vaccine has been listed as a top reason for bypassing the HPV vaccine (Zimet et al., 2013). Contrary to this belief, several cross-sectional studies have shown no evidence of this, with one even finding that adolescents recognized a need for safer practice with sexual behaviors (Zimet et al., 2013). These results may provide assurance to apprehensive parents and providers that there are no increased risks associated with the vaccine (Zimet et al., 2013). Other issues brought to light in this study are the beliefs that the vaccines are too new, causing parents to doubt the vaccine's safety (Zimet et al., 2013). Many studies have been conducted on HPV vaccine safety and any adverse effects associated with them showing little to no evidence of adverse health effects (Zimet et al., 2013). The third major influence on vaccine uptake includes healthcare provider recommendation (Zimet et al., 2013). This has been found to be negatively affected by several concerns: safety and efficacy; patient age; time constraints; and fear of alarming parents with the discussion of their child's sexuality (Zimet et al., 2013).

School-Based Interventions. A study to compare the efficacy of HPV interventions was completed to evaluate if there were increased HPV knowledge and vaccination intentions in college students (Krawczyk et al., 2012). The compared interventions consisted of written and video interventions, and HPV knowledge and vaccination intentions were assessed both before and after the interventions (Krawczyk et al., 2012). Participants, including 60 males and 140 females in universities in Montreal and Quebec, Canada, were randomly assigned to either a written, video, or control group (Krawczyk et al., 2012). The written and video interventions discussed HPV incidence, transmission, consequences of HPV, and vaccine efficacy and safety. The control group discussed information relating to healthy lifestyle choices to prevent cancer. The first study objective was to determine if the educational intervention successfully improved HPV knowledge. Both the written and video interventions greatly improved knowledge when compared with the control group. The second study objective was to determine if educational interventions improved the intent to vaccinate. The written and video interventions resulted in increased vaccination intentions more significantly when compared to the control group. The third objective was to see if a HPV video had a greater impact with increasing knowledge and intent to vaccinate when compared with the same information given to students in a written format. Results indicated that there was no difference between the two interventions when measuring increase in knowledge and vaccination intent (Krawczyk et al., 2012).

A cross-sectional, descriptive study was completed by Donadiki et al. (2014) to examine reasons for female university student HPV vaccine refusal, and assess beliefs, attitudes, and barriers related to the HPV vaccine series. The study included a sample size of 2007 Greek university students ages 18-26, and utilized a self-administered questionnaire incorporating Health Belief Model (HBM) directed questions. The study analyzed both demographic (age,

employment status, and relationship status) and independent variables (health/sexual behaviors) (Donadiki et al., 2014). Results of the study indicated that being in a stable relationship was more consistent with non-HPV vaccination. Smokers were shown to be more likely to refuse the HPV vaccine, which could also reflect less healthy lifestyle choices in general. Students who had never visited a gynecologist had a greater likelihood of not being vaccinated with the HPV vaccine. Results indicated that students who were more likely to refuse the HPV vaccine or be non-vaccinated were positive for a lack of information, having a higher number of barriers (cost, lack of social security), belief in no benefits to them, and belief that the HPV vaccine were neither safe nor effective (Donadiki et al., 2014). These results have shown to be consistent with other studies that have been completed (Donadiki et al., 2014).

In an on-going Australian study, Skinner et al. (2015) developed a two-year cluster randomized controlled analysis to evaluate how effective strategies would be to promote HPV vaccination in the school setting. The study goals were to evaluate vaccination-related psychosocial outcomes (knowledge and attitudes, decision-making, and self-efficacy), to reduce any fear and anxiety associated with the vaccine, and to improve vaccination uptake. A school-based delivery of vaccines is used in Australia, and adolescents are eligible to participate if a consent form is signed by their parent (Skinner et al, 2015). Past research completed in Australian schools has shown that “adolescents’ understanding, self-efficacy, and involvement in decision-making regarding HPV vaccination are low, and that their fear and anxiety are high” (Skinner et al, 2015, p 2). The intervention consisted of three components: adolescent intervention, parent/adolescent decision support tool, and logistical strategies. The adolescent intervention involved education given at the school in a lesson, a take-home magazine, an app for mobile devices and distraction/relaxation methods to be used before vaccination (Skinner et

al, 2015). The decision support tool was designed for use in the home environment. Logistical strategies included methods of increasing vaccine uptake including mailing vaccination consent forms to parents, reminders, non-material incentives (homeroom points), and guidelines for nurses and teachers to lessen student anxiety and promote student privacy (such as providing distraction techniques) (Skinner et al, 2015). Internationally there is an interest in the HPV vaccination because so many countries are not able to meet vaccination target numbers (Skinner et al, 2015). There are no conclusive study results now because the study is currently in progress.

A Capstone Project was completed in 2013 by Denise Barry, a Doctor of Nursing Practice student, regarding increasing HPV knowledge and vaccine promotion in a school-based setting. The project allowed the student to reach out to adolescents and parents to promote HPV education. Parents were targeted through an informational booth at parent information night, providing education about HPV and the vaccine. A 50-minute educational session was presented to a ninth-grade health class, with a pre-test and post-test administration. A handout with HPV education was also created and sent home with all the students. Overall results indicated an increase in knowledge about HPV and the HPV vaccine in the adolescent population (Barry, 2013). The number of adolescents who intended to get the HPV vaccine in the future was also increased (Barry, 2013). A measurement tool was not generated regarding the parental population.

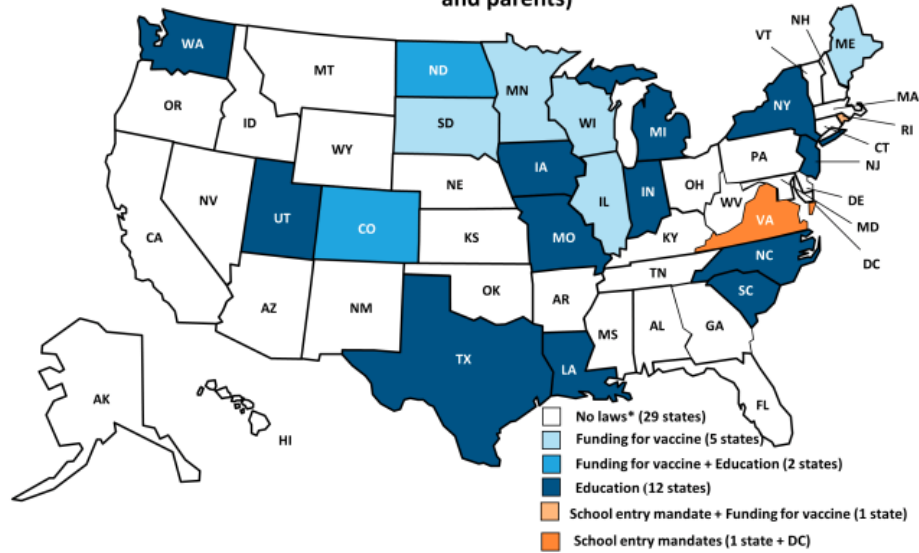
An educational intervention study aimed at HPV and the HPV vaccine was completed by Reiter et al (2011) in a school setting to increase basic HPV knowledge and vaccine uptake. One-time intervention sessions were completed in schools to a target audience of parents, healthcare staff, and school staff, with self-administered pre-and post-tests used to evaluate learning. An educational PowerPoint presentation was given, covering the topics of HPV

prevalence/transmission, associated diseases, vaccine recommendations, dosage schedule, vaccine efficacy/safety, and insurance coverage (Reiter et al, 2011). The pre-and post-surveys included self-rated knowledge and multiple-choice items. A handout was provided during the education session with similar information. Results indicate low levels of HPV objectivity and vaccine knowledge prior to the intervention. A significant result of the study was over 90% of school staff members thought the HPV and HPV vaccine education is important for school personnel and that the setting was an appropriate choice in venue to administer the information (Reiter et al, 2011). The study concluded overall the intervention succeeded to greatly increase knowledge among influential parties of adolescent females (Reiter et al, 2011).

The following figure shows the status of each state's policy regarding HPV mandates, education, and funding. Twenty-two states currently have some form of HPV policy in place, while 29 states have no policies in place (KFF, 2015). Virginia, DC, and Rhode Island are the only three states which currently require the HPV vaccination to attend school (KFF, 2015).

HPV Vaccination Policies- Mandates, Education, and Funding

State laws requiring HPV vaccinations for school entry, providing funding to cover the cost of the vaccine, or requiring public education (including for school children and parents)



NOTES: *States may have other laws relating to the HPV vaccine, such as insurance coverage mandates and research initiatives.
 SOURCE: National Conference of State Legislatures. (2014). HPV vaccine: state legislation and statutes.
 State of Rhode Island Department of Health (2015). Immunization Information for Schools and Child Care Workers.

Figure 1. State HPV Vaccination Policies (KFF, 2015)

A school-based education cluster randomized controlled study by Grandahl et al. (2016) was completed to increase HPV vaccination in 18 schools in Sweden. Each school was placed in an intervention or control group, and both male and female students were invited to participate. The initial intervention involved a one-hour face-to-face health interview. Students in the control-group received general information, while the intervention-group received information guided by the Health Belief Model (HBM). A baseline questionnaire was completed, with a follow-up questionnaire completed after three months. A handout was also given to students in both groups including general facts, transmission information and sequelae, risk factors, prevention, locations to receive the vaccine, vaccine facts, and importance for cervical screening (Grandahl et al, 2015). The results indicated the intervention influenced behavior due vaccination rates in the intervention group being slightly higher than the control group, and

overall the intervention had positive effects about HPV prevention with an increase in HPV vaccination rates (Grandahl et al, 2015).

Cost-Analysis. A cost-analysis of the newest HPV vaccine, Gardasil 9, in comparison with the cost-effectiveness of previous HPV vaccines, was conducted to further justify the need, practicality, and sustainability of the proposed project. The cost of treating HPV and HPV associated cancers is well known, and the projected cancer incidence in the US is well studied. Assuming the vaccine is available, easily administered, broadly used, and safe and effective, potential health benefit outcomes can be projected. Researchers showed through simplified statistical models that 9vHPV vaccine strain carries a better financial benefit than 4vHPV (Durham et al., 2015; Chesson et al., 2016b).

Durham and associates (2015) participated in a recent study assessing cost-effectiveness of the nonavalent HPV vaccine both at the state level and national level. The newest nonavalent vaccine, 9vHPV, was determined to be more cost-effective compared to the bivalent and quadrivalent vaccines (Durham et al., 2015). However, the newest vaccine is also more expensive than previous HPV vaccines. 9vHPV is listed at a per-dose cost of \$126, which is \$13 more expensive than Gardasil and \$18 more expensive than Cervarix (Durham et al., 2015). Using the 9vHPV was found to produce better health benefits while producing the same or lower societal costs, and predicted expansions of coverage prevented up to 66% more cervical cancer and related deaths when states with lowest coverage were compared with states of high coverage (Durham et al., 2015).

Chesson and associates (2016a) developed a study determining the impact and cost-effectiveness of U.S. females vaccinated with 9vHPV after they had previously been vaccinated with 4vHPV. The overall results of the study conclude that, with the high degree of variability

found in results, findings are not able to fully support the claim that additional 9vHPV vaccination is cost-effective. At the same time, the results did not rule out the possibility of additional vaccination having a high amount of cost-effectiveness (Chesson et al., 2016a). A similar study by Chesson and associates (2016b) evaluated cost effectiveness and projected quality-adjusted life years (QALYs) of 4vHPV compared to 9vHPV. Results determined vaccination of both sexes with 4vHPV strains reduced projected cancer rates by 53.4%. If cross protection was assumed, projected cancer rates increased to 63%. 9vHPV vaccination increased overall protection to 65.3% for both sexes, an 11% increase. QALY gained and cost projected analysis with 9vHPV for both sexes saved about \$386 million dollars and resulted in a gain of 147,000 QALYs. Most of the benefit incurred from providing vaccinations to females (Chesson et al., 2016b). Sensitivity analysis of providing 9vHPV to both genders in comparison to 4vHPV resulted in costs under \$10,000 per QALY in three projected vaccination scenarios over 100 years. The result implied actual cost saving will take considerable time to occur. The cost of treating HPV and HPV associated cancers is well known, and the projected cancer incidence in the US is well studied. Assuming the vaccine is available, easily administered, broadly used, and safe and effective, potential health benefit outcomes can be projected. Researchers showed through their simplified statistical model that 9vHPV vaccine strain carries a better financial benefit than 4vHPV (Chesson et al., 2016b).

National Survey Data. There has been an overall reduction in HPV prevalence since the vaccine was first introduced in 2006 (Markowitz, 2013). Data measurement was completed from the prevaccine era (2003-2006) and the vaccine era (2007-2010) through analysis of National Health and Nutrition Examination Surveys (Markowitz, 2013). Cervicovaginal swab samples were taken from women ages 14-59 years old, with 4150 total samples in 2003-2006, and 4253

total samples in 2007-2010 (Markowitz, 2013). In females ages 14-19, high-risk HPV types decreased from 11.5% (2003-2006) to 5.1% in 2007-2010 (a drop of 56%) (Markowitz, 2013). The prevalence did not decrease significantly with other age groups within the two time periods. These numbers show a substantial decrease in HPV prevalence within four years of introduction of the HPV vaccine.

A similar study by Markowitz et al. (2016) was done to determine the comparison between prevaccine (2003-2006) and an extended vaccine era (2009-2012) through analyzing data from cross-sectional surveys. Cervicovaginal specimens were examined from females ages 14-34 years old, and prevalence of 4vHPV types and other HPV types were compared. Overall, within six years of the release of the HPV vaccine, a 64% decrease was seen in 4vHPV type prevalence (in females 14-19 years old), and 34% decrease was seen in 20 to 24-year-old females (Markowitz et al, 2016).

Health Promotion Model

The Health Promotion Model (HPM) is a nursing theory developed by Nola Pender in 1982 and later revised in 1996 (Pender, Murdaugh, & Parsons, 2011). The purpose of the theory is to help nurses understand determinants of health behavior to promote the development of healthy lifestyles (Pender et al., 2011). The theoretical foundation of the HPM are based on the Expectancy Value Theory, where actions are taken to achieve goals that achieve favorable outcomes, and the Social Cognitive Theory, which examines the interactions of thoughts, behavior, and the environment (Pender et al., 2011).

Key concepts utilized in the HPM are person, environment, nursing, health, and illness. Together these concepts work together to form the basis of the HPM. There are eight beliefs which are the main focal points of the HPM (Pender et al., 2011). These beliefs are assessed by

the nurse and aid in helping the nurse change behaviors to influence healthier lifestyles. The beliefs focused on by the HPM are the following:

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

There are two other factors the HPM takes into consideration which influence each individual's lifestyle. Unique characteristics and experiences such as past health behaviors, and personal factors such as age, personality, race/ethnicity, and socioeconomic status (Pender et al., 2011). The other factor considered is health promoting behavior that determines a desired health outcome or behavioral end point, and how individuals are prepared to take action to achieve the desired outcome (Pender et al., 2011). The following seven assumptions are also made which reflect both nursing and behavioral science:

1. Individuals strive to create living conditions to express unique health potential.
2. Each person has the ability to assess their abilities and self-reflection.
3. Positive outcomes are desired and a balance needs to be found between change and stability.
4. Self-regulation of behavior is preferred.

5. All individuals interact with the environment in a complex way, both transforming themselves as well as the environment over time.
6. Health professionals influence individuals throughout the lifespan.
7. Self-initiation is required for behavior change.

The HPM is compatible with the clinical project question. Understanding determinants of health for both individuals and the target population was helpful for the nurse to promote individuals in making healthier sexual lifestyle choices. Being aware of beliefs which influence the decision to make positive or negative health choices allow the nurse to have a greater awareness of all contributing factors which influence both past health choices as well as future health outcomes.

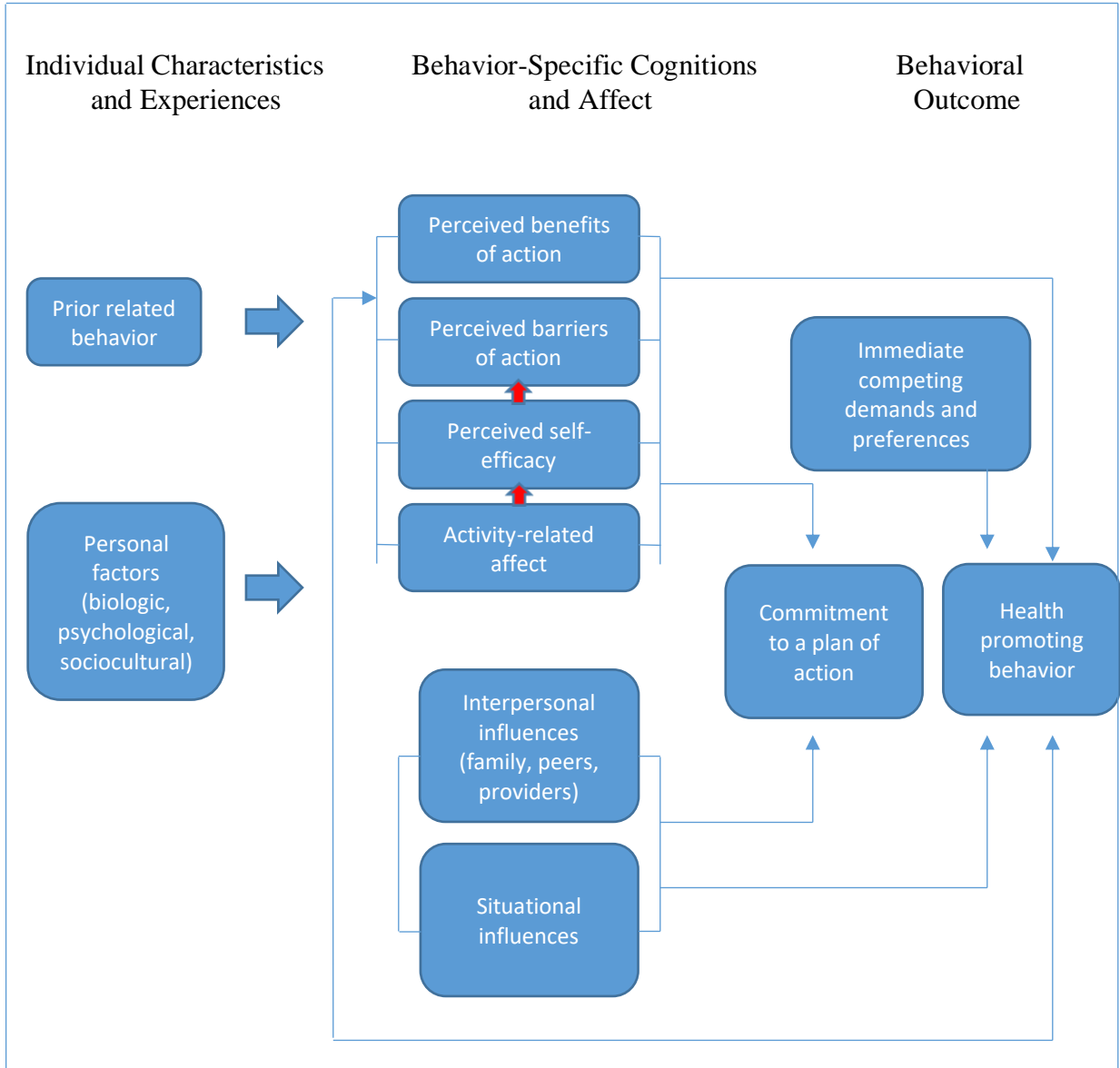


Figure 2. Health Promotion Model. (Pender et al., 2011)

CHAPTER 3. PROJECT DESIGN

Needs Assessment

The need exists to improve HPV vaccination rates among young adults in North Dakota. North Dakota statistical data, while close to national average percentages in all levels of the HPV vaccination completion series for adolescents ages 13-17, could be improved. The estimated vaccination coverage with one or more doses of HPV vaccine in females in North Dakota is 60.9% when compared with the national average (NA) of 60.0%, and males at 37.6% when compared with NA of 41.7% (CDC, 2015h). Estimated vaccination coverage with two or more doses in ND females is 48.7% when compared with the NA at 50.3%, and males at 32.1% in comparison with the NA at 31.4% (CDC, 2015h). The estimated vaccination coverage with three or more doses in females is 41.7% when compared to the NA of 39.7%, and males at 25.3% in comparison with the NA at 21.6% (CDC, 2015h). Estimated vaccination coverage of three dose HPV vaccine series completion in ND females is 75.8% when compared with the NA at 69.3%, and males at 71.7% when compared to the NA of 57.8% (CDC, 2015h). According to Healthy People 2020 (HP2020), the national target percentage for HPV vaccination in both males and female adolescents ages 13-15 years old is 80% (HP2020, 2014). The baseline to receive at least 3 doses of the HPV vaccine in 2012 for females was 28.1% and 6.9% in males. North Dakota females ages 13-15 years' old who have completed three or more doses of HPV was listed at 41.4%, and males at 18.1% when compared to the HP2020 goal of 80% (CDC, 2015h).

