Examining the influence of e-Health in motivating cervical cancer screening and HPV vaccination among college students

by

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M.B.A., University of Dhaka, 2013

A THESIS

submitted in partial fulfillment of the requirements for the degree

MASTER OF SCIENCE

A.Q. Miller School of Journalism and Mass Communications
College of Arts and Sciences

KANSAS STATE UNIVERSITY
Manhattan, Kansas

2018

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Abstract

Background: Cervical cancer is one of the leading lethal diseases diagnosed in women globally. By early diagnosis and vaccine, cervical cancer can be prevented. Young adults are mainly at risk of cancer-causing HPV. But they are not motivated to take HPV vaccine and screening test. It is crucial to communicate young adults by education and information about cancer. Electronic health (e-Health) communication strategy has the potential to raise awareness about cancer prevention and control. This study examined the key motivational determinants that are associated with college student's cervical cancer and HPV prevention behavior in relation to their online health information seeking behavior.

Method: An online survey among college students (n= 405), age range 18- 35 years was conducted. All measures were from validated instruments and modified to examine the current study's objectives structured with key variables derived from the Protection-Motivation theory (PMT). Data from the survey were analyzed statistically using Statistical Package for the Social Sciences (SPSS) software. The reliability of the scales used was assessed through the calculation of coefficient alpha and the dimensionality of the scale was tested through confirmatory factor analysis using the principal components method of extraction. Descriptive of the study variables, Pearson correlation coefficient, One-way ANOVA, and multiple linear regression analysis were done to test the research questions and hypothesis.

Results: Result showed that, perceived vulnerability to HPV (β= .17, t= 4.53, p= .000), self-efficacy (β= .13, t= 2.91, p< .01), and response costs (β= .46, t= 10.44, p= .000) were the key motivational variables that are associated with college student's HPV vaccine and Pap test. In testing predictors for online health information seeking behavior, perceived response-efficacy (β= .20, t= 3.41, p= .001) and response costs (β= .19, t= 3.21, p= .001) gained significance in the

model. Also, a Pearson correlation coefficient showed a positive association between college student's online health information seeking behavior and motivation for preventive measures (r = .10, p = .05). Result demonstrated that, college student's knowledge about HPV and cervical cancer influenced their motivation for HPV vaccine and Pap test (p< .001) but knowledge did not influence their online health information seeking behavior (p= .43).

Conclusion: E-Health strategy can be an effective tool for targeting young adults and should be explored further in cancer communication and vaccine promotion. It is important for cancer communication interventions to promote e-Health strategy and enhance the usage of online health information seeking behavior. The contents of online health education and information need to be upgraded to provide the maximum benefits to the public.

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Acknowledgements

I want to take this opportunity to convey my sincere gratitude and utmost respect to Almighty Allah. The last two years had been an exciting journey for me. I would like to acknowledge the people who have been my strength and support all the time.

I would first like to express my earnest gratitude to my major professor, Dr. Nancy Muturi, who welcomed me into this program and from then she has been a great support, supervisor for me. She always motivated and guided me to go forward and explore new things. She gave me every possible opportunity to enrich my career. Without her encouragement, valuable input and effort, it would be difficult for me to complete my thesis nicely.

I would like to thank my other committee members, Professor Bonnie Bressers and Dr. Richard Goe, for giving me the valuable input and feedback designing and writing my thesis. I am thankful to the entire A. Q. Miller School of Journalism and Mass Communications department.

I am grateful to my husband, Shuvo Islam, for always being there for me and taking really good care of me in the hardest time. Finally, I want to express my respectful gratitude to my parents and entire family members, who are far away from me but always support, pray for my success and wellbeing.

Chapter 1 - Introduction

Cervical cancer is one of the leading lethal diseases diagnosed in women globally. It is the third most prevalent malignant disease among women (Strohl et al., 2015; Yörük, Acikgoz, & Ergor, 2016) and the seventh most common cancer overall (Sinha, 2016). Globally, every year approximately 530,000 women develop cervical cancer (Foreman et al., 2012). World Health Organization (WHO, 2014) reported 274,000 deaths in 2012 due to cervical cancer all over the world. In the United States, roughly 12,000 women are diagnosed with cervical cancer, with an estimated 4,000 deaths each year (American Cancer Society, 2013; Cohen et al., 2016). In 2017 alone, the American Cancer Society (2016) estimated about 12,820 new cases of cervical cancer that were diagnosed and about 4,210 deaths in the United States.

Cervical cancer starts in the cells of the cervix, the lower part of the uterus, which is a part of the female reproductive system. This happens when the body's cervical cells divide rapidly where the extra cells form a tumor. The treatment of cervical cancer depends on the stage of cancer, the size and shape of the tumor, patient's age, general health and some other related conditions (Burd, 2003; Benedet et al., 2000). Some identified risk factors for cervical cancer in women includes, Human Papilloma Virus (HPV), early sexual relationship, multiple sex partner, uncircumcised sex partner, sexually transmitted infection (STI) history, Human Immunodeficiency Virus (HIV) /Acquired Immune Deficiency Syndrome (AIDS), poor hygienic conditions, giving multiple birth, using oral contraceptive, smoking, malnutrition, Chlamydia infection, overweight, having a family history of cervical cancer etc. (American Cancer Society, 2013; Yörük et al., 2016).

Genital infection with HPV type 16 and 18 are strongly associated with the development of cervical cancer (Beavis & Levinson, 2016; Rama et al., 2010; Sinha, 2016; Watts et al., 2009).

This sexually transmitted virus can infect both men and women (Harper et al., 2006; Tu & Wang, 2013). There is a connection between an increased danger of HPV and the commencement of sexual activity at a younger age and with a greater number of lifetime sexual partners (Daly et al., 2016; Garner, 2003; Schiffman et al., 2007).

Cervical cancer is one of the preventable diseases (Lopez & McMahan, 2007; Vanslyke et al., 2008, WHO, 2014). Early diagnosis and prevention of cervical cancer have shown positive response in reducing this cancer by 70% in the U.S. (Hweissa, Lim, & Su, 2016). The acceptance of Papanicolaou (Pap) screening for detection of cervical cancer has led to a substantial decline in the incidence and the associated mortality rates (Hitt et al., 2013). Early detection greatly improves the prospects of successful treatment and detects any early cervical cell changes from becoming cancerous (Beavis & Levinson, 2016; Vahabi & Lofters, 2016). Vaccination is another preventive measure for cervical cancer-related HPV infections. Specifically, to enhance immunity against the virus and prevent the development of the disease (Medeiros & Ramada, 2011; Yörük et al., 2016).

Increasing the HPV vaccine rate is a national priority supported by the US Department of Health and Human Services Healthy People 2020 initiative, the President's Cancer Panel 2012, and the American College Health Association 2012 (Beavis & Levinson, 2016; Daly et al., 2016). Over the past few decades' cancer prevention campaigns have been used to reduce cervical cancer incidence and mortality rate substantially. Studies show the limited effectiveness of mass media campaign in encouraging women to go for the screening test and vaccine (Anderson et al., 2009; DiClemente & Andrus, 2016; Wakefield, Loken, & Hornik, 2010). The number of people screening for cervical cancer and receiving HPV vaccine rates also remains extremely low within the United States, regardless of the advanced vaccine development (Cohen

et al., 2016; Strohl et al., 2015). Healthy People 2020 objective for cervical cancer is to increase the proportion of adult females (age 21–65 years) who receive a Pap test based on the most recent guidelines by 93%. But the rate fell to 80.7 % in 2013, which is an alarming issue. Even the baseline percentage was higher (84.5%) in 2008 (Beavis & Levinson, 2016; Brown, 2014).

In addressing cervical cancer detection and prevention, effective cancer communication is necessary and a public health priority (Davis et al., 2002). A significant proportion of cervical cancer is caused by lifestyle factors. Cancer-causing risky health behavior that is modifiable needs to be addressed by communication. Emphasizing the need for communication in reducing cervical cancer burden, Viswanath et al. (2006) argue that it is important to motivate people to change and adopt recommended self-protective health behavior since motivation is the driving factor for behavioral performance (Gu et al., 2013). People's motivation is best assessed by behavioral intentions and feelings (for example, personally susceptible to any threat which is hard, self-belief to adopt recommended behavior and belief in the effectiveness of response) to protect oneself from the threat (Rogers, 1983). Effective cancer communication can help promote changes, demonstrate the benefits of newly adopted behavior and motivate behavior change (Kreps, 2003).

In the modern health care system, various cancer communication strategies and technologies have been implemented to distribute information and in general to promote preventive behavior. One of the most rejuvenating strategies is the use of electronic health (e-Health) in the field of healthcare. E-Health is the cost-effective use of information and communication technology in support of health-related fields, including healthcare services, health surveillance, health education, knowledge, and research (WHO, 2005). E-Health interventions demonstrate potential in promoting health behavior change, increase knowledge

about diseases, treatments, and prevention measures (Sanchez et al., 2013). This study proposes that e-Health, as a health communication strategy that utilizes digital technologies, can be an efficient tool in cervical cancer communication.

Problem statement

Three factors work behind a successful public health intervention: the accessibility of the intervention, motivation of the individual to follow that intervention, and acceptance and sustenance of the recommended behavior (WHO, 2014). Despite the availability of services or level of information about health risks, there is often a gap in public health where those targeted for various interventions lack the motivation to adopt recommended behaviors and preventive measures. In addressing cervical cancer prevention, effective treatment and prevention programs are in place, which enables women to get screened and vaccinated, but people are not motivated enough to uptake that health behavior. There is a persistent gap that exists in motivation and identifying motivational factors of health behavior change in communication efforts (Becker, 1975). Research shows that, though cervical cancer generally occurs after 30 years of age, young women age 16-24 years who are most at risk of HPV, are not concerned about HPV protection (Harper et al., 2006; Hoover, Carfioli, & Moench, 2000; Subasinghe et al., 2016). Besides, they are not motivated by HPV vaccine and Pap screening (Gerend, Shepherd, & Lustria, 2013; McRee et al., 2014). That is why intervention that addresses young adult's motivation to start and maintain recommended health behavior are needed to reduce health threat. It is assumed that people will not attempt to take preventive measures unless they own relevant health motivation in undertaking suggested actions (Becker, 1975).

The prevalence of cervical cancer among young women are high due to lack of participation in Pap screening. One of the reasons behind this non-participation behavior among

young adults is limited knowledge of the extent of the morbidity and mortality of this disease (Harper et al., 2010; McFarland, 2003). Previous studies demonstrate that college women with high-risk sexual behavior have low knowledge about the severity, consequences and recommended actions of cervical cancer and its relationship with HPV (Ingledue, Cottrell, & Bernard, 2004; Lopez & McMahan, 2007; Montgomery et al., 2010; Tu & Wang, 2013; Wu et al., 2010). Effective cancer communication interventions need to be made to educate and increase the knowledge level of young people about this disease. Without proper understanding and knowledge of the disease, people will not be motivated to take preventive measures regarding cervical cancer (Medeiros & Ramada, 2011). Prevention through cancer communication with an emphasis on knowledge about cervical cancer is necessary and a cost-effective strategy.

In public health promotion and disease prevention, risk perception is a central element of health behavior change (Muturi et al., 2016; Zhao & Nan, 2016). With adequate risk perception, a woman would perceive herself as susceptible, that there is a prospect of being diagnosed with cervical cancer at any stage of her life. Individuals who do not believe they are at risk of the disease, and that the disease has serious consequences, then the promoted health benefits of an action are irrelevant to them (Glanz, Rimer, & Viswanath, 2008; Krawczyk et al., 2012). Research shows that because of low-risk perception very few people participate in prevention programs (Glanz & Rimer, 1997). There has been limited research on the effects of risk perception on cervical cancer detection and prevention (Zhao & Nan, 2016). This demands a further understanding of the level of susceptibility towards cervical cancer and HPV in general, especially among young women who are at a higher risk of infection but have limited knowledge about the disease.

There is evidence that adequate knowledge of Pap screening and vaccine does not lead to practicing the recommended health behavior (Lenselink et al., 2008; Waller, McCaffery, & Wardle, 2004). Rather, people may consider the negative outcomes of practicing healthy behavior more important than being safe from maladaptive behavior (Zare Sakhvidi et al., 2015). Despite the available data to support the effectiveness of HPV vaccine, people's acceptance within the United States has been exceedingly low (Kessels et al., 2012; Strohl et al., 2015; Watson et al., 2008). Negative attitude towards vaccine, disbelief that cervical cancer can be prevented, perception of personal treatment during the Pap screening, stigma, embarrassment from significant others about the disease and its prevention procedure and some other barriers are rising the tendency of HPV and cervical cancer among young adults (Downs et al., 2010; Dzuba et al., 2002; Marek et al., 2011; Moreira et al., 2006). Some recent adverse narratives, online and other media exposure, inadequate information, distrust toward things that cannot be experienced immediately are possible reasons behind the distrust of cervical cancer prevention measures among young people (Marek et al., 2011). To increase the vaccine and Pap screening rate these misconceptions need to be addressed and vaccine safety, benefits associated with prevention and detection measures need to be highlighted.