The next figure describes the most recent information taken from the CDC regarding 2016 percentages receiving at least one or more doses of HPV vaccine. These numbers show a great improvement from the baseline percentages in 2012. However, there is still a significant amount of work to do to get to the HP2020 80% target.

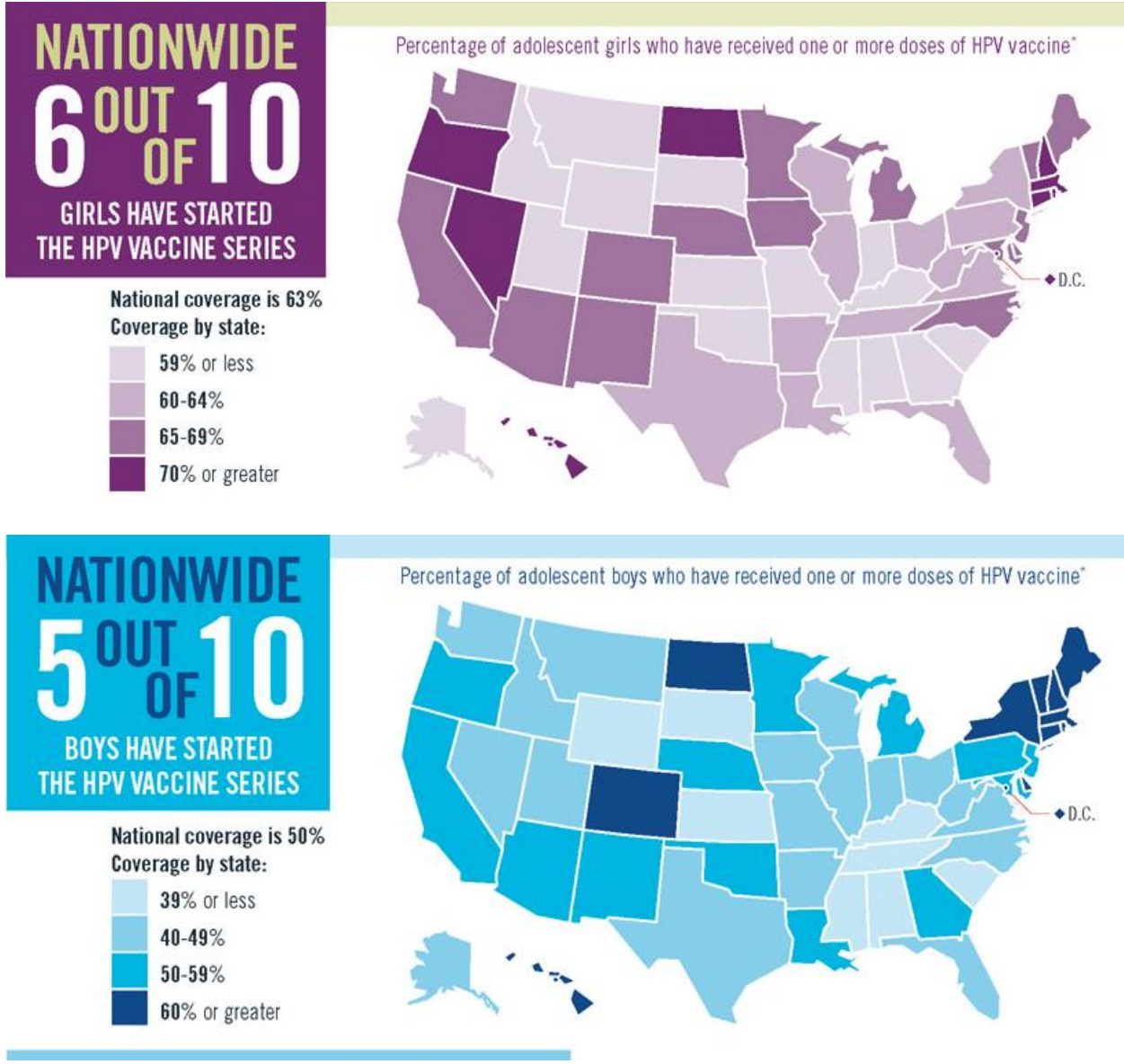


Figure 3. 2016 Nationwide HPV Vaccine Information (CDC, 2015i)

Project Implementation

The HPV vaccination education intervention plan utilized the Health Promotion Model (HPM) to assist the nurse in understanding individual determinants of health to promote knowledge about HPV and the importance of receiving the vaccine series. The HPM emphasizes the importance of the promotion of healthier lifestyles choices, which fits in with the clinical project aim of giving students the knowledge they need to protect themselves from sexually acquiring harmful strains of HPV (Pender et al., 2011). Individual characteristics and experiences, behavior-specific cognitions and affect, and health promoting behavior are all key parts of the HPM which helped to facilitate nurse promotion of learning for NDSU students (Pender et al., 2011). Survey data addressing student health data and attitudes/beliefs was collected to better understand and facilitate student health promotion.

The project has been designed with the following study inclusion criteria:

1. Currently a NDSU student in the age range of 18-26.
2. Able to read and understand English independently.
3. Physically and cognitively able of completing a written/online survey as identified by school or administrative personnel.
4. Must be present on the day of education (applies to organization meetings only).

The first step to begin project intervention implementation involved the development of the main educational video, the pre/post survey, the 3 and 6-month reassessment surveys, and a supplemental VoiceThread PowerPoint with additional HPV vaccine information. An educational video presentation was chosen that would best appeal to the target population. The video was developed by a team of Canadian professional associates, led by Dr. Mike Evans, a physician with many years of experience. The supplemental PowerPoint was developed by the

nurse researcher to reflect basic educational information related to HPV and the vaccine (including prevalence/transmission), long-term negative health implications (cancers), vaccine recommendations, dosage schedule, vaccine efficacy/safety, and student resources. Pre-and post-surveys were developed using a combination of research tools and the Health Promotion Model (HPM) (Denise Barry, 2013; Donadiki et al., 2014; Pender et al., 2011). Permission was granted for usage of both tools with modifications, as well as the HPM, which primarily addressed questions assessing student beliefs, attitudes, and barriers (Pender et al., 2011).

Project implementation involved two components. The main component of the intervention plan took place during either one weekly or biweekly meeting of two NDSU organizations: Women's Activist Organization (WAO) and Violence Protection Educators (VPE). Students began by taking an online Qualtrics pre-survey to establish a baseline about HPV knowledge, HPV vaccine knowledge, beliefs, attitudes, barriers, current HPV vaccine status (vaccinated or not vaccinated), and intent to receive the vaccine series if they have not. Next, a 10-minute educational you-tube video was watched, entitled "Should You Get the HPV Vaccine?" Student questions were answered after viewing the video. Two registered nurse representatives from Student Health Services were present during the education sessions to assist in answering questions students had about how much the vaccine costs to receive, scheduling a time to receive the vaccine series, and other various questions students had about receiving the vaccine series through Student Health Services at the Wellness Center. Last, an online Qualtrics post-survey was administered to assess if baseline knowledge, beliefs, attitudes, barriers, or overall student intent to receive the vaccine had improved after receiving the education. Student email addresses were collected at the end of each online survey to send out three and six-month follow-up surveys to assess if students either started or completed the HPV vaccine series since

taking part in the clinical intervention. An educational CDC handout about HPV was given to students at the end of the intervention, as well as a link to the supplemental online VoiceThread PowerPoint, and Student Health Service cards with contact information for questions or scheduling a time to start or finish the HPV vaccine series.

The second component of the intervention involved participating in the annual spring Sex Positivity Expo (SPE), which took place on the second level of Memorial Union in the Plains Room from 5-8 pm on April 4, 2017. The same two Student Health Services registered nurse representatives were present during this event to assist in answering questions students had about receiving the vaccine series through NDSU. A booth was reserved where the nurse researcher and Student Health Services representatives were able to speak with participants about HPV and the importance of the vaccine. Each participant was asked if they would like to participate in the clinical project and had the choice whether or not to leave their email address. Contact was made with a total of 52 students at the event. A total of 14 online pre-and post-surveys were started by SPE participants, and eight were completed.

Timeline. The timeline for project implementation was enacted as follows:

1. September 2016: Proposal meeting.
2. November – December: Reached out to potential organizations at NDSU to whom to provide the educational intervention.
3. March 2017: Request for project approval submitted and granted by NDSU's Institutional Review Board (IRB).
4. April 2017: Implementation of the Practice Improvement Project at two selected NDSU organizations and provision of participant education at the annual Sex Positivity Expo.

5. July 2017: 3-month reassessment Qualtrics surveys emailed to students.
6. October 2017: 6-month reassessment Qualtrics surveys emailed to students.
7. October 2017: Started final analysis of collected data.

NDSU IRB Approval

Documentation was compiled and submitted to NDSU's Institutional Review Board (IRB) for review in compliance with human subject's protection and NDSU policies. Approval was granted on March 29, 2017 for Protocol number PH17165 (Appendix C). The approval period was listed as 3/29/2017 through 3/28/2018. The review type was considered to be expedited category number six and seven.

Data Collection

Permission to use assessment survey tools (with modifications) was granted by researcher Denise Corrigan, previously Denise Barry, and Elizabeth Donadiki (Appendix B). Permission was also granted by Nola Pender for the application of the Health Promotion Model (Appendix B). Analysis of initial survey results involved comparison of pre-and post-survey answers. The pre/post survey assessed demographic information (gender, age), knowledge related to a general understanding about HPV, modes of transmission, who should receive the vaccine, current HPV vaccination status of the student, intent to vaccinate, prior indications of personal health, and beliefs, attitudes, and barriers (Appendix D, E) (Barry, 2013; Donadiki et al., 2014, Pender et al., 2011). Survey questions were asked in the following formats: true/yes and false/no, agree/disagree, and select all that apply (Barry, 2013).

The main bulk of data was collected in the form of pre-and post-online surveys. Seven of the pre-and post-surveys were from participants at the Sex Positivity Expo who completed the surveys outside of the classroom setting. The educational video was embedded into the survey

so that these participants were able to take the pre-survey first, watch the video in the same survey, and then take the post survey. Skewing of data in these surveys was prevented because these participants were not given any HPV education counseling during the expo. Twenty-five of the surveys were completed at the time of the educational training sessions during the two NDSU organization meetings on campus. Three and six-month follow-up surveys were emailed to those participants who consented to receive them. Of the twenty-five participants that gave consent for this, seven students responded to each of the three and six-month follow-up surveys.

The pre-and post-surveys measure quantitative and qualitative data collected through online Qualtrics surveys. The post-survey was not identical to the pre-survey because it does not contain a few of the belief, attitude, and barrier questions which were repetitive for students to answer and intended to provide better understanding of the target population. Survey results were acquired anonymously through an “anonymize response” setting on the Qualtrics survey.

CHAPTER 4. EVALUATION

Each of the four practice improvement project objectives have specific evaluation criteria in place to determine if they were successfully met at the conclusion of the project. There are three possible outcomes each objective may be labeled with, including met, partially met, or unmet. If the outcome is met, it means that objective was successful. If partially met, it means at least a portion of the objective was successful. If unmet, the objective was not successful. The objectives are listed again as follows:

- Practice Improvement Objective One – *Determine whether an educational video intervention can successfully improve HPV knowledge among NDSU students.*
- Practice Improvement Objective Two – *Determine whether an educational video intervention can successfully improve HPV vaccination intent and vaccine uptake among NDSU students.*
- Practice Improvement Objective Three – *Assess NDSU student beliefs, attitudes, and barriers associated with the HPV vaccine.*
- Practice Improvement Project Objective Four: *Provide HPV education to NDSU student participants at the annual spring Sex Positivity Expo.*

The first, second, and third objectives were measured by data collected from NDSU participants who complete pre-and post-surveys (Appendix D, E). The expectation for the first objective is to have a noticeable increase in knowledge after students watch the educational video. The second objective measured if students who are not already fully vaccinated with the HPV vaccine had a favorable response regarding vaccine intent. The second objective also mentions vaccine uptake, which was evaluated through student response to the three and six-month follow-up surveys. The third objective examining student beliefs, attitudes, and barriers

associated with the HPV vaccine was measured by whether or not there was an increase in favorable responses when comparing the pre-and post-surveys.

Measurement of the fourth objective is determined by how many students stop at the Sex Positivity Expo booth for education. Students who approached the booth were first asked if they would like to participate in the project through providing their emails to take the online Qualtrics pre-and post- surveys. This was done to avoid the skewing of any online survey data. If they preferred not to take the survey, they were asked if they had any knowledge about HPV, if they had been vaccinated with the vaccine series, or if they had any questions related to HPV or the vaccine series. Appropriate education was given at that time in response to student questions. Educational CDC handouts were available to give to students, as well as Student Health Service business cards for them to call with any questions or to schedule a time to receive the HPV vaccine series.

A logic model was developed to serve as a tool for evaluation of the practice improvement project to organize project information concisely and strategically (Pell Institute, 2016).

Table 2

Logic Model

Resources/Inputs	Activities	Outputs	Outcomes	Impact
Emily Hegg (NDSU Health & Wellness Promotion Coordinator)	Pre-test	Collected pre-tests	1. Determine whether educational video interventions can successfully	Improved vaccination intent and increased HPV knowledge for NDSU students.
Organization presidents: Oliva Oland (WAO) Kelsey Keimig(VPE)	Educational video PowerPoint presentation	Collected post-tests	improve HPV knowledge among NDSU students.	Determine student beliefs, attitudes, and barriers to the HPV vaccine.
Graduate Committee Members	CDC Educational handout	Collected reassessment surveys	2. Determine whether educational video interventions can successfully improve HPV vaccination intent and vaccine uptake among NDSU students.	
	Post-test	Participant level: Freshman-Senior college students	3. Assess NDSU student beliefs, attitudes, and barriers associated with the HPV vaccine.	
	Online Qualtrics reassessment survey		4. Provide HPV education to NDSU student participants at the annual spring Sex Positivity Expo.	

CHAPTER 5. RESULTS

Sample Population

The HPV education was provided to two different factions of NDSU college students ages 18-26. The first group consisted of participants at the Sex Positivity Expo (SPE), where a booth was set up for students to stop by and ask questions and be offered the chance to participate in the online survey. The second group consisted of two NDSU student organizations (WAO and VPE). Both males and females were encouraged to participate in the online surveys, although there were significantly more females than males (26:4). The age groups were more evenly divided into groups of 18-21 (N=14) and 22-26 (N=16).

Quantitative Data Results

The SPE took place on April 4, 2017 in the Plains Room of the Memorial Union, and education or survey involvement was available to all NDSU student attendees. The WAO meeting took place on April 5, 2017 in the Rose Room in Memorial Union, and the VPE meeting took place on April 11, 2017 in a classroom on the third floor of the Family Life Center. During the SPE, a total of 55 students stopped by the HPV education booth and either visited about what questions they had, or were emailed a link to participate in the pre-and post-survey. A total of 14 online pre-and post-surveys were started by SPE participants, and eight were completed. A total of 11 surveys were started by WAO participants, and nine were completed. A total of nine surveys were started by VPE participants, and eight were completed.

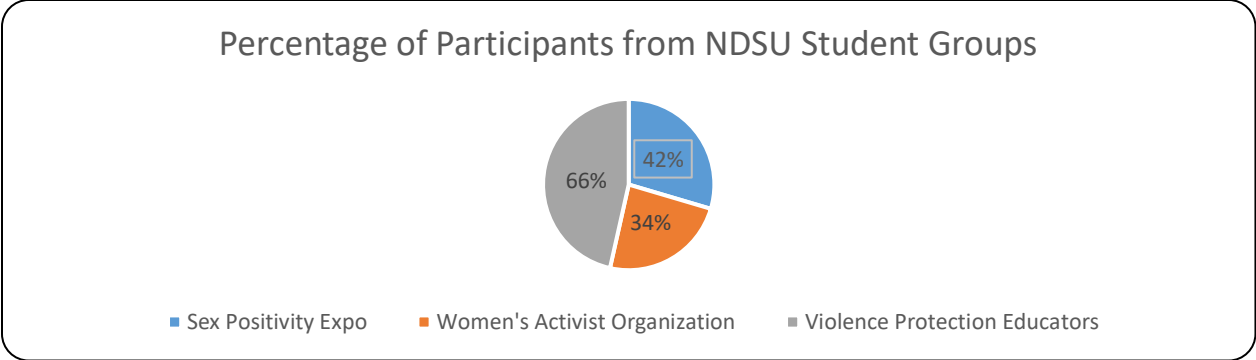


Figure 4. Group Participation

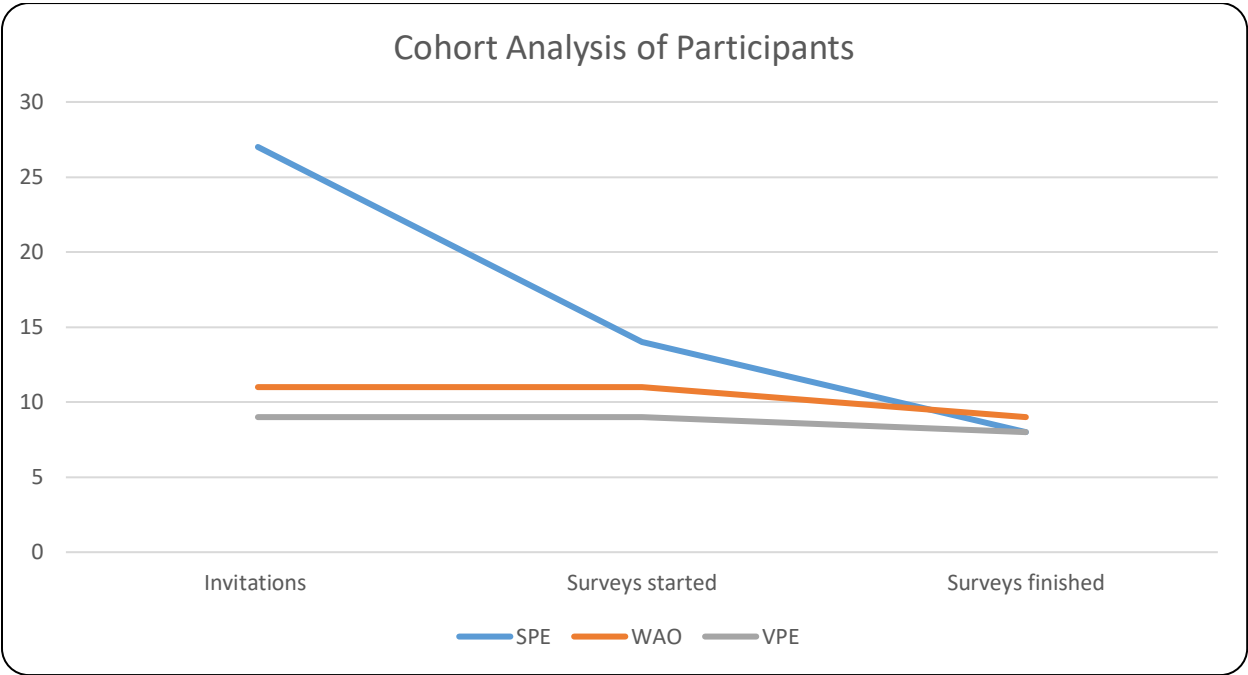


Figure 5. Cohort Analysis

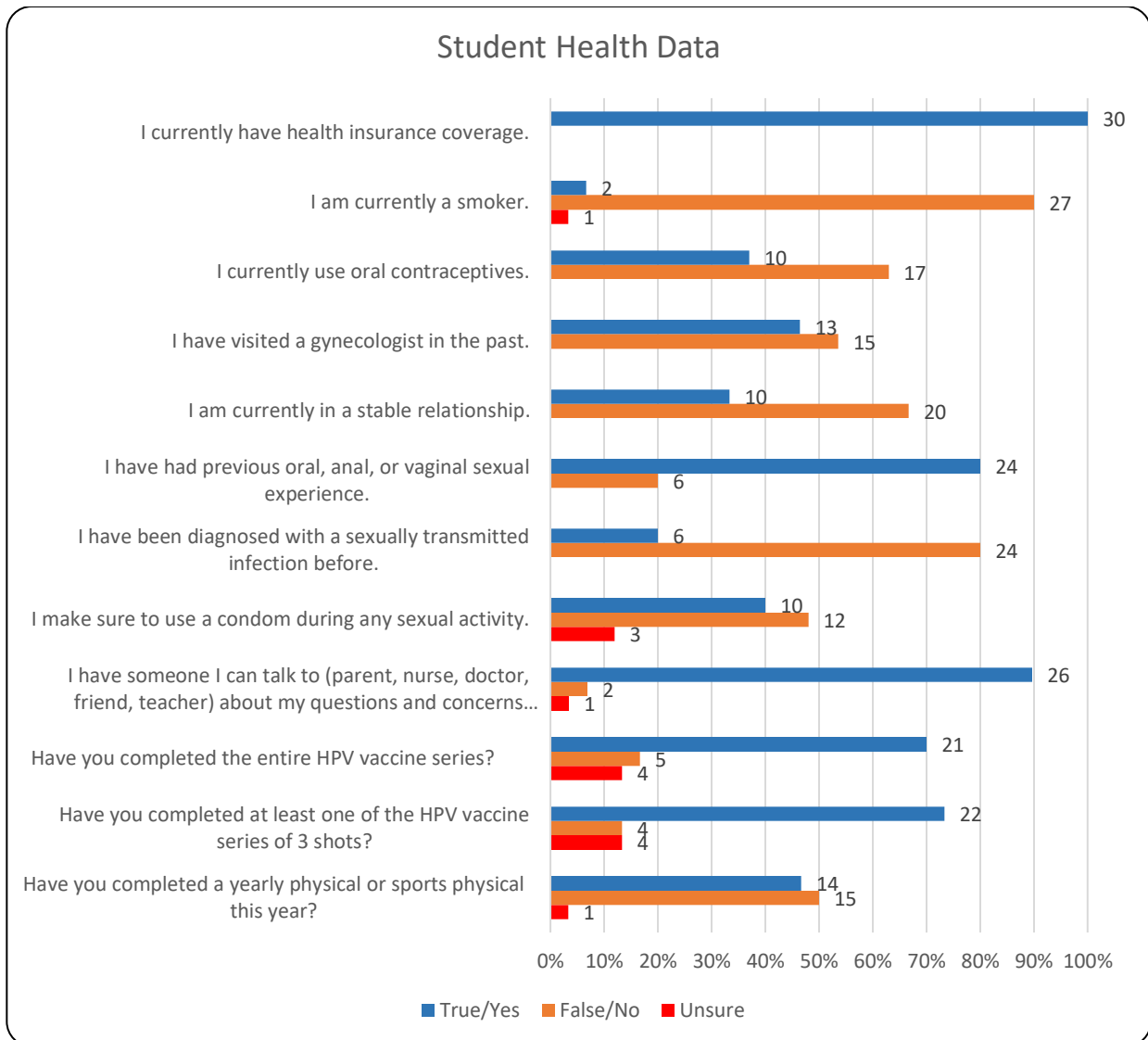


Figure 6. Student Health Data

A total of 30 students completed either all or part of the pre-and post-surveys. Health data was collected about each student in order to determine overall health information and to establish how active students are in maintaining healthy lifestyle habits. General health information such as health insurance status, yearly/sports physicals, smoking status, contraceptive use and gynecologist visits were collected. Sexual health information such as relationship status, sexual activity, condom use, resources for questions, and HPV vaccination starting/completion rates were collected (Appendix D).

Pre-and post-survey questions were collected assessing student HPV knowledge. Knowledge questions were designed to assess basic HPV information in the pre-survey such as prevalence, sequelae, transmission, vaccine information, and belief of self-risk. They were also designed to assess the educational component of the study to determine if there was an increase in learning in the post-survey after viewing the educational video. Answers to the true and false questions were all “true”, and answers to the other two questions have been highlighted in the following table. Five student participants did not answer questions in the post-test portion, so these student’s responses were taken out of pre-test data in the following chart to allow for better data comparison.

Table 3

Education Questions

Variable	Pre-test			Post-test		
	True	False	Unsure	True	False	Unsure
I believe I could be at risk for getting HPV.	N= 9	N= 10	N= 2	N=10	N=10	N=1
The highest rates of new genital HPV infections occur in young adults in their late teens and early 20s.	N= 22	N= 2	N= 1	N=22	N=1	N=2
If I am infected with HPV, I could get genital warts and/or cancer.	N= 21	N= 2	N= 2	N=24	N=1	N=0
It is estimated that nearly 100% of sexually active men and women will become infected with HPV at some point in their lifetime.	N= 6	N=14	N= 5	N=22	N=3	N=0
Human papillomavirus (HPV) is the most common sexually transmitted infection in the United States.	N= 15	N= 6	N= 4	N=21	N=3	N=1
	M	F	Both	M	F	Both
Who should receive the HPV vaccine?						
A. Females	N=0	N=1	N=24	N=0	N=1	N=24
B. Males						
C. Both						
	D	E	F	D	E	F
How is HPV transmitted?						
A. Skin-to-skin contact						
B. Contact with infected blood						
C. An infected person coughs or sneezes on another person.	N=12	N =11	N=2	N=6	N=18	N=1
D. Vaginal, oral, or anal sex						
E. A&D						
F. B&C						

Belief, barrier, and attitude questions were designed to assess student beliefs and attitudes towards the HPV vaccine (and all vaccines in general), and barriers (such as vaccine cost or

needing additional information). Certain pre-and post-survey answers consisted of “True/Yes” or “False/No”, or “Absolutely Agree”, “Agree”, “Neutral”, “Disagree”, or “Absolutely Disagree”. Statistical analysis was evaluated on all pre-and posttest answers. It was determined that, due to the small sample size, confidence intervals and p-values would not be included in study results due to a lack of statistical significance. Descriptive statistics was decided to be of more value to describe overall results. Knowledge/education and belief/barrier/attitude results of pre-and post-responses can be seen in the below graphs.

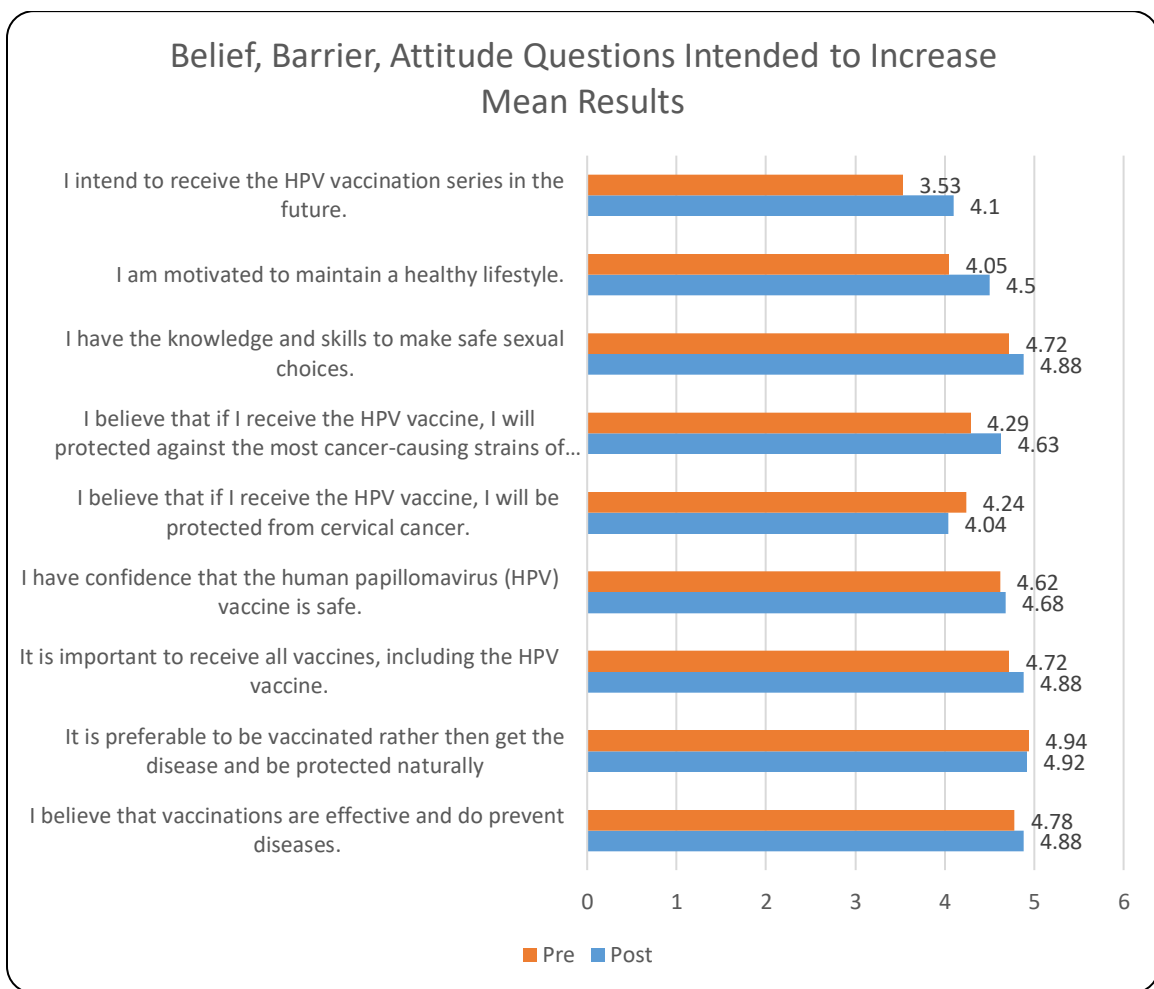


Figure 7. Belief, Barrier, Attitude Increase Questions
 5=Absolutely Agree, 4=Agree, 3=Neutral, 2=Disagree, 1=Absolutely Disagree

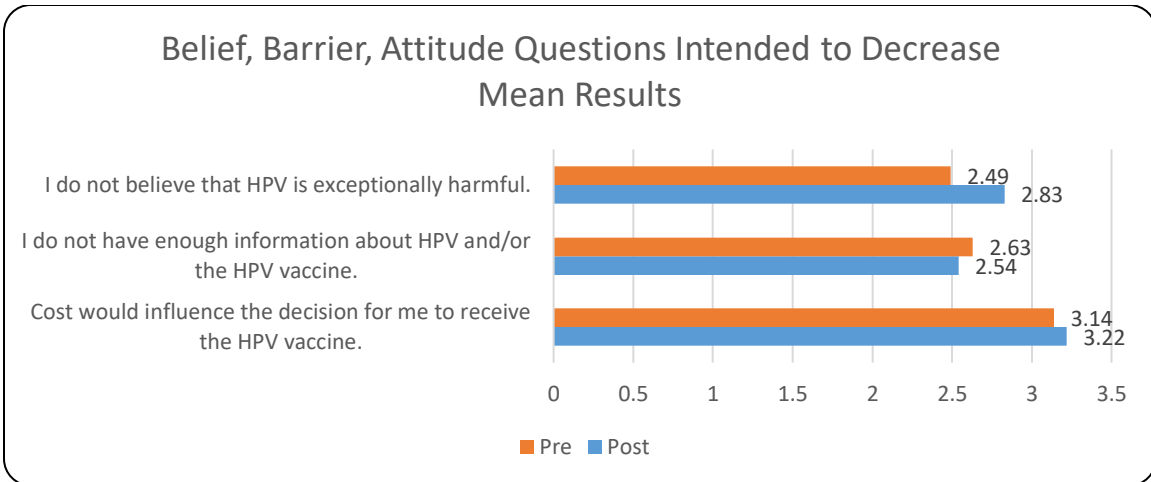


Figure 8. Belief, Barrier, Attitude Decrease Questions
 5=Absolutely Agree, 4=Agree, 3=Neutral, 2=Disagree, 1=Absolutely Disagree

Questions were also designed to determine significance of implications for future practice. Question answers consisted of “True/Yes” or “False/No”, or “Absolutely Agree”, “Agree”, “Neutral”, “Disagree”, or “Absolutely Disagree”. The last question in the graph (Do you feel this education has motivated you to engage in safer sexual practices in the future) consisted of a “Yes” or “No” answer.

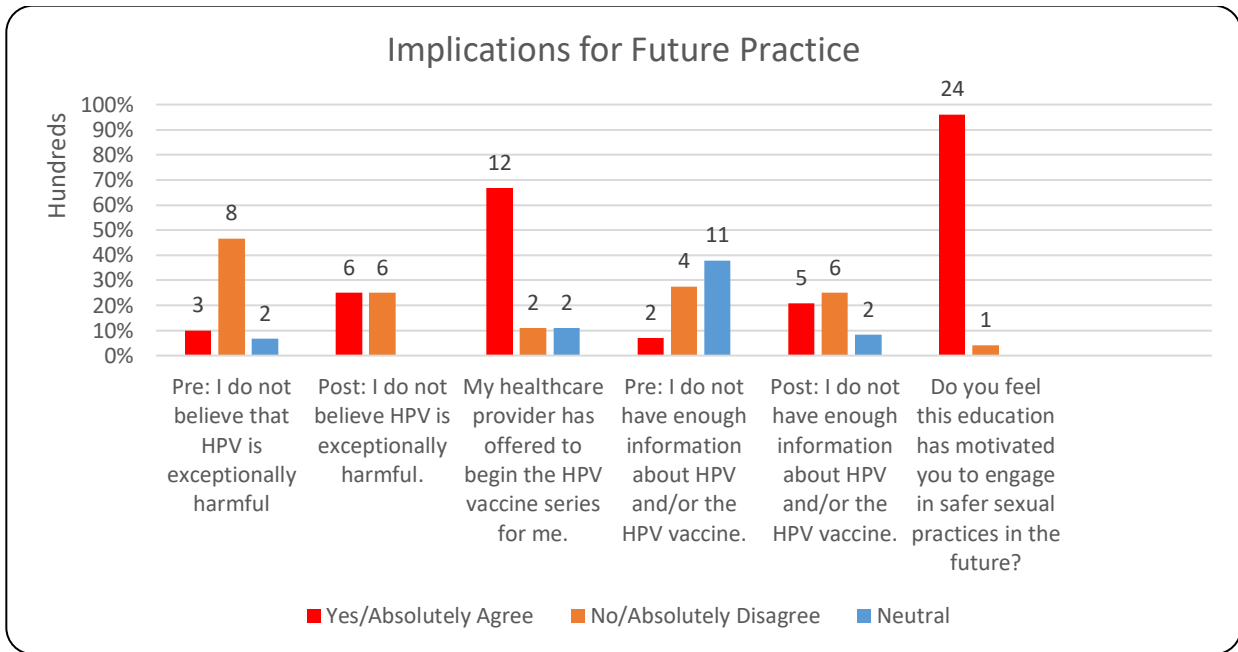


Figure 9. Implications for Future Practice

3-6 Month Reassessment Surveys

Reassessment surveys were sent out to participating students at three and six months after the initial education sessions were provided, to which seven students responded to each.

Questions asked in the follow-up surveys assessed the following: if the education sessions made students more likely to receive the vaccine; if students were vaccinated with the HPV vaccine before the education was given; if students made an appointment with Student Health Services or their health care providers to begin the HPV vaccine series or if they received any HPV vaccinations since participating in the education; or if students plan on receiving the vaccine in the future. Questions also addressed whether students were already fully vaccinated at the time of education, if they are not interested in receiving the vaccine, or if they would like more information about the HPV vaccine. If students indicated on the survey that they wanted more information, they were directed to the CDC website addressing HPV vaccine information.

The results of the three and six-month surveys were identical to each other in all question responses. Results revealed four of seven respondents were more likely to receive the HPV vaccine. Six of seven students were vaccinated with at least part of the HPV vaccine series, and one student was not. Four students stated they had not made an appointment to receive the HPV vaccine, and one student was unsure. Five students answered they had not received any HPV vaccination since the education session, and five had indicated they were already fully vaccinated. Two students indicated they do intend to receive the vaccine in the future. Three students disagreed they were not interested in receiving the HPV vaccine, and three students indicated they would like more information about the HPV vaccine.