A common barrier to screening and vaccinating is the lack of confidence in own ability to adopt and maintain new health behavior (McCave, 2010; Sandfort & Pleasant, 2009). Unless an individual believes he/she can gain the desired results from their actions; they have little incentive to act in the needed time (Rutkowski & Connelly, 2012, Williams, 2012). Research shows that the various costs associated with the vaccine and Pap screening may prevent people to adopt and maintain these health behaviors (Wong, 2009). But Bandura (1975) suggested that self-confidence and motivation can change health behavior and empower people to overcome the

difficulties arise from health threat. Research has also demonstrated that young adults are unlikely to participate in vaccination because they believe there is little to do on their part to prevent HPV (Gamble et al., 2010; Kahn et al., 2008). Women need to possess strong self-confidence that they can exercise the recommended cervical cancer prevention measures as the process is a self-directed activity (Holroyd, Twinn, & Adab, 2004). Interventions need to include components that increase sexually active young adult's confidence to address risk behaviors and take preventive measures as recommended (Rock et al., 2000).

It is crucial to communicate to young adults by educating them about cervical cancer with the overall goal of empowering and motivating them to make informed decisions about engaging in protective behaviors (Bright et al., 2005). E-Health communication strategy has the potential to raise awareness about cancer prevention and control (Waters et al., 2009). Most of the young people have access to the internet and one of the most searched topics online is health information (Paek & Hove, 2012; Stellefson et al., 2011). For this reason, the internet can be an optimal channel to inform, educate, and motivate adults about cervical cancer and HPV. But there is a limited evidence about the effectiveness of e-Health interventions for promoting health behavior change of vulnerable populations (Kreps & Neuhauser, 2010; Neuhauser & Kreps, 2003; 2010). However, little is known about whether e-Health has the potential to significantly increase knowledge about cancer prevention and control (Peterman, Victorson, & Cella, 2009). It is imperative to understand college students' health information seeking behavior and if it is related to their motivation for cervical cancer prevention. The role of e-Health in cervical cancer knowledge also needs to be examined.

To better understand the determinants of health behaviors, the design, and data collection of this study was conducted using the lens of the Protection-Motivation Theory (PMT). This

theory, developed by Rogers in 1975, has been widely applied to health-related behavior and in health communication (Gu, Chan, Twinn, & Choi, 2012; Yan et al., 2014). PMT posits that people's motivations to protect themselves from harm are enhanced by four critical cognitions or perceptions of the severity of the risks, vulnerability to the risks, self-efficacy of performing the advocated risk-reducing behavior, and the response efficacy of the advocated behavior (Rogers, 1983). Based on PMT, this study examined the key motivational determinants that are associated with college student's Pap screening behavior and HPV vaccine for cervical cancer treatment and prevention.

Objectives of the study

There is a gap in the literature understanding college student's motivation for detection and treatment and online health information seeking behavior in relation to cervical cancer. By considering the risks of cervical cancer and HPV among college students, this study was done-

i) To understand the determining motivational factors that are associated with college student's Pap screening and the HPV vaccine behavior.

ii) To examine the influence of online health information seeking behavior in motivating college student's Pap screening behavior and HPV vaccine.

iii) To understand college student's online health information seeking behavior and how this affects their cervical cancer knowledge and perception of risks.

Significance of the study

The global burden of cervical cancer remains to be high where approximately a quarter of million women die from this disease every year (Arbyn et al., 2011). If the uptake of HPV vaccine and Pap screening continues to lag, then the cases of cervical cancer will increase

dominantly. It is anticipated that by 2030, globally the number of cervical cancer cases will be 443,000. Along with the cases, the global cost of cervical cancer will also rise to $4.7 billion per year in 2030 (WHO, 2013). To lessen this socio-economic burden, it is imperative to promote cancer prevention and control measures. Also, research demonstrates that usually, women go for screening at an advanced stage of cancer when treatment cost is very high (WHO, 2014). It would be sensible enough to take preventive measures beforehand than to carry more financial, mental, physical burden afterward. Special efforts need to be made to reach the most vulnerable population to promote cervical cancer health behavior. As cost-effective process cancer communication is needed to motivate people to take the vaccine and do Pap screening as per guideline to prevent cervical cancer.

Literature suggests that health education and knowledge about cervical cancer has the potential to help an individual to make informed decisions about their health and motivate people to follow recommended health behavior (Leroy & Miller, 2010). American health organizations emphasize on increasing knowledge about sexual health to eliminate misconceptions of people and healthcare costs nationally (Hilpert, Brem, Carrion, & Husman 2012; Parrish, 2016). This study aims to provide insights on young people's cervical cancer information seeking behavior and how this affects their knowledge and perception of risks. Researchers, decision-makers need this information to make effective interventions targeting young adults in promoting HPV vaccine and Pap screening.

Most of the cervical cancer prevention and control program make interventions targeting girls, ages 9-13 years and women, ages >30 years (WHO, 2014). Very limited interventions have been taken targeting young adults, where studies suggest that young adults are most vulnerable to get infected by HPV. Early and multiple sexual behaviors mandate the importance of HPV

vaccine and cancer detection for young people to improve public health (Caron, Kispert, & Mcgrath 2008). It is a priority to make aware and motivate young age people to adopt and maintain prescribed cervical cancer prevention behavior.

Cancer communication emphasizes the importance of HPV vaccine, but the misconception and vaccine rejection are working as a barrier to prevention process. Besides increasing knowledge about the disease, it is important to motivate young people to initiate and continue prescribed health behavior. Motivation can work as the push factor to adopt and maintain recommended behavior in cervical cancer and HPV prevention. This study aims to provide information on which determining factors motivate young people to adopt recommended responses so that they can be benefited by reducing their chance of getting infected by HPV. From a theoretical and behavioral perspective, it is utmost important to understand the relationship between motivation and actual behavior, the reasons of why young people are not inspired enough for vaccine and Pap screening and which factors play as a determinant in motivating people to implement these recommended behaviors.

Targeted at the college students in the U.S., - the current study intends to contribute to cancer communication by providing insights on the role of e-Health or use of digital technologies in educating young adults about HPV and cervical cancer and motivating them to adopt and maintain recommended behavior. Based on the findings, researchers can make the strategic design using e-Health to promote and motivate young people for vaccine and Pap screening as preventive measures of cervical cancer.

Chapter 2 - Review of Literature

This chapter is a review of the literature on topics based on the objectives of the current study. First, it provides an overview of cervical cancer and its causal factor HPV. In addition, this segment describes the detection and prevention procedure for HPV in detail. Second, this chapter lists the previous research on cervical cancer in young women, in addition, their knowledge, attitudes, and motivation towards Pap screening and HPV vaccine. Third, it reviews study that addresses the role of cancer communication, focusing on e-Health. This chapter also discusses literature on the Protection-Motivation theory, the main constructs of the theory and how it is applied in this study. The hypothesis and research questions that were examined for this study are included in the conclusion of this chapter.

Cervical cancer and HPV

Cervical cancer usually begins in the transformation zone cells. Normal cervix cells first gradually develop pre-cancerous changes that turn into cancer. Cervical cancer is one of the very few cancers where it usually takes several years for the cervical pre-cancer turn to invasive malignancy. However, it is not obvious every woman with the pre-cancerous cell will suffer from cervical cancer (American Cancer Society, 2016; Cancer Genome Atlas Research Network, 2017; Edge et al., 2010; WHO, 2014). This cancer may not exhibit signs and symptoms at the beginning. Nevertheless, at an advanced stage can cause abnormal bleeding or discharge from the vagina (American Cancer Society, 2016; Cancer Genome Atlas Research Network, 2017; WHO, 2014).

HPV type 16 and 18 have been identified in the development of cervical cancer (Daly et al., 2016; Garner, 2003; Markovic et al., 2005). It is the most common sexually transmitted

disease in the U.S., contaminate 6.2 million people annually (Beavis & Levinson, 2016; Strohl et al., 2015; Subasinghe et al., 2016). This virus is passed from person to person through genital contacts, like vaginal, anal or oral sex (Garner, 2003; Vanslyke et al., 2008). It is estimated that 50% of sexually active men and women will be infected with HPV at some point in their lives (Watts et al., 2009). Research shows that about 74% of sexually active young women aged 15–24 and men aged 18-70 are infected with HPV infection in the U.S. (Fisher et al., 2013; Lopez & McMahan, 2007; Tu & Wang, 2013). Whereas cervical cancer is the primary concern with HPV, the infection affects both adult female and male. The HPV family of viruses includes more than 150 different viral genotypes, HPV 6 and 11 can cause genital warts (Rama et al., 2010; Watts et al., 2009). This virus is recognized to cause various malignancies, including oral, anal, vulvar, vaginal, and penile cancers (Centers for Disease Control and Prevention [CDC], 2011; Schuler et al., 2014).

Cervical cancer Pap test and HPV vaccine

Effective public health interventions, including Pap screening, HPV vaccine, visual inspection screening, and treatment for both pre-invasive and invasive cervical cancer are available to reduce death and suffering from this disease. Early detection increases the likelihoods of successful treatment by indicating any early cervical cell changes from the pre-invasive stage. Pap screening test has reduced cervical cancer deaths by detecting cases at earlier and more treatable stages (Hweissa et al., 2016; Vahabi & Lofters, 2016). The American College of Obstetricians and Gynecologists and the American Academy of Family Physicians recommend that all women who have been or who are sexually active, or who have reached 18 years of age, should receive Pap test every three years (U.S. Department of Health and Human Services, 2012). The high occurrence of cervical cancer is allied with women who mostly have

never been screened or have not been frequently screened according to the guideline (Garner, 2003). Despite this effective prevention diagnosis out there, from 2003 to 2013, Pap test usage decreased for all age groups; the most substantial decreases were for women aged 18–20 and 65 and over. Pap screening test decreased 39% for women aged group 18-20; for age group 21–44 (5%); 45–64 (9%); 65–74 (22%); and 75 and over (45%) (National Center for Health Statistics, 2016).

Prevention of cervical cancer also entails HPV recommended vaccine for both female and male. This vaccine prevents normal cervical cells from becoming cancer cells. Currently, in the U.S., there are two HPV vaccines available: Gardasil, produced by Merck, and Cervarix, produced by GlaxoSmithKline. Both the vaccines were approved by the Food and Drug Administration (FDA). Studies suggest that HPV vaccines are approximately 100% dependable and effective for prevention of high-risk of HPV strain 16 & 18 (Beavis & Levinson, 2016; Boyle & Levin, 2008; Harper et al., 2006; Medeiros & Ramada, 2011; Pitts, 2009; Tu & Wang, 2013). In addition, the Gardasil vaccine protects against two other HPV types causing more than 90% of genital warts (Beavis & Levinson, 2016; Wilson et al., 2016).

Several factors have led to the low acceptance of HPV vaccine which includes some concerns over effectiveness and side-effects. Studies have reported that males specifically aged nine to 26 years, complains about several health issues such as pain at injection site, headache, fever after getting the vaccine for HPV (Schuler et al., 2014; Slade et al., 2009). However further examination of these reports and surveillance data has not established a causative link between the HPV vaccine and these conditions. Studies have also reported concerns about other potential effects associated with the HPV vaccine, such as promiscuity (Marlow, Waller, & Wardle, 2007; Forster et al., 2010), birth defects, miscarriages, or vaccine-associated infertility (Watson et al.,

2009). Although the HPV vaccine has not been examined in humans, specifically regarding infertility, studies using male and female rat models have exhibited no adverse effects on fertility, and so there is presently no evidence to confirm a connection between infertility and HPV vaccine (Wise et al., 2010; Schuler et al., 2014).

There is also a lack of adequate knowledge, misconceptions, and misinformation about the HPV vaccines and cervical cancer in general (DiClemente & Andrus, 2016; Tu & Wang, 2013). Media exposure, narratives, inadequate information, distrust toward things that cannot be experienced immediately are possible reasons behind the distrust of cervical cancer prevention measures among young people (Marek et al., 2011). Poor understanding and misconception of HPV prevention may cause a substantial gap in young people's knowledge. This could lead to further undermine their health behavior and lessen their intention and motivation to get vaccinated (Tu & Wang, 2013). Cancer communication and education about HPV vaccines and related issues are needed to prevent this severe disease by motivating people to adopt and maintain recommended health behavior.

Cervical Cancer disease in young women

Unlike other cancers, cervical cancer affects women at an earlier age, typically develops an evolutionary process from HPV infection to cervical malignancy (Harper et al., 2006; Subasinghe et al., 2016). Research shows that almost 500,000 women develop the pre-invasive disease of the cervix at a young age. College-aged individuals, on average, are mostly affected by cervical cancer and HPV because they underestimate their risk of infecting by sexually transmitted disease (Baxter, Egbert, & Ho, 2008; Hsu et al., 2011; Montgomery et al., 2010; Tu & Wang, 2013). In the U.S., nearly 74% of sexually active young female (16-24 years) have

been found to be infected with the high risk of HPV due to engaging in increased rates of reproductive activity, many with the strains associated with cervical cancer (Daly et al., 2016; McRee et al., 2014; Tu & Wang, 2013). The highest rates of genital HPV infection have consistently been found in sexually active women under twenty-five years of age (Sandfort & Pleasant, 2009, p: 5) with an estimated prevalence influences near 54% (Medeiros & Ramada, 2011; Wilson et al., 2016).

Despite being in the most critical time of their life, young adults are not concerned about taking measures to prevent themselves from being affected by the severe disease like cancer and sexually transmitted disease (Tu & Wang, 2013). The acceptance of the HPV vaccine uptake rates within the United States has been exceedingly low (Kessels et al., 2012; Strohl et al., 2015; Watson et al., 2008). Very few young adults have received at least one dose of the recommended three doses series of vaccine (National Center for Health Statistics, 2016; Gerend, 2013). It is essential to communicate, educate, and motivate young adults to practice safer sexual behavior. That's why a special focus on sexual health education demands to be afforded to college students who are in higher danger of getting cervical cancer. It will not only increase HPV vaccine and Pap test uptake but also will reduce overall risk for HPV and cancer incident (DiClemente & Andrus, 2016).

Knowledge of cervical cancer of young people

Cancer communication emphasizes the significance of knowledge and understanding specific risk factors, considering it as an important cancer prevention strategy (Viswanath et al., 2006). This is because, knowledge, which is at the core of health behavior theories, is the first step to accomplishing the objective of health promotion intervention (Tiro et al., 2007). Understanding of cancer-related knowledge can lead to improved health. Knowledge, higher

education, and beliefs have an influence on attitude, motivation towards cancer prevention behavior (Harnack et al., 1997).

Knowledge deficit about cervical cancer and the related risk factors among young people appear to signify one of the greatest challenges in battling this disease, which contributes to the sustenance of the health problem. Despite all the health education campaigns carried out through media, health professionals, a broad gap exists in knowledge regarding the cervical disease. A significant number of young adults still have a lack of information coupled with the misconception of susceptibility of this disease (Ingledue et al., 2004; Medeiros & Ramada, 2011; Tiro et al., 2007). Studies show that very few university students had heard about HPV and know about the link between HPV and cervical cancer (Friedman & Shepeard, 2007; Ingledue et al., 2004; Marek et al., 2011; Vanslyke et al., 2008). Additionally, women's comprehension of Pap smears is often inadequate (Sandfort & Pleasant, 2009). This lack of knowledge and information of young people connects to less involvement in cancer prevention actions. The extent of the cervical cancer burden demands the need for information about cervical cancer and education to prevent this disease.

Many studies have predominantly focused on women's knowledge, perception, attitudes towards cervical cancer detection and treatment (Medeiros & Ramada, 2011; Oh et al., 2011; Wong & Sam, 2010). However, to date, there is a limited number of studies that seek to understand men's perception, knowledge of cervical cancer. Gender differences indicate a problem in health care knowledge and education. Women possess a greater knowledge base than men regarding HPV (Marek et al., 2011). Researchers reported that there is an increased risk of cervical cancer in a female, whose male partner is infected with HPV (McPartland et al., 2005). Educating men about HPV and cervical cancer is equally important because, men may

unknowingly increase their female sex partner's risk for getting HPV as the infections are asymptomatic (Medeiros & Ramada, 2011). This highlights the necessity to measure both male and female's knowledge level about cervical cancer to constitute effective interventions.

Health literacy on cervical cancer and HPV might contribute to a change in behaviors that profoundly affect participation in Pap screening, follow-up of abnormal Pap results and acceptance of HPV testing, vaccines among young adults. Considering the importance of knowledge, one of the objectives of this study is to evaluate the general knowledge of cervical cancer among young people and the role of e-Health in educating college students about cervical cancer prevention process. Accordingly, effective cancer communication strategies can be made targeting these particularly vulnerable people.

Young people's motivation for Pap screening and HPV vaccination

By early detection and prompt treatment, survival rates of cervical cancer can be increased. It mostly needs one's self-motivation to be free from the danger of disease. Motivation and confidence are vital prerequisites in preventing any disease (Bandura, 2004; Yim & Graham, 2007). A positively motivated individual is more likely to act the recommended health behavior (Zhao & Nan, 2016). Health care providers specified their apprehension about young adult's lack of motivation for cervical cancer treatment and prevention (Downs et al., 2010; Hweissa et al., 2016; Marek et al., 2011; & Strohl et al., 2015). In addressing cervical cancer prevention among young people, cancer communication has been highlighting the importance of motivation (Ackerson & Preston, 2009). As a positively motivated person will attempt taking preventive measures (Becker, 1975). People need to be positively motivated, empowered and self-driven to comply with the guided recommendation and continue that behavior, otherwise, their health

behavior can relapse any time. Young adults possess the capacity to make informed decisions regarding vaccination and, given the precise guidance and education, and they are more likely to accept HPV vaccine if they are properly reached. Motivation not only persuades intention to adopt preventive measures but also influence intentions to search for health information (Rimal, 2003). Knowledge people will be clear of any misconceptions and misunderstanding about the disease and associated preventive measures. Additionally, they will be highly motivated to adopt and maintain recommended health behavior. Accurate and reliable cancer information and interventions are needed to motivate women so that they can make informed decisions about the prevention of cervical cancer. It is necessary to understand the factors that trigger the motivation of young people for detection and treatment of this disease to facilitate in making effective interventions.

Role of Cancer Communication

Cancer communication, a goal-directed study and application, gives target audiences the opportunity to gather relevant health information through selected media, and helps them with the ways how to avoid and respond to health threats (Kreps & Massimilla, 2002). It has great potential to raise awareness about cancer risks, to promote cancer prevention, reduce cancer incident, morbidity, and mortality, and guide cancer treatment (Kreps, 2003; Kreps & Massimilla, 2002). Scholars have emphasized the importance of effective cancer communication as it is a public health priority in cancer prevention and control (Davis et al., 2002). Additionally, cancer communication can portray a substantial role in improving knowledge through sharing information (Lang, 2006). Prevention through cancer communication with an emphasis in knowledge about the disease and preventive measures is a necessary and cost-effective strategy.

In the modern health care system, various cancer communication strategies and technologies have been implementing to distribute information about cancer and in general to promote preventive behavior. Literature suggests that new communication technologies have potential to significantly alter health behaviors associated with cancer risk reduction (Kreps & Massimilla, 2002). Among all the communication medium e-Health is gaining recognition for its applications and various prospects (Kreps & Massimilla, 2002; Neuhauser & Kreps, 2003). Cervical cancer is a significant health threat that needs to be addressed by effective cancer communication. Very few studies assessed the effectiveness of e-Health in cervical cancer prevention. To make effective interventions targeting audiences it is required to understand the role of electronic health in cervical cancer prevention and control.

Role of e-Health in health communication

E-Health is an emerging field which connects health informatics, public health, health services, and business referring to health services and information transmission process through the Internet and Web-based applications (Eysenbach, 2001; Stellefson et al., 2011). Several regulatory institutions such as the WHO, the Medicines and Healthcare Products Regulatory Agency, the FDA, and the National Health Service board provide legal frameworks and guiding principles to ensure valid and reliable e-Health platforms (Bateman & Keefe, 2016).

E-Health has great potential to contribute to health communication efforts (Jacobs et al., 2016). It can influence and enable health behavior change and support in the prevention and management of disease by its improved features of interactivity, multimodal, mass customization, and the opportunity for users to be decision makers of their own health (Neuhauser & Kreps, 2010). E-Health can improve health outcomes by fulfilling several

different functions, including function as a vast available library by providing quick and organized access to information; function as a communication and support channel by joining people together (e.g. Via online discussion groups); gather information from a user, apply algorithms or decision rules, and provide appropriate feedback to the individual user's characteristics or problems (Baker et al., 2011; Strecher, 2007). A wide variety of e-Health application includes, social cybernetics and social informatics (Libin, A., & Libin, E., 2005), online support groups, collaborative communities, health information on the Internet, electronic health records, messaging, computer-aided learning, information provided by the internet and websites, interactive television, computer-controlled telemedicine/ telehealth, bio metric assessment and monitoring, and patient-provider email contact, health wikis, blogs, podcasts, electronic games, etc. (Kamel & Wheeler 2007; Neuhauser & Kreps, 2010).

E-Health information is interactive, inter-operable, personally engaging, contextually tailored, with the ability to be delivered to mass audiences effectively so that the goal of health care and health promotion efforts are achieved (Kreps & Neuhauser, 2010). It can easily update health information based on changing health conditions. This communication process provides the opportunity for patients to improve communication with health service providers, access to personal health information, connecting with others in online spaces, and health education, so that patient feel empowered and can take important health care decisions of their lives. Likewise, health service providers can enjoy the benefits of e-Health applications including improved patient information management, coordination of longitudinal care, and symptom monitoring (Franklin, Farzanfar, & Thompson, 2008). E-Health services have already become an important part of health care for many people (Andreassen et al., 2007). Patients consider e-Health applications improve their knowledge, confidence about health, in addition, they feel empowered

which reinforced their relationships with health professionals (Akesson, Saveman, & Nilsson, 2007).

Like other health promotion tools e-Health also has some disadvantages. A consistent concerning topic about online health information is the accuracy and quality of the content. An analysis of 79 studies involving nearly 6,000 health websites and over 1300 health web pages concerning users' credibility criteria found that nearly 70% of the studies reported on inaccurate and unreliable information on web pages, with only nine percent concluded a positive evaluation (Thompson et al., 2011). Also, concerns exist regarding patient privacy, information security, slow promotion of behavioral health (Bateman & Keefe, 2016; Kreps & Neuhauser, 2010).

E-Health and Cervical cancer communication

E-Health technology is increasingly being used to increase women's cancer awareness and participation in screening and HPV vaccination (DiClemente & Andrus, 2016). It encompasses a variety of possible resources for cancer patients, including websites with basic information, email notices, web-based interactive cancer communication services (ICCSs), social support services, etc. These health-care services are highly accessible, cost-effective, have high-quality assurance and can be tailored to interested distinct patient groups (Baker et al., 2011). In preventing cervical cancer, relevant health information and education about this disease is a crucial factor considering the extent of this cancer problem (Bright et al., 2005). E-Health applications have the advantage to disseminate health information by connecting consumers through the social network. Current functions of online support groups, health blogs, and different social media like Facebook, Twitter, Instagram, YouTube, Pinterest, etc., and web portals are helping to leverage the use of social interaction in support of health promotion (Kreps

& Neuhauser, 2010). These factors may lead to changes in the knowledge level of people regarding cervical cancer and may prove as an effective prevention strategy in cancer communication. That is why one of the objectives of Healthy People 2020 is to increase the number of online health information seekers (Mackert et al., 2014). Online health information has the potential to play a significant role in cancer prevention and control (Waters et al., 2009). If people find any relevant cancer health information from the internet, they will be highly motivated to search more information online. This can influence their desire to practice recommended behavior or at least to consult healthcare provider about the recommendation (Paek & Hove, 2012).

Literature shows that young people consider the internet a major source of information on health and disease prevention (Paek & Hove, 2012). Even though they are aware of the credibility and quality of health information retrieved from the websites (Bell, 2014; Duduciuc, 2014; Seckin, 2014). There is a positive connection between rates of cancer screening and health information seeking behavior on the internet. People can find abundant information conveniently within a short period almost free of cost (Shneyderman et al., 2016). The Health Information National Trends Survey (HINTS, 2006) reported that many cancer patients use the internet to find data before calling the National Cancer Institute's Cancer Information Service. People usually trust the information they get from the internet as it is easy to access the internet to find cancer-related resources (Baker et al., 2011). With the largely positive behavioral effects of e-Health cancer communication, research also demonstrations problems associated with e-Health interventions like barriers of language, the reliability of the information, literacy, and culture (Neuhauser & Kreps, 2010).