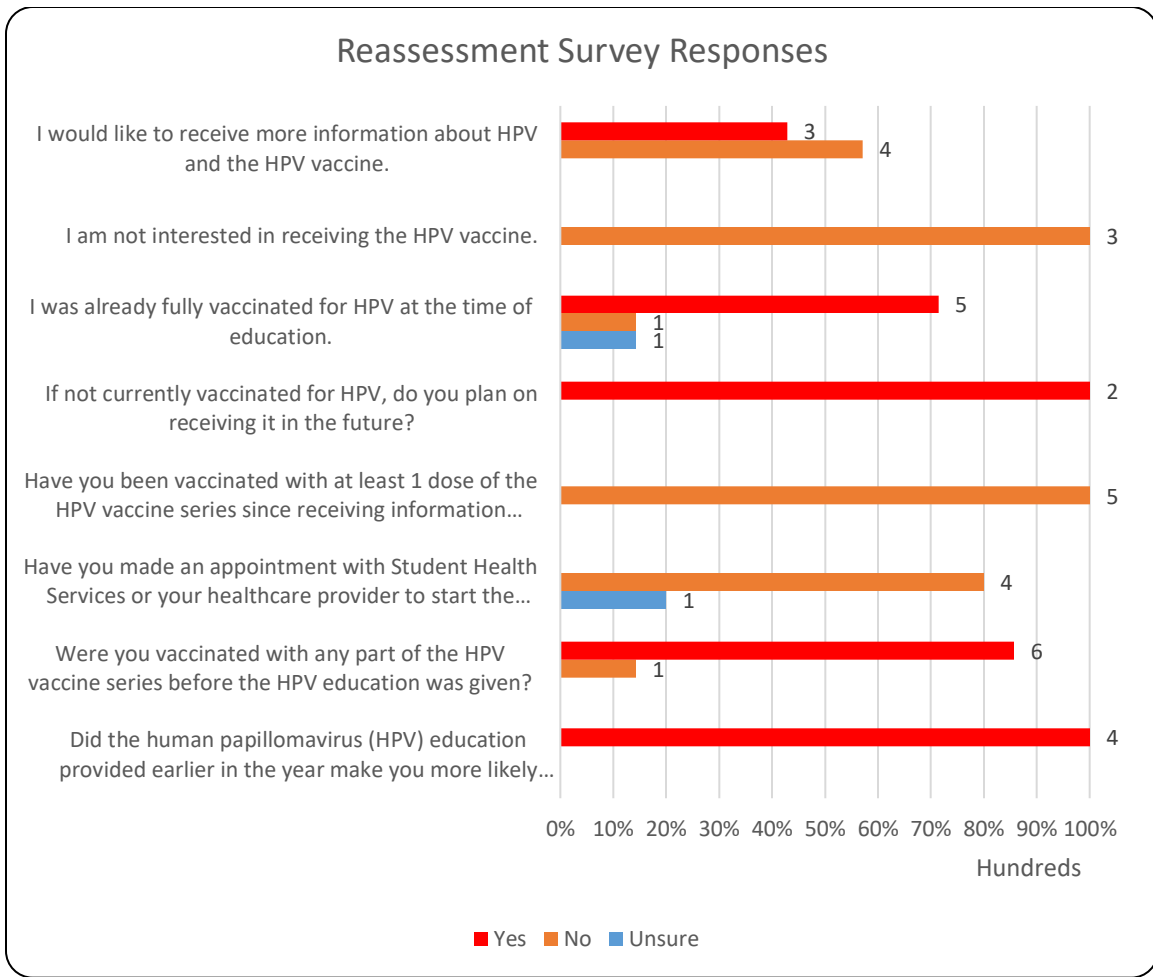


Figure 10. Reassessment Survey Responses

Qualitative Data Results

Qualitative data was also collected. An open-ended question at the end of the post-survey allowed students to type in a response about why they did or did not believe in the HPV vaccine. The follow responses were recorded:

- Doesn't sound like there are many downsides.
- It can save you and others from getting cancer.
- I received it when I was 15 and I think it's a good thing to prevent rather than to cure.
- I want to prevent any potential future problems.

- I believe that health care providers work to provide the public with safe vaccinations that help keep our population healthy.
- It's a vaccine. That prevents cancer. It's so important.
- Protection against cancer, duh!
- Vaccines save lives!

Program Evaluation

Program success was evaluated by going through each objective to decide if they were “met”, “partially met”, or “unmet”. The first objective was to determine whether an educational video intervention was able to successfully improve HPV knowledge among NDSU students. There was a clear increase in a majority of post-survey mean response in education/knowledge questions, as seen previously in table 3, indicating this objective was met. Facilitating factors that made the objective achievable include the educational video used to enhance learning, and the assessment tool (pre-and post-surveys) to assess knowledge. A barrier to this objective includes the drop-out rates of student responses in the post-survey.

The second objective was to determine whether an educational video intervention was able to successfully improve HPV vaccination intent and uptake among NDSU students. Intent to vaccinate increased in mean numbers from the pre-survey (3.53) to the post-survey (4.1), and two students in the reassessment surveys indicated they planned on receiving it in the future (Figure 7, 9). Vaccine uptake was addressed in the reassessment surveys. When asked whether or not any students had made an appointment with Student Health Services or their primary care providers to receive the HPV vaccine, four indicated they had not, and one student was unsure (Figure 10). When asked whether or not students had received at least one dose of the HPV vaccine since the educational session, five students indicated they had not (Figure 10).

Information from the pre-survey indicated 21 (70%) students had been fully vaccinated with the HPV vaccine series, and 22 students had at received at least one part of the HPV vaccine series. However, four students indicated the education they received earlier in the year did make them more likely to receive the HPV vaccine (Figure 10). From this data, it appears that vaccine intent was positively impacted, but evidence of vaccine uptake was not achieved. Therefore, this objective is partially met. Facilitating factors that made the objective achievable include the educational video used to enhance learning, and the assessment tool (pre-and post-surveys) to assess knowledge. A barrier to this objective included the number of students that were already vaccinated with all or part of the HPV vaccine series.

The third objective was to assess NDSU student beliefs, attitudes, and barriers associated with the HPV vaccine. These were assessed in pre-and post-surveys. There was an overall increase in majority of mean post-survey results in the belief, attitude, and barrier questions, indicating a positive response to education, and giving this objective a label of “met” (Figure 10). Facilitating factors that made the objective achievable include the educational video used to enhance learning, and the assessment tool (pre-and post-surveys) to assess knowledge. A barrier to this objective includes the drop-out rates of student responses in the post-survey.

The fourth objective was to provide HPV education to NDSU students at the annual 2017 spring Sex Positivity Expo. A total of 55 students stopped by the booth set up at this event, and either chose to participate in the pre-and post-survey or simply to ask questions and receive education at that time. In describing group participation previously (Figure 4), one can see the participants from this event made up the largest group which completed the pre-and post-surveys. Due to the sizeable number of students who stopped by the booth and participated in the surveys, this objective is met. Facilitating factors that made the objective achievable include the

annual meeting of the Sex Positivity Expo and communication with the Woman’s Activist Organization’s president to set up a booth at the event. A barrier to this objective includes students who declined HPV education/discussion at the event.

The educational session was also evaluated by a question at the end of the post-survey asking students how reliable they found the information presented to them in the video.

Question responses included “Very Reliable”, “Reliable”, “Slightly Reliable”, and “Not at All Reliable”. Eighteen students (60%) rated the video information as “Very Reliable”, six (20%) rated it as “Reliable”, and one (3%) rated it as “Slightly Reliable”. Overall, this was a good response to the education, as the majority of students gave it the highest possible rating.

CHAPTER 6. DISCUSSION AND RECOMMENDATIONS

Current research data recommends providing health education to college students in order to increase uptake of the HPV vaccine series (Thompson et al., 2017). Higher education institutions such as colleges and universities are ideal places to focus on catch-up HPV vaccination (18-26 years) because a greater focus is placed on preventive health education and the development of greater responsibility when making personal decisions (Thompson et al., 2017). There is also better availability and access for students in regard to campus health care services (Thompson et al., 2017). Lower knowledge levels have been connected with both high and low acceptability, meaning education and knowledge don't always positively affect vaccine uptake (Carnegie et al., 2017). Regardless, knowledge and education are important in order for patients to be able to make an informed decision about whether or not to be vaccinated (Carnegie et al., 2017).

A positive response was received from NDSU student participants to the HPV education sessions. Although over half of students had received part or all the of the vaccine series, many didn't know what it protected them against. Several students had questions about risk factors, transmission, and sequelae which were addressed in discussion at the end of each education session. Discussions were constructive and able to allow students to think in-depth about protecting their sexual health. This is beneficial particularly during college years where sexual experimentation may be at an all-time high (Garcia, 2013).

Of the 30 students who participated in the pre-and post-surveys, 22 students (73.33%) had completed at least one of the HPV vaccine series of three shots, and 21 students (70.0%) had completed the entire HPV vaccines series. Four students indicated they were unsure if they had started/completed the series. Although over half of student participants had completed the

vaccine series, HPV education was still beneficial to them for a few important reasons. The education allows students to focus on sexual health and prevention as a primary means of stopping the acquisition of HPV (which can also be translated to prevention for other sexually transmitted infection), allowing them to think about their own sexual habits and whether they are considered to be high risk. Another benefit of the education is, as potential future parents of children who will hopefully receive the HPV vaccine, these participants will know how important it is for those children to be vaccinated in order to be protected from HPV-related cancers. The goal was for the other 30 percent of students who had not received the vaccine, or who were unsure if they had, to develop their interest in receiving the vaccine and hopefully to actually receive it before being exposed to any high-risk types of HPV which may lead to cancer. Half of this goal was achieved, which will be discussed in later in the chapter.

The following paragraphs discuss different segments of results as seen in the previous chapter. A large amount of data was collected in order to make correlations between different variables. The first section to be discussed is student health data.

Student Health Data

Student health data was collected in order to determine how motivated students were to take an active role in their healthcare. It was interesting to note both pre-and post-survey approximately 50% of students believed they could be at risk for getting HPV. Correlating with this, only about 40% of students used a condom with sexual activity, while 48% did not. This places the group who doesn't use condoms at a higher risk for acquiring HPV (or other consequences), although transmission can also occur with nonpenetrative sexual activity (CDC, 2015j). Only about 40% of student participants used contraceptives. Twenty-four students (80%) indicated they had previous oral, anal, or vaginal sexual experience, while only 6 students (20%)

had been previously diagnosed with a sexually transmitted infection (STI). This is a smaller number of students than was expected to have been diagnosed with a previous STI based on how many had sexual experience, as research indicates HPV infection usually occurs shortly after the onset of sexual activity (CDC, 2015j). However, other factors such as how many partners, etc., had not been specified. Ten students (33.33%) indicated they were in a stable relationship, while 20 students (66.67%) indicated they were not. While a majority of students were not in a stable relationship, a majority also indicated some type of sexual experience in the past. This data substantiates evidence that a majority of adults in their late teens and early 20's is when the highest rates of new genital HPV infections occur (CDC, 2015j).

Almost 90% of students had someone they could talk to about questions associated with HPV or the vaccine. This can be associated with meaning they have someone to talk to about other health concerns as well (such as a parent, friend, teacher, or health care professional), which shows many students have a good support system. One hundred percent of students had health coverage, although the question did not specify what type of health coverage they had (private, Medicaid, etc.). It is assumed that many students were likely still covered by a parent's health insurance as the age limit is currently 26. The insurance topic came up during both group discussions when students asked how insurance coverage would work to pay for the vaccination series on campus.

Education Questions

An overall increase in knowledge between pre-and post-surveys in a majority of knowledge-based questions was noted. The education question with the biggest change in pre-and post-survey percentage was the question asking if it was true or false that nearly 100% of sexually active men and women will become infected with HPV at some point in their lifetime.

Eight (26.67%) students answered correctly (true) in the pre-survey, and 22 (88.0%) students answered correctly in the post-survey. As noted during the discussion at the end of the educational session, this was one of the more shocking education components for students, as many couldn't believe the high rate of prevalence this virus has in the community. One student asked, "If HPV is so common, why should we take any extra precautions to prevent acquiring it if we are almost 100% guaranteed to get it?" This was a good opportunity for some education to be provided about the importance of receiving the catch-up HPV vaccine series to better protect them. It was explained that with the proper precautions and reduction in risk factors (vaccination, condom use, limiting number of sexual partners, etc.), their chances of acquiring HPV could be reduced (CDC, 2015j).

A question that did not see much of an increase in the pre-or post-survey asked who should receive the HPV vaccine (males, females, or both). Almost 100% of students answered this question correctly, showing that a good majority of students had knowledge of this component of the HPV vaccine. This information correlates well with the question asking how if the students had ever heard of the HPV vaccine before, to which 27 (90.0%) students indicated they had.

Belief, Attitude, and Barrier Questions

Belief, attitude, and barrier questions were addressed in the pre-and post-surveys to determine whether student's views changed after education was provided. A majority of questions were designed to increase mean results, while a smaller number of questions were designed to decrease mean results (Figure 7, 8). Questions designed to increase mean results in post-survey responses largely had the intended outcome. The question with the greatest positive change in post-survey mean (0.57) asked if students intended to receive the HPV vaccination

series in the future. The question with the second greatest change in post-survey mean (0.45) asked if students were motivated to maintain a healthy lifestyle. These two questions correlate well because it shows students are motivated to be healthy as well as ready to take action to do so (intent to vaccinate). This response shows a very positive attitude and belief reaction to teaching and student comprehension of material.

Only two questions in this category had the opposite response. The first question (I believe that if I receive the HPV vaccine, I will be protected from cervical cancer) had the greatest reduction in mean response between the two. This is interesting because another question in this category (I believe that if I receive the HPV vaccine, I will be protected against the most cancer-causing strains of HPV) received the third highest positive change in mean numbers (0.34). This leads us to question if students were not aware that in women, HPV-related cancers usually manifest as cervical cancer (70%), although it was a component addressed in the explanation of HPV-related cancers in the educational video (CDC, 2015j). The other possibility is students were simply not paying attention at the beginning of the video, because the video mentions this fact within the first few minutes. The other question with a reduction in mean (It is preferable to be vaccinated rather than get the disease and be protected naturally), had a decrease in post-survey mean of only 0.02, so the numbers are very close to being the same.

Three questions were also designed to decrease mean results, having the intended response in one out of three questions. The belief question with the highest increased mean (0.34) in this category (I do not believe that HPV is exceptionally harmful) had a response which was not anticipated. The first possibility to this response is after receiving education and learning how much protection the vaccination series offers from high-risk HPV strains (because

over half of participants were already vaccinated with the HPV vaccine series) they believed themselves protected from the cancer-causing strains and therefore did not believe it is a virus that is harmful to them. The second possibility is simply that the students require a greater amount of education for better understanding, which is supported by the third question in this category showing an anticipated decline in mean results asking students if they did not have enough information about HPV or the HPV vaccine. The last question with a slight increase in mean (0.08) indicated cost would be a barrier, although the numbers are not significantly different.

Additional barrier questions which were addressed throughout other sections in the surveys revealed that health care coverage is not a barrier, as 100% of participants indicated a positive response. Although the type of health care coverage was not specified, one can reasonably assume many participants were still covered by their parent's health insurance plans, as all participants were under the age of 26. Healthcare providers offering to begin the HPV series was also determined not to be a barrier, as a majority of students indicated this had been offered to them. As a future healthcare provider, it is encouraging to see such a good response to this question. The data also indicated that being busy with work and school was not a barrier, correlating well with the previously discussed question of being motivated to live a healthy lifestyle despite the busy life of a university student.

Gender and Age Findings

Results were also divided into categories of gender and age. Gender question results were not as significant because there were only four male respondents and 26 female respondents. There were, however, a few noteworthy findings in the gender results. All four male respondents

were found to be smokers, placing them at higher risk for HPV-acquired cancers. Fifty percent of male respondents used condoms, but only 50% had sexual experience.

Age results were more significant because the two age groups were more evenly divided (ages 18-20 and 21-26). There were a range of noteworthy findings in this category. A higher percentage of the older age group (81%) had completed the HPV series when compared to the younger age group (57%), and the younger age group showed a much higher belief in self-risk to acquire HPV (63%) when compared with the older age group (27%). Therefore, the younger age group was less likely to be vaccinated with the HPV series and also more likely to engage in higher risk sexual activity than the older age group. Another possibility is this could be a reflection of learning from the video presentation, which indicated younger, unvaccinated individuals were at higher risk. The older age group had a higher percentage of sexual experience (93%) when compared to the younger age group (64%), and a higher percentage of the older age group (31%) had been diagnosed with an STI compared to the younger age group (7%). These findings correlate well, as a higher amount of sexual activity promotes a higher risk for the acquisition of sexually transmitted complications. Interesting to note, under half (26%) of older age group participants use a condom with sexual activity, compared to over half (60%) of younger age group participants. Most likely less of the older age group reported condom use because fifty percent reported being in a stable relationship when compared to only fourteen percent of younger age group participants. Over half of older age group participants (66%) had seen a gynecologist before as compared to less than half of younger age group participants (23%) had. Research indicates students who have never visited a gynecologist before have a greater likelihood to not be vaccinated with the HPV vaccine (Donadiki et al., 2014). Oral contraceptive use was determined to be comparable.

Reassessment Surveys

Reassessment surveys were sent out at three and six months to participants. Twenty-five reassessment surveys were sent to participants at each three and sixth month. The three-month surveys had a total of 10 surveys started, and seven completed with a completion rate of 70%. The six-month surveys had a total of nine surveys started, and seven completed with a completion rate of 78%. The same seven students responded to each of both reassessment surveys, as could be noted by recorded anonymous codes identifying each student. Three respondents indicated they would like more information about the HPV vaccine, showing the need for further education. Four students signified they would be more likely to receive the HPV vaccine now after attending the learning session earlier in the year, showing a good response to the education.

Out of the seven respondents, six had been vaccinated with at least one of the HPV vaccine series doses, while one had not, and five indicated they had been fully vaccinated. While no students indicated they had received the HPV vaccine since education, two students indicated they intend to receive it in the future. One of the goals of the reassessment surveys was to remind students about getting the HPV vaccine if they had not already completed it, so even though no participants indicated they had actually received the vaccine since education, it is encouraging two were still intending to receive it.

Limitations

There were a few limitations to the project. Not all student participants completed all post-survey questions. It would have been more beneficial for data analysis to require students to select an answer before progressing. As currently designed, students did not have to answer any question they didn't feel comfortable answering. One student admitted to taking the pre-and

post-survey without viewing the video, which may have skewed some of the education and belief/barrier/attitude questions. This was able to happen because the surveys were sent out to student groups one hour prior to the set meeting times. During the Sex Positivity Expo, there were problems with the surveys sending immediately for students to be able to take it right at the booth, so the goal was to prevent any complication if the surveys were to take longer to send (since it was sent out to a larger number of group participants). It also may have been beneficial to do the question and answer discussion session right after students viewed the educational video, so the post-survey could have demonstrated more significant student learning outcomes.

Recommendations

Due to the positive outcome of increased intent to vaccinate found in the data of this practice improvement project, it would be beneficial to continue education on NDSU's campus to various other student organizations. The project falls into line with NDSU's strategic plan for 2015-2020 through collaboration with core values of educational excellence, cutting-edge scholarship, accountability, collaboration, and diversity (NDSU, 2015). The program challenges students to excel not only in the classroom, but promotes learning through group activities outside the classroom, is supported by evidence-based research, and focuses on teaching students about primary prevention. It also works to improve quality of life and is able to reach a variety of university students with diverse cultural backgrounds.

The types of researchers recommended to continue future phases of this research include clinical professionals such as registered nurses, graduate student nurses, advanced practice nurses, medical students, or physicians. Those in the medical field have unsurpassed credibility when focusing on providing education about HPV prevention and catch-up vaccination. HPV

education would be beneficial to be continued in the university/college setting, as well as the high school setting.

Other settings which could benefit from this type of research include primary care clinics with the provision of education to primary care providers, or other clinic settings including family planning, community health centers, or clinics focusing on women's health. Another good setting may be high schools, where young adults are within the target age group to receive the HPV vaccine series.

Implications for Future Practice

After reviewing numerous research studies and the analyzing results of this practice improvement project, there are many implications for future practice in regard to HPV education, focusing on catch-up vaccination and reduction of risk factors to prevent HPV-related cancers and other sequelae. As discussed previously, one of the belief questions with an unexpected outcome was an increase in positive post-survey response when students were asked if they did not believe HPV is exceptionally harmful. Knowledge regarding prevalence of HPV has seemed to work against us by making it seem so common and therefore not as harmful. Placing an extra emphasis on the importance of vaccination and prevention of associated HPV-related cancers and sequelae is necessary. This result may also be due to the fact that over half of students were already vaccinated with the HPV series and therefore did not view HPV as a threat, or it might have indicated a need for further teaching. To go along with this point, students indicated in both the post-survey and reassessment surveys that they wanted to know more about both HPV and the vaccine.

Assessment of healthcare provider roles in advocating for use of the HPV vaccine series revealed most students had been asked to begin the series by their provider. Despite healthcare

providers having offered to start the series, or even students having already been vaccinated with the series, there is a need for more education outside of the clinic setting. Healthcare providers simply do not always have enough time to dedicate towards giving patients hesitant to receive the HPV vaccine education about it or explaining how vaccine monitoring systems (Vaccine Adverse Event Reporting System, Vaccine Safety Datalink, and Clinical Immunization Safety Assessment Project) are utilized to continually monitor HPV vaccine safety and efficacy (CDC, 2015e). The practice improvement project indicated 70% of NDSU students in the study sample were partially or fully vaccinated with the HPV series. This matches up well with the most recent state data, which gave North Dakota a range of 60-69% HPV vaccination coverage, and better than the national data coverage of 60% (CDC, 2017c). Therefore, when compared with national and state data, NDSU students are more likely to be partially or fully vaccinated with the HPV series.