One important section of e-Health is electronic games, for example, computer and video games. Video game play is one paradigm of entertainment education, which entertain the players by offering the game as well as provide information about health topics and related storylines. It presents appealing role model characters, offers scenarios that involve health-related decision making and commits self-care skills, depicts consequences in response to players' decisions and actions (Lieberman, 1997). In a recent survey of media use, it is reported that adults spend more than 1 hour on an average everyday playing electronic games. Health communication researchers suggest that electronic games may be an effective method, as it offers unique advantages for delivering health promotion messages (Franklin et al., 2008; Lieberman, 1997). To illustrate, Turnin (2001) reported that nutrition knowledge games improved knowledge, practices, and consumption of elementary school youth who played the game. Packy & & Marlon, Rex Ronan, Captain Novolin, video games have shown positive effects in improving young person's self-confidence, ability and motivation to undertake the rigorous self-care necessary to control distinct diseases (Brown, 1997; Lieberman, 1997; Lieberman, 2001). On the other hand, Homer (2000); Huss (2003); McPherson, Glazebrook, Forster, James, & Smyth (2006) found not all game effects have produced the expected outcomes.

Nowadays e-Health communication strategy is being used in various health behavior change interventions (Andreassen et al., 2007). Scholars differ about the effectiveness of online information in health promotion behaviors targeting young people. For example, communication technologies and social media have been proven to be effective in college based immunization campaigns (DiClemente & Andrus, 2016). On the other side, in relation to dietary interventions, a review by Harris et al. (2011) concludes that e-Health interventions to promote dietary behavior change were not significant in changing the purpose and were as expensive as other

individual behavior change interventions. In relation to physical activities, Davies et al. (2012) conducted a meta-analysis that found Web-based interventions significantly improved physical activities in the short term, particularly when targeted at inactive participants. However, long-term maintenance of behavior change, as well as engagement and retention of participants, were problematic. Considering these differences, it is necessary to study the role of e-Health in cervical cancer prevention behavior.

It is imperative to understand college students' health communication experiences, from whether they use e-Health to educate, communicate about health topics, share their experiences with others. That's how health communicators, researchers can gain a comprehensive picture of how to get to college students to improve the health issue about this sensitive topic like cervical cancer. So, that based on this, they can design effective e-Health communication that can serve accurate information to concerned different audiences at their needed time and place as well as the best guide for health care. That's why the current study aims investigate whether e-Health has significant potential to reduce the knowledge gap about cervical cancer as well as young generation's intention to use e-Health as a medium to seek health-related information.

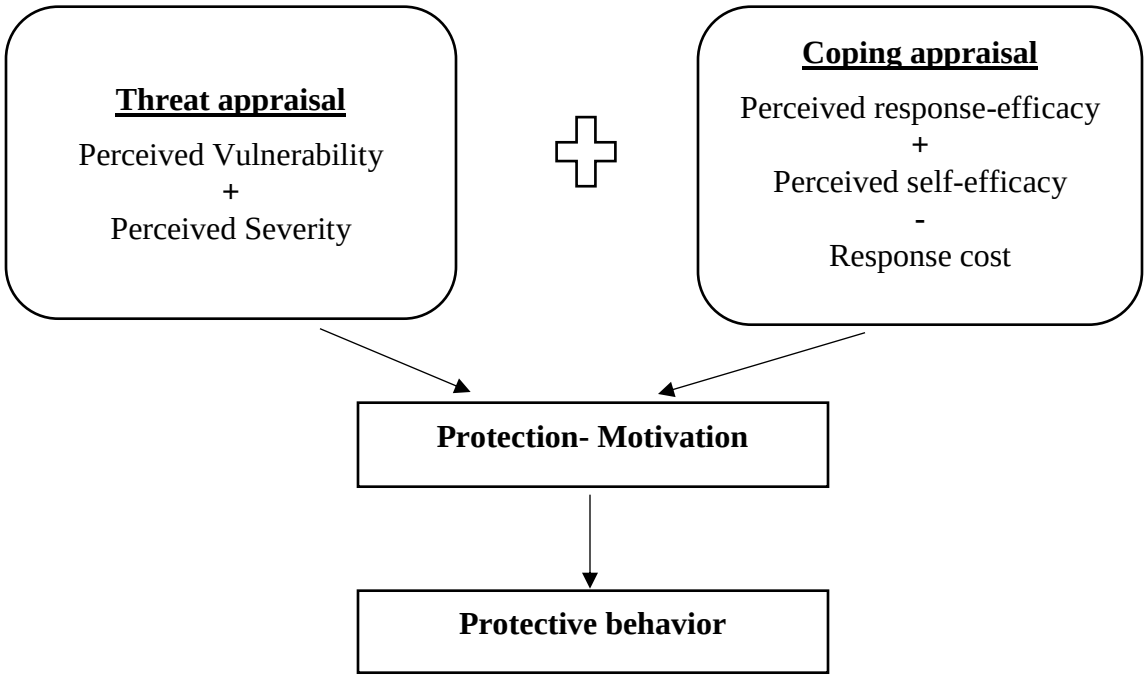
Protection-Motivation theory

Protection-Motivation theory (Rogers, 1975) has often been used as a framework for health education interventions intended to stimulus health behavior (Gu et al., 2012; Yan et al., 2014). This theory explains how people adapt to effectively recommended response confronting any threat (Bolkan & Goodboy, 2016). It posits that people's motivation to protect themselves from harm is enhanced by four critical cognitions or perceptions of the severity of the risks, vulnerability to the risks, self-efficacy of performing the advocated risk-reducing behavior, and

the response efficacy of the advocated behavior (Rogers 1983). In addition, the theory suggests that people's motivations to protect themselves are weakened by the perceived response costs of the advocated risk-reducing behavior and the perceived benefits of the opposing risk-enhancing behavior (Pechmann et al., 2003). PMT postulates that an individual's motivation to initiate health protective behavior is influenced by two cognitive processes:

1. Threat appraisal, and
2. Coping appraisal

Figure 1. Protection-Motivation theory



1) Threat appraisal

Threat appraisal process evaluates the seriousness of the health threat by estimating the probability of a maladaptive outcome or behavior and the severity of the negative outcome if no protective action is taken (Milne, Orbell, & Sheeran, 2002; Prentice-Dunn & Rogers, 1986; Tesson et al., 2016). An individual with higher perception about threat will be more likely to be

motivated to adopt the recommended protection behavior (Milne Orbell, & Sheeran, 2002). Threat appraisal includes two variables: perceived vulnerability, and perceived severity. This study will examine young adults' perception of getting infected by HPV and their perception of how serious they consider cervical cancer and HPV and does their perception motivate them to take preventive measures.

i) Perceived Vulnerability

Perceived vulnerability refers to whether individual feels likely to develop the likelihood of harm from a risk (Eklund & Tenenbaum, 2014; Rogers, 1975). The more vulnerable an individual feel, the less effective the threat of disease, that means the more protection-motivation maximize (Rogers, 1975). Studies suggest that individual's perception of vulnerability to health threat is not always consistent in motivating people to adopt preventive regimen (Tesson et al., 2016; Zare Sakhvidi et al., 2015). On the contrary, regarding cervical cancer prevention, DiClemente & Andrus (2016) argues perceived vulnerability is an important factor that can motivate women to seek preventive measures, including HPV vaccine, Pap screening. The current study will examine the influence of perceived vulnerability in motivating college student's cervical cancer prevention behavior.

ii) Perceived Severity

Perceived severity refers an individual's perception of the degree of harm resulting from the threat. The more severe an individual feel about the risk of the disease, the more protection-motivation maximize (Rogers, 1975). If individuals do not believe they are at risk of the disease, and the disease has serious consequences then the protective measures are irrelevant to them (Glanz et al., 2008; Krawczyk et al., 2012). Though severity construct mobilizes an individual to act, studies found its limited and indirect effect on guaranteed protection motivation (Eklund &

Tenenbaum, 2014; Zare Sakhvidi et al., 2015). The current study examined the influence of perceived severity in motivating college student's cervical cancer prevention behavior. Understanding young adult's perception and how they affect behavior is necessary to make appropriate communication strategies targeting health promotion, education and information.

1) Coping appraisal

Rogers (1983) mainly emphasizes on coping appraisal processes and protective motivation as a mediating factor of attitude and behavior change. The coping appraisal process is the perception of engaging in protective behavior to the appraised threat minus the cost associated with adaptive response (Salazar et al., 2013; Milne, Orbell, & Sheeran, 2002). When a person is convinced that certain behavior will lead to desired positive outcome, feels able to perform the prescribed behavior, belief in the ability of the treatment to provide assistance and perceives the behavior will be low in cost only then he/she will be motivated to perform that behavior (Grindley, Zizzi, & Nasypany, 2008; Eklund & Tenenbaum, 2014, Milne, Orbell, & Sheeran, 2002). The coping appraisal includes three variables: response-efficacy, self-efficacy, and response cost.

i) Response-efficacy

Response-efficacy is an evaluation of how effective the behavior will be in protecting an individual from a certain threat that means perceived success in reducing or averting perceived threat (Rogers, 1983; Salazar et al., 2013; Tesson et al., 2016). It is the belief that recommended response can reduce or eliminate one's chances of exposure to a threat, increasing intentions to adopt the response (Rogers, 1975). If an individual believes the recommended response is a highly effective preventive measure, then the person will be strongly motivated to adopt that practice. Otherwise, if an individual perceives the response is ineffective then the intention to adopt the response will decrease (Rogers, 1983). Literature suggests that, negative attitude

towards Pap test, disbelief in the effectiveness of vaccine work as a barrier to cervical cancer prevention. Health communication is needed to evidently demonstrate the effectiveness of recommended response behavior (Maibach & Parrott, 1995).

ii) Self- efficacy

Self-efficacy can be an effective component in motivating college students at improvements in cancer preventive behaviors. That's because self-efficacy beliefs provide the basis for motivation and a crucial component to the successful avoidance of the threatening situation (Bandura, 1977; 1986). It is a combination of the belief regarding the presence or absence of facilitators and barriers to behavioral performance, weighted by perceived power or control factor to ease the behavior (Ajzen, 1991; Prabawanti et al., 2015). High self-efficacy motivates behavior. Unless young people believe they can gain their desired results from their actions; they have little incentive to act in the needed time (Rutkowski & Connelly, 2012, Williams, 2012). Bandura (1997) reasoned that self-efficacy means an individual's confidence and perceived capacity to carry out actions and to make decisions that are part of success in progressing to positive outcomes. This theory assumes that an individual's self-efficacy and perception of whether they can successfully engage in a behavior, or not, often has a direct effect on their intentions, particularly when the behavior involves challenges and complexities such as those associated with Pap screening, HPV vaccination (Fisher et al., 2013). Self-efficacy reflects the individual's belief in his or her ability to go for the cervical cancer screening and vaccination in the presence of constructive or obstructive factors.

iii) Response cost

When an individual perceives much higher costs (monetary, inconvenience, unpleasantness, difficulty, side effects, time, disruption of daily life, personal, psychological and overcoming habit strength etc.) than benefits associated with undertaking the protective behavior, then the

individual might unlikely to adopt and maintain the recommended behavior (Ralph et al., 2014; Rogers, 1983; Tesson et al., 2016). The negative outcomes resulting from complying with recommended health behavior is known to as response cost (Maibach & Parrott,1995). For instance, women's discomfort during the Pap test, high costs of vaccine and Pap test may discourage people from going for prevention process (Dzuba et al., 2002; Price, 2011). Response costs associated with health promotion need to be anticipated and disprove, otherwise, the intervention will not achieve its intended objective. Effective health communication can reduce the fear of response cost and motivate people to adopt the recommended health behavior.

Protection-motivation

Protection-motivation is the result of threat appraisal and coping appraisal. It is a mediating variable whose function is to stimulate, sustain, and direct protective behavior (Salazar et al., 2013; Rogers, 1975, p: 94). The adoption of protected health behavior is a chronological process from motivation to decision and then action (Rogers, 1975; Wu et al., 2005). When perceived vulnerability and severity outweigh the maladaptive responses, then protection-motivation elicit. Similarly, when response-efficacy and self-efficacy outweigh the response costs associated with the adaptive behavior, then protection-motivation prompt (Norman, Boer, & Seydel, 2005). Basically, protection motivation originates from the perception of harmful threat that likely to occur, along with the belief that a recommended response can effectively prevent the threat from occurring (Rogers, 1983). The aim of the study is to understand which component of the protection motion theory determine college student's motivation towards cervical cancer prevention behavior as well as e-health's effectiveness in motivating student's health behavior.

Research Questions and Hypothesis

Based on a review of the literature, the hypothesis and research questions addressed in this study are as follows.

The present study addressed the following research questions:

RQ 1: What are the determining motivational factors in college student's Pap screening behavior and the HPV vaccine?

RQ 2: Does online health information seeking behavior has an association with college student's motivation for Pap screening behavior and the HPV vaccine?

The present study addressed the following hypothesis:

H1: Motivation for vaccination and screening will vary based on college student's knowledge level of cervical cancer and HPV.

H2: Engaging in protective behavior will have more influence on online health information seeking behavior than perceived risks behavior.

H3: Online health information seeking behavior will vary based on college student's knowledge level of cervical cancer and HPV.

Chapter 3 - Method

This study examined college student's motivation for cervical cancer screening and HPV vaccine as well as the effectiveness of e-Health as a communication medium in educating and motivating people to adopt recommended cancer prevention health behavior. To answer the research questions and hypothesis, this study conducted an online survey with college students. This chapter presents the research methods that were applied in this study, including participants, research design, outcome and independent variables with measurements, and data analysis process. In the end, this chapter contains regression diagnostics that were assessed to validate regression assumptions.

Participants

Sample data for this survey were gathered randomly from undergraduate and graduate students from diverse courses at Kansas State University with the help of University's Information Technology Assistance Center (iTAC). Both female and male students, aged 18-35 years were involved in this study.

Research design

This study was a cross-sectional, non-experimental design. It comprised of an online survey distributed to both male and female students after approval from the Institutional Review Board (IRB). Samples were included in the online Qualtrics survey system. Randomly selected students received an e-mail describing the study and were asked to access the provided personalized link with the email. The link directed them to the survey on Qualtrics. The students were asked to complete a series of questions about their knowledge of cervical cancer, usage of online health information resources and motivation for cancer prevention in accordance with Protection-Motivation theory. The survey did not take more than 30 minutes. Three reminders

were sent out after a few weeks only to those who had not completed the survey. Female participants were required to answer all the items in the survey, but male participants responded to certain items.

Data from the survey were analyzed statistically using Statistical Package for the Social Sciences (SPSS) software. The reliability of the scales used was assessed through the calculation of coefficient alpha and the dimensionality of the scale was tested through confirmatory factor analysis using the principal components method of extraction. For statistical tests, an alpha level of 0.05 was used to be statistically significant. Descriptive of the study variables, Pearson correlation coefficient, One-way ANOVA, and multiple linear regression analysis were done to test the research questions and hypothesis.

Measurements

All measures were collected from various validated instruments and modified to examine the current study's objectives. They were grouped according to factors described in the PMT along with items regarding knowledge about cervical cancer and HPV. At the beginning of the survey participants were asked to provide some demographic information, for example, gender, age, year of college, relationship status, and ethnicity. The gender of the participants was measured as a binary variable with "1" indicating male and "0" indicating the female and other category. Age 18-21 years were coded as "1", 22-25 years as "2", 26-29 years as "3", 30 & above years were coded as "4". Participant's year in college was coded from "1" to "5" chronologically for the freshman, sophomore, junior, senior, and graduate year. The relationship status was measured as a binary variable with "1" indicating single and "0" indicating dating someone, engaged, married, other.

Independent variables

Knowledge about cervical cancer

Both female and male participants were asked nine-items (American Cancer Society, 2016) regarding knowledge about cervical cancer, symptoms, causal factors of this disease, detection and prevention measures. For example, “Cervical cancer usually doesn’t cause symptoms right away”; “Women need to get a Pap test every year to check for cervical cancer”; respondents were asked to identify if the statement is true, false or they don’t know. Another type of questions about knowledge was, “How many doses of HPV vaccine are required for protection?”. The respondents were given five options to choose answer- 1) one, 2) two, 3) three, 4) four, and 5) I don’t know. Respondents were assessed for correct answers to these questions. For the correct answer score was “1”, and for the incorrect answer and “I don’t know” answer scores were assigned to “0”.

Vulnerability to contracting cervical cancer and HPV

Vulnerability to contracting cervical cancer and HPV was evaluated with five- items, which were adopted from Krawczyk et al., 2012. The instruments were modified for the current study to examine female participants’ perception of the chances of getting cervical cancer and HPV in their lifetime. Male participants responded to only three-items, “Risk of getting HPV in a lifetime”, “If I did not receive the HPV vaccine, I feel that I would be at risk for developing cervical cancer”, and “I am at risk of getting HPV because I do not practice safe sexual behavior”. The effect of perceived vulnerability was not investigated for male and female separately in this study. The items were measured on a 5- point Likert scale with 1 (No chance at all) to 5 (Very high chance). After eliminating the one item, Cronbach α was estimated to be .69, indicating a reliable scale. The factor analysis confirmed the unidimensional of the scale as one

factor was found with an eigenvalue greater than 2.0 while the remaining factors had eigenvalues less than 1.0. Accepting a one-factor solution that explained 44.39% of the variance in the scale items, all scale items had factor loadings greater than or equal to .45. Responses to the four-items comprising the scale were averaged to form a composite score of perceived vulnerability.

Severity of cervical cancer and HPV

Participants' perception of the severity of cervical cancer and HPV was assessed using five- items (Krawczyk et al., 2012). Items asked participants, "How severe do you think cervical cancer would be?", "How serious would a diagnosis of cervical cancer be for you?", "Getting infected with HPV would be more serious than many people think", "I fear that this virus will affect my long-term health condition" and "Compare to most people of your age how seriously do you understand your risk of getting HPV?". These items were scored on a 5-point Likert scale with 1 (Not at all serious) to 5 (Extremely serious). After eliminating the fifth item, Cronbach α was estimated to be .82, indicating the scale could be deemed reliable. The factor analysis confirmed the unidimensional of the scale as one factor was found with an eigenvalue greater than 2.0 while the remaining factors had eigenvalues less than 1.0. Accepting a one-factor solution that explained 53.77% of the variance in the scale items, all scale items had factor loadings greater than or equal to .70. Responses to the four-items comprising the scale were averaged to form a composite score of perceived severity.

Response-efficacy of the preventive measures

Both female and male participants perceived believe of a prescribed preventive process to cervical cancer were measured by four- items (Krawczyk et al., 2012). The items were, "Pap screening can find cervical changes before they become cancer", "There might be an unknown future side effect of HPV vaccine", and "I might get short or long-term complications from the

HPV vaccine". These items were scored on a 5-point Likert scale with 1 (Not at all agree) to 5 (Strongly agree). After eliminating two items, Cronbach α was estimated to be .82, indicating the scale could be deemed reliable. The factor analysis confirmed the unidimensional of the scale as two factors were found with an eigenvalue greater than 1.0 while the remaining factors had eigenvalues less than 1.0. Accepting a two-factor solution that explained 79.66% of the variance in the scale items. Responses to the two-items comprising the scale were averaged to form a composite score of perceived response-efficacy.

Self-efficacy

In examining one's belief in their ability to perform the recommended task a five-items (Britt et al., 2015; Helmes, 2002) scale with 5 response points was developed. The items were phrased to measure participant's ability not to get tested and vaccinated if they do not want or agree. The items were, "I do not feel confident about getting/ completing the HPV vaccination in the next year", "There is not much I can do to lower my chances of getting virus/ cancer", "I do not feel confident about getting vaccinated/ screened despite my spouse/ partner's positive attitude towards it'', "I cannot cope with feeling nervous about having the vaccination procedure", and "It would be hard for me to cope with the monetary barriers (approximately $103 per screening test, $130 per dose of vaccine) associated with vaccine and Pap screening". These items were scored on a 5-point Likert scale with 1 (Not at all agree) to 5 (Strongly agree). After eliminating the fifth item, Cronbach α was estimated to be .73, indicating the scale could be deemed reliable. The factor analysis confirmed the unidimensional of the scale as one factor was found with an eigenvalue greater than 2.0 while the remaining factors had eigenvalues less than 1.0. Accepting a one-factor solution that explained 48.12% of the variance in the scale

items, all scale items had factor loadings greater than or equal to .54. Responses to the four-items comprising the scale were averaged to form a composite score of perceived self-efficacy.

Response costs of preventive measures

Potential negative outcomes for getting Pap test and HPV vaccine were measured with five- items (Abotchie & Shokar, 2009; Helmes, 2002; Tesson et al., 2016) by asking both female and male participants their concern about "HPV vaccination and Pap test would affect their sex life", "painful process", "isolation from friends, family if they get HPV vaccine", "less chance of living longer", and "concern about appropriate medical care". These items were scored on a 5-point Likert scale with 1 (Not at all concern) to 5 (Extremely concern). Cronbach α was estimated to be .72, indicating a reliable scale. The factor analysis confirmed the unidimensional of the scale as one factor was found with an eigenvalue greater than 2.0 while the remaining factors had eigenvalues less than 1.0. Accepting a one-factor solution that explained 56.78% of the variance in the scale items, all scale items had factor loadings greater than or equal to .62. Responses to the five-items comprising the scale were averaged to form a composite score of perceived response-cost.

Online health information seeking behavior

Online health information seeking behavior among college students was assessed by four- items (Kelly, Ziebland, & Jenkinson, 2015). These items were scored on a 5-point Likert scale with 1 (Not at all agree) to 5 (Extremely agree). The items include, "The internet can be useful to help people decide if their symptoms are important enough to go to see a doctor", "The internet is a reliable resource to help me understand what a doctor tells me", "Online health information encourage me to play a more active role in my healthcare", and "I have learned something new from electronic health information". Cronbach α was estimated to be .82,

indicating a reliable scale. The factor analysis confirmed the unidimensional of the scale as one factor was found with an eigenvalue greater than 2.0 while the remaining factors had eigenvalues less than 1.0. Accepting a one-factor solution that explained 65.56% of the variance in the scale items, all scale items had factor loadings greater than or equal to .68. Responses to the four-items comprising the scale were averaged to form a composite score of online health information seeking behavior.

Additionally, which source students often use to get health information was assessed by one item (Wong & Sam, 2010). Both traditional and electronic sources (TV, Newspaper, Social media, Web sites, Blogs, Radio, Magazine etc.) were mentioned and how often (never, rarely (1-2 times), sometimes (3-4 times, often (5 or 6 times), always (More than 7) they use these media was asked to know their preferred media to get health information.

Dependent variable

Protection-Motivation for Pap test and HPV vaccine

Participants' motivation towards getting vaccinated and screened was measured using six- items (Matejic et al., 2011; Tesson et al., 2016) with 5 points Likert scale with 1 (Not at all concern) to 5 (Extremely concern). The items include, "My family history of cervical cancer", "I am not well informed about the disease", "I do not practice safer sexual behavior (e.g. multiple partners, unprotected sex)", "The cost of HPV vaccine and/or Pap test", "Personal fear of getting HPV vaccine", and "My friends who have contracted HPV". After eliminating the first item, Cronbach α was estimated to be .63, indicating the scale could be deemed reliable. The factor analysis confirmed the unidimensional of the scale as one factor was found with an eigenvalue greater than 2.0, one factor was found with an eigenvalue greater than 1.0 while the remaining factors had eigenvalues less than 1.0. Accepting a two-factor solution that explained 52.24% of

the variance in the scale items. Responses to the five-items comprising the scale were averaged to form a composite score of protection motivation.

Other factors

At the end of the survey, students were asked if they already had taken HPV vaccine and screened for cervical cancer, their intention to get HPV vaccine and Pap test, and their actual lifetime sexual partners. These questions were asked to test if there was any relation between their intention to get vaccine and Pap test with their sexual behavior.

Regression diagnostics

Regression diagnostics were done to assess the extent to which key assumptions of the regression models complied. The result of standardized residuals showed the error term has the mean value equal to zero, compliance with the assumption of the regression model. Standardized DfBeta was generated to examine if there were any significant outlier or influence point in each independent variable. The result showed that the values of each independent variable were within range (range: Standardized DfBetas <-2 or >2). A normal probability plot of regression standardized residual was constructed to test the normality of the error term. The histogram showed the error term was almost normal. The assumption of the error term is independent of each other was examined by generating Durbin-Watson value. The result showed the value was within the range, which means covariance was equal to 2 (range: if d< 2= positive autocorrelation; d>2= negative autocorrelation; d=2 not autocorrelated). Variance inflation factor (VIF) coefficients for each independent variable was done to test for the presence of high multicollinearity in the regression model. The result showed the VIF value for each independent variable was less than 3, which means there was no multicollinearity in the regression model.