From a different perspective, young adults who have been vaccinated will someday be parents and need to decide whether or not to vaccinate their children, so this improvement project and any future educational opportunities for young adults and parents will be beneficial to future practice with the goal of reducing the prevalence of HPV in society and reducing HPV-related cancers. Newer evidence also shows that head and neck cancer is caused by HPV and less by alcohol and tobacco, and although it is more prevalent in males, can also affect females (American Cancer Society, 2016).

A question with great significance to the project inquired if students felt the education motivated them to engage in safer sexual practices in the future. All but one student replied positively to this question. Promoting the use of education to allow students to be proactive in protecting their sexual health is beneficial to students for many reasons, but primarily for the

purpose of this project, preventing the acquisition of HPV-related cancers and sequelae and promoting the HPV catch-up vaccination series.

Plans to disseminate this research include presenting a poster at NDSU this spring. I also plan on completing a three-minute video to be posted publicly for viewing on NDSU's website in accordance with graduate school requirements. In the future, I would also like to consider writing an article to submit to a sexual health journal.

Implications for Future Research

Future studies which focus on HPV education can benefit from methods and findings in previously completed research. Recommendations for future research on this subject would be to focus primarily on increasing the population sample to receive the education. During the working phase of this project when groups were being contacted to participate, communication was initiated with both a sorority and fraternity member at a poster presentation who were eager to have the HPV education presented in their affiliations. However, no further contact was established after a few initial emails. Sororities and fraternities would be a great target audience on college campuses if one had the proper connections, as there are hundreds of potential participants. A question asking whether or not students would choose to vaccinate their children with the HPV vaccine series someday would be beneficial, as this could be a good indicator of long-term impact from the education. This would also be a great question for those students who are already vaccinated with the series.

There is a broad spectrum of other types of information that could be collected in order to make correlations between different variables. Further risk factors (alcohol/drug consumption, how many sexual encounters in the past year, number of past sexual partners, any comorbidities such as depression/loneliness, etc.) could be assessed. Directly inquiring whether female

students over the age of 21 have received preventative pap smears (from their primary healthcare provider or a gynecologist) rather than just asking whether or not they had seen a gynecologist may also be beneficial.

Application to Other DNP Roles

This practice improvement project can be applied to other DNP roles including leadership and advocacy. Throughout the past few years, designing this evidence-based practice project has allowed for the maturity of leadership skills through development of communication with key stakeholders and study participants, and enhanced teaching skills used to motivate and inspire NDSU students to learn about HPV and the importance of the HPV vaccine. The project has also allowed for student health advocacy by focusing on health promotion and preventative health measures in order to protect students from the harmful effects of HPV-related cancers.

Interprofessional collaboration was demonstrated through collaboration with health care professionals, such as working with the two registered nurses who also attended the Sex Positivity Expo and the Woman's Activist Organization meeting in order to answer student questions. Communication with leaders of NDSU student groups and leaders of student health affairs to participate in the study was also a demonstration of Interprofessional collaboration.

Translating evidence into practice is another DNP role which was fulfilled in the project. Through the development of research skills and searches conducted on multiple professional databases, evidence for benefits of HPV education and vaccine importance was proven. Current research is ongoing to promote education and vaccine uptake. New statistics have recently emerged about the prevalence of oral HPV among men (1:9), how the vaccine can possibly increase chance of conception, information about cervical cancer, new antibody testing to detect risk of developing oral HPV, and many more (Medical Life Science, 2017).

REFERENCES

- American Cancer Society. (2014). What are the key statistics about cervical cancer? Retrieved from <http://www.cancer.org/cancer/cervicalcancer/detailedguide/cervical-cancer-key-statistics>
- American Cancer Society. (2016). More evidence that HPV can cause head and neck cancers. Retrieved from <https://www.cancer.org/latest-news/more-evidence-that-hpv-can-cause-head-and-neck-cancers.html>
- Garcia, J. (2013). Sexual hook-up culture. Retrieved from <http://www.apa.org/monitor/2013/02/ce-corner.aspx>
- Barry, D. (2013). Increasing knowledge about HPV and the HPV vaccine amongst adolescents and adults through a school-based setting: A capstone project. University of Massachusetts- Amherst. Retrieved from http://scholarworks.umass.edu/nursing_dnp_capstone
- Carnegie, E., Whittaker, A., Brunton, C., Hogg, R., Kennedy, C., Hilton, S., Harding, S., Pollock, K., Pow, J. (2017). Development of a cross-cultural HPV community engagement model within Scotland. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5446167/>
- Centers for Disease Control and Prevention. (2012a). HPV and men – CDC fact sheet. Retrieved from <http://www.cdc.gov/std/hpv/hpvandmen-fact-sheet-february-2012.pdf>
- Centers for Disease Control and Prevention. (2012b). HPV vaccine information for clinicians – fact sheet. Retrieved from <http://www.cdc.gov/std/hpv/stdfact-hpv-vaccine-hcp.htm>

Centers for Disease Control and Prevention. (2013). Ready-to-use STD curriculum for clinical educators human papillomavirus (HPV) module. Retrieved from

<http://www2a.cdc.gov/stdtraining/ready-to-use/Manuals/HPV/hpv-notes-2013.docx>

Centers for Disease Control and Prevention. (2014a). Human papillomavirus vaccination: recommendations of the Advisory Committee on Immunization Practices. Retrieved from

<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6305a1.htm>

Centers for Disease Control and Prevention. (2015a). What is HPV? Retrieved from

<http://www.cdc.gov/hpv/parents/whatishpv.html>

Centers for Disease Control and Prevention. (2015b). Diseases and the vaccines that prevent them. Retrieved from <http://www.cdc.gov/vaccines/parents/diseases/teen/hpv-indepth-color.pdf>

Centers for Disease Control and Prevention. (2015c). HPV vaccine information for clinicians.

Retrieved from <http://www.cdc.gov/hpv/hcp/need-to-know.pdf>

Centers for Disease Control and Prevention. (2015d). HPV vaccines: vaccinating your preteen or teen. Retrieved from <http://www.cdc.gov/hpv/parents/vaccine.html>

Centers for Disease Control and Prevention. (2015e). Human papillomavirus (HPV) vaccine safety. Retrieved from <http://www.cdc.gov/vaccinesafety/vaccines/hpv-vaccine.html>

Centers for Disease Control and Prevention. (2015f). Use of 9-valent human papillomavirus (HPV) vaccine: updated HPV vaccination recommendations of the Advisory Committee on Immunization Practices. Retrieved from

<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6411a3.htm>

Centers for Disease Control and Prevention. (2015g). Human papillomavirus (HPV) vaccine safety. Retrieved from <http://www.cdc.gov/vaccinesafety/vaccines/hpv-vaccine.html>

Centers for Disease Control and Prevention. (2015h). 2014 NIS-teen vaccination coverage data table. Retrieved from <http://www.cdc.gov/vaccines/imz-managers/coverage/nis/teen/data/tables-2014.html>

Centers for Disease Control and Prevention. (2015i). HPV vaccine coverage maps – infographic. Retrieved from <http://www.cdc.gov/hpv/infographics/vacc-coverage.html>

Centers for Disease Control and Prevention. (2015j). Epidemiology and prevention of vaccine-preventable diseases. Retrieved from <http://www.cdc.gov/vaccines/pubs/pinkbook/hpv.html>

Centers for Disease Control and Prevention. (2015k). Questions and answers. Retrieved from <http://www.cdc.gov/hpv/parents/questions-answers.html>

Center for Disease Control and Prevention. (2015l). HPV vaccine for preteens and teens. Retrieved from <http://www.cdc.gov/vaccines/parents/diseases/teen/hpv-basics-color.pdf>

Centers for Disease Control and Prevention. (2016a). Genital HPV infection – fact sheet. Retrieved from <http://www.cdc.gov/std/hpv/stdfact-hpv.htm>

Centers for Disease Control and Prevention. (2016b). Human papillomavirus (HPV) and cancer. Retrieved from <https://www.cdc.gov/cancer/hpv/>

Centers for Disease Control and Prevention. (2016c) Recommended immunization schedule for persons aged 0 through 18 years. Retrieved from <http://www.cdc.gov/vaccines/schedules/hcp/imz/child-adolescent.html>

Centers for Disease Control and Prevention (2016d). CDC recommends only two HPV shots for younger adolescents. Retrieved from <https://www.cdc.gov/media/releases/2016/p1020-hpv-shots.html>

- Centers for Disease Control and Prevention (2016e). Human papillomavirus vaccine information sheet. Retrieved from <https://www.cdc.gov/vaccines/hcp/vis/vis-statements/hpv.html>
- Centers for Disease Control and Prevention (2017a). HPV vaccine information for young women. Retrieved from <https://www.cdc.gov/std/hpv/stdfact-hpv-vaccine-young-women.htm>
- Centers for Disease Control and Prevention (2017b). CDC fact sheet: information for teens and young adults: staying healthy and preventing STDs. Retrieved from <https://www.cdc.gov/std/life-stages-populations/stdfact-teens.htm>
- Centers for Disease Control and Prevention (2017c). HPV vaccine coverage maps – infographic. Retrieved from <https://www.cdc.gov/hpv/infographics/vacc-coverage.html>
- Chesson, H., Laprise, J., Brisson, M., Markowitz, L. (2016a). Impact and cost-effectiveness of 3 doses of 9-valent human papillomavirus (HPV) vaccine among US females previously vaccinated with 4-valent HPV vaccine. *Journal of Infectious Diseases*. doi: 10.1093/infdis/jiw046
- Chesson, H., Ekwueme, D., Saraiya, M., Markowitz, L., Chesson HW, Ekwueme DU, Saraiya M. (2016b). The impact and cost-effectiveness of nonavalent HPV vaccination in the United States: estimates from a simplified transmission model. *Human Vaccines and Immunotherapeutics*. Feb;14(2):244-51. doi: 10.3201/eid1402.070499.
- Davis, K., Dickman, E., Ferris, D., Dias, J., (2004) Human papillomavirus vaccine acceptability among parents of 10 to 15-year-old adolescents. *Journal of Lower Genital Tract Disease*. 8(3). AN: 00128360-200407000-00005.
- Donadiki, E.M., Jimenez-Garcia, R., Hernandez-Barrera, V., Sourtzi, P., Carrasco-Garrido, P., Lopez de Andres, A., Jimenez-Trujillo, I., Velonakis, E.G. (2014). Health belief model

applied to non-compliance with HPV vaccine among female university students.

Retrieved from www.sciencedirect.com.

Durham, P., Ndeffo-Mbah, M., Skrip, L., Jones, F., Bauch, C., Galvani, A. (2015). National-and state-level impact and cost-effectiveness of nonavalent HPV vaccination in the United States. Retrieved from <http://www.pnas.org.ezproxy.lib.ndsu.nodak.edu/content/early/2016/04/13/1515528113.full.pdf>

Fiks, A., Grundmeier, R., Mayne, S., Song, L., Feemster, K., Karavite, D., Hughes, C., Massey, J., Keren, R., Bell, L., Wasserman, R., Localio, R. (2013). Effectiveness of decision support for families, clinicians, or both on HPV. Retrieved from <http://www.ncbi.nlm.nih.gov.ezproxy.lib.ndsu.nodak.edu/pmc/articles/PMC3666111/pdf/peds.2012-3122.pdf>

Franceschi, S., Baussano, I. (2014). Naturally acquired immunity against human papillomavirus (HPV): why it matters in the HPV vaccine era). Retrieved from <http://jid.oxfordjournals.org/content/early/2014/04/02/infdis.jiu143.full>

Gardasil, (2015). Important safety information. Retrieved from <http://www.gardasil.com/why-3-doses/3-to-complete-faqs/>

Grandahl, M., Rosenblad, A., Stenhammar, C., Tyden, T., Westerling, R., Larsson, M., Oscarsson, M., Andrae, B., Dalianis, T., Neveus, T. (2015). School-based intervention for the prevention of HPV among adolescents: a cluster randomized controlled study. Retrieved from <http://bmjopen.bmj.com/content/6/1/e009875.full>

- Healthy People 2020. (2014). Immunization and infectious diseases. IID-11.4, IID-11.5.
Retrieved from <https://www.healthypeople.gov/2020/topics-objectives/topic/immunization-and-infectious-diseases/objectives>
- Holman, D.M., Benard, V., Roland, K.B., Watson, M., Liddon, N., Stokley S. (2014). Barriers to human papillomavirus vaccination among US adolescents: a systematic review of the literature. Retrieved from <http://www.ncbi.nlm.nih.gov.ezproxy.lib.ndsu.nodak.edu/pubmed/24276343>
- HPV (human papillomavirus) vaccine. (2012) Retrieved from <http://www.vaccines.gov/diseases/hpv/index.html>
- Jena, A., Goldman, D., Seabury, S. (2015). Incidence of sexually transmitted infections after human papillomavirus vaccination among adolescent females.
doi:10.1001/jamainternmed.2014.7886.
- Kaiser Family Foundation (KFF). (2015). The HPV vaccine: access and use in the U.S.
Retrieved from <http://kff.org/womens-health-policy/fact-sheet/the-hpv-vaccine-access-and-use-in/>
- Krawczyk, A., Lau, E., Perez, S., Delisle, V., Amsel, R., Rosberger, Z. (2012). How to inform: comparing written and video education interventions to increase human papillomavirus knowledge and vaccination intentions in young adults. *Journal of American College Health*, 60:4. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/22559091>
- Markowitz, L.E., Hariri, S., Lin, C., Dunne, E.F., Steinau, M., McQuillan, G., Unger, E.R. (2013). Reduction in HPV prevalence among young women following HPV vaccine introduction in the United States, national health and nutrition examination surveys,

- 2003-2010. Retrieved from
<http://www.ncbi.nlm.nih.gov.ezproxy.lib.ndsu.nodak.edu/pubmed/23785124>
- Markowitz, L.E., Lui, G., Hariri, S., Steinau, M., Dunne, E.F., Unger, E.R. (2016). Prevalence of HPV after introduction of the vaccination program in the United States. *American Academy of Pediatrics*. Retrieved from
<http://pediatrics.aappublications.org/content/early/2016/02/19/peds.2015-1968>
- Mayhew, A., Mullins, T., Ding, L., Rosenthal, S., Zimet, G., Morrow, C., Kahn, J. (2014). Risk perceptions and subsequent sexual behaviors after HPV vaccination in adolescents. Retrieved from <http://pediatrics.aappublications.org/content/early/2014/01/28/peds.2013-2822>
- Medical Life Science. (2017). Human papillomavirus (HPV) news and research. Retrieved from [https://www.news-medical.net/?tag=/Human-Papillomavirus-\(HPV\)](https://www.news-medical.net/?tag=/Human-Papillomavirus-(HPV))
- Mishra, G., Pimple, S., Shastri, S. (2015). HPV vaccine: one, two, or three doses for cervical cancer prevention? *Indian Journal of Medical and Paediatric Oncology*. doi: 10.4103/0971-5851.171534. Retrieved from
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4711216/>
- Mulcahy, N. (2016). GSK's HPV vaccine, Cervarix, no longer available in US. Retrieved from <https://www.medscape.com/viewarticle/870853>
- National Cancer Institute (NIH). (2015). Gardasil 9 vaccine protects against additional HPV types. Retrieved from <http://www.cancer.gov/types/cervical/research/gardasil9-prevents-more-HPV-types>
- NDSU (2009). Mission, vision, core values. Retrieved from
https://www.ndsu.edu/president/mission_and_vision/

- NDSU (2015). Strategic plan 2015-2020. Retrieved from https://www.ndsu.edu/fileadmin/provost/Forms/Strategic_Planning/Strategic_Vision_Ma_y_2015.pdf
- NY State Dept. of Health. (2012). Questions and answers about human papillomavirus (HPV) and HPV vaccine, information for providers. Retrieved from https://www.health.ny.gov/prevention/immunization/providers/hpv_q_and_a.htm
- Pell Institute. (2016). How to create a logic model. Retrieved from <http://toolkit.pellinstitute.org/evaluation-guide/plan-budget/use-a-logic-model-in-evaluation/>
- Pender, N.J., Murdaugh, C. L., & Parsons, M.A. (2011). Health promotion in nursing practice (6th Edition). Boston, MA: Pearson. Retrieved from http://research2vrpractice.org/wp-content/uploads/2013/02/HEALTH_PROMOTION_MANUAL_Rev_5-2011.pdf
- Reiter, P.L., Stubbs, B., Panozzo, C.A., Whitesell, D., Brewer, N.T. (2011). HPV and HPV vaccine education intervention: effects on parents, healthcare staff, and school staff. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/21949110>
- Skinner, S., Davies, C., Cooper, S., Stoney, T., Marshall, H., Jones, J., Collins, J., Hutton, H., Parrella, A., Zimet, G., Regan, D., Whyte, P., Brotherton, J., Richmond, R., McCaffrey, K., Garland, S., Leask, J., Kang, M., Braunack-Mayer, A., Kaldor, J., McGeechan, K. (2015). HPV.edu study protocol: a cluster randomized controlled evaluation of education, decisional support and logistical strategies in school-based human papillomavirus (HPV) vaccination of adolescents. *BMC Public Health*, 15:896. DOI 10.1186/s12889-015-2168-

- Smith, L., Kaufman, J., Strumpf, E., Levesque, L., (2015). Effect of human papillomavirus (HPV) vaccination on clinical indicators of sexual behavior among adolescent girls: The Ontario Grade 8 HPV Vaccine Cohort Study. doi: 10.1503/cmaj.140900
- Thompson, V., Butler-Barnes, S., Jones, B., Wells, A., Cunningham-Williams, R., Williams, S. (2017). Factors associated with human papillomavirus vaccination status at U.S. colleges and universities. Retrieved from <https://academic-oup-com.ezproxy.lib.ndsu.nodak.edu/hsw/article/42/1/e1/2631408>
- U.S. Food and Drug Administration. (2015). Human papillomavirus vaccine. Retrieved from <http://www.fda.gov/BiologicsBloodVaccines/Vaccines/ApprovedProducts/ucm172678.htm>
- Walhart, T. (2012). Parents, adolescents, children and the human papillomavirus vaccine: a review. Retrieved from <http://www.ncbi.nlm.nih.gov.ezproxy.lib.ndsu.nodak.edu/pubmed/22897180>
- Zimet, G. (2005). Improving adolescent health: focus on HPV vaccine acceptance. Retrieved from <http://www.ncbi.nlm.nih.gov.ezproxy.lib.ndsu.nodak.edu/pubmed/16310137>
- Zimet, G., Rosberger, Z., Fisher, W., Perez, S., Stupiansky, N. (2013). Beliefs, behaviors and HPV vaccine: correcting the myths and the misinformation. Elsevier Inc. Retrieved from <http://dx.doi.org/10.1016/j.yjmed.2013.05.013>

APPENDIX A. KEY STAKEHOLDERS AND RESOURCES

Key stakeholders for the clinical project include the presidents of each of the three NDSU organizations. Each stakeholder was contacted via email to determine if their organization would be a good fit for the clinical project. Contact was initially made via email with Kelsey Keimig, the Assistant Director of Sexual Assault Prevention and Advocacy and VPE president. After interest in the clinical project was established, an in-person meeting was held with her to discuss the details of the project. Ms. Keimig then was able to refer me to the other two organizations (WAO and SST) who are the other two organizations participating in the clinical project. Contact was then made with Olivia Oland (president of WAO) and Kailyn Ohm (president of SST). They both agreed the clinical project would be a good fit for their organizations. Ms. Oland recommended I participate in the SEXPO, which WAO hosts annually, and was able to reserve a booth for the HPV education for Spring 2017.