Chapter 4 - Results

This chapter provides the study findings based on the research questions and hypothesis that were formulated from Protection-Motivation theory and reviewed literature. The chapter starts with the presentation of descriptive results focusing on demographic characteristics followed by other independent study variables. Data are then analyzed to test the study hypothesis and research questions using a variety of methods.

Sample Characteristics

In total, 2000 college students were randomly selected from various colleges and disciplines. The sample was composed of 405 college students who participated in the survey. Overall, a response rate of 20.25% was attained for the survey. The sample was predominantly female (80%, *n*= 324), while males accounted for 19.5% (*n*= 79). The sample was evenly distributed across age group with a mean age of 23.34 years (SD= 1.03) ranging from 22-25 years. The majority (42.5%) were in the 18-21 age group followed by 31.9% in the 22-25 age group, and equal number 12.8% in the 26-29 and 30 years and above age groups. As shown in Table 1 below- 39.8% (*n*= 161) were graduate students, followed by senior 35.8%, junior 11.9%, sophomore 6.2% and freshman 6.4%. The most prevalent ethnicity that the respondents self-identified with was White 81.2% which is a common characteristic of a Midwestern Universities. While other ethnicities accounted for total only 18.8%. Of the total respondents, the majority of the students (40.7%) mentioned their relationship status as single. Participants' demographics are summarized in Table 1.

Table 1. Participant Demographic Characteristics

Variables	Characteristics	*N* (%)
Gender	Male	79 (19.5)
	Female	324 (80.0)
	Other	2 (.5)
Age (M= 23.34, SD= 1.03)	18 – 21	172 (42.5)
	22 – 25	129 (31.9)
	26 – 29	52 (12.8)
	30 & above	52 (12.8)
Year in college	Freshman	26 (6.4)
	Sophomore	25 (6.2)
	Junior	48 (11.9)
	Senior	145 (35.8)
	Graduate	161 (39.8)
Relationship status	Single	165 (40.7)
	Dating someone	125 (30.9)
	Engaged	35 (8.6)
	Married	79 (19.5)
	Other	1 (.2)
Ethnicity	Alaska Native or American Indian	2 (.5)
	Asian or Asian American	33 (8.1)
	Black or African American	9 (2.2)
	Hawaiian/ other Pacific Islander	1 (.2)
	Hispanic/ Latino or Spanish	23 (5.7)
	White	329 (81.2)
	Other	8 (2.0)
Vaccinated for HPV		200 (49.4)
Taken Pap test		167 (41.2)

Descriptives of study variables

Knowledge about HPV and Cervical cancer

College student's knowledge about HPV and cervical cancer was measured through 9 questions. The questions had options of True, False and I don't know. These questions were recoded where correct answers were coded as "1" and the incorrect or I don't know responses were coded as "0". The scores were then summed up to provide a knowledge score for each participant out of possible 9 points (score range 0-9). Results showed a mean value of 6.22 (SD= 2.05) for knowledge. Then the knowledge level of participants was divided into three categories- low, moderate, and high level of knowledge. The cut-off points for low level knowledge was 25 percentiles (range 0-5), moderate level was determined by 50 percentiles (range 5.1-7), and high level was 75 percentiles and above (range 7.1-9). About 27.9% (*n*= 113) participants have low knowledge about this disease, 42.7% (*n*= 173) students have the moderate knowledge, and 29.4% (*n*= 119) students exhibited high knowledge. Table 2 includes the questions used for assessing the knowledge level of participants and frequencies of correct and incorrect answers for each question the participants responded.

Table 2. Frequencies of Knowledge about HPV and cervical cancer questions

Question/Statement and answer	Incorrect answer *N* (%)	Correct answer *N* (%)
1. Human Papillomavirus (HPV) can cause cervical cancer and pre-cancer cells. (True)	60 (14.8)	345 (85.2)
2. The virus associated with cervical cancer is transmitted by- (Sexual intercourse)	96 (23.7)	309 (76.3)
3. Cervical cancer usually doesn't cause symptoms right away. (True)	97 (24)	308 (76)
4. Cervix cell changes can be diagnosed by- (Pap test)	99 (24.4)	306 (75.6)
5. Women need to get a Pap test every year to check for cervical cancer. (False)	308 (76)	97 (24)
6. Only older women get cervical cancer. (False)	29 (7.2)	376 (92.8)
7. How many doses of HPV vaccine are required for protection? (Three)	209 (51.6)	196 (48.4)
8. Only women can carry or contract HPV. (False)	69 (17)	336 (83)
9. Can the HPV vaccine be given to boys? (Yes)	158 (39)	247 (61)

To see if there are any association between knowledge and demographics, a chi-square test was performed. The results showed significant relationships were found between knowledge level and age χ^2 (6, N = 405) = 23.62, p =.001; knowledge level and gender χ^2 (4, N = 405) = 24.04, p =.000; knowledge level and education level χ^2 (8, N = 405) = 27.85, p =.001; knowledge level and ethnicity χ^2 (12, N = 405) = 22.18, p =.04; but no relationship was found between knowledge level and relationship status χ^2 (8, N = 405) = 11.94, p = .15.

Inter-Correlations of study variables

The descriptives and Pearson's correlations coefficient of studied variables including perceived vulnerability, perceived severity, perceived response-efficacy, perceived self-efficacy, response cost, and motivation from Protection-Motivation theory along with online health information seeking behavior that were used in this study to test the research questions and hypothesis are depicted in Table 3.

Table 3. Descriptives and Inter-Correlations of Study Variables

Variables	1	2	3	4	5	6	7	M	SD
Independent variables:									
1. Perceived vulnerability (4-items)	1.00	.04	-.05	-.11*	.12	.20**	.05	2.57	.80
2. Perceived severity (4-items)		1.00	.13**	-.11*	-.04	-.00	-.00	4.17	.72
3. Perceived response-efficacy (2-items)			1.00	.42**	.24**	.14**	.18**	2.94	1.16
4. Perceived self-efficacy (4-items)				1.00	.47**	.36**	.09	1.80	.85
5. Perceived response cost (5-items)					1.00	.62**	.20**	.80	1.52
6. Online health information seeking behavior (4-items)							1.00	2.91	.88
Dependent variable:									
7. Protection-Motivation (5-items)								1.84	.73

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Significant findings are shown in Table 3. For example, perceived vulnerability was significant but negatively correlated to perceived self-efficacy (r = .11, p <.05) but positively correlated to motivation for HPV vaccine and Pap test (r = .20, p <.01). Perceived severity was significantly correlated to response-efficacy (r = .13, p <.01) but negatively correlated to self-efficacy (r = -.11, p <.05). A statistically significant positive correlation was found between protection motivation and vulnerability, response-efficacy, self-efficacy and response costs. The response cost showed low mean value (.80), which means college students are not concerned about the costs associated with Pap test and HPV vaccine.

The relationship between motivation and other study variables

To provide additional insight into young adult's motivation for HPV vaccine the study examined if there was a significant difference between male and female participant's motivation for HPV vaccine. An independent-samples t-test was conducted to compare motivation in male and female participants. The result showed there was a significant difference in the scores for male (M= 2.02, SD= .82) and female (M= 1.8, SD= .70); t = (401) = 2.45, p =.02. These results suggest that male participants demonstrated more motivation for HPV vaccine than female participants.

A one-way between groups ANOVA was conducted to compare the effects of demographic factors on college student's motivation for vaccine and screening test. There was a significant effect on motivation for vaccine and Pap test at the p <.001 level for ethnicity [F (6, 404) = 12.45, p =.000]. But there was no significant effect on motivation for vaccine and screening for education level, age, and relationship status.

A chi-square test was performed and significant relationships were found between gender and vaccine takers [χ^2 (2, N= 401) = 42.77, p <.001]. When the participants were asked about

their intention to get vaccinated, 55.1% participants reported they are not planning to take HPV vaccine while 23.5% reported maybe they will take the vaccine. A chi-square test was performed and significant relationships were found between gender and their intention to get vaccine [χ^2 (4, N= 401) = 14.14, p <.01]. On the other hand, 43.2% female participants reported they are planning to go for Pap test, 24.2% stated maybe they will go for the test, others rejected. A one-way between groups ANOVA was conducted to compare the effects of the number of actual lifetime sexual partner on college student's motivation for vaccine and screening. The result showed no significant effect.

Also, a one-way between groups ANOVA was conducted to examine whether college student's motivation varied by their intention to get screened and vaccinated. Results show a significant effect on motivation for intention to get vaccine [F (2, 400) = 17.40, p =.000], and Pap test [F (2, 320) = 11.05, p =.000].

Testing of Research Questions and Hypothesis

Motivational factors for Pap screening and HPV vaccine

The first research question (RQ 1) sought to examine the determining motivational factors in college student's HPV vaccination and Pap test behavior. To test this research question, a multiple linear regression was performed with protection motivation as the dependent variable. In examining motivational factors, demographic factors (age, gender, education level, ethnicity, relationship status) were entered in the first model. As shown in Table 4 these demographic factors explained about 18% of model variance (R^2 = .18) and produced a significant model [F (5, 399) = 16.93, p = .000]. In this model, gender (β = -.10, t = -2.17, p =

.03), relationship status (β = -.11, *t* = -2.09, *p* =.04), and ethnicity (β = -.39, *t* = -8.27, *p* =.000) played a significant role in determining motivation for HPV prevention.

Table 4. Determining factors for motivation for HPV vaccine and Pap test

Predictor variables	Model 1 β (*t*)	Model 2 β (*t*)
Gender	-.10 (-2.17) *	-.08 (-1.98) *
Age	.01 (.16)	-.03 (-.57)
Education	-.10 (-1.79)	-.03 (-.57)
Ethnicity	-.39 (-8.27) ***	-.26 (-6.53) ***
Relationship status	-.11 (-2.09) *	-.07 (-1.70)
Perceived vulnerability		.17 (4.53) ***
Perceived severity		.05 (1.37)
Response- efficacy		-.02 (-.39)
Perceived self-efficacy		.13 (2.91) **
Response costs		.46 (10.44) ***
R^2	**.18**	**.48**

Note. 1. β values are standardized coefficients with *t* values in parentheses

2. * $p < .05$, ** $p < .01$, *** $p < .001$

After controlling for the effect of demographic factors in model 2, other study variables including vulnerability to contracting HPV and cervical cancer, severity of the disease, response-efficacy, self-efficacy and response costs were entered and that produced a significant equation [F (10, 394) = 36.17, p= .000] and increased the model explanatory power to about 48% (R^2 = .48). As Table 4 shows, after controlling for the effect of demographic factors, the most

significant factors in the model included vulnerability to contracting HPV (β =.17, t = 4.53, p = .000); self-efficacy (β =.13, t = 2.91, p <.01); and response costs (β =.46, t = 10.44, p = .000). Gender (p =.05) and ethnicity (p =.000) gained significance in the second model after adding other determinant factors.

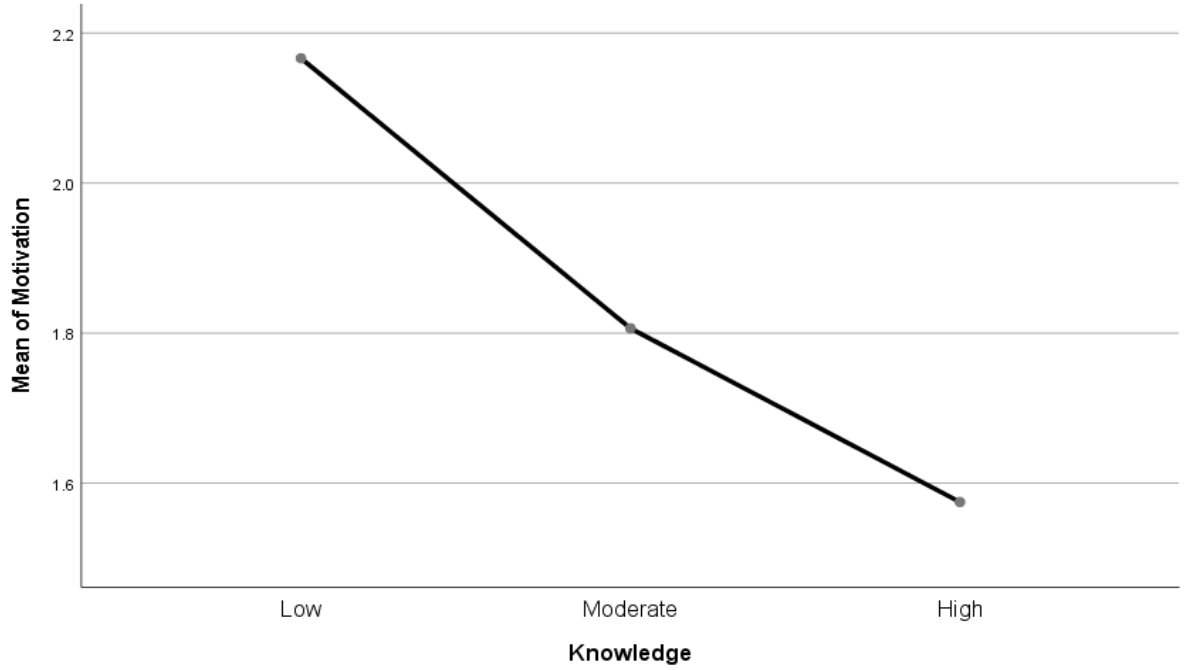
Motivation and Online health information seeking behavior

The second research question (RQ 2) sought to examine whether college student's online health information seeking behavior has an association with motivation for HPV vaccination and Pap screening behavior. A Pearson correlation coefficient was computed to assess this research question. The result showed a significant positive correlation between college student's online health information seeking behavior and motivation for HPV vaccine and Pap test (r = .10, p = .05). Students who mostly seek and use health information obtained from online are most likely motivated enough to take preventive measures for HPV and cervical cancer.