Another key stakeholder in the clinical project is Emily Hegg, the Health and Wellness Promotion Coordinator at Student Health Services. A meeting was held with her initially to see if Student Health Services would be interested in having a representative present and possibly be able to administer the vaccine at the end of each education session if students wanted to receive it. It was decided that having the vaccine present at the meetings would not be a viable option. However, she did advocate for having a Student Health Services representative present during the meetings in order to answer questions students may have about receiving the vaccine series through NDSU's Student Health Service.

Needed resources included a place for the presentation, screen, projector, and laptop for the video presentation. The screen and projector were located in each of the two group meeting rooms, and the researcher provided the laptop. Dates for implementation of education to each

organization were determined at the beginning of the 2017 spring semester. Resources for the SEXPO include a booth, which was provided by the host of the event, the Woman's Activist Organization.

APPENDIX B. PERMISSION TO USE RESEARCH

Re: Permission to use research tool



Denise Corrigan <denisebarry@mac.com>

7/19/2016

Sarah Siebert ↵



Reply all | ▾

Inbox

Hi Sarah,

Thanks for contacting me. Thanks for providing me the details of your project. You most definitely have my permission to use my tool. Good luck with your project.

Best,
Denise

Re: Permission to use research tool



Denise Corrigan <denisebarry@mac.com>

Today 11:45 AM

Sarah Siebert ↵



Reply all | ▾

Inbox

Hi Sarah,

Yes this is not a problem.

Good luck.

Denise

On Aug 5, 2016, at 12:39 PM, Sarah Siebert <sarah.siebert@ndsu.edu> wrote:

Ms. Corrigan,

I thank you for your permission to use your work! I just wanted to make sure it is ok with you if I slightly revise a few of the questions in your pre/post test to better appeal to my target audiences. I have the revised copies attached for your review.

Thanks,

Sarah Siebert
DNP Student



Elizabeth Don <elizadonadiki5@hotmail.com>

Mon 1/23, 9:34 AM

Sarah Siebert <sarah.siebert@ndsu.edu> ▾



Reply all | ▾

Dear Ms Siebert,

I would like to thank you for your interest on my research.
As you know from your experience I worked hard to create the questionnaire for my research, and in order for you to use it I would appreciate if my articles would be used as citations in your project.
I have 4 articles on HPV vaccine, and you can find them online.

Thank you very much.
If you have any questions, please let me know.

Best regards,
Elizabeth

Εστάλη από το [Outlook](#)

...



Nola Pender <npender@umich.edu>

Thu 4/27, 1:59 PM

Siebert, Sarah ▾



Reply all | ▾

Flag for follow up. Start by Thursday, April 27, 2017. Due by Thursday, April 27, 2017.



HEALTH PROMOTION ...

14 KB



Download Save to OneDrive - North Dakota University System

Dear Sarah:

You have my permission to use the Health Promotion Model in your clinical dissertation. Please see the websites in the attachment for more information, especially the Deep Blue site.

Wishing you good health,

Nola Pender

...

APPENDIX C. IRB APPROVAL



March 29, 2017

Dr. Mykell Barnacle
Nursing

IRB Approval of Protocol #PH17165, "Human Papillomavirus Vaccine Knowledge, Beliefs, Attitudes, and Barriers: A College-Based Intervention for Students to Increase Knowledge, Vaccine Intent, and Vaccine Uptake"

Co-investigator(s) and research team: Sarah Siebert

Approval period: 3/29/2017 to 3/28/2018
Continuing Review Report Due: 2/1/2018

Research site(s): varied Funding Agency: n/a
Review Type: Expedited category #6, 7

IRB approval is based on the revised protocol submission (received 3/29/2017).

Additional approval from the IRB is required:

- o Prior to implementation of any changes to the protocol (Protocol Amendment Request Form).
- o For continuation of the project beyond the approval period (Continuing Review/Completion Report Form). A reminder is typically sent approximately 4 weeks prior to the expiration date; timely submission of the report the responsibility of the PI. To avoid a lapse in approval, suspension of recruitment, and/or data collection, a report must be received, and the protocol reviewed and approved prior to the expiration date.

Other institutional approvals:

- Research projects may be subject to further review and approval/disapproval.

A report is required for:

- o Any research-related injuries, adverse events, or other unanticipated problems involving risks to participants or others within 72 hours of known occurrence (Report of Unanticipated Problem or Serious Adverse Event Form).
- o Any significant new findings that may affect risks to participants.
- o Closure of the project (Continuing Review/Completion Report Form).

Research records are subject to random or directed audits at any time to verify compliance with human subjects protection regulations and NDSU policies.

Thank you for cooperating with NDSU IRB procedures, and best wishes for a successful study.

Sincerely,

Digital signed by Kristy Shirley
DN: cn=Kristy Shirley, o=NDSU
ou=Institutional Review Board,
email=kshirley@ndsu.edu, c=US
Date: 2017.03.29 17:25:17 -0700

Kristy Shirley, CIP, Research Compliance Administrator

For more information regarding IRB Office submissions and guidelines, please consult www.ndsu.edu/irb. This Institution has an approved FederalWide Assurance with the Department of Health and Human Services: FWA00002439.

INSTITUTIONAL REVIEW BOARD
NDSU Dept 4000 | PO Box 6050 | Fargo ND 58108-6050 | 701.231.8995 | Fax 701.231.8098 | ndsu.edu/irb

Shipping address: Research 1, 1735 NDSU Research Park Drive, Fargo ND 58102

NDSU is an EQAA university

APPENDIX D. STUDENT PRE-INTERVENTION SURVEY

Questions	Yes	No	
I give my permission to participate in this study and attest I am at least 18 years old.			
	Male	Female	
I am a:			
I am in the age group of (select one):	<input type="radio"/> 18-20 years' old <input type="radio"/> 21-26 years' old		
Questions	True/Yes	False/No	Unsure
1. Human papillomavirus (HPV) is the most common sexually transmitted infection in the United States.			
2. It is estimated that nearly 100% of sexually active men and women will become infected with HPV at some point in their lifetime.			
3. If I am infected with HPV, I could get genital warts and/or cancer.			
4. The highest rates of new genital HPV infections occur in young adults in their late teens and early 20s.			
5. How is HPV transmitted? (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	
	Males	Females	Both
6. Who should receive the HPV vaccine?			
	Yes	No	Unsure/NA
7. Have you completed a yearly physical or sports physical this year?			
8. Have you ever heard of the HPV vaccine before?			
9. Have you completed at least one of the HPV vaccine series of 3 shots?			
10. Have you completed the entire HPV vaccine series?			
11. I believe I could be at risk (now or in the future) for getting HPV.			
12. I have someone I can talk to (parent, nurse, doctor, friend, teacher) about my questions and concerns about HPV and the HPV vaccine.			
13. I make sure to use a condom during any sexual activity.			
14. I have been diagnosed with a sexually transmitted infection before.			
15. I have had previous oral, anal, or vaginal sexual experience.			
16. I am currently in a stable relationship.			
17. I have visited a gynecologist in the past.			
18. I currently use contraceptives.			
19. I am currently a smoker.			
19. I currently have health insurance coverage.			

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

Questions	Absolutely Agree	Agree	Neutral	Disagree	Absolutely Disagree	Not Applicable
1. I believe that vaccinations are effective and do prevent diseases.						
2. It is preferable to be vaccinated rather than get the disease and be protected naturally						
3. It is important to receive all vaccines, including the HPV vaccine.						
4. I have confidence that the human papillomavirus (HPV) vaccine is safe.						
5. I believe that if I receive the HPV vaccine, I will be protected from cervical cancer.						
6. I have the knowledge and skills to make safe sexual choices.						
7. Cost would influence the decision for me to receive the HPV vaccine.						
8. I believe that if I receive the HPV vaccine, I will be protected against the most cancer-causing strains of HPV.						
9. I do not believe that HPV is exceptionally harmful.						
10. I do not have enough information about HPV and/or the HPV vaccine.						
11. I intend to receive the HPV vaccination series in the future.						
12. I am motivated to maintain a healthy lifestyle.						

(Donadiki et al., 2014; Pender et al., 2011)

APPENDIX E. STUDENT POST-INTERVENTION SURVEY

Questions	True/Yes	False/No	Unsure
1. Human papillomavirus (HPV) is the most common sexually transmitted infection in the United States.			
2. It is estimated that nearly 100% of sexually active men and women will become infected with HPV at some point in their lifetime.			
3. If I am infected with HPV, I could get genital warts and/or cancer.			
4. The highest rates of new genital HPV infections occur in young adults in their late teens and early 20s.			
5. How is HPV transmitted? Select all that apply. <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>A. Skin-to-skin contact</p> <p>C. An infected person coughs or sneezes on another person</p> </div> <div style="width: 45%;"> <p>B. Contact with infected blood</p> <p>D. Vaginal, oral, or anal sex</p> </div> </div>			
	Males	Females	Both
6. Who should receive the HPV vaccine?			
	Yes	No	Unsure
7. I believe I could be at risk (now or in the future) for getting HPV.			
8. If you choose, please provide an explanation of why you do or do not believe in the HPV vaccine.			
9. How reliable did you find the informational video that you saw?	1 Not at all reliable 2 Slightly reliable 3 Reliable 4 Very reliable		
Do you feel this education has motivated you to engage in safer sexual practices in the future?	YES		NO

(Barry, 2013; Donadiki et al., 2014)

Questions	Absolutely Agree	Agree	Neutral	Disagree	Absolutely Disagree	Not Applicable
1. I believe that vaccinations are effective and do prevent diseases.						
2. It is preferable to be vaccinated rather than get the disease and be protected naturally						
3. It is important to receive all vaccines, including the HPV vaccine.						
4. I have confidence that the human papillomavirus (HPV) vaccine is safe.						
5. I believe that if I receive the HPV vaccine, I will be protected from cervical cancer.						
6. I have the knowledge and skills to make safe sexual choices.						
7. Cost would influence the decision for me to receive the HPV vaccine.						
8. I believe that if I receive the HPV vaccine, I will be protected against the most cancer-causing strains of HPV.						
9. I do not believe that HPV is exceptionally harmful.						
10. I do not have enough information about HPV and/or the HPV vaccine.						
11. My healthcare provider has offered to begin the HPV vaccine series for me.						
12. I am too busy with school/work/friends to go see a healthcare provider.						
13. I intend to receive the HPV vaccination series in the future.						
14. I am motivated to maintain a healthy lifestyle.						
15. My parents believe in receiving all vaccines, including the HPV vaccine.						
16. My friends believe in receiving all vaccines, including the HPV vaccine.						

(Donadiki et al., 2014; Pender et al., 2011)

Please enter your email address for a chance to win a \$50 Walmart gift card. You will also be sent 3 and 6-month reassessment surveys to assess your vaccination status if you have not previously received or completed the HPV vaccine series. Each additional survey reply will give you another entry for your chance to win a Walmart gift card. _____

Thank you for your participation!

APPENDIX F. STUDENT 3 AND 6-MONTH REASSESSMENT SURVEYS

Questions	Yes	No	Unsure/NA
Did the human papillomavirus (HPV) education provided earlier in the year make you more likely to receive this vaccine?			
Were you vaccinated with any part of the HPV vaccine series before the HPV education was given?			
Have you made an appointment with Student Health Services or your healthcare provider to start the HPV vaccine series since receiving the HPV education?			
Have you been vaccinated with at least 1 dose of the HPV vaccine series since receiving information about HPV?			
If not currently vaccinated for HPV, do you plan on receiving it in the future?			
I was already fully vaccinated for HPV at the time of education.			
I am not interested in receiving the HPV vaccine.			
I would like to receive more information about HPV and the HPV vaccine.			

Thank you, your name has been entered for a drawing for a \$50 Walmart gift card!

Please visit the following CDC website if you have any additional questions or concerns about HPV or the HPV vaccine series: <https://www.cdc.gov/hpv/>

APPENDIX G. STUDENT HANDOUTS

VACCINE INFORMATION STATEMENT

HPV (Human Papillomavirus) Vaccine: *What You Need to Know*

Many Vaccine Information Statements are available in Spanish and other languages. See www.imzmnzta.org/via

Hojas de Información Sobre Vacunas están disponibles en español y en muchos otros idiomas. Visite www.imzmnzta.org/via

1 Why get vaccinated?

HPV vaccine prevents infection with human papillomavirus (HPV) types that are associated with many cancers, including:

- cervical cancer in females,
- vaginal and vulvar cancers in females,
- anal cancer in females and males,
- throat cancer in females and males, and
- penile cancer in males.

In addition, HPV vaccine prevents infection with HPV types that cause genital warts in both females and males.

In the U.S., about 12,000 women get cervical cancer every year, and about 4,000 women die from it. HPV vaccine can prevent most of these cases of cervical cancer.

Vaccination is not a substitute for cervical cancer screening. This vaccine does not protect against all HPV types that can cause cervical cancer. Women should still get regular Pap tests.

HPV infection usually comes from sexual contact, and most people will become infected at some point in their life. About 14 million Americans, including teens, get infected every year. Most infections will go away on their own and not cause serious problems. But thousands of women and men get cancer and other diseases from HPV.

2 HPV vaccine

HPV vaccine is approved by FDA and is recommended by CDC for both males and females. It is routinely given at 11 or 12 years of age, but it may be given beginning at age 9 years through age 26 years.

Most adolescents 9 through 14 years of age should get HPV vaccine as a two-dose series with the doses separated by 6-12 months. People who start HPV vaccination at 15 years of age and older should get the vaccine as a three-dose series with the second dose given 1-2 months after the first dose and the third dose given 6 months after the first dose. There are several exceptions to these age recommendations. Your health care provider can give you more information.

3 Some people should not get this vaccine

- Anyone who has had a severe (life-threatening) allergic reaction to a dose of HPV vaccine should not get another dose.
- Anyone who has a severe (life threatening) allergy to any component of HPV vaccine should not get the vaccine.

Tell your doctor if you have any severe allergies that you know of, including a severe allergy to yeast.

- HPV vaccine is not recommended for pregnant women. If you learn that you were pregnant when you were vaccinated, there is no reason to expect any problems for you or your baby. Any woman who learns she was pregnant when she got HPV vaccine is encouraged to contact the manufacturer's registry for HPV vaccination during pregnancy at 1-800-986-8999. Women who are breastfeeding may be vaccinated.
- If you have a mild illness, such as a cold, you can probably get the vaccine today. If you are moderately or severely ill, you should probably wait until you recover. Your doctor can advise you.

4 Risks of a vaccine reaction

With any medicine, including vaccines, there is a chance of side effects. These are usually mild and go away on their own, but serious reactions are also possible.

Most people who get HPV vaccine do not have any serious problems with it.

Mild or moderate problems following HPV vaccine:

- Reactions in the arm where the shot was given:
 - Soreness (about 9 people in 10)
 - Redness or swelling (about 1 person in 3)
- Fever:
 - Mild (100°F) (about 1 person in 10)
 - Moderate (102°F) (about 1 person in 65)
- Other problems:
 - Headache (about 1 person in 3)



U.S. Department of
Health and Human Services
Centers for Disease
Control and Prevention

Problems that could happen after any injected vaccine:

- People sometimes faint after a medical procedure, including vaccination. Sitting or lying down for about 15 minutes can help prevent fainting, and injuries caused by a fall. Tell your doctor if you feel dizzy, or have vision changes or ringing in the ears.
- Some people get severe pain in the shoulder and have difficulty moving the arm where a shot was given. This happens very rarely.
- Any medication can cause a severe allergic reaction. Such reactions from a vaccine are very rare, estimated at about 1 in a million doses, and would happen within a few minutes to a few hours after the vaccination.

As with any medicine, there is a very remote chance of a vaccine causing a serious injury or death.

The safety of vaccines is always being monitored. For more information, visit: www.cdc.gov/vaccinesafety/.

5 What if there is a serious reaction?

What should I look for?

Look for anything that concerns you, such as signs of a severe allergic reaction, very high fever, or unusual behavior.

Signs of a severe allergic reaction can include hives, swelling of the face and throat, difficulty breathing, a fast heartbeat, dizziness, and weakness. These would usually start a few minutes to a few hours after the vaccination.

What should I do?

If you think it is a severe allergic reaction or other emergency that can't wait, call 9-1-1 or get to the nearest hospital. Otherwise, call your doctor.

Afterward, the reaction should be reported to the Vaccine Adverse Event Reporting System (VAERS). Your doctor should file this report, or you can do it yourself through the VAERS web site at www.vaers.hhs.gov, or by calling 1-800-822-7967.

VAERS does not give medical advice.

6 The National Vaccine Injury Compensation Program

The National Vaccine Injury Compensation Program (VICP) is a federal program that was created to compensate people who may have been injured by certain vaccines.

Persons who believe they may have been injured by a vaccine can learn about the program and about filing a claim by calling 1-800-338-2382 or visiting the VICP website at www.hrsa.gov/vaccinecompensation. There is a time limit to file a claim for compensation.

7 How can I learn more?

- Ask your health care provider. He or she can give you the vaccine package insert or suggest other sources of information.
- Call your local or state health department.
- Contact the Centers for Disease Control and Prevention (CDC):
 - Call 1-800-232-4636 (1-800-CDC-INFO) or
 - Visit CDC's website at www.cdc.gov/hpv

Vaccine Information Statement

HPV Vaccine

12/02/2018

42 U.S.C. § 300aa-26

Office Use Only



APPENDIX H. VOICETHREAD PRESENTATION

Students,

Thank you for your participation. Additional information including material about the newest vaccine Gardasil-9 covering 9 sub-types can be found at the following link:
<https://voicethread.com/share/8573996/>.

Best regards,

Sarah Siebert, BSN, RN, DNP-Student
NDSU College of Nursing

APPENDIX I. HPV POSTER PRESENTATION

Human Papillomavirus Vaccine Knowledge, Beliefs, Attitudes, and Barriers: A College-Based Intervention for Students to Increase Knowledge, Vaccine Intent, and Vaccine Uptake

Sarah Siebert, RN, DNP Student, North Dakota State University

Dr. Mykell Barnacke, DNP, FNP-BC; Kara Falk, MSN, FNP-C; Molly Secor-Turner, Ph.D., MS, RN; Lisa Montplaisir, Ph.D., Emily Hegg, MS, CHES; Theresa Wickenhiser, BSN, RN



Purpose

The goals of this evidence-based practice improvement project are:

- Improve basic HPV and HPV vaccine knowledge, intent, and uptake in female NDSU students.
- Determine common beliefs, attitudes, and barriers associated with HPV and the HPV vaccine in female NDSU students.

Background

- Human papillomavirus (HPV) is the most common sexually transmitted infection in the U.S.
- The CDC estimates nearly 100% of sexually active people will acquire HPV at some point in their lifetime.
- Approximately 79 million Americans are currently infected with HPV, with an additional 14 million new HPV infections every year.
- HPV causes several types of cancers including cervical, vaginal, penile, anal, and oropharynx.
- Nationwide vaccination rates: 6 out of 10 females have started the HPV vaccine series, and 5 out of 10 males. HP2020 goal: 80%
- ND rates: >70% females, >60% males
- 6 years after HPV vaccine introduction, there was a 64% decrease in HPV DNA prevalence in females aged 14-19, and a 34% decrease in females aged 20-24.

Wacholder et al. (2012). Prevalence of HPV DNA and prevalence of HPV antibodies in the United States. Retrieved from <http://jco.org/jco/article/30/12/1640>

Methods

Design:

- A 10-minute educational video about HPV will be presented.
- Pre and post surveys will determine if there are changes in basic HPV knowledge, intent to vaccinate, and vaccine beliefs, attitudes, and barriers.
- Online reassessment surveys will be sent at 3 and 6 months to students who have not started or completed the HPV vaccine series to determine if vaccine uptake has increased.

Sample:

- The sample will include up to 200 female NDSU student participants between the ages of 18-26.

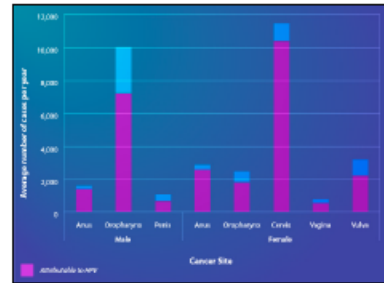
Setting:

- Several NDSU organizations (SST, VPE, WAO) will be attended to give the HPV video presentation.
- Attendance at the annual spring Sex Education Expo to provide HPV and HPV vaccine education and invite students to participate in the project.

Measurements

The pre and post survey will measure the following:

- Demographic variables (age, gender)
- HPV and HPV vaccine knowledge
- Self-care behavior
- Previous sexual experience and health information
- Current HPV vaccination status
- HPV vaccine intent
- Beliefs, attitudes, and barriers associated with the HPV vaccine.



Source: © (2015). Retrieved from <http://www.cancer.gov/types/anal/anatomy/anal-cancer-2015>

HPV VACCINE IS CANCER PREVENTION

APPENDIX J. COLLECTIVE RESULTS

I am a:	Male (N=4)		Female (N=26)		Total (N=30)	
I am in the age group of:	<ul style="list-style-type: none"> ○ Age 18-20 (N=14) ○ 21-26 years old (N=16) 					
Questions	True/Yes		False/No		Unsure	
	Pre	Post	Pre	Post	Pre	Post
1. Human papillomavirus (HPV) is the most common sexually transmitted infection in the United States.	63.33% N=19	84.00% N=21	23.33% N=7	12.00% N=3	13.33% N=4	4.00% N=1
2. It is estimated that nearly 100% of sexually active men and women will become infected with HPV at some point in their lifetime.	26.67% N=8	88.00% N=22	53.33% N=16	12.00% N=3	20.00% N=6	% N=
3. If I am infected with HPV, I could get genital warts and/or cancer.	83.33% N=25	96.00% N=24	6.67% N=2	4.00% N=1	10.00% N=3	
4. The highest rates of new genital HPV infections occur in young adults in their late teens and early 20s.	90.00% N=27	88.00% N=22	6.67% N=2	4.00% N=1	3.33% N=1	8.00% N=2
5. How is HPV transmitted? (Select all that apply)						
<p style="text-align: center;"> A. Skin-to-skin contact B. Contact with infected blood </p> <p style="text-align: center;"> C. An infected person coughs or sneezes on another person D. Vaginal, oral, or anal sex </p>						
Pretest			Posttest			
D 50.00% (N=15), A&D 43.33% (N=13) , B&C 6.67% (N=2)			D 24.00% (N=6), A&D 72.00% (N=18) , B&C 4.00% (N=1)			
	Males		Females		Both	
	Pre	Post	Pre	Post	Pre	Post
6. Who should receive the HPV vaccine?			6.67% N=2	4.00% N=1	93.33% N=28	96.24% N=24
	Yes		No		Unsure/NA	
	Pre	Post	Pre	Post	Pre	Post
7. Have you completed a yearly physical or sports physical this year?	46.67% N=14	NA	50.00% N=15	NA	3.33% N=1	NA
8. Have you ever heard of the HPV vaccine before?	90.00% N=27	NA	6.67% N=2	NA	3.33% N=1	NA
	Yes		No		Unsure	
	Pre	Post	Pre	Post	Pre	Post
9. Have you completed at least one of the HPV vaccine series of 3 shots?	73.33% N=22	NA	13.33% N=4	NA	13.33% N=4	NA

	Yes		No		Unsure	
	Pre	Post	Pre	Post	Pre	Post
10. Have you completed the entire HPV vaccine series?	70.00% N=21	NA	16.67% N=5	NA	13.33% N=4	NA
11. I believe I could be at risk for getting HPV.	46.43% N=13	45.45% N=10	42.86% N=12	50.00% N=11	10.71% N=3	4.55% N=1
12. I have someone I can talk to (parent, nurse, doctor, friend, teacher) about my questions and concerns about HPV and the HPV vaccine.	89.66% N=26	NA	6.90% N=2	NA	3.45% N=1	NA
13. I make sure to use a condom during any sexual activity.	40% N=10	NA	48.00% N=12	NA	12.00% N=3	NA
14. I have been diagnosed with a sexually transmitted infection before.	20.00% N=6	NA	80.00% N=24	NA	0% N=0	NA
15. I have had previous oral, anal, or vaginal sexual experience.	80.00% N=24	NA	20.00% N=6	NA	0% N=0	NA
16. I am currently in a stable relationship.	33.33% N=10	NA	66.67% N=20	NA	0% N=0	NA
17. I have visited a gynecologist in the past.	46.43% N=13	NA	53.57% N=15	NA	0% N=0	NA
18. I currently use oral contraceptives.	37.04% N=10	NA	62.96% N=17	NA	0% N=0	NA
19. I am currently a smoker.	6.67% N=2	NA	90.00% N=27	NA	3.33% N=1	NA
19. I currently have health insurance coverage.	100% N=30	NA				
	Very Reliable		Reliable		Slightly Reliable	
20. How reliable did you find the informational video that you saw?	72.00% N=18		24.00% N=6		4.00% N=1	
	Yes			No		
21. Do you feel this education has motivated you to engage in safer sexual practices in the future?	96.00% N=24			4.00% N=1		

Questions	Absolutely Agree (5pt)		Agree (4pt)		Neutral (3pt)		Disagree (2pt)		Absolutely Disagree (1pt)	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1. I believe that vaccinations are effective and do prevent diseases.	83.33% N=25	92.00% N=23	13.33% N=4	4.00% N=1	3.33% N=1	4.00% N=1				
2. It is preferable to be vaccinated rather than get the disease and be protected naturally	90.00% N=27	92.00% N=23	10.00% N=3	8.00% N=2						
3. It is important to receive all vaccines, including the HPV vaccine.	73.33% N=22	88.00% N=22	23.33% N=7	12.00% N=3	3.33% N=1					
4. I have confidence that the human papillomavirus (HPV) vaccine is safe.	66.67% N=20	76.00% N=19	23.33% N=7	20.00% N=5	6.67% N=2		3.33% N=1			
5. I believe that if I receive the HPV vaccine, I will be protected from cervical cancer.	33.33% N=10	41.63% N=10	40.00% N=12	33.33% N=8	6.67% N=2	12.50% N=3	20.00% N=6	12.50% N=3		
6. I have the knowledge and skills to make safe sexual choices.	73.33% N=22	88.00% N=22	23.33% N=7	12.00% N=3	3.33% N=1					
7. Cost would influence the decision for me to receive the HPV vaccine.	13.79% N=4	13.04% N=3	27.59% N=8	43.48% N=10	20.69% N=6	13.04% N=3	27.59% N=8	13.04% N=3	10.34% N=3	17.39% N=4
8. I believe that if I receive the HPV vaccine, I will be protected against the most cancer-causing strains of HPV.	40.00% N=12	66.67% N=16	43.33% N=13	29.17% N=7	10.00% N=3	4.17% N=1	3.33% N=1		3.33% N=1	
9. I do not believe that HPV is exceptionally harmful.	10.00% N=3	25.00% N=6	10.00% N=3	16.67% N=4	6.67% N=2		46.70% N=14	33.33% N=8	26.67% N=8	25.00% N=6
10. I do not have enough information about HPV and/or the HPV vaccine.	6.90% N=2	20.83% N=5	13.79% N=4	4.17% N=1	37.93% N=11	8.33% N=2	27.59% N=8	41.67% N=10	13.79% N=4	25.00% N=6
11. My healthcare provider has offered to begin the HPV vaccine series for me.	Post Only: 66.67% N=12		Post Only: 11.11% N=2		Post Only: 11.11% N=2				Post Only: 11.11% N=2	
12. I am too busy with school/work/friends to go see a healthcare provider.	Post Only: 4.17% N=1		Post Only: 16.67% N=4		Post Only: 4.17% N=1		Post Only: 50.00% N=12		Post Only: 25.00% N=6	
13. I intend to receive the HPV vaccination series in the future.	23.08% N=3	60.00% N=6	23.08% N=3	20.00% N=2	38.46% N=5		7.69% N=1	10.00% N=1	7.69% N=1	10.00% N=1

Questions	Absolutely Agree (5pt)		Agree (4pt)		Neutral (3pt)		Disagree (2pt)		Absolutely Disagree (1pt)	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
14. I am motivated to maintain a healthy lifestyle.	40.00% N=12	58.33% N=14	50.00% N=15	37.50% N=9	6.67% N=2		3.33% N=1	4.17% N=1		
15. My parents believe in receiving all vaccines, including the HPV vaccine.	Post Only: 83.33% N=20		Post Only: 12.50% N=3						Post Only: 4.17% N=1	
16. My friends believe in receiving all vaccines, including the HPV vaccine.	Post Only: 50.00% N=12		Post Only: 33.33% N=8		Post Only: 12.50% N=3		Post Only: 4.17% N=1			

	Yes				No				Unsure			
	Male		Female		Male		Female		Male		Female	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
9. Have you completed at least one of the HPV vaccine series of 3 shots?	50%	NA	76.92%	NA	25%	NA	11.54%	NA	25%	NA	11.54%	NA
	N=2		N=20		N=1		N=3		N=1		N=3	
10. Have you completed the entire HPV vaccine series?	50%	NA	73.08%	NA	25%	NA	15.38%	NA	25%	NA	11.54%	NA
	N=2		N=19		N=1		N=4		N=1		N=3	
11. I believe I could be at risk for getting HPV.	33.3%	33.44%	48%	47.34%	66.67%	66.89%	40%	47.34%			12%	5.26%
	N=1	N=1	N=12	N=9	N=2	N=2	N=10	N=9			N=3	N=1
12. I have someone I can talk to (parent, nurse, doctor, friend, teacher) about my questions and concerns about HPV and the HPV vaccine.	100%	NA	88.46%	NA			7.69%	NA			3.85%	NA
	N=4		N=23				N=2				N=1	
13. I make sure to use a condom during any sexual activity.	50%	NA	39.13%	NA			52.17%	NA	50%	NA	8.70%	NA
	N=2		N=9				N=12		N=2		N=2	
14. I have been diagnosed with a sexually transmitted infection before.			23.08%	NA	100%	NA	76.92%	NA				
			N=6		N=4		N=20					
15. I have had previous oral, anal, or vaginal sexual experience.	50%	NA	84.62%	NA	50%	NA	15.38%	NA				
	N=2		N=22		N=2		N=4					
16. I am currently in a stable relationship.	25%	NA	34.62%	NA	75%	NA	65.38%	NA				
	N=1		N=9		N=3		N=17					
17. I have visited a gynecologist in the past.	NA		50%	NA	NA		50%	NA				
			N=13				N=13					
18. I currently use oral contraceptives.	NA		40%	NA	NA		60%	NA				
			N=10				N=15					
19. I am currently a smoker.	100%	NA	7.69%	NA			88.46%	NA			3.85%	NA
	N=4		N=2				N=23				N=1	
19. I currently have health insurance coverage.	100%	NA	100%	NA								
	N=4		N=26									
	Male		Female		Male		Female		Male		Female	
	Very Reliable				Reliable				Slightly Reliable			
20. How reliable did you find the informational video that you saw?	75%		71%				29%		25%			
	N=3		N=15				N=6		N=1			
	Male				Female							
	Yes		No		Yes		No					
21. Do you feel this education has motivated you to engage in safer sexual practices in the future?	100%				95%		5%					
	N=4				20		N=1					

Questions	Absolutely Agree (5pts)		Agree (4pts)		Neutral (3pts)		Disagree (2pts)		Absolutely Disagree (1pt)	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
1. I believe that vaccinations are effective and do prevent diseases.	Pre: 75% N=3 Post: 75% N=3	Pre: 84.62% N=22 Post: 95.24% N=20	Pre: 25% N=1 Post: 25% N=1	Pre: 11.53% N=3		Pre: 3.84% N=1 Post: 4.76% N=1				
2. It is preferable to be vaccinated rather than get the disease and be protected naturally	Pre: 100% N=4 Post: 75% N=3	Pre: 88.47% N=23 Post: 95.24% N=20	Pre: 0% N=0 Post: 25% N=1	Pre: 11.53% N=3 Post: 4.76% N=1						
3. It is important to receive all vaccines, including the HPV vaccine.	Pre: 75% N=3 Post: 100% N=4	Pre: 73.09% N=19 Post: 85.72% N=18	Pre: 25% N=1	Pre: 23.07% N=6 Post: 14.28% N=3		Pre: 3.84% N=1				
4. I have confidence that the human papillomavirus (HPV) vaccine is safe.	Pre: 75% N=3 Post: 100% N=4	Pre: 65.40% N=17 Post: 71.44% N=15	Pre: 25% N=1	Pre: 23.07% N=6 Post: 23.80% N=5		Pre: 7.69% N=2		Pre: 3.84% N=1 Post: 4.76% N=1		
5. I believe that if I receive the HPV vaccine, I will be protected from cervical cancer.	Pre: 75% N=3 Post: 100% N=3	Pre: 26.91% N=7 Post: 33.32% N=7	Pre: 25% N=1	Pre: 42.29% N=11 Post: 38.08% N=8		Pre: 7.69% N=2 Post: 14.28% N=3		Pre: 23.07% N=6 Post: 14.28% N=3		
6. I have the knowledge and skills to make safe sexual choices.	Pre: 75% N=3 Post: 100% N=4	Pre: 73.09% N=19 Post: 85.72% N=18	Pre: 25% N=1	Pre: 23.07% N=6 Post: 14.28% N=3		Pre: 3.84% N=1				
7. Cost would influence the decision for me to receive the HPV vaccine.		Pre: 15.99% N=4 Post: 14.99% N=3	Pre: 50% N=2 Post: 66.56% N=2	Pre: 23.99% N=6 Post: 39.98% N=8	Pre: 25% N=1	Pre: 19.99% N=5 Post: 14.99% N=3	Pre: 25% N=1 Post: 33.44% N=1	Pre: 27.99% N=7 Post: 10.00% N=2		Pre: 12.00% N=3 Post: 19.99% N=4
8. I believe that if I receive the HPV vaccine, I will be protected against the most cancer-causing strains of HPV.	Pre: 50% N=2 Post: 100% N=3	Pre: 38.45% N=10 Post: 61.88% N=13	Pre: 50% N=2	Pre: 42.29% N=11 Post: 33.32% N=7		Pre: 11.53% N=3 Post: 4.76% N=1		Pre: 3.84% N=1		Pre: 3.84%=1 N
9. I do not believe that HPV is exceptionally harmful.	Pre: 25% N=1 Post: 66.56% N=2	Pre: 7.69% N=2 Post: 19.04% N=4	Pre: 25% N=1	Pre: 7.69% N=2 Post: 19.04% N=4		Pre: 7.69% N=2	Pre: 0% N=0 Post: 33.44% N=1	Pre: 53.86% N=14 Post: 33.32% N=7	Pre: 50% N=2	Pre: 23.07% N=6 Post: 28.56% N=6

Questions	Absolutely Agree (5pt)		Agree (4pt)		Neutral (3pt)		Disagree (2pt)		Absolutely Disagree (1pt)	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
10. I do not have enough information about HPV and/or the HPV vaccine.	Pre: 0% Post: 33.44% N=1	Pre: 8% N=2 Post: 19.04% N=4	Pre: 25% N=1	Pre: 12% N=3 Post: 4.76% N=1	Pre: 25% N=1	Pre: 39.98% N=10 Post: 9.52% N=2	Pre: 25% N=1 Post: 33.44% N=1	Pre: 27.99% N=7 Post: 42.84% N=9	Pre: 25% N=1 Post: 33.44% N=1	Pre: 12% N=3 Post: 23.80% N=5
11. My healthcare provider has offered to begin the HPV vaccine series for me.	Post Only: 100% N=2	Post Only: 62.46% N=10		Post Only: 12.49% N=2		Post Only: 12.49% N=2				Post Only: 12.49% N=2
12. I am too busy with school/work/friends to go see a healthcare provider.		Post Only: 4.76% N=1		Post Only: 19.04% N=4	Post Only: 33.44% N=1		Post Only: 33.44% N=1	Post Only: 52.36% N=11	Post Only: 33.44% N=1	Post Only: 23.80% N=5
13. I intend to receive the HPV vaccination series in the future.	Pre: 0% N=0 Post: 100% N=2	Pre: 29.97% N=3 Post: 50% N=4	Pre: 66.89% N=2	Pre: 9.99% N=1 Post: 25% N=2	Pre: 33.44% N=1	Pre: 39.96% N=4		Pre: 9.99% N=1 Post: 12.50% N=		Pre: 9.99% N=1 Post: 12.50% N=
14. I am motivated to maintain a healthy lifestyle.	Pre: 0% N=0 Post: 33.44% N=1	Pre: 46.14% N=12 Post: 61.88% N=13	Pre: 75% N=3 Post: 66.56% N=2	Pre: 46.14% N=12 Post: 33.32% N=7	Pre: 25% N=1	Pre: 3.84% N=1		Pre: 3.84% N=1 Post: 4.76% N=1		
15. My parents believe in receiving all vaccines, including the HPV vaccine.	Post Only: 100% N=3	Post Only: 80.96% N=17		Post Only: 14.28% N=3						Post Only: 4.76% N=1
16. My friends believe in receiving all vaccines, including the HPV vaccine.	Post Only: 33.44% N=1	Post Only: 52.36% N=11	Post Only: 66.56% N=2	Post Only: 28.56% N=6		Post Only: 14.28% N=3		Post Only: 4.76% N=1		

APPENDIX L. AGE RESULTS

I am a:	Male (N=4)				Female (N=26)				Total (N=30)																										
I am in the age group of:	<ul style="list-style-type: none"> ○ Age 18-20 (N=14) ○ 21-26 years old (N=16) 																																		
Questions	True/Yes				False/No				Unsure																										
	Age 18-20		Age 21-26		Age 18-20		Age 21-26		Age 18-20		Age 21-26																								
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post																							
1. Human papillomavirus (HPV) is the most common sexually transmitted infection in the United States.	64.29% N=9	78.57% N=11	62.50% N=10	90.91% N=10	21.43% N=3	14.29% N=2	25% N=4	9.09% N=1	14.29% N=2	7.14% N=1	12.50% N=2	0% N=0																							
2. It is estimated that nearly 100% of sexually active men and women will become infected with HPV at some point in their lifetime.	28.57% N=4	92.86% N=13	25% N=4	81.82% N=9	50% N=7	7.14% N=1	56.25% N=9	18.18% N=2	21.43% N=3	0% N=0	18.75% N=3	0% N=0																							
3. If I am infected with HPV, I could get genital warts and/or cancer.	85.71% N=12	100% N=14	81.25% N=13	90.91% N=10	7.14% N=1	0% N=0	6.25% N=1	9.09% N=1	7.14% N=1	0% N=0	12.50% N=2	0% N=0																							
4. The highest rates of new genital HPV infections occur in young adults in their late teens and early 20s.	85.71% N=12	85.71% N=12	93.75% N=15	90.91% N=10	14.29% N=2	7.14% N=1	0% N=0	0% N=0	0% N=0	7.14% N=1	6.25% N=1	9.09% N=1																							
5. How is HPV transmitted? (Select all that apply)																																			
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>A. Skin-to-skin contact</p> <p>C. An infected person coughs or sneezes on another person</p> </div> <div style="width: 45%;"> <p>B. Contact with infected blood</p> <p>D. Vaginal, oral, or anal sex</p> </div> </div>																																			
Pretest						Posttest																													
18-20				21-26				18-20				21-26																							
D 43% (N=6), A&D 43% (N=6) , B&C 14% (N=2)				D 56% (N=9), A&D 44% (N=7)				D 29% (N=4), A&D 64% (N=9) , B&C 7% (N=1)				D 18% (N=2), A&D 82% (N=9)																							
Males				Females				Both																											
Pre		Post		Pre		Post		Pre		Post		Pre		Post																					
6. Who should receive the HPV vaccine?				7% N=1				0% N=0				6% N=1				9% N=1				93% N=13				100% N=14				94% N=15				91% N=10			
Yes				No				Unsure/NA																											
Age 18-20		Age 21-26		Age 18-20		Age 21-26		Age 18-20		Age 21-26		Age 18-20		Age 21-26																					
Pre		Post		Pre		Post		Pre		Post		Pre		Post																					
7. Have you completed a yearly physical or sports physical this year?		42.86% N=6		NA		50% N=8		NA		50% N=7		NA		50% N=8		NA		7.14% N=1		NA		0% N=0		NA											
8. Have you ever heard of the HPV vaccine before?		78.57% N=11		100% N=16		14.29% N=2		0% N=0		7.14% N=1																									