Variances in motivation based on knowledge level

The first hypothesis (H1) predicted that motivation for vaccination and screening will vary based on college student's knowledge level of cervical cancer and HPV. A one-way between groups ANOVA was conducted to compare the effects of college student's knowledge level of cervical cancer and HPV on the motivation for vaccine and Pap test.

Figure 2. Effects of knowledge level on motivation



Results show significant differences in motivation based on the level of knowledge [F (2, 402) = 21.38, p =.000]. A Bonferroni post hoc analysis shows (Figure 2) significant differences at all knowledge levels (p <.05). Therefore, H1 was supported.

Additionally, a Pearson correlation coefficient was computed to assess the association between knowledge of college students and their motivation for HPV vaccine and Pap test. The result showed a significant but negative correlation between college student's knowledge and motivation for HPV vaccine and Pap test (r = -.32, p = .000).

Predictors for online health information seeking behavior

The second hypothesis (H2) predicted that engaging in the protective behavior (response-efficacy, self-efficacy, and response costs) will have more influence on online health information seeking behavior than perceived risks (vulnerability and severity). To test this hypothesis, a multiple linear regression was performed with online health information seeking behavior as the outcome variable. As shown in Table 5, demographic factors (age, gender, education level,

ethnicity, relationship status) were entered in model 1 and that explained about 1.5% of model variance (R^2 = .015) but did not produce a significant model [F (5, 398) = 1.22, p = .30]. In model 1, none of the demographic factors played any significant role in predicting online health information seeking behavior.

Table 5. Predictors for online health information seeking behavior

Predictor variables	**Model 1**	**Model 2**	**Model 3**
	β (*t*)	**β (*t*)**	**β (*t*)**
Gender	-.07 (-1.32)	-.08 (-1.48)	-.12 (-2.06) *
Age	.06 (.93)	-.06 (.85)	-.08 (1.19)
Education	-.04 (.69)	.04 (.60)	.04 (.62)
Ethnicity	-.04 (-.81)	-.05 (-.88)	.01 (.25)
Relationship status	-.03 (-.47)	-.02 (-.34)	-.02 (-.37)
Perceived vulnerability		.05 (1.03)	.03 (.59)
Perceived severity		.02 (.40)	-.00 (-.04)
Response-efficacy			.20 (3.41) **
Perceived self-efficacy			-.09 (-1.39)
Response costs			.19 (3.21) **
***R*²**	**.015**	**.018**	**.083**

Note. 1. β values are standardized coefficients with *t* values in parentheses

2. * p < .05, ** p <.01, *** p < .001

After controlling for the effect of demographic factors, perceived risks components vulnerability to contracting HPV and cervical cancer, severity of the disease was entered in model 2 and that did not produce a significant equation [F (7, 396) = 1.05, p= .39] and increased

the model explanatory power to about 1.8% (R^2 = .018). As Table 5 shows, no variable played any significant role in model 2.

After controlling for the effect of demographic factors in model 3, engaging in protective behavior components response- efficacy, self-efficacy, and response costs were entered and that produced a significant equation [F (10, 393) = 3.54, p = .000] and increased the model explanatory power to about 8.3% (R^2 = .083). The most significant factors in model 3 included response-efficacy (β =.20, t = 3.41, p =.001) and response costs (β =.19, t = 3.21, p = .001). Only gender (p =.04) gained significance in the third model after adding other determinant factors. Therefore, H2 was supported that engaging in protective behavior will have more influence on online health information seeking behavior than perceived risks.

Online health information seeking behavior and knowledge

The third hypothesis (H3) predicted that online health information seeking behavior will vary based on college student's knowledge level of cervical cancer and HPV. A one-way between groups ANOVA was conducted to compare the effects of college student's knowledge level of cervical cancer and HPV on their online health information seeking behavior in low, moderate and high level of knowledge condition. Results show no significant differences in college student's online health information seeking behavior based on the level of knowledge [F (2, 403) = .86, p=.43]. A Bonferroni post hoc analysis shows no differences between any levels of knowledge. Therefore, H3 was not supported.

Chapter 5 - Discussion, Implications, and Conclusion

This chapter contains discussion based on the results of tested research questions and hypothesis. Then suggestions are made based on the findings of the theoretical framework that was used in this study. Also, practical implications for future research are included in this chapter. In the end, limitations of conducting the study, the conclusion of the study and recommendations for future research are as well included in this chapter.

Discussion

The main objective of the study was to examine the key motivational determinants that are associated with college student's Pap screening behavior and HPV vaccine using the lens of Protection-Motivation theory in relation to their online health information seeking behavior. Also, to determine young adult's knowledge of cervical cancer and HPV and the influence of knowledge on their motivation for HPV vaccine along with their online health information seeking behavior. Result show that most of the college students have low and moderate level of knowledge about cervical cancer and HPV. Consistent with previous study's results 18-21 age group students have a low level of knowledge (Waller, McCaffery, & Wardle, 2004) compared to the older age groups. Similarly, female college students possess higher knowledge of HPV and cervical cancer than male college students (Marek et al., 2011). Though ethnically, white students showed high level of knowledge than other ethnicities, we cannot conclusively state from these result that there are ethnic differences because of the limited diversity in the sample. Most of the senior level of college students demonstrated lack of knowledge about HPV and cervical cancer among other education levels. However, contrary to other studies, our analysis of sexual history variable (number of actual sexual partners in a lifetime) revealed that it was not

associated with protection motivation (Caron, Kispert, & Mcgrath, 2008; Durvasula, Regan, Ureno, & Howell, 2008).

This study analyzed young adult's motivation for HPV vaccine and Pap test with the influence of demographic factors to provide additional insights behind their motivation. Results showed that male participants demonstrated more motivation for HPV vaccine than female participants. Interestingly, though white ethnic students showed a high level of knowledge than other ethnic students, the result indicates they are less motivated to get screened for cervical cancer and HPV vaccine.

The first research question (RQ 1) examined the determining motivational factors in college student's HPV vaccine and screening test behavior using Protection-Motivation theory. Test of the individual parameters revealed that three variables of this theory- perceived vulnerability to HPV/ cervical cancer, perceived self-efficacy, and perceived response costs emerged as substantial predictors in young adult's motivation to be vaccinated and screened. If young adults believe that they are at high risk of developing HPV, which can tip to various cancers they will be more motivated to adopt recommended health behavior.

Contrary to the PMT, perceived severity of the disease was not a significant predicting variable in motivating college students for HPV vaccine and Pap test. Although the PMT suggests that the more severe an individual perceives the risk of the disease, the more protection-motivation maximize (Rogers, 1975), finding from this study do not support that assertion.

The study also tested whether response-efficacy plays any significant role in motivating college students for HPV vaccine and Pap test. Findings showed that college student's perception of the effectiveness of HPV vaccine and Pap test had no significant role in motivating them to take HPV vaccine and Pap test. Most of the participants expressed fear that they might get short

or long-term complications from HPV vaccine (M= 2.74, SD= 1.29). Also, they were anxious about the fact that there might be any unknown future side effects of HPV vaccine (M= 3.15, SD= 1.24). Interestingly, a large number of participants (M= 4.05, SD= 1.08) believe HPV vaccine can reduce the chances of developing cervical cancer.

Results reveal that young adults do not perceive various barriers associated with uptake of HPV vaccine and Pap test very importantly. Although response-cost, as a barrier, is a significant predictor of motivation, most of the participants indicated a lack of concern about the barriers associated with HPV preventive measures. Self-efficacy was also significant predictor to motivate for HPV vaccine and screening test. Self-efficacy was also found to be a significant predictor of prevention behavior in many studies (Sakhvidi et al., 2015). If young adults perceive they have the ability to adopt and maintain recommended health behavior, they will be more motivated and will show positive outcome.

The second research question (RQ 2) examined whether online health information seeking behavior has an association with college student's motivation for Pap screening and HPV vaccine. The result indicated that college student's online health information seeking behavior has a positive although very weak significant association with motivation for HPV vaccination and Pap screening behavior. Students who seek and use health information obtained from online are more likely to be motivated to take HPV vaccine and Pap test.

The first hypothesis (H1) predicted that motivation for vaccination and screening will vary based on college student's knowledge level of cervical cancer and HPV. Results showed different levels of knowledge have an impact on motivation for vaccine and screening test. Surprisingly, those who have higher knowledge does not demonstrate high motivation for

preventive measures. On the other hand, students with low knowledge of HPV and cervical cancer showed more motivation.

Furthermore, results from the second hypothesis (H2) suggested that people who have more involvement in protective behavior for HPV and cervical cancer, mostly use online health information or electronic media to seek information, tend to believe the information. Here protective behavior includes variables like response-efficacy, self-efficacy, and response cost. College students who believe in the effectiveness of HPV vaccine and Pap test tend to use online health information. On the other hand, the risk perception behavior of young adults did not play any substantial role in their online health information seeking behavior. Here risk perception behavior includes variables like perceived vulnerability and perceived severity. The result also showed that the effect of gender was suppressed until the response-efficacy, response cost and self-efficacy were included in the regression model. The result indicates that female college students who participated in the survey showed more inclination for the effectiveness of the vaccine.

Hypothesis three (H3) tested whether online health information seeking behavior varied based on college student's knowledge level of cervical cancer and HPV. The result showed that the college student's knowledge level of cervical cancer and HPV did not influence their online health information seeking behavior. Participating students with a higher level of knowledge showed less involvement in e-Health. Students with the moderate level of knowledge were more involved in using electronic media to seek health information.

Theoretical implications

The current study applied the Protection-Motivation theory in an effort to better understand college student's motivation for HPV vaccine and Pap test. Results suggest that PMT is a useful theoretical framework for predicting cervical cancer-related and HPV preventive behavior and health promotion. Researchers can utilize this model in cancer communication to motivate target audiences in the form of perceived threats, coping aptitude, and perceived costs associated with preventive measures. Moreover, this approach allows researchers to observe target audience's adaptive coping ability in response to a health-threatening situation. In this study perceived vulnerability of college students played a significant role in determining their motivation for HPV vaccine and Pap test. The result showed college students perceive themselves vulnerable to HPV and cervical cancer (M= 2.57, SD= .80). This behavior influences their motivation for HPV vaccine and Pap test. Previous studies also found perceived vulnerability to be predictive of protection motivation and protective health behavior (Ackerson, Pohl, & Low, 2008; DiClemente & Andrus, 2016).

Congruent with previous studies (Durvasula, Regan, Ureno, & Howell, 2008; Gu, 2013) this study found that the more severe young adults perceived HPV and cervical cancer to be, the less likely they are motivated to get vaccinated and screening test. This means that the more people perceive the HPV and cervical cancer as a serious illness, the more they get anxious about finding out their cancer status and this may work as barriers to go for preventive measures (Durvasula, Regan, Ureno, & Howell, 2008). However, the result does not imply that perceived severity as an unimportant factor that plays a minimal role in the adoption and promotion of health behavior.

In this study, response-efficacy did not play a significant role in predicting motivation for HPV vaccine and Pap test. But previous research found this variable as a strong predictor of motivation for recommended health behavior (Sakhvidi, 2015). Results from this study illuminate the situation that young adults perceive HPV vaccine and Pap test as having negative outcomes or it can be hazardous to the health condition. However, they may believe that the HPV vaccine has effectiveness in preventing the development of cervical cancer (M= 2.94, SD= 1.16). Consistent with other studies, self-efficacy also played a significant role in predicting motivation. Self-efficacy among young adults need to be improved so that preventive behaviors in vulnerable people will be improved.

Practical Implications

The current findings have a number of implications for cancer communication research and public health interventions to promote HPV vaccine uptake and early detection test. The findings offer a comprehensive outlook in the promotion of HPV vaccine and Pap test among young adults so that health educators, researchers, practitioners can utilize the information collectively in developing and implementing strategies and interventions.

Results suggest that knowledge by itself does not necessarily lead to health behavior change. Rather it can play a significant role towards positive health behavior change when it is coupled with people's attitude, risk perceptions, self-efficacy and motivation for recommended health behavior. In other words, target audience's knowledge needs to go hand-in-hand with motivation for young adults to adopt and maintain recommended health behavior regarding cervical cancer and HPV.

Literatures suggests that young adult who have multiple sexual partners are most at risk of getting affected by HPV. The results of the study showed that those who have multiple sexual

partners are not motivated to get HPV vaccine and Pap test. Correspondingly, very few students responded they have no intention to go for HPV vaccine and Pap test in recent times. Considering these alarming findings, firstly, it is essential to implement HPV education programs targeted at young adults with the goal of improving their motivation for protection. Secondly, effective public health interventions and cancer communication are needed to extensively address the effectiveness of HPV vaccine and screening test to alleviate the misinformation and misconception associated with these preventive measures. Thirdly, the expenses associated with HPV vaccine and Pap test should be within the reach of students to motivate them towards recommended health behavior associated with cervical cancer and HPV prevention. Fourthly, as a strong health behavior predictor, self-efficacy of the young adults should be promoted. Practitioners need to encourage young adults and motivate them to adopt the recommended health behaviors.

The findings of the study showed that most of the college students use electronic media compared to traditional media to find health information. Moreover, online health information seeking behavior has a positive correlation with college student's motivation for HPV vaccine and Pap test behavior in this study. This suggests that e-Health communication strategy has the potential to motivate young adults to adopt and maintain recommended health behavior regarding HPV and cervical cancer. However, this strategy needs to be explored further in cancer communication and vaccine promotion given its potential. It is also important for cancer communication interventions to promote e-Health strategy and enhance the usage of online health information seeking behavior. Making e-Health interventions more attractive, reliable, and accessible to young adults would lead to more usage of e-Health as a cost-effective strategy that can contribute to more knowledge, perceived risks, and overall reduction of other medical

burdens. E-Health interventions will give the opportunity to young adults to be more aware of the health condition, self-manage their health decisions, and empower them so they can feel comfortable to discuss their health condition with healthcare provider.

Findings from this study demonstrated that online health information seeking behavior had a positive correlation with participant's perceived response-efficacy and response cost. This implies using e-Health strategy practitioners can develop promotional efforts targeting young adults to make them aware and knowledgeable about the positive outcomes of HPV vaccine and Pap test. Also, they will be motivated to contemplate on the positive outcomes of taking preventive measures than considering the barriers associated with it. Young adults with higher perceived response-efficacy will be more assured from the health information they get online, which can have a better influence on their health behaviors (Rains, 2008).

Results suggest that young adult's online health information seeking behavior is not influenced by their knowledge level. This implies that those who have high knowledge can not necessarily operate electronic media skillfully to find health information. Students with higher knowledge of HPV and cervical cancer may have difficulties to find, understand and implement online health information. This finding emphasizes the importance of exploring college student's e-Health literacy level in relation to their online health information seeking behavior for future investigation. It is essential to reduce the burden of literacy disparities among young adults to effectively utilize the use of e-Health in health communication. In this regard, the content of online health education and information need to be upgraded to provide the maximum benefits to the public.

Limitations and future research

The current study is subject to a few limitations. First, the participant sample was not diverse enough. Using a more diverse sample might affect the current results. Future research on this topic could look at different ethnic samples. Second, most of the participants were female. Very few men responded to the survey. Future researchers may focus on larger male sample size to look at their motivation for HPV vaccine and online health information seeking behavior. Third, the study was conducted by an online survey where participants self-reported their perception and attitudes towards the asked questions/ statements. Since the topic of the survey was sensible health-related, emotions or over/underestimation towards the topic might influence the results of the study. Future researchers can do an experiment with the same age range to see any differences in the results. Fourth, the study was a cross-sectional, non-experimental design, thus causation cannot be inferred. Future research may try to find any causal relationship through experimental design. Fifth, the effect of perceived vulnerability was not investigated for male and female separately in this study. Future research may look at the effect of gender on perceived vulnerability separately.

Conclusion

In previous studies, cervical cancer and HPV have been addressed from various perspectives. The current study tries to address the issue from behavioral and cancer communication perspective. The objective of this study was to analyze the key motivational determinants that are associated with college student's Pap screening behavior and HPV vaccine for cervical cancer treatment and prevention using the lens of Protection-Motivation theory in relation to their online health information seeking behavior. The current study contributes to better understanding of college student's motivation for HPV vaccine and Pap test and to

implement e-Health strategy effectively in cancer communication. This study suggests that perceived vulnerability, perceived self-efficacy, and perceived response cost could be considered key determinant factors in motivating college students for HPV vaccine and Pap test.

Study findings also highlight the importance of e-Health strategy in HPV vaccine and Pap test promotion and awareness efforts. Although media outlets play a role in information dissemination and educating the public about various health risks, online health sources are much more relevant to young adults. This strategy has the potential to raise awareness about cervical cancer and HPV among young adults, motivate them to take preventive measures, and encourage them to keep up the recommended health behavior (Neuhause & Kreps, 2010). It also should be noted that for successful e-Health interventions practitioners need to increase young adult's e-Health literacy, so they can easily access, properly understand and use the opportunities of e-Health strategy.

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Appendix A- Survey Questionnaire

This survey is being conducted by a graduate student in A.Q. Miller School of Journalism and Mass Communications at Kansas State University as preliminary research for a master's thesis. This survey is approved by Institutional Review Board protocol no. 8731. The purpose of this study is to gather information about cervical cancer screening and HPV vaccine uptake behavior and your usage of online health information. The following survey will ask you a series of questions on this topic. We know that this topic can sometimes be uncomfortable, but it is still very important to us. The survey will not take more than 30 minutes. We encourage you to respond all the questions, but we also understand if you wish to stop taking this survey. Your responses will be completely confidential. We will not be able to tie back your individual responses to your name or email address. Therefore, we hope this allows you to respond as honestly as possible. Thank you for taking the time to answer these questions.

TERMS OF PARTICIPATION: I verify that by selecting and submitting my agreement to participate, and clicking yes below serves as my signature and indicates that I have read and understood this consent form, and willingly agree to participate in this study under the terms described.

Do you wish to continue?

Tell us more about yourself. Please keep in mind that all information you provide is completely confidential and will not be associated with you in any way.

2. Year in College/ University:
    A) Freshman
    B) Sophomore
    C) Junior
    D) Senior
    E) Graduate

3. Your age (in years):
    A) 18 – 21
    B) 22 – 25
    C) 26 – 29
    D) 30 & above

4. Sex:
    A) Female
    B) Male
    C) Other

5. What is your relationship status?
    A) Single
    B) Dating someone
    C) Engaged
    D) Married
    E) Other

6. Please indicate your ethnicity:
    A) Alaska Native or American Indian
    B) Asian or Asian American
    C) Black or African American
    D) Hawaiian or other Pacific Islander
    E) Hispanic/Latino or Spanish
    F) White
    G) Other

Knowledge about Cervical cancer and HPV

In this section, we ask you some basic questions about cervical cancer and HPV. Please read the questions carefully.

7. Human Papillomavirus (HPV) can cause cervical cancer and pre-cancer cells.
    A) True
    B) False
    C) I don't know

8. The virus associated with cervical cancer is transmitted by-
    A) Sexual intercourse
    B) Blood transfusions
    C) I don't know

9. Cervical cancer usually doesn't cause symptoms right away.
    A) True
    B) False
    C) I don't know

10. Cervix cell changes can be diagnosed by:
    A) X-ray
    B) Pap tests
    C) Blood tests
    D) Urine tests

E) I don't know

11. Women need to get a Pap test every year to check for cervical cancer.
    A) True
    B) False
    C) I don't know

12. Only older women get cervical cancer.
    A) True
    B) False
    C) I don't know

13. How many doses of HPV vaccine are required for protection?
    A) One
    B) Two
    C) Three
    D) Four
    E) I don't know

14. Only women can carry or contract HPV
    A) True
    B) False
    C) I don't know

15. Can the HPV vaccine be given to boys?
    A) Yes
    B) No
    C) I don't know

Vulnerability to contracting cervical cancer and HPV

16. Please indicate the likelihood of the following applying to you:

Statements	No chance at all	Very low chance	Low chance	High chance	Very high chance
a) Getting cervical cancer in your lifetime					
b) Risk for getting HPV in your lifetime					
c) If I did not receive the HPV vaccine, I feel that I would be at risk for developing cervical cancer					
d) I am at risk of getting HPV because I do not practice safe sexual behavior					

e) If I get HPV, it will increase my chances of having cervical cancer					

Severity of cervical cancer and HPV

17. Please indicate your perceptions of cervical cancer and HPV:

Statements	No at all serious	Slightly serious	Somewhat serious	Moderately serious	Extremely serious
a) How severe do you think cervical cancer would be?					
b) How serious would a diagnosis of cervical cancer be for you?					
c) Getting infected with HPV would be more serious than many people think					
d) I fear that HPV would affect my long-term health condition					
e) Compare to most people of your age how seriously do you understand your risk of getting HPV?					

Response-efficacy of the preventive measures

18. Please indicate how much you agree with the following statements on HPV vaccine and Pap test:

Statements	No at all Agree	Slightly agree	Somewhat agree	Moderately agree	Strongly agree
a) Pap screening can find cervical changes before they become cancer					
b) HPV vaccine can reduce the chances of developing cervical cancer					
c) There might be any unknown future side effects of HPV vaccine					

d) I might get short or long-term complications from the HPV vaccine					

Self-efficacy

Please indicate how much you agree with the following statements on HPV vaccine and Pap test:

Statements	No at all agree	Slightly agree	Somewhat agree	Moderately agree	Strongly agree
e) I do not feel confident about getting/ completing the HPV vaccine in the next year					
f) There is not much I can do to lower my chances of getting virus/ cancer					
g) I do not feel confident about getting vaccinated/ screened despite my spouse/ partner's positive attitude towards it					
h) I cannot cope with feeling nervous about having the vaccination procedure					
i) It would be hard for me to cope with the monetary barriers (approximately $103 per screening, $130 per dose of vaccine) associated with vaccine and screening test					

Response costs of preventive measures

19. Please indicate your level of concern in considering HPV vaccine and Pap test:

Statement	Not at all concern	Slightly concern	Somewhat concern	Moderately concern	Extremely concern
a) I am concern that HPV vaccination and Pap test would affect my sex life					

b) I am concern that I would not be able to get appropriate medical care					
c) I am concern about the painful process					
d) I am concerned that I might be isolated from friends, family if I take HPV vaccine					
e) I would be concerned that I will have less chance of living longer					

20. Protection Motivation for Pap screening and vaccination

Statement	Not at all concern	Slightly concern	Somewhat concern	Moderately concern	Extremely concern
a) My family history of cervical cancer					
b) I am not well informed about the disease					
c) I do not practice safer sexual behavior (e.g. multiple partners, unprotected sex)					
d) The cost of HPV vaccine and/or Pap test					
e) Personal fear of getting HPV vaccine					
f) My friends who have contracted HPV					

22. Online health information seeking behavior

Please indicate your perception of online health information:

Statement	Not at all agree	Slightly agree	Somewhat agree	Moderately agree	Extremely agree
a) The internet can be useful to help people decide if their symptoms are important enough to go to see a doctor.					

b) The internet is a reliable resource to help me understand what a doctor tells me					
c) Online health information encourages me to play a more active role in my healthcare					
d) I have learned something new from electronic health information					

23. How often do you use the following sources for finding health information in a two-week period?

Sources	Never	Rarely (1-2 times)	Sometimes (3-4 times)	Often (5 or 6 times)	Always (More than 7)
TV					
Newspaper					
Social media					
Websites					
Blogs					
Radio					
Magazine					
Brochure/ pamphlet					
Television commercial					
Other					

25. Have you taken HPV vaccine?
    A) Yes
    B) No

26. Are you planning to take HPV vaccine?
    A) Yes

B) Maybe
C) No

27. Have you ever screened for cervical cancer?
    A) Yes
    B) No

28. Are you planning to go for cervical cancer screening?
    A) Yes
    B) Maybe
    C) No

29. Number of actual lifetime sexual partners (how many partners have you had so far in your life)?
    A) 0
    B) 1- 2
    C) 3- 4
    D) 5 & more