	Yes				No				Unsure							
	Age 18-20		Age 21-26		Age 18-20		Age 21-26		Age 18-20		Age 21-26					
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post				
9. Have you completed at least one of the HPV vaccine series of 3 shots?	64.29%	NA	81.25%	NA	7.14%	NA	18.75%	NA	28.57%	NA	0%	NA				
	N=9		N=13		N=1		N=3		N=4		N=0					
10. Have you completed the entire HPV vaccine series?	57.14%	NA	81.25%	NA	14.29%	NA	18.75%	NA	28.57%	NA	0%	NA				
	N=8		N=13		N=2		N=3		N=4		N=0					
11. I believe I could be at risk for getting HPV.	53.85%	63.64%	40%	27.27%	46.15%	36.36%	40%	63.64%	0%	0%	20%	9.09%				
	N=7	N=7	N=6	N=3	N=6	N=4	N=6	N=7	N=0	N=0	N=3	N=1				
12. I have someone I can talk to (parent, nurse, doctor, friend, teacher) about my questions and concerns about HPV and the HPV vaccine.	92.86%	NA	86.67%	NA	0%	NA	13.33%	NA	7.14%	NA	0%	NA				
	N=13		N=13		N=0		N=2		N=1		N=0					
13. I make sure to use a condom during any sexual activity.	60%	NA	26.67%	NA	40%	NA	53.33%	NA	0%	NA	20%	NA				
	N=6		N=4		N=4		N=8		N=0		N=3					
14. I have been diagnosed with a sexually transmitted infection before.	7.14%	NA	31.25%	NA	92.86%	NA	68.75%	NA	0%	NA	0%	NA				
	N=1		N=5		N=13		N=11		N=0		N=0					
15. I have had previous oral, anal, or vaginal sexual experience.	64.29%	NA	93.75%	NA	35.71%	NA	6.25%	NA	0%	NA	0%	NA				
	N=9		N=15		N=5		N=1		N=0		N=0					
16. I am currently in a stable relationship.	14.29%	NA	50%	NA	85.71%	NA	50%	NA	0%	NA	0%	NA				
	N=2		N=8		N=12		N=8		N=0		N=0					
17. I have visited a gynecologist in the past.	23.08%	NA	66.67%	NA	76.92%	NA	33.33%	NA	0%	NA	0%	NA				
	N=3		N=10		N=10		N=5		N=0		N=0					
18. I currently use contraceptives.	38.46%	NA	35.71%	NA	61.54%	NA	64.29%	NA	0%	NA	0%	NA				
	N=5		N=5		N=8		N=9		N=0		N=0					
19. I am currently a smoker.	14.29%	NA	0%	NA	78.57%	NA	100%	NA	7.14%	NA	0%	NA				
	N=2		N=0		N=11		N=16		N=1		N=0					
19. I currently have health insurance coverage.	100%	NA	100%	NA												
	N=14		N=16													
	Ages 18-20		Ages 21-26		Ages 18-20		Ages 21-26		Ages 18-20		Ages 21-26					
	Very Reliable				Reliable				Slightly Reliable							
20. How reliable did you find the informational video that you saw?	71%		73%		21%		27%		7%		0%					
	N=10		N=8		N=3		N=3		N=1		N=0					
	Ages 18-20				Ages 21-26											
	Yes				No				Yes				No			
21. Do you feel this education has motivated you to engage in safer sexual practices in the future?	93%				7%				100%				0%			
	N=13				N=1				11				N=0			

Questions	Absolutely Agree (5pts)		Agree (4pts)		Neutral (3pts)		Disagree (2pts)		Absolutely Disagree (1pt)	
	Age 18-20	Age 21-26	Age 18-20	Age 21-26	Age 18-20	Age 21-26	Age 18-20	Age 21-26	Age 18-20	Age 21-26
1. I believe that vaccinations are effective and do prevent diseases.	Pre: 85.71% N=12 Post: 92.86% N=13	Pre: 81.25% N=13 Post: 90.91% N=10	Pre: 14.29% N=2 Post: 7.14% N=1	Pre: 12.50% N=2		Pre: 6.25% N=1 Post: 9.09% N=1				
2. It is preferable to be vaccinated rather than get the disease and be protected naturally	Pre: 92.86% N=13 Post: 85.71% N=12	Pre: 87.50% N=14 Post: 100% N=11	Pre: 7.14% N=1 Post: 14.29% N=2	Pre: 12.50% N=2 Post: 0% N=0						
3. It is important to receive all vaccines, including the HPV vaccine.	Pre: 71.43% N=10 Post: 85.71% N=12	Pre: 75% N=12 Post: 90.91% N=10	Pre: 21.43% N=3 Post: 14.29% N=2	Pre: 25% N=4 Post: 9.09% N=1	Pre: 7.14% N=1					
4. I have confidence that the human papillomavirus (HPV) vaccine is safe.	Pre: 71.43% N=10 Post: 78.57% N=11	Pre: 62.50% N=10 Post: 72.73% N=8	Pre: 28.57% N=4 Post: 21.43% N=3	Pre: 18.75% N=3 Post: 18.18% N=2		Pre: 12.50% N=2		Pre: 6.25% N=1 Post: 9.09% N=1		
5. I believe that if I receive the HPV vaccine, I will be protected from cervical cancer.	Pre: 35.71% N=5 Post: 50% N=7	Pre: 31.25% N=5 Post: 30% N=3	Pre: 42.86% N=6 Post: 28.57% N=4	Pre: 37.50% N=6 Post: 40% N=4	Pre: 7.14% N=1 Post: 7.14% N=1	Pre: 6.25% N=1 Post: 20% N=2	Pre: 14.29% N=2 Post: 14.29% N=2	Pre: 25% N=4 Post: 10% N=1		
6. I have the knowledge and skills to make safe sexual choices.	Pre: 57.14% N=8 Post: 85.71% N=12	Pre: 87.50% N=14 Post: 90.91% N=10	Pre: 35.71% N=5 Post: 14.29% N=2	Pre: 12.50% N=2 Post: 9.09% N=1	Pre: 7.14% N=1					
7. Cost would influence the decision for me to receive the HPV vaccine.	Pre: 14.29% N=2 Post: 15.38% N=2	Pre: 13.33% N=2 Post: 10% N=1	Pre: 35.71% N=5 Post: 46.15% N=6	Pre: 20% N=3 Post: 40% N=4	Pre: 14.29% N=2 Post: 7.69% N=1	Pre: 26.67% N=4 Post: 20% N=2	Pre: 21.43% N=3 Post: 7.69% N=1	Pre: 33.33% N=5 Post: 20% N=2	Pre: 14.29% N=2 Post: 23.08% N=3	Pre: 6.67% N=1 Post: 10% N=1
8. I believe that if I receive the HPV vaccine, I will be protected against the most cancer-causing strains of HPV.	Pre: 35.71% N=5 Post: 61.54% N=8	Pre: 43.75% N=7 Post: 72.73% N=8	Pre: 57.14% N=8 Post: 30.77% N=4	Pre: 31.25% N=5 Post: 27.27% N=3	Pre: 7.14% N=1 Post: 7.69% N=1	Pre: 12.50% N=2 Post: 0% N=0		Pre: 6.25% N=1		Pre: 6.25% N=1
9. I do not believe that HPV is exceptionally harmful.	Pre: 7.14% N=1 Post: 23.08% N=3	Pre: 12.50% N=2 Post: 27.27% N=3	Pre: 21.43% N=3 Post: 23.08% N=3	Pre: 0% N=0 Post: 9.09% N=1	Pre: 7.14% N=1	Pre: 6.25% N=1	Pre: 42.86% N=6 Post: 46.15% N=6	Pre: 50% N=8 Post: 18.18% N=2	Pre: 21.43% N=3 Post: 7.69% N=1	Pre: 31.25% N=5 Post: 45.45% N=5

Questions	Absolutely Agree (5pt)		Agree (4pt)		Neutral (3pt)		Disagree (2pt)		Absolutely Disagree (1pt)	
	Age 18-20	Age 21-26	Age 18-20	Age 21-26	Age 18-20	Age 21-26	Age 18-20	Age 21-26	Age 18-20	Age 21-26
10. I do not have enough information about HPV and/or the HPV vaccine.	Pre: 14.29% N=2 Post: 30.77% N=4	Pre: 0% N=0 Post: 9.09% N=1	Pre: 21.43% N=3 Post: 7.69% N=1	Pre: 6.67% N=1 Post: 0% N=0	Pre: 28.57% N=4 Post: 15.38% N=2	Pre: 46.67% N=7 Post: 0% N=0	Pre: 21.43% N=3 Post: 15.38% N=2	Pre: 33.33% N=5 Post: 72.73% N=8	Pre: 14.29% N=2 Post: 30.77% N=4	Pre: 13.33% N=2 Post: 18.18% N=2
11. My healthcare provider has offered to begin the HPV vaccine series for me.	Post Only: 58.33% N=7	Post Only: 83.33% N=5	Post Only: 16.67% N=2		Post Only: 16.67% N=2				Post Only: 8.33% N=1	Post Only: 16.67% N=1
12. I am too busy with school/work/friends to go see a healthcare provider.	Post Only: 7.69% N=1		Post Only: 30.77% N=4			Post Only: 9.09% N=1	Post Only: 30.77% N=4	Post Only: 72.73% N=8	Post Only: 30.77% N=4	Post Only: 18.18% N=2
13. I intend to receive the HPV vaccination series in the future.	Pre: 28.57% N=2 Post: 57.14% N=	Pre: 16.67% N=1 Post: 66.67% N=2	Pre: 42.86% N=3 Post: 28.57% N=		Pre: 28.57% N=2	Pre: 50% N=3	Pre: 0% N=0 Post: 14.29% N=1	Pre: 16.67% N=1 Post: 0% N=0		Pre: 16.67% N=1 Post: 33.33% N=1
14. I am motivated to maintain a healthy lifestyle.	Pre: 35.71% N=5 Post: 46.15% N=6	Pre: 43.75% N=7 Post: 72.73% N=8	Pre: 57.14% N=8 Post: 46.15% N=6	Pre: 43.75% N=7 Post: 27.27% N=3		Pre: 12.50% N=2	Pre: 7.14% N=1 Post: 7.69% N=1			
15. My parents believe in receiving all vaccines, including the HPV vaccine.	Post Only: 84.62% N=11	Post Only: 81.82% N=9	Post Only: 15.38% N=2	Post Only: 9.09% N=1						Post Only: 9.09% N=1
16. My friends believe in receiving all vaccines, including the HPV vaccine.	Post Only: 53.85% N=7	Post Only: 45.45% N=5	Post Only: 38.46% N=5	Post Only: 27.27% N=3	Post Only: 7.69% N=1	Post Only: 18.18% N=2		Post Only: 9.09% N=1		

Qualitative Student Responses About the HPV Vaccine	
Age Group	Responses
18-20 yrs.	Doesn't sound like there are many downsides.
	It can save you and others from getting cancer.
	I received it when I was 15 and I think it's a good thing to prevent rather than to cure.
	I want to prevent any potential future problems.
21-26 yrs.	I believe that health care providers work to provide the public with safe vaccinations that help keep our population healthy.
	It's a vaccine. That prevents cancer. It's so important.
	Protection against cancer, duh!
	Vaccines save lives!

APPENDIX M. 3 AND 6 MONTH REASSESSMENT SURVEYS

Questions	Yes	No	Unsure/NA	Total Students
Did the human papillomavirus (HPV) education provided earlier in the year make you more likely to receive this vaccine?	43% (N=4)			4
Were you vaccinated with any part of the HPV vaccine series before the HPV education was given?	86% (N=6)	14% (N=1)		7
Have you made an appointment with Student Health Services or your healthcare provider to start the HPV vaccine series since receiving the HPV education?		43% (N=4)	14% (N=1)	5
Have you been vaccinated with at least 1 dose of the HPV vaccine series since receiving information about HPV?		71% (N=5)		5
If not currently vaccinated for HPV, do you plan on receiving it in the future?	29% (N=2)			2
I was already fully vaccinated for HPV at the time of education.	71% (N=5)	14% (N=1)	14% (N=1)	7
I am not interested in receiving the HPV vaccine.		43% (N=3)		3
I would like to receive more information about HPV and the HPV vaccine.	43% (N=3)	57% (N=4)		7

Questions	Yes	No	Unsure/NA	Total Students
Did the human papillomavirus (HPV) education provided earlier in the year make you more likely to receive this vaccine?	43% (N=4)			4
Were you vaccinated with any part of the HPV vaccine series before the HPV education was given?	86% (N=6)	14% (N=1)		7
Have you made an appointment with Student Health Services or your healthcare provider to start the HPV vaccine series since receiving the HPV education?		43% (N=4)	14% (N=1)	5
Have you been vaccinated with at least 1 dose of the HPV vaccine series since receiving information about HPV?		71% (N=5)		5
If not currently vaccinated for HPV, do you plan on receiving it in the future?	29% (N=2)			2
I was already fully vaccinated for HPV at the time of education.	71% (N=5)	14% (N=1)	14% (N=1)	7
I am not interested in receiving the HPV vaccine.		43% (N=3)		3
I would like to receive more information about HPV and the HPV vaccine.	43% (N=3)	57% (N=4)		7

APPENDIX N. EXECUTIVE SUMMARY OF THE PROJECT

The purpose of this disquisition was to determine knowledge, beliefs, attitudes, and barriers of college-age students at North Dakota State University (NDSU) related to the human papillomavirus (HPV) and the vaccine used to prevent certain strains of the virus. HPV is the most common sexually transmitted infection in the United States, with the highest rates of infection occurring in the late teens to early twenties (CDC, 2015b). Therefore, there is a need to educate college age students about HPV and how to protect themselves from acquiring it. An intervention was designed to address the following clinical question: Will the provision of HPV education to college students, ages 18-26, increase HPV knowledge, vaccine intent, and the number of student HPV vaccinations within six months at NDSU? Four practice improvement project objectives were designed to determine the overall success of the project. They are listed as follows:

- Practice Improvement Objective One – *Determine whether an educational video intervention can successfully improve HPV knowledge among NDSU students.*
- Practice Improvement Objective Two – *Determine whether an educational video intervention can successfully improve HPV vaccination intent and vaccine uptake among NDSU students.*
- Practice Improvement Objective Three – *Assess NDSU student beliefs, attitudes, and barriers associated with the HPV vaccine.*
- Practice Improvement Project Objective Four: *Provide HPV education to NDSU student participants at the annual spring Sex Positivity Expo).*

The project intervention consisted of two components: reaching out to NDSU students at the annual Sex Positivity Expo, and providing education to members of two NDSU organizations, the Women's Activist Organization (WAO), and Violence Prevention Educators (VPE). A booth was set up at the annual Sex Positivity Expo (SPE), hosted by the WAO, where students could stop by, receiving education and asking questions about HPV. They were first invited to take part in the online pre-and post-survey. If they declined to be part of the study, education and questions were then addressed. During the SPE, a total of 55 students stopped by the HPV education booth and either visited about what questions they had, or were emailed a link to participate in the pre-and post-survey. Meeting times for HPV education were also set up with members of WAO and VPE at designated organization meeting times. The WAO meeting took place on April 5, 2017 in the Rose Room in Memorial Union, and the VPE meeting took place on April 11, 2017 in a classroom on the third floor of the Family Life Center. Students were first instructed to take an online Qualtrics pre-survey to establish baseline HPV knowledge, beliefs, attitudes, and barriers. Following the pre-survey, students were instructed to watch a short educational video about HPV and the HPV vaccine, and then complete a similar post-survey to assess if there were increases in basic HPV education, and changes in beliefs, attitudes, barriers, or intent to vaccinate. At three and six months after participating in the initial education session, consenting students were then sent a reassessment Qualtrics survey link to determine any increases in vaccination rates or intent to vaccinate.

A total of 14 online pre-and post-surveys were started by SPE participants, and eight were completed. A total of 11 surveys were started by WAO participants, and nine were completed. A total of nine surveys were started by VPE participants, and eight were completed. The different topics which were assessed in pre-and post-surveys include the following: student

health data, HPV knowledge, HPV beliefs/barriers/attitudes, current vaccination status, and intent to vaccinate. Results between pre-and post-survey data indicated an increase in both HPV knowledge and intent to vaccinate. An increase in vaccination rates was not noted, although of the 30 student participants, 70% had either partially or fully completed the HPV vaccine series prior to education. Questions addressing attitude indicated an increase in motivation to maintain a healthy lifestyle. Questions addressing belief indicated students believed they would be protected from the most cancer-causing strains of HPV. Fifty percent of students indicated they believed themselves at risk for acquiring HPV. Questions addressing barriers indicated the following were not barriers: healthcare coverage, work and school, and their provider offering them the chance to begin the HPV vaccine series. The only barrier identified with a slight increase in mean of 0.08 indicated the cost of the vaccine series to be a concern.

The results of the three and six-month surveys were identical to each other in all question responses. Results revealed four of seven respondents were more likely to receive the HPV vaccine. Six of seven students were already vaccinated with at least part of the HPV vaccine series, and one student was not. Four students stated they had not made an appointment to receive the HPV vaccine, and one student was unsure. Five students answered they had not received any HPV vaccination since the education session, and five had indicated they were already fully vaccinated. Two students indicated they do intend to receive the vaccine in the future. Three students disagreed they were not interested in receiving the HPV vaccine, and three students indicated they would like more information about the HPV vaccine. If the student indicated they would like more vaccine information, a link to a CDC website discussing the HPV vaccine then appeared on their screen.

Qualitative data was also collected. An open-ended question at the end of the post-survey allowed students to type in a response about why they did or did not believe in the HPV vaccine.

The follow responses were recorded:

- Doesn't sound like there are many downsides.
- It can save you and others from getting cancer.
- I received it when I was 15 and I think it's a good thing to prevent rather than to cure.
- I want to prevent any potential future problems.
- I believe that health care providers work to provide the public with safe vaccinations that help keep our population healthy.
- It's a vaccine. That prevents cancer. It's so important.
- Protection against cancer, duh!
- Vaccines save lives!

Program success was evaluated by going through each objective to decide if they were “met”, “partially met”, or “unmet”. Objectives one, three, and four were deemed to be “met”, while objective two was deemed to be “partially met” due to the lack of increase in vaccine uptake. An additional evaluation question at the end of the post-survey asked students how reliable they found the information presented to them in the video. Question responses included “Very Reliable”, “Reliable”, “Slightly Reliable”, and “Not at All Reliable”. Eighteen students (60%) rated the video information as “Very Reliable”, six (20%) rated it as “Reliable”, and one (3%) rated it as “Slightly Reliable”. Overall, this was a good response to the education, as the majority of students gave it the highest possible rating